THE INTERNET OF OTHER PEOPLE'S THINGS

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Dealing with the pathologies of a digital world

Edited by Linda Kronman and Andreas Zingerle

Published 2018 by servus.at
Kirchengasse 4,
4040 Linz
AUSTRIA

ISBN: 978-3-9504200-1-2

FOREWORD

There is a notable tradition of artistic protest and activism against unfettered technological change. From Ruskin, Morris and the Pre-Raphaelite brotherhood's rejection of the industrial revolution, through to Yoko Ono, Banksy, and Pussy Riot, artists have often been the designers and facilitators in a collaborative critical exercise. They have sought to shine a questioning light on social change and prompt a usually acquiescent public to look up, to think more deeply about the changes wrought by politicians and business and, if there is no real benefit, to demand pause.

As the white heat of yet another era of dramatic technological change threatens to scorch most of us, it is vital that we have a conversation about this change and the real benefits for society. We must question the relationship between the Silicons, the state and the citizen and how we are going to deal with the next technological leap forward where transports have become autonomous and culture algorithmic. We are too focused on convenience and price, and driven by the familiar catch-all rationale of economic growth, when we should be asking questions about what is good for work and a good for society, about technology and privacy, and questioning how AI and Big Data are threatening to eclipse human discretion and the very basis of liberal democracy.

It is a discussion that should not only be led by politicians, policy makers and the private sector, it should include creative technologists, designers, artists, and activists, enabling different tones of discussion, and embracing the emerging focus on digital art and media aesthetics and the relations between technology, science, art, and society. In the past,

artists have been central in raising important questions at times of social dislocation and disenchantment with technology, and as we enter this liminal time, it will allow us to tell the story of the Internet of Other People's Things in a compelling and accessible way.

Speaking in April 2018, The Governor of the Bank of England, Mark Carney, raised his concern about Engle's pause, a term that refers to the early period of the industrial revolution when, due to great technological upheaval, the livelihood of a large number of people worsened before society began to prosper in the longer term. The vast improvements in productivity from automation in the early days of the Industrial Revolution seemed not to feed through into wages for the workers. Carney went so far as to suggest that, as the growth of technology and expected automation of millions of blue and white collar jobs results in a poor wage growth for those in work, Marx and Engels may again "become relevant." If technology destroys jobs, decreases wages and increase the amount of inequality, as a new elite of highly-skilled workers and the owners of high-tech machines receive the rewards.

The works gathered here offer an opportunity to investigate the infrastructures of power and reflect on the contradictions between the promise of a technotopian future and the reality in which the citizens are living keen, perhaps, to buy into a future, if not "the" future, and constantly feeling either like it is not fully arrived yet or that there are better futures arriving for your neighbor or across the street.

From the burgeoning amounts of data around our social networking identities, to the fragility inherent in creating a

connected object, it is important that we dismiss the uncritical enthusiasm for a "smarter" life that has become a hallmark of the world being created by the "Silicons," yet wraps us in an electronic embrace of security and privacy issues. The Internet of Things offers a system of surveillance and control, and a way of nudging citizens towards preferable behavior instead of trying to understand and deal with the root causes of social problems. Artists, like those in the book, can connect emotionally with their audience, and hold up a mirror for them to see the threats of a "smart future."

Jonathan Woodier

THE INTERNET OF OTHER PEOPLE'S THINGS INTRODUCTION

The Internet of Things (IoT), smart city initiatives, and smart home technology are marketed to us as sleek and glamorous 3D renderings promising a convenient and sustainable technology that will save us and our planet from a future of environmental distress. Yet the buzzword bingo of smart city rhetoric, the polished advertisements for networked devices, and the glossy packaging of smart home devices are in stark contrast to the news and research which investigates the vulnerabilities of our connected lives. The expansion of the IoT and the proliferation of virtually-connected data points are providing ever increasing amounts of information for those keen on use or abuse. The massive implementation of IoT in hyper-connected urban environments, paths the way to technocratic governance and urban development, corporatizing our living spaces into lock-in, hack-able, "pan optic" smart cities. The IoT seems to develop towards an Internet of Other People's Things (IoOPT), where users do not own their data, agree to Terms of Services that mean their data are then shared by default to third parties, and the risks that citizens rights are managed by technocratic governance or cyber criminals attacking critical infrastructures are always present.

In this cyberwar of ideas, an asymmetric battle for power and influence, systems will have to be more robust and people will have to be more vigilant. Therefore we turned to the community of artists, designers, activists, hackers and researchers with an open call for new critical perspectives on ubiquitous technology and its impact on our lifestyle. We were looking for for projects that abuse to expose; artistic research and tacit knowledge that is produced through cultures of making, hacking, and reverse engineering. Our aim was to collect artworks, projects,

essays, and interviews discussing questions such as: What does privacy look like in a smart home of connected objects? How are citizens involved in co-design collaborations with private corporations and the public sector to build better cities? How can we enable a secure and trustworthy Internet communication so that business, personal, and machine-to-machine interactions can be conducted safely and without interferences?

From our previous project *Behind the Smart World*[1], we knew that with a mix of essays, interviews with artists, and extended artwork abstracts, we were able to collect both an academic and a personal perspective on the issues of saving, deleting and the resurfacing of personal data in the smart world. *Behind the Smart World* focused on artistic research that touched upon topics such as how data is collected and saved, how hard it is to delete personal data, and how personal data can resurface again. The texts chosen for this new publication show how artistic and design research produces valuable insight into how we either adapt or resist "the Internet of Other People's Things." We have avoided categorizing the texts in chapters, but there are three loose threads than can be followed: how networked technologies affect our lives in the cities we live in, how they inhabit our homes, and how they materialize in the form of gadgets, sensors, cables, servers, and other infrastructures that constitute the Internet of Things. Two textual artworks by Mez Breeze and Tyler Coburn are also included in this publication.

1 In 2014, artist collective KairUs visited the biggest e-waste dump in the world, Agbogbloshie in Accra, Ghana. There KairUs bought 22 hard drives. As a hands-on part of this research lab some of the hard drives were reanimated and explored by a group of international artists exposing the kind of data traces that reveal the lives and behaviours of their prior owners. Retrieved from: http://kairus.org/portfolio/behind-the-smart-world-research-lab/

The first four texts examine our lives in cities through the eyes of machine vision. Using unsecured public CCTV and private IP cameras, satellite images, and user generated social media content the discussed artworks offer an insight to our lives in the networked city that is constantly streamed and analyzed by machines, yet seldom seen by humans. As Russian artist **Helena Nikonole** notes in her essay ***Dystopian Artificial Intelligence within the Internet of Things***, algorithms and machine vision registers, analyzes, recognizes, and even judges our data before it (if ever) reaches the human eye. According to Nikonole "IoT and AI together become a potential new tool for algorithmic regulation." Hence, she finds it important to experiment with networked devices, AI, and Big Data as she does in the two artwork described in the essay: *deus X mchn* in which AI generated holy texts are broadcast through the microphones of unsecured networked cameras and *The Other View*, that records the "selfie" culture in a mirror hall through a security camera. Both of her works use unsecured networked cameras raising awareness of the machine gaze and how the perspective of the security camera differs from composed images recorded by another machine, the smart phone. There are similar aesthetics in *The Other View* used by **Carlos Rene Pacheco** in his work ***Found***, which he describes as "an exploration utilizing social media and live streaming web-cams to pinpoint a moment in time from multiple perspectives." In his extended artwork abstract he describes how virtual, armchair tourism into cities through streaming web cams became an investigation on the performance of taking pictures at the celebrated Abbey Road in London.

A number of live streaming webcams are made publicly available by various institutions, yet a large number of webcam streams that are intended to be private are insecure by design meaning that the web servers they are connected to are not protected by a password or have hard-coded login credentials

saved as plain text. By default, then, the servers stream unencrypted and on publicly-accessible network ports, providing potential risks of being intercepted and allowing unknown third parties unintended access to the set up function of the cameras. In our (**KairUs**) essay ***Artistic Reconnaissance***, we discuss three of our recent artworks: The first, *Panopticities* emphasizes the vulnerabilities of unsecured public CCTV and private IP cameras. The video installation portrays views of life in the cities of Seoul, Tokyo, Bangalore and New York from the perspective of the networked cameras following the aesthetics of smart city control rooms such as the one in South Korea's Songdo. Security cameras are supposed to offer safety and security, yet they enable hackers to enslave these cameras with botnets and malware that use insecure webcams to infect the rest of the network, routers and other devices in the smart home. The second artwork *Sharing locations: YONGSAN & HUMPHREY GARRISON,* investigates various mapping services and reveals how satellite images are obscured to hide military infrastructures whereas site specific data tracked by fitness devices are revealing new layers of data of our urban landscapes. Finally, the third artwork, *Ruins of the Smart City,* is a photo series which portrays how a smart city still in construction already feels like it is part of the contemporary past.

The *Artistic Reconnaissance* essay also outlines methods of artistic research. The term reconnaissance is originally used in military contexts, yet it can be subverted and used to investigate military or other structures of power. **Owen Mundy** in his essay ***Listening Stations: A Prompt to Examine the Histories of the Internet of Things***, refers to "Operation Igloo White," a mission carried out by the 553rd Reconnaissance Wing, a U.S. Air Force unit active during the Vietnam war obtaining reconnaissance information using electronic sensors, radio communication, and computer processing. The camouflaged sensors used during the mission serve as a starting point for

his Physical Computing course in which subversive strategies are used to oppose "surveillance capitalism." Shoshana Zuboff the Charles Edward Wilson Professor of Business Administration at the Harvard Business School popularized the term "surveillance capitalism," she describes the harvest of user-generated data such as Tweets, e-mails, texts, photos, videos etc. as "data exhaust."[2] The existence of a city can also be experienced through "data exhaust" as endless streams of site specific, user-generated content as in **Mark Lee's** *10'000 Moving Cities*, a VR installation in which Tweets, images, videos, and sound from a chosen city are rendered real time on cubes staging a city landscape. **Yvonne Volkart** in her essay, ***Journey into Predictability***, reflects on the meaning of the cloud of a city through Mark Lee's work *10'000 Moving Cities*. Volkart articulates how the streams of data are constantly evaluated in the attempt to predict and control our behavior: "Patterns lead to prognoses that, as mathematically calculated assumptions about the future, destroy both the present as well as the possible future." The data streams of our connected cities are analyzed by machines resulting in prognostic data simulations consulting urban planners, thus the data we produce by living in a city feeds back into how our cities are shaped.

To better understand how life in a corporate owned smart city can look, we collected a series of interviews for this publication featuring artists who have, in the process of creating their artworks, researched the South Korean smart city Songdo. **Tyler Coburn**, **Binna Choi** and artist duo **Nana & Felix** discuss their experiences of the mega construction Songdo, a

2 Zuboff, S. (2014, September 15). A Digital Declaration. *Frankfurter Allgemeine*. Retrieved from https://www.faz.net/aktuell/feuilleton/debatten/the-digital-debate/shoshan-zuboff-on-big-data-as-surveillance-capitalism-13152525.html

newtown smart city built from scratch on 600 hectares of reclaimed land, owned by three companies: Gale International a privately owned real estate development based in New York City, holds a majority stake of 61%, the Korean steel company Posco 30%, and the remaining 9% is owned by Morgan Stanley Real Estate – part of the giant US investment bank[3].

The interviews are preluded with Tyler Coburn's mock "diary," written from the perspective of someone working in the Integrated Operations Center in Songdo. Together, the artists interviews draw an image of a city that failed as a "future city," yet succeeded as a Korean middle class residential area. Songdo has, however, become a city where everything is installed like elements in a game environment. A city of "ecological gentrification"[4] in which words such as eco, green, and sustainable are merely company marketing. And, yet, for Koreans the smart city prototype still seems to stand as a Korean invention and a success model. As Nana notes, "koreans actually really like smart cities."

Indeed, there are few critical voices questioning the idea of the 4th industrial revolution, much heralded by the Korean government. As Binna Choi explains "Korean society just follows what happens or what is offered...," [we] "have to achieve it without any critical thinking." The technocratic Koreans make "ideal" smart citizens. In her book, *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet*[5], Jennifer Gabrys describes smart citizens as monitoring, real-time data producing "*citizen sensors*" that are expected to be computationally responsive nodes in a frictionless system, making informed and responsible choices for the common good. They are expected to "become governable to the extent that they operate as homo economicus," effective and responsive.

Even if Koreans are enthusiastic about their smart cities, is the rest of the world? Adam Greenfield, once an enthusiastic advocate of urban informatics, warns that we should "resist the attempts of companies to gather ever more data about our lives."[6] The corporate agenda to attain control over our cities is worrying other critics as well, who warn that smart city plans support proprietary platforms leading to technological lock-ins, foretelling that both digital participation and the urban land of smart cities are soon governed by companies rather than elected governments[7]. Songdo might be the most prototypical example of what a corporate owned city looks like but, as Tyler Coburn notes, most of "our experience of smartness is more in insidious and often imperceptible weavings of public and private."

To challenge which visions of the "good life" are promoted in smart cities, we conclude the discussion on smart cities with interaction designer **Bastien Kerspern** essay ***Critical and playful mitigation, Tackling smart city controversies with fictions and***

3 Wikipedia contributors. (2018, October 31). Songdo International Business District. *In Wikipedia,* The Free Encyclopedia. Retrieved from: https://en.wikipedia.org/wiki/Songdo_International_Business_District

4 Choi, B. (2012) *Generic Nature*. Seoul: mediabus. ISBN 978-89-94027-47-0 90600

5 Gabrys, J. (2016). *Program Earth: Environmental Sensing Technology and the Making of a Computational Planet*. Minneapolis/London: University of Minnesota Press.

6 Greenfield, A. (2017, June 6). Rise of the machines: who is the 'internet of things' good for? *The Guardian.* Retrieved from https://www.theguardian.com/technology/2017/jun/06/internet-of-things-smart-home-smart-city

7 Barns, S. (2017). FCJ-214 Visions of Urban Informatics: From Proximate Futures to Data-Driven Urbanism. *The Fiberculture Journal,* 29. (p.38)

games. As a member of the Design Friction design studio, he has been experimenting with three mitigation tactics playfulness, participativeness, and weirdness to question the directions of decision making in today's cities. He describes smart cities as a "playground to observe and discuss socio-technological controversies." And, in the essay, he describes three of Design Friction's participatory projects: *Flaws of the Smart City,* a card game, *A City Made of Data* , a series of one-day workshops, and *Animals of the Smart City,* speculating on the role of wild life and domestic animals in a smart city.

With **Lily Martinet's** essay, ***Resisting the deployment of Linky in France***, we move into the private realm of our homes. She describes why and how French citizens were resisting the implementation of a smart electricity grid, a "prerequisite" to a smart city. *Linky* is a "smart meter" and it is mandatory to have it installed in every French home. Martinet discusses the problematics around the top-down approach of fostering sustainable energy consumption that neglected issues of privacy, data security and electromagnetic hypersensitivity. Isabelle Stenger's cosmopolitical proposal encourages us to "build an active memory of the way solutions that we might have considered promising turn out to be failures."[8] Martinet achieves this by recording the flawed execution of the *Linky* introduction program hence, questioning the "accepted" ideal of modernity and growth.

If *Linky* is an example of smart technology being forced into our homes the vast majority of smart devices are consumer goods that we buy and install in our homes in the hope of a more convenient, time saving, and smooth life. At the same

8 Stengers, I. (2004, October 1). The cosmopolitical proposal. *Balkan Express.* Retrieved from https://balkanexpresss.files.wordpress.com/2013/09/stengersthe-cosmopolitcal-proposal.pdf

time, we invite machines, algorithms, and AI into our most private sphere. **Lauren McCarthy** decided to become a human version of Amazon's Alexa to "have a conversation about letting AI into our data, our decision making, and our private spaces." In her essay ***Feeling at Home: Between Human and AI***, she explains how microphones, cameras and other electronics where installed in a volunteer's home and how she then got full access and control over their homes for three days. The performances emphasize how the smart home utilities really invade our personal space. Lauren tried to be better than an AI implement, after all, she is a human.

Another perspective is offered by **Luke Munn** who is interested in how Amazon's Alexa and other smart home devices "index, filter and frame the world, producing particular formations of knowledge." His attention was caught by a news report in which communication logs of Amazon's Alexa were requested by the Bentonville Police Department investigating a homicide. In his essay he describes how the story inspired a work of speculative fiction arguing that the smart home is a perfect example of Le Corbusier's motto "house is a machine for living in." Munn's artwork and essay ***Monitor - code, browser, viewer*** reveals how the house as a machine both creates an intimate profile of it's resident's, and how it fails to register certain everyday activities.

Also **Anuradha Reddy**, in her essay ***Feeling at home with the Internet of Things***, discusses the desire to automate different aspects of living. She questions if we really can feel "at home" with technology that is created to accumulate value, and serve companies and governments rather than its users. She argues that designing for IoT should, rather, focus on the "ethics of caring" rather than data collection. Reddy's call for more human values are supported by many other critics of IoT. For example, Andrew Keen, who was one of the few critical voices

at the Smart City Expo World Congress 2018 in Barcelona, emphasized that agency over technology and human values such as empathy and creativity is what should matter in our future cities, not algorithms.

Human values in designing IoT and smart cities sounds like a reasonable goal, yet as Shoshana Zuboff observes, surveillance capitalism has met with little resistance. Why? Because plenty of people agree that surveillance capitalism is a reasonable business model.[9] We agree to conditions of data collection to use products and services for free. **Mez Breeze's** literary piece, ***ToSS (Terms of Service Static)***, extracts from several Terms and Conditions/Terms and Services agreements that we blindly agree to when using apps, digital platforms or other types of software. For the *ToSS* Breeze has invented an imaginary software called *FacePalm*, in its Terms and Conditions we recognize the form of language that obscures the intentions of the global digital powerhouses to demolish our privacy.

The last set of texts reminds us of the material aspects of the Internet of Things. As **Lasse Scherffig** writes in his essay ***Leaked Locations from Your Networked Past***, the Internet of Things "are material things and changing physical quantities in cables or the ether." He uses his artwork, *Where have you been?*, as a case study showing how companies and governments use protocols defined in IEEE 802.11 to track and surveil devices connected to the Internet. Scherffig's work reveals how the Internet of Things is a deeply political technology, inherently material, and how local protocols blur the distinction between the public and the private.

9 Zuboff, S. (2014, September 15). A Digital Declaration. *Frankfurter Allgemeine*. Retrieved from: https://www.faz.net/aktuell/feuilleton/debatten/the-digital-debate/shoshan-zuboff-on-big-data-as-surveillance-capitalism-13152525.html

Control of the material infrastructures enabling data streams between physical devices also gives authority over the data. **César Escudero Andaluz** considers the socio-political effects of underwater Internet cables in his essay ***The Work of Art in the Age of Its Technological Distribution***. His starting point is three companies that, since the 1990's, have controlled the Internet traffic in submarine networks cables: Alcatel Submarine Networks from France, TE Subcom from the USA, and NEC from Japan. By noticing that tech giants Google, Facebook, and Microsoft, have also begun installing their own cables he shows that the ownership of the physical Internet infrastructure gives access to its data streams. In the essay we learn how artists such as Trevor Paglen and Joana Moll, and the series of lectures DEEP CABLES organized by Tatiana Bazzichelli. investigate various dimensions of fiber-optic and undersea network cables. Additionally Escudero Andaluz illustrates the political nature of the undersea cable network in his artistic project *Free Universal Cut Kit for Internet Dissidence [F.U.C.K-ID]*, which he describes as "an autonomous cutting device, powered by marine currents able to cut underwater Internet cables." As an advocate of tactical media, remix culture, and reverse engineering, Escudero Andaluz intends the 3D printable *[F.U.C.K-ID]* cable cutter, at least symbolically, to give us back the agency over technology and, hence, over our data by damaging the cables.

Another attempt to re-imagine our relationship to telecommunication infrastructure is **Martin Reiche's** *Razor Wire Modem*. In his essay ***Razor Wire Modem: An Artistic Intervention at the Schengen Border***, Reiche describes how a fence between Slovenia and Croatia, intended to stop feared mass migration yet obsolete from the very day it was built, was repurposed to become something "inclusive, meaningful, and desirable." Inspired by cases in the 1900's when barbed wire fences were used as telephone lines in rural areas of the United States, the

essay describes how suppressing the architecture of a fence was subverted to the free infrastructure of a simple computer network. Both *[F.U.C.K-ID]* and *Razor Wire Modem* can be viewed just as smart hacks, nevertheless they invite us to think about the seemingly invisible but very material infrastructures of our networked life.

Marie Kondo, a Japanese organizing consultant[10] famous for the both loved and criticized *Konmari* method of organizing one's belongings, "treats her possessions as if they were alive."[11] The idea is that, if we treat our belongings with respect, they will last longer. This might apply to belongings such as a loved sweater or book, but what about the maintenance of the increasing number of connected devices which depend on software updates, platform services, cloud storage, and the success of start up companies offering the device. The complexity of the maintenance of loved belongings like the Little Printer, a small Internet-connected thermal printer, is the focus of **Andrew Lovett Barron's** essay ***The Decay of Digital Things***. Through a couple of anecdotes Lovett Barron reflects upon the importance of company strategies and values as well as a striving user community support in ensuring a sustainable product maintenance.

At the recent Smart City Expo World Congress two quite contrasting approaches to future cities were apparent. The dominating technocratic approach in which problems are solved

10 Wikipedia contributors. (2018, August 6). Marie Kondo. *In Wikipedia,* The Free Encyclopedia. Retrieved from: https://en.wikipedia.org/wiki/Marie_Kondo

11 Murai, Y. (2015, April 10). 12 Ways the #KonMari Method Will Transform the Way You Organize Your Home. *Brit+co.* Retrieved from: https://www.brit.co/konmari-method/

with technology, selling abstract futures with buzzwords such as "AI," "Big Data," "sustainability," "ecology," and "green-ness." Impressive exhibition booths from cities such as Dubai and Moscow, or from companies such as Genetec (a Canadian provider of IP video surveillance, access control and license plate recognition solutions), Inesa (a Chinese provider and operator of total solutions for smart cities), and Ubiwhere (software and R&D company for the smart cities), just to mention a few, selling sophisticated control systems including vehicle, facial, and mood recognition purveyed a bright future for "surveillance capitalism." On the other hand, mainly northern European countries were also offering some hope in terms of citizen participation.

Citizen participation can easily become a buzzword or succumb to the real challenges of actually engaging citizens, and this was discussed in panels in the side events at the Congress such as "Grow smarter - sustainable urbanism"[12] and the "Sharing Cities Summit: How to engage citizens?"[13] It is imperative that citizens are engaged in shaping the technologies that are eventually becoming part of their cities and homes. As we look to the future, we must recognize Winston Churchill's statement,"We shape our buildings and, afterwards, our buildings shape us," and Marshall McLuhan's insight, "We shape our tools and, afterwards, our tools shape us." Inspired keynote speaker at the Smart City Expo Congress, Andrew Keen, added:"We shape our technology and, afterwards, our technology shape us"[14]. In the attempt to bring together the collection of texts for this

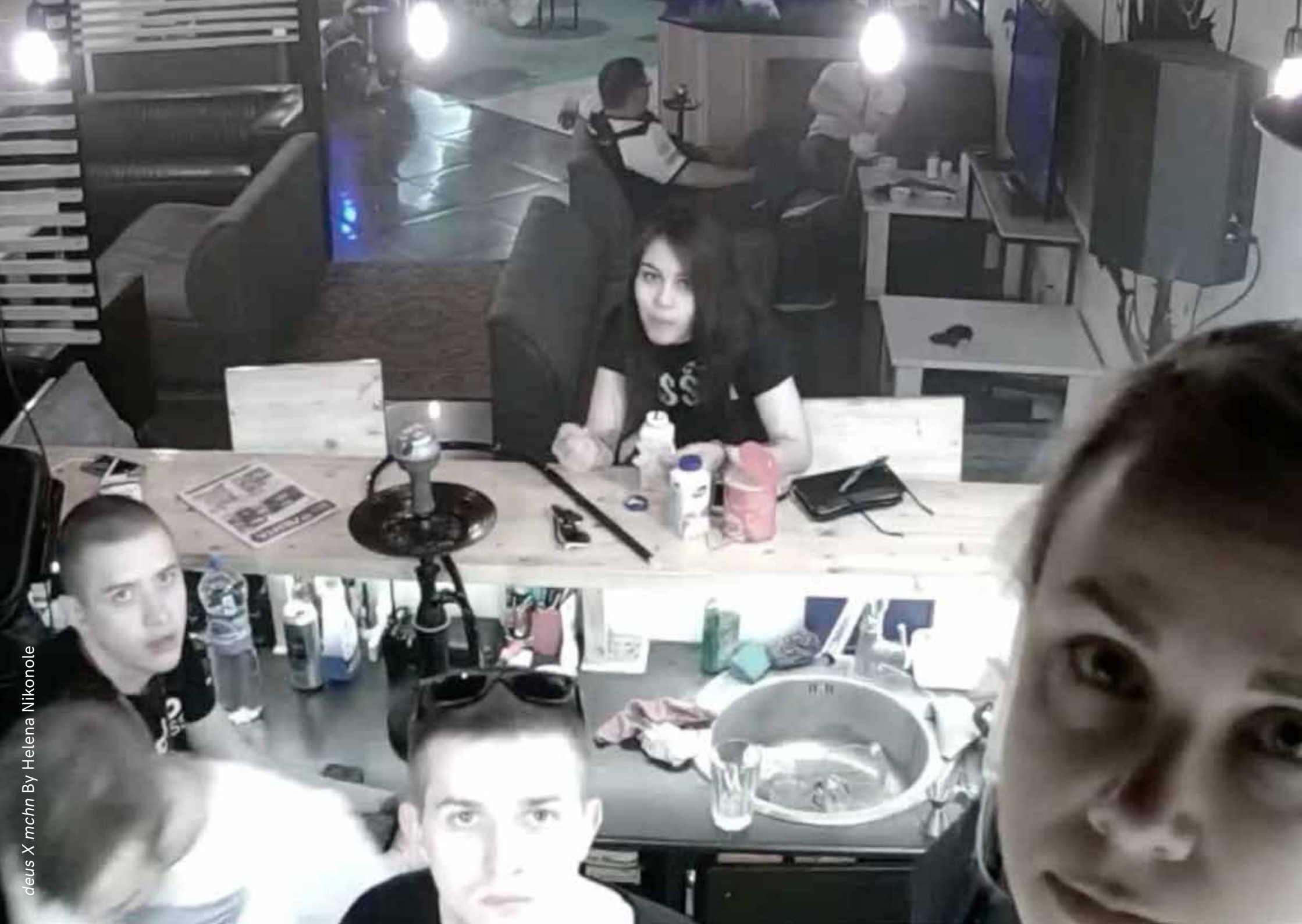
12 GrowSmarter. Retrieved from: http://www.grow-smarter.eu/home/

13 Share Barcelona. Sharing Cities Summit. Retrieved from: https://www.teixidora.net/wiki/Share_Barcelona_2018_es_documenta

14 Keen, A. (2018). How to fix the future. Smartcity Expo World Congress Conference 2018 Keynote Presentation.

publication, we wanted to bring forth the research of artists and authors who question: who is shaping and who should be shaping our technology? And, then, how is it shaping and how should it be shaping us?

KairUs – Linda Kronman and Andreas Zingerle



deus X mchn By Helena Nikonole

The Other View By Helena Nikonole

DYSTOPIAN ARTIFICIAL INTELLIGENCE WITHIN THE INTERNET OF THINGS

by Helena Nikonole

"Art as radar acts as
'an early alarm system,'
as it were, enabling us to
discover social and psychic targets
in lots of time to prepare to cope with them"
Marshall McLuhan, Understanding Media, 1964[1]

Over the last 6 years we have been witnessing a rapid development of a technology called Artificial Intelligence (AI), which is essentially Machine Learning or Deep Learning based on the concept of artificial neural networks, mathematical models inspired by biological neural networks. This technology demonstrates human-competitive performance in certain tasks such as classification, clusterization, object recognition, prediction, and optimization.

Mass culture offers a popular image of singularity, wherein strong artificial intelligence, humanity's antagonist, is trying to overcome and go beyond the imperfect and obsolete human brain. However, today's weak AI, which is largely controlled by states and corporations is, in fact, a significantly more dystopian phenomenon than the one presented in mass culture.

This year we are seeing AI technology merge with the Internet of Things (IoT): from "Nest's" smart thermostats to wearable healthcare devices. In July 2018, Chinese company Dahua

1 McLuhan, M. (1964/2003). *Understanding media: The extensions of man.* Corte Madera, CA: Gingko Press. (p.21)

launched a smart-camera and server for surveillance systems integrating AI face-recognition capable of detecting gender, age, and emotions[2]. At the same time, the Russian NTechLab, which has one the best face-recognition technologies in the world, has declared that it is closing its service FindFace (which was basically a face-search engine on the Russian social network VK) for private use, and is now going to provide this technology only for states and enterprises[3].

Trevor Paglen, an artist largely working with AI over the last 2 years, emphasized in his talk at the Art\Politics conference in Berlin last May that every image uploaded to the internet is first seen by a machine's eyes before human ones.[4] We can say the same about many devices within the Internet of Things: many streams from IP-cameras are processed by machine vision: registered, analyzed, recognized, or even judged. And very soon, all content and information from the physical world captured by the ubiquitous IoT devices will be perceived by AI cloud processing.

AI based on artificial neural networks is not a brand new concept: it has a history of about 70 years. However, it was only 6-7 years ago that it started becoming such a powerful tool: first, because of increased computing power and second, because of massive datasets collected from the internet, which both made machine learning possible. Datasets are still being collected to train AI every moment we go online, but today this is happening

2 Dahua unveils deepsense face recognition network cameras. (2018, July 17). In Asmag.com - Security & IoT. Retrieved from: https://www.asmag.com/showpost/25678.aspx

3 findfaceblog.(2018,July 3). FindFace закрылся (FindFace closed). Retrived from: https://findfaceblog.wordpress.com

4 Paglen, T. (2018, May 12). Invisible Images. Art / Politics Conference at Neuer Berliner Kunstverein (n.b.k.).

even when we think that we are off the grid. "Surveillance is the business model of the internet," Bruce Schneier writes in his essay[5]. According to research, (conducted at Princeton University, or Associated Press investigations) Google is tracking our movements even if we switch off GPS tracking and remove the SIM-card, and we cannot opt out[6]. So it comes as no surprise when Google acquires Nest Labs, the producer of self-learning smart heaters and security cameras, since tech giants have a tendency to collect as much data as possible.

IoT is not a step towards smart cozy houses and cities, but rather a means to gather data of our presence and actions in the physical world. "The Internet of Things ... simply wants those new forms of digitised command and control"[7]. Therefore, IoT and AI together become a potential new tool for algorithmic regulation.

deus X mchn (2017)

In the project *deus X mchn* I explore the controversial concept of algorithmic regulation which can be now further developed based on the integration of AI and IoT. In this project, an AI (an LSTM-neural network possessing a long-short-term memory), has been taught the language contained within a corpus of sacred texts such as The Old and The New Testament, the Quran, the Torah, the Dhammapada, the Ramayana, the Tao Te Ching, and others. It perceives the text as a sequence of numbers (en-

5 Schneier, B. (2016, January 13). The Internet of Things that Talk About You Behind Your Back. *Schneier on Security blog*. Retrieved from: https://www.schneier.com/blog/archives/2016/01/the_internet_of.html

6 Nakashima, R. (2018, August 13). AP Exclusive: Google tracks your movements, like it or not. *AP News*. Retrieved from: https://www.apnews.com/828aefab64d4411bac257a07c1af0ecb

7 Sterling, B. (2014). *The Epic Struggle of the Internet of Things*. Moscow, Russia: Strelka Press. (p.21)

coded symbols). The AI performs Big Data computations based on the texts in order to discover their grammatical structures, i.e. the "code" of the language. Eventually, this neural network starts to generate its own "sacred" text, creating new words and revealing the universal poetics of religious writings.

Another neural network uses this text for speech synthesis and artificial intelligence becomes the voice of unsecured devices on the Internet of Things: IP-cameras with speakers start reciting this (pseudo-religious) text to unsuspecting users; audio files containing the text are left on people's media-servers for them to be discovered. Finally, these texts are simultaneously printed once every 30 minutes both on an IP-printer in the exhibition space and on a randomly chosen device somewhere in the world.

Within the framework of the project, a series of photographs automatically taken by a scanning script, which takes random screenshots from IP-cameras, were also presented.

The project introduces the IoT not only as Michel Foucault's Panopticon,[8] but rather as a tool of biopolitics[9], a system of surveillance and control and a way of nudging citizens towards preferable behavior, instead of trying to understand and deal with the root causes of social problems. Evgeny Morozov considers this concept of data-based governance an extension of technological "solutionism," which is his term for a tendency to recast "all complex social situations either as neatly defined problems with definite, computable solutions or as transparent and self-evident processes that can be easily optimized—if only the right algorithms are in place."[10,11] He points out that this approach can eventually cause more damage than the problems it seeks to address.

8 Foucault, M. (1975/1999). *Discipline and Punish: The Birth of the Prison.* Moscow, Russia: Ad Marginem.

9 Foucault, M. (2010). *The Birth of Biopolitics*. Moscow, Russia: Nauka.

The Other View (2018)

For this project I connected to IP-cameras at a mirror gallery imitating Yayoi Kusama's mirror installations. The visitors are taking "selfies" in these mirrors and posting them on social media. This project demonstrates the supplementation of IP-camera surveillance by self-representation through social media.

An IP-camera at the mirror gallery is installed to look down from above the entrance and shows a non-human point of view by observing reality as it is. At the same time, visitors represent clichés of social constructs by looking at themselves from an "imaginary Other's" point of view.

In this work, I'm exploring two perspectives of surveillance: first, the gathering of our data by tech companies through social-media based on the information we provide in exchange for their free services and, second, the surveillance of our physical presence by IoT devices, in this case IP-cameras.

"Social media that are based on targeted advertising sell prosumers as a commodity to advertising clients. There is an exchange of money for the access to user data that allows economic user surveillance."[12]

10 Morozov, E. (2013). Chapter One, Solutionism and its Discontents In E. Morozov, *To Save Everything Click Here (*pp. 1-16). New York, NY: PublicAffairs.

11 Morozov, E. (2018, January 28). Will tech giants move on from the internet, now we've all been harvested? *The Guardian*. Retrieved from: https://www.theguardian.com

12 Fuchs, C. (2014). *Social Media / a Critical Introduction*. Ltd; New York, NY: SAGE Publications. (p.108)

Big Data AI-processing based on our previous activity is now determining many of the kinds of information we receive online, such as search engine output and social media news feeds, anticipating what we would like to see. Smart devices, by collecting further information of our activity in the material world, will share this information with states and corporations to control and define our reality. But the disturbing thing about AI is that we never know why it provides certain results based on our own data. Even their creators and scientists are not able to explain that.

AI is a kind of a black-box, the inner workings of which are incomprehensible. It can make dangerous mistakes and it can emphasize society's typical biases, as was illustrated in the controversial cases when Google Translate and Apple autocomplete demonstrated sexism, and it is capable of other forms of discrimination as well[13].

It becomes harder to believe that technology can make the world more equal or more free, when we are well aware that AI can be used to manipulate public opinion, when we know that AI and IoT surveillance systems are deployed by enterprises for labor surveillance and suppression and by states to control citizens, or when we know that people are preparing datasets to train machine learning algorithms at Amazon Mechanical Turk and get paid $1 per hour, or at a similar Russian service Yandex Toloka for a meager $0,4 per hour[14].

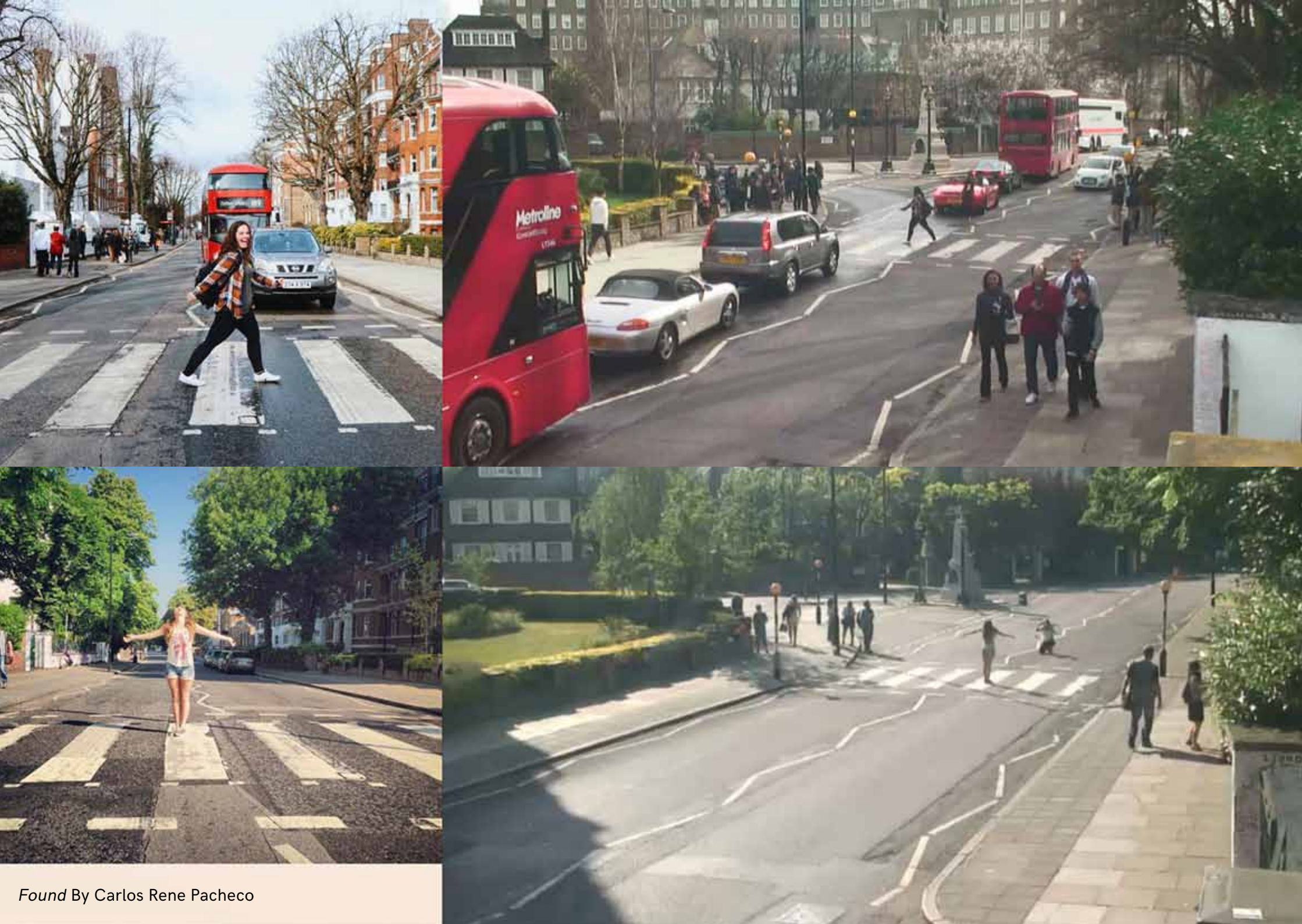
13 Zou, J., Schiebinger, L. (2018, July 18). AI can be sexist and racist — it's time to make it fair. *Nature - International journal of science*. Retrieved from: https://www.nature.com/articles/d41586-018-05707-8

14 The Yandex ad says people can earn 1-1.5$ per hour. In many reviews on internet people write it's about 0.4 - 0.6. Some of them earned even less. Yandex stories: http://zarablegko.ru/moy-opyit-zarabotka/yandeks-toloka-otzyivyi/, https://ifyes.ru/work/eksperiment-skolko-mozhno-zarabotat-na-yandeks-toloka.html

However, the same technologies can not only be used by companies and states but can also be hacked and exploited by open source communities, activists, makers, and artists who can anticipate both technology's potential opportunities and the potential risks and dangers which techno-evangelists have not yet realized.

We can use IoT and AI as tactical media to spread information which states and companies are trying to hide; we can launch blockchain databases which collect cases of censorship or human rights violations deployed on IoT; we can perform distributed computations based on IoT CPUs in search of treatments for cancer; we can build open source software to control IoT and DIY IoT solutions based on cheap microcontrollers; we can demand transparency for companies and states and privacy for people. Finally, we can experiment with AI to understand the way it works in order to become aware of its biases and perhaps, some day, we can find a way out of this dystopian present.

Helena Nikonole is a media artist and lecturer based in Moscow, Russia. Her work explores intersections of art and technologies such as Artificial Intelligence and Internet of things. She presents lectures and workshops in the field of new media art and new aesthetic at different institutions including National Center of Contemporary Art (Moscow), Institute of Philosophy (Russian Academy of Sciences), Office of educational programs in the field of arts and culture at the Department of Culture of Moscow, Rodchenko Art School, etc. Exhibitions include *Open Codes* ZKM Center for Art and Media in Germany, *The Wrong – New Digital Art Biennia*l, «IAM» GARAGE Museum Moscow, *New Codes of Art,* ELECTROMUSEUM (VI Moscow Biennial of Contemporary Art), PolitechScienceArt exhibition at GARAGE Museum Moscow, *Earth Lab* (The Polytechnic Museum and Ars Electronica Center collaborative project), *101* Mediapoetry Festival (St. Petersburg) and many others.



Found By Carlos Rene Pacheco

Found By Carlos Rene Pacheco

FOUND

by Carlos Rene Pacheco

Found is an ongoing, globally-collaborative exploration utilizing social media and live streaming web-cams to pinpoint a moment in time from multiple perspectives. A virtual link is created between myself and the participants, all of whom are complete strangers, in a questioning of privacy and access to information.

When I began work on *Found* I was a graduate student at Ohio University in Athens, Ohio. The idea developed out of my own general wonder at what events I might witness through live streaming cameras placed around the world. The cameras exist as a form of armchair tourism. Can't travel to New York? Experience the bustling streets of Times Square without ever leaving your living room.

What you come to realize very quickly is that the scenes playing out in front of these watchful eyes are often quite mundane, sometimes empty. One camera features a static city skyline, the only sign of life being the flicker of lights in the distant windows. Another camera features an unpopulated beach with muted, pixelated waves in the background. Admittedly, the beach scenes were a nice reprieve from the cold Ohio winters.

Nevertheless, I found myself returning to the more active cameras to do a little people watching. The repetition of certain actions people were performing, specifically the act of taking pictures, caught my attention. Everyone was capturing essentially the same image over and over again; each new image contributing to a sort of collective memory. What happens to these memories? Could I find them?

The web-cam I had, initially, been working with in Times Square, New York City, was taken down so I shifted my attention to another tourist destination, Abbey Road, London. I was especially fond of the notion that a photograph was the reason people made the pilgrimage to this spot. They come in droves to the crossing made famous by the Beatles, often with the intention of recreating the famous Abbey Road album cover photograph. And they never get it quite right, looking like something between Egyptian hieroglyphics and the alleged Bigfoot of the Patterson-Gimlin film.

The first step in creating a virtual link between myself and the image-makers was finding the tourist photographs being posted online. One search for #abbeyroad yields nearly 400,000 results. I was able to sift through all the noise and pick out the self-portraits people had shared. The one hitch is that the platforms where these images are posted remove the Exif[1] metadata such as date, time and GPS location from the photographs. The only information I have is the time the image was posted. This is often not the same as when the image was taken. Some users share their photographs immediately, while others wait until it is convenient. If the most convenient time to share the photograph is two days later I will never find it in the live stream.

1 Exchangeable image file format (officially Exif, according to JEIDA/JEITA/CIPA specifications) is a standard that specifies the formats for images, sound, and ancillary tags used by digital cameras (including smartphones), scanners and other systems handling image and sound files recorded by digital cameras. Wikipedia contributors. (2018, November 28). Exif. *In Wikipedia,* The Free Encyclopedia. Retrieved 12:40, December 14, 2018, from: https://en.wikipedia.org/wiki/Exif

The capture to share latency creates a dilemma. The feed at Abbey Road is live but there is an archive that goes back 24-hours from the local time of the camera. Every hour, an hour is removed from the archive. Once that hour is gone, that's it; it is gone. Working between different time zones means that I was already at a disadvantage. With only a vague sense of when a photograph was made I had to rely on the information in the still photograph; the position of the sun, traffic, street lights. If I could look at the photograph and estimate what time of day it was made then I could narrow my search window.

One photograph I found features a young woman standing in the crosswalk her arms outstretched, head thrown back, basking in the glory of her moment. The photograph is relatively empty. This was the first clue that the photograph was made early in the day, since it lacked the usual crowd of people and traffic. The warm light and long shadows were the second clue. With that information I narrowed my search in the live feed down to a few hours. As I scrubbed through each hour in the playback window I could narrow the time frame even further. If the light seemed to dim when compared to the still image then I must have gone too far back. If the shadows receded as the sun rose overhead I had gone too far forward in the day. The whole process took minutes on a good day.

On cloudy days when clues like the position of the sun are not as helpful, the time of day is very difficult to discern. I focused on other elements in the photographs. In one instance there was a red double-decker bus in the background of a photograph. The route information on the bus' marquee read, "Oxford Circus 189." The bus schedule showed that particular route saw a bus pass through every half hour, give or take a few minutes. From there I could scrub through the live feed looking for buses. No bus, keep scrubbing. The particular bus I was looking for had a

silver SUV in front of it. Bus but no SUV? Keep scrubbing. Until finally, there it was, a double-decker bus with a silver SUV in front of it. And, there in the crossing about to make her photograph was the elated, young woman in the plaid shirt I was looking for.

The final step in the process was to bring these two instances together. I synchronized the video I captured through the web-cam with the still photograph made on the other end. They show the exact moment the self-portrait was taken. I then reached out to each person I had found and shared my image with them. I also asked if I could use their photograph in the project. The community coming to these tourist destinations is truly an international one, so sometimes it required some rough online translating. Surprisingly, most people were happy to oblige to my strange request. If anyone said no, I didn't use their photograph.

Having taken a break to get out from behind the computer screen and make my own photographs for a while, I'm excited to pick up where I left off and explore new locations. The landscape has changed in the few years since I first started the project. New concerns regarding technology and online privacy seemingly arise more frequently now. I wonder what, if any, impact this might have on people's online interactions.

Carlos Rene Pacheco is a photographer and artist originally from Tucson, Arizona. As a young astronomy student, he became disenchanted with applied physics and mathematics and exchanged his view through a telescope for a view through a camera lens. This was a transformational experience and he soon reconciled his passion for scientific exploration with his investigation of the photographic medium. Through this filter Pacheco explores issues of time, technology, and the photographic archive in his work. In 2011, Pacheco received his Bachelor of fine Arts (BFA) with an emphasis in Photography from the University of Arizona in Tucson, and, in 2014, he received his Masters of Fine Arts (MFA) in Photography + Integrated Media from Ohio University in Athens. Pacheco currently resides in the Fargo-Moorhead area where he is an Assistant Professor of Photography in the School of Art at Minnesota State University Moorhead in Moorhead, Minnesota.

Ruins of the Smart City By KairUs

ARTISTIC RECONNAISSANCE

by Linda Kronman and Andreas Zingerle (KairUs Art+Research)

KairUs Art + Research[1] artworks investigate the vulnerabilities of how network technologies are designed, used, and trusted. The works usually narrate episodes of investigations that derive from long-term research projects and we chosen to describe one of our methodologies as "artistic reconnaissance." In this essay we explain how "artistic reconnaissance" is used to investigate network vulnerabilities, and how the careless use of IoT devices remains a global security and privacy issue. We also describe how "reconnaissance walks" in the South Korean smart city Songdo reveal an extreme contrast between the imagined and the real smart city experience.

Reconnaissance is exploration carried out to gain information. We have co-opted this exploratory military term of surveying a territory to outline a set of methods artists use to investigate infrastructures of power. As James Bridle's artwork *Watching the Watcher* implies, tactics of military reconnaissance can now be reversed to expose military infrastructures and surveillance tools.[2] In Bridle's work, US army reconnaissance drones are captured on publicly-available satellite imagery. In Ingrid Burrington's work *Reconnaissance* the methodology is articulated in the title.[3] Burrington uses pairs of before-and-after satellite images of data centers and military sites to investigate

1 All our artworks and projects mentioned in this document are described in detail on our website: www.kairus.org

2 Bridle, J. (2013). Watching the Watchers. Retrieved from: http://jamesbridle.com/works/watching-the-watchers

3 Burringron, I. (2016). Reconnaissance. NOME, Berlin. Retrieved from: http://sfaq.us/2016/09/reconnaissance-ingrid-burrington-at-nome-berlin/

state and corporate structures. Using satellite maps, investigating leaked and publicly available industry or military documents, and investigating physical locations are common methods among investigative journalists and artists. Trevor Paglen, for example, does this in an outstanding way by tracking and photographing locations off underwater fibre-optic cables that the NSA probably tapped.[4] According to Paglen metaphors of infrastructure are often misleadingly immaterial:

"Infrastructures of power always inhabit the surface of the earth somehow, or the skies above the earth. They're material things always and, even though the metaphors we use to describe them are often immaterial — for example we might describe the internet as the Cloud or cyberspace — those metaphors are wildly misleading. The Cloud is buildings with servers in them."

These investigations have revealed to us what the Internet or surveillance actually looks like. On the other hand they point our attention to what is hidden in plain sight. In our work *Sharing locations: YONGSAN & HUMPHREY GARRISONS* we used satellite maps from various mapping services to expose strategies of concealing, and exploring other layers of information like labels and heat maps of tracked movement. The work investigates two U. S. military infrastructures in South Korea; Garrison Yongsan and Garrison Humphreys. When military locations are explored through web mapping services such as Google-maps, Microsoft's Bing-maps, Naver-maps, and Strava's heat-maps we start to recognize differences in their appearance and how much information they reveal. It is not just

4 Jobey, L. (2015, December 31). Trevor Paglen: What lies beneath. *Financial Times*. Retrieved from: https://www.ft.com

subtle differences depending when the satellite images were taken, but attempts to hide the obvious: digitally disguised as parks, forests, farmland, or otherwise obscured and blurred.

By switching between various mapping services and their modes we start to unfold strategies used to hide these military infrastructures in plain sight. Consequently we start questioning what is removed from these publicly available imaginary objective representations and which policies are followed? Another layer of information is revealed by services using location based tracking. For example the Strava mobile app that is used to track athletic activities and share them on their social networking service. The app is compatible with several GPS watches and head units, including the devices US Army staff are equipped with. When Strava is used with default privacy settings, workout routes and personal times on activities such as running, cycling or swimming are logged and become available to third parties. When we share our locations with such services, satellites are not just recording representations of the earth in form of maps, data is also constantly recorded of how we move and behave. Combining the two enables informed reconnaissance of strategic sites.

Two videos in the *Sharing Locations* artwork show concealing strategies used by different mapping services at the U.S. garrisons Yongsan and Humphrey in South Korea. The parks, farmlands and forests are compared with activity movements that are shared by Strava network users. Anyone can log into the Strava social network. Once logged in, identities of individuals (including service members), and their present and past workout routines are visible to everyone, not just friends and followers. To further stress the exposure of personal data through the Strava social network as a part of the mixed media installation best individual lap times from each garrison are printed and exhibited on workout T-shirts.

Initially, reconnaissance referred to scouts or patrolling troops exploring enemy terrain. Technologies of machine vision such as satellite and drone images has been developed to assist the human eye. Further the term "network reconnaissance" used in cyber security context extends the terrain of exploration to include networked sensors, or as in our work *Panopticities,* the vulnerabilities of networked CCTV cameras. In this video installation city portraits of Seoul, Tokyo, Bangalore and New York serve as evidence of cameras that are insecure by design, accessible for both human and non-human intruders. By conducting virtual visits to cities through insecure camera lenses the artwork shows us private and public day to day activities and we get a glimpse of the rhythm of a city and its citizens daily routines: early morning commutes, busy lunch times at restaurants, evening cram schools, rush hours, or late night workout sessions.

Networked security cameras as part of the growing amount of connected devices also known as the Internet of Things offer 24/7 surveillance with integrated web-server allowing real-time processing and streaming. These web-servers are often insecure by design, meaning they are not protected by a password or have hard-coded login credentials saved as plain text. By default, the servers stream unencrypted data through publicly-accessible network ports, causing a potential risk of being intercepted and allowing unknown third parties unintended access to the cameras. Some manufacturers use the same vulnerable settings across their entire camera lineup. "By default, the Network Camera is not password-protected," or "the default user name is admin" and "the password is 12345" can be read in the camera manuals. Besides insecure ip-cameras, modems and routers we found hundreds of critical infrastructure manufacturers that still use default and hard-coded login credentials.

Security cameras are supposed to offer security, not provide surveillance footage for anyone to view. Often, camera owners don't realize that their cameras are accessible on the Internet with default insecure settings, enabling hackers to enslave these cameras into botnets. Malware will use insecure webcams to infect the rest of the often unsecured network, including routers and other devices in the "smart home," threatening both the reliability of surveillance cameras and also serving as a transmission vector to attack other devices and critical infrastructure.

Whereas the two prior works use techniques of virtual observations made from a distance in the *Ruins of the Smart City* photo series we observe locally-tangible structures by documenting obsolete design implementations of South Korean smart city initiatives. South Korea is one of the rapidly developing, tech-driven Asian states, with the second fastest and most connected society in the world, when you look at average internet connection speed and active social media penetration. At the same time, it's a very young democracy, everything is driven by the government and the market in a top-down approach, not focusing on the people who shall live in smart cities or use IoT devices on a daily basis. Cities like Songdo are built from scratch, supported by big tech companies amongst others IBM, CISCO, POSCO and LG. The photo series documents the massive investments in smart cities, its design, scenarios, and technology that are all hyped when a new city is planned. On the other hand, the built in technology often becomes obsolete or even dysfunctional during the process of building the city.

This is because the strategies of smart cities are inherently part of a consumer capitalism in which the new model must replace the old with an accelerating pace. This results in the envisioned smart technology being obsolete when implemented. As Nicholas Allen, Non-Executive Chairman, Link Real Estate Invest-

ment Trust[5], in a World Economic Forum panel admits: "Technology is changing so fast, that even if you put it in a year ahead of time the chances are that when you finish the building it is out of date."[6] Real-estate speculation, obsolete infrastructure and technology, coupled with the inability to attract new investment, result in an uneven development of the city. We have observed material traces of a smart city failures in form of empty malls, dysfunctional high-tech waste management infrastructure, and obsolete tele-presence technology. If we consider these spaces and technologies as contemporary ruins. According to Tim Edensor they offer: "opportunities for challenging and deconstructing the imprint of power on the city."[7]

By investigating these sites we can start to challenge the sustainability as core concept of the smart city. For example in Songdo City there is a central pneumatic waste disposal system. Citizens can activate a smart trash bin with their ID cards and are then able to deposit their garbage in the bins. The trash gets transported at high speed through underground pneumatic tubes to a collection station where it is separated and recycled. The city wants to eliminate the need for garbage pick-up. During field research together with activists from Seoul-based Unmakelab, we were able to observe that the trash system is not working and piles of trash become part of the urban landscape. Residents living in the buildings that have invested in this infrastructure end up paying for a dysfunctional system. Due to examples like this, Songdo has been criticized as a prototype city or a test bed of technologies. For us, this shows that from a citizen perspective important questions to be asked are around the actually maintenance, openness, and sustainability of the technology that is promoted as enhancing the quality of life in the urban environment.

5 A real estate investment trust in Hong Kong.

6 Allen, N. [World Economic Forum]. (2017, June 29). The Smart City Revolution: Where's It All Going?. Retrieved from: https://youtu.be/mXtpdby9JSQ?t=53m35s

7 Edensor, T. (2005). *Industrial Ruins. Space, Aesthetics and Materiality.* Oxford: Berg.

During these "reconnaissance walks" in the new smart city terrains we realized that the failed implementations of technologies reveal the materiality of the "smart city." The technological development progresses so rapidly, specially from a city planning perspective, that 5-10 years later, many ideas they had been envisioned for Songdo are unpractical or not used by the citizens. For example, the tele-presence system praised in the Songdo advertising materials, that connects homes equipped with multiple screens with other homes or institutions such as hospitals or schools. This idea, developed before the breakthrough of mobile Internet usage, has left Songdo apartments full of obsolete screens in their kitchens, bathrooms and living rooms. Which city really needs a stationary video telepresence infrastructure now? Other observations included nonfunctioning sensors paved into the streets and lamp posts. In a smart city, recent history moves with such a great speed that a city still in construction can already feel as part of the contemporary past. It can be exiting to imagine the future city and the smart city always exists in the near future, as Thaddeus Arroyo, Chief Executive Officer, Business Solutions and International AT&T, reveals in his statement: "we are right at the forefront of another wave, with the advent now of the next generation of technologies… it is exciting to think what the future of smart city will be."[8] Nevertheless, the visions of the future have not

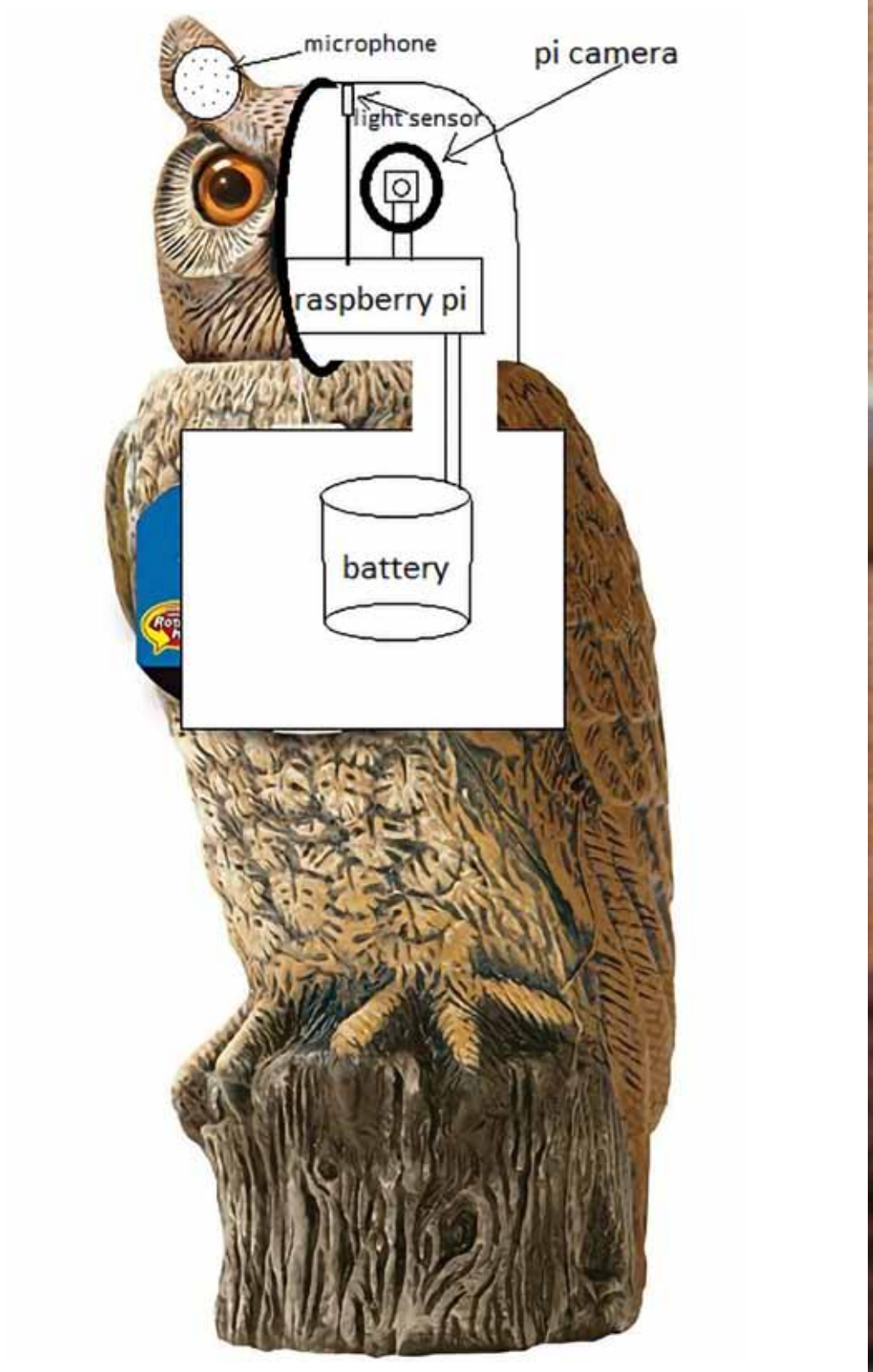
8 Arroyo, T. [World Economic Forum]. (2017, June 29). The Smart City Revolution: Where's It All Going?. Retrieved from https://youtu.be/mXtpdby9JSQ?t=55m36s

been realized as planned, at least in the case of Songdo. The photo series unveils the contrast between the 3D rendered imaginary Songdo and the real city which is a construction in progress and a ruin of a smart city at the same time.

In this essay we have described how we have co-opted tactics of reconnaissance to investigate vulnerabilities of the Internet of Things and smart cities. We have also identified how other artists use similar tactics in their artworks. We have demonstrated how these artistic reconnaissance tactics can be used to acquire evidence that problematizes the withstanding technotopian dreams of computing each aspect of our life. Networked devices and sensing cities will be part of our future. Rosi Braidotti, who explores the concept of posthumanism in her philosophical work, sees that we have become: "dependent on the enhanced capacity, on the enormous power that we get, power of connectivity through these device."[9] According to Braidotti, we are in the preliminary stages of "an enhanced relationship to what these technologies make possible" and to get use to it, at the moment, we are suffering; Braidotti sees the price of the progress in terms of lost jobs, the anthropocene, and the digital proletariat and, therefore, calls for a transitional phase in which we take the positive and negative into account and make social plans to take care of the ones who risk being left behind. In a similar manner we recognize the benefits and dangers of becoming fully networked citizens and our artworks call attention to the vulnerabilities of technologies that should be taken into account when designing the programmable cities we are going to live in.

9 Kirkham, S. (Producer). (2018, April 17). The human and the posthuman [Radio broadcast]. Sydney, ABC RN. Retrieved from ABC RN archive https://www.abc.net.au/radionational/programs/drawingroom/drawingroom-17.04.2018/9668486

KairUs is a collective of two artists Linda Kronman (Finland) and Andreas Zingerle (Austria). They explore topics such as vulnerabilities in IoT devices, corporatization of city governance in Smart Cities and citizen sensitive projects in which technology is used to reclaim control of our living environments. Their practice-based research is closely intertwined with their artistic production. Adopting methodologies used by anthropologists and sociologist, their artworks are often informed by archival research, participation observations, and field research. Besides the artworks they publish academic research papers and open access publications to contextualize their artworks to wider discourses such as data privacy & security, activism & hacking culture, disruptive art practices, electronic waste and materiality of the Internet.



Mockup and final placement of *A.T.H.E.N.A.* project by Tucker Craig, Davidson College

A TURDSID from "Operation Igloo White" (image via Mark Witham, Military Heritage Collection North Texas).

LISTENING STATIONS: A PROMPT TO EXAMINE THE HISTORIES OF THE INTERNET OF THINGS

by Owen Mundy

Introduction

The following essay describes an artistic/public-intervention concept developed in response to the proliferation of networked sensors in public and private spaces. Rather than produce the work alone, I decided to initiate the idea as an assignment in my Physical Computing course in the Department of Digital Studies at Davidson College. The idea draws on multiple histories and issues corresponding to the rise of IoT devices in our world including, 1) the deadly military provenance of networked sensors, 2) the nefarious origins of precious metals required to produce such devices, and 3) the plethora of security and privacy issues these machines introduce into our lives. The essay discusses these issues to provide context, followed by the assignment prompt, and concludes with images and source code from student outcomes.

Part 1: Context

Operation Igloo White

From 1967–1972 the U.S. Air Force ran a covert program of electronic warfare in order to disrupt a military supply route called the Ho Chi Minh Trail, which enabled support from North Vietnam and Cambodia to flow into South Vietnam. This enterprise, code-named "Operation Igloo White," combined electronic sensors, radio communication, and computer processing to automate intelligence collection to inform and direct military action. The project incorporated more than 20,000 acoustic, seismic, and other sensors, airdropped in an attempt to halt the flow of war supplies from the north into South Vietnam.

When tripped, in less than five minutes, data from the sensors was relayed by planes flying overhead to computer analysts at a base in Thailand, who called in airstrikes at the location of the sensors.

Igloo White sensors were disguised to blend into the natural environment. One of the most common was the ADSID (Air-Delivered Seismic Intrusion Detector), which used an internal geophone to detect vibrations in the earth from nearby persons or vehicles. Disguised with camouflage patterns and an antenna resembling a stalk of weeds[1], these sensors were thrown from the air without a parachute where they stuck into the ground like a lawn dart[2].

While over time the sensors were improved and refined, as an experimental project the cost was significant. In 1967, one ADSID cost $2,145 (not adjusted) to produce, with its NiCad batteries lasting only two weeks. By 1970, technical improvements dropped the cost to $975 each, and updated the power source to lithium batteries which lasted up to two months[3]. Still, challenges remained, like distinguishing human activity from "false alarms generated by wind, thunder, rain, earth tremors, and animals—especially frogs"[4].

1 Rosenau, W. (RAND). (2001). U.S. Air Ground Operations Against the Ho Chi Minh Trail, 1966 – 1972. In Special Operations Forces and Elusive Enemy Ground Targets: Lessons from Vietnam and the Persian Gulf War (Vol. 1, pp. 5-27). Retrieved from https://www.rand.org/pubs/monograph_reports/MR1408.html

2 Haider, E. D. (1998). *Unattended Ground Sensors and Precision Engagement*. Naval Postgraduate School. Retrieved from https://calhoun.nps.edu/bitstream/handle/10945/32642/98Dec_Haider.pdf;sequence=1

3 Rosenau, 48.

4 Correl, J. T. (2004). Igloo White. *Air Force Magazine*, 56-61. Retrieved from http://www.airforcemag.com/MagazineArchive/Documents/2004/November%202004/1104igloo.pdf

Another seismic sensor that shared a unique disguise (and challenges) was the T-1151 TURDSID. This device consisted of a vibration sensor, a transmitter and antenna, and batteries, and was small enough to fit into a small rubber case disguised to look like dog excrement, thus its name. Due to its size the batteries lasted only a few days, and required another, larger sensor nearby to relay their signal. Consequently, these were an expensive and temporary solution to the problem of detecting activity along the supply route. While the disguise was later modified after learning there were no dogs running wild along the Ho Chi Minh Trail[5] this device still assumes a prominent position among celebrated surveillance apparatus for its unorthodox disguise.

While an expensive technological failure for the U.S. military, as one of the first real-time computer-driven surveillance operations, Igloo White should be seen as an instrumental development in the history of IoT. After its demise, R&D from Igloo White returned to the U.S. where it was deployed along the Mexican border, forming the basis of an ongoing surveillance program. Further, evidence of the research for this once covert operation can be found not only in the modern electronic battlefield and border operations, but in battery, wireless communication, and other electronic components of consumer goods produced by the private corporations who worked on Igloo White. The ADSID was produced by the Sandia Corporation[6] , a subsidiary of Honeywell, which today manufactures a variety of related products like smart thermostats, connected home security systems, and even cluster bombs. Other Igloo White sensors like the MICROSID and HELOSID were produced by Texas Instruments, maker of digi-

5 Haider, 50.

6 Haider, 46.

tal calculators, the "Speak & Spell" learning toy, and an abundance of weapons and armament systems for the U.S. military.

Precious Metals – Poisonous origins

With the rise in demand for both military and consumer electronic devices comes myriad unseen environmental and human costs. The raw materials required to make modern electronics are often toxic or must be mined in remote locations under extremely difficult conditions. Take, for example the Apple iPhone; with over 1.2 billion manufactured since 2007, it is one of the most groundbreaking, capable, and prototypical connected devices that exist. However, examining its materials shows the degree to which its manufacture depends on extracting both materials and human labor from the third world.

The bulk of the iPhone's weight comes from non-precious materials: aluminum (24.1%), carbon (15.4), oxygen (14.5%), iron (14.4%), silicon (6.3%), copper (6.1%), cobalt (5.1%), hydrogen (4.3%), chromium (3.8%), and nickel (2.1%) (Merchant, 2017: 5). The remaining 3.9% of the device contains traces of materials that are toxic like lithium (.7%) or lead (.03%), or are considered valuable because of the difficulty in retrieving them. The most valuable material at >$40/gram is gold (.01%). Along with lead and zinc (.5%), tin (.5%), an integral part of the solder that connects components in the circuits, is extracted from mines in rural South America under dangerous or deadly conditions. These mines operate without regulation, and do not provide health or disability insurance, workers compensation, or other protections for workers. Further, they often employ children as young as six to collect minerals from the tiniest spaces. One mine in Potosí, Bolivia, where tin from your smartphone might have originated, was found to employ as many as 3,000 children in its depths.[7] According to one report, the smallest humans are not only strategic, but the most vulnerable, with over sixty children killed in accidents in a single mine in Potosí in 2008[8].

The iPhone example reveals multiple paradoxes at work in the production of consumer electronics and IoT devices. At the time of this writing, Apple is the most profitable publicly-traded company in the world, yet its enormous profit depends on extracting value from the land and peoples of the third world, including those least fortunate among us. The market value of raw materials used in a single iPhone total only $1.03, with 56% of the cost the tiny amount of gold inside[9]. While the marketing language around such devices often promotes efficiency and convenience, the human cost of extracting the raw materials remains large, and their capture is anything but convenient. This is only one example of the "carbon capitalism" phenomenon, where the first world profits thanks to economic disparities and extraction of third world resources. In the final example the essay will address disproportionate profit via another form of raw material; the collection and exchange of personal data.

Surveillance Capitalism and the IoT

As IoT devices continue to invade our lives under the pretense of convenience their continuous presence enables new forms of extraction and disproportionate power relationships.

7 Merchant, B. (2017). Everything That's Inside Your iPhone. *Motherboard Magazine*. Retrieved from https://motherboard.vice.com/en_us/article/433wyq/everything-thats-inside-your-iphone

8 Enzinna, W. (2013) Unaccompanied Miners: Down the Shaft with Bolivia's Child Laborers. *Vice News*. Retrieved from https://www.vice.com/en_us/article/av38yb/child-workers-of-the-world-unite

9 Merchant, 2017:5.

Shoshana Zuboff calls the accumulation of profit using data to predict and modify human behavior, "Surveillance Capitalism." She states, as a result of increasingly automated and "informated" spaces, where we live, work, and sleep, "more and more data will be generated about individuals and will persist under the control of others."[10] At issue is not only the barrage of duplicitous advertisements that use our data to tap into desires we don't even know we had[11], but how this system that uses our information to hold power over us permeates our lives, is entrenched in our social fabric and condemns us further into the depths of a surveillance society.

Like the smartphone, IoT brings this "home", invading our personal spaces and passively watching us under the cover of efficiency. The security and privacy implications of these devices we have been convinced are necessary are endless. Imagine how Google might (or already does) use data from its "Nest" device. This so-called "smart thermostat," knows where you are in the house, your current temperature setting, and combined with the youtube video you are currently watching, can generate very specific YouTube advertisements. Above and beyond the common practice of targeted behavioral tracking, big data analytics are being used to generate consumer models and applying those predictions to your visual space: how might your physical properties like body temperature, or the last time you visited your connected refrigerator or any other IoT-extracted

10 Zuboff, S. (2015). Big other: surveillance capitalism and the prospects of an information civilization. Journal of Information Technology, 30(1), 75–89. https://doi.org/10.1057/jit.2015.5

11 Ellenberg, J. (2014). What's Even Creepier Than Target Guessing That You're Pregnant ? *Slate*, 4–7. Retrieved from http://www.slate.com/blogs/how_not_to_be_wrong/2014/06/09/big_data_what_s_even_creepier_than_target_guessing_that_you_re_pregnant.html (p.3)

surveillance be used to change not just what you see or purchase, but what issues you value, who you vote for, or even how you allow yourself to think?[12]

Beyond the larger shift into a society where this is acceptable, what about questions regarding potential egregious uses by individuals or groups who intend to do direct harm? There is no shortage of reports of human rights abuses due to state-sponsored dataveillance in countries like Iran, Egypt, and China; examples orchestrated thanks to technology from western countries[13]. Reports of similar patterns of domestic abuse exist thanks to smart home technology where Internet-connected devices have been used to harass, monitor, and enact even more monstrous power over others. As more IoT products emerge so do the examples of abuse, like remotely changing someone's thermostat to extreme temperatures, posting intimate images captured by devices for revenge, or locking people out of their homes[14]. Unlike a corporation that has a positive image to project, perpetrators have remotely-controlled IoT devices to assault their victims in a shocking example of "feature creep" that finds off-the-shelf devices are also quite adept as a means of creating terror.

12 Anonymous (2018). The Internet of Things has a dirty little secret: it's not really yours, 1–7. Retrieved from https://www.technologyreview.com/s/601013/the-internet-of-things-roadmap-to-a-connected-world/

13 Privacy International. *The Right to Privacy in Egypt*. (2014). Retrieved from https://privacyinternational.org/advocacy-briefing/775/right-privacy-egypt

14 Bowles, N. (2018). Thermostats, Locks and Lights: Digital Tools of Domestic Abuse. *The New York Times*, pp. 1–5. Retrieved from https://www.nytimes.com/2018/06/23/technology/smart-home-devices-domestic-abuse.html

Part 2: Project Prompt

Let's move now to the instructions for "listening stations," which gets its name from a symbol of state and corporate power through information gathering, the NSA post atop the Teufelsberg west of Berlin, Germany.

Description

The following asks you to respond to these histories and contradictions by making your own "listening station" to symbolize and engender discussion around these issues. Like the Igloo White sensors, your work will be disguised in a modestly absurd way, and like the devices above, you will monitor "human activity".

Instead of a weather station that senses natural phenomena, your work will log data specific to how humans impact the world. Your device should therefore be placed in a public space, near people, and the data you collect should be relevant to the disguise you adopt. For example in a design for a traffic cone disguise, the sensors might collect images, noise pollution (volume), carbon dioxide emissions, and seismic vibrations from vehicles.

Finally, you'll visualize the data (photographic, quantitative, qualitative) you collect from these stations in order to measure, analyze, and discuss ongoing effect of humans on the world, and write a short white paper explaining your research, process, and outcomes.

This ironic take, reproducing and escalating the "problem," employs a subversive strategy commonly used by The Yes Men and others that Slavoj Žižek calls "overidentification."[15] This method playfully enacts the "worst option" which, on its surface, appears to contradict a positive response in order to overemphasize a position and follow anti-humanist positions to their ultimate ridiculous end, thereby calling those positions into question.[16] Overidentification offers to its audiences the most extreme form of a system revealing how, in our case, IoT devices are clandestine human surveillance apparatuses at their core, and should be considered within various histories of such technologies.

Suggested Process

The following was proposed as a process for executing this work, along with example outcomes from students.

1) Research: Read through this essay's citations. Examine the histories and technologies of similar works, both the avant garde and everyday. Follow your own interests in these subject(s).

2) Develop your idea: How will you sense (direct or indirect) effects of humans? How does your data relate to your disguise? How might your audience perceive the object? Create three different ideas. Don't worry about technical viability yet, be imaginative.

15 Žižek, S. (1993). Why Are Laibach and Neue Slowenische Kunst Not Fascists? *The Universal Exception: Selected Writings,* Volume Two, 63-66.

16 BAVO. (2007). Always Choose the Worst Option - Artistic Resistance and the Strategy of Over- Identification. In BAVO, G. Boie, & M. Pauwels (Eds.), *Cultural Activism Today: The Art of Over-identification.* Rotterdam: Episode Publishers. Retrieved from http://xenopraxis.net/readings/bavo_overidentification.pdf

3) Create a proposal: Pick one idea and draw an illustration of it. Research the technical components you need. You are constructing a new device, but it is likely you will find the "pieces of your puzzle" have already been created and documented online. Share it with friends for feedback and viability.

Technical note: There are many ways to collect data using electronic sensors and microcontrollers like the Arduino or single-board computers like the Raspberry Pi. There is the potential to teach a whole class on electronics and sensor data, however, because the hardware and code is specific to the idea being implemented, it is not possible to go into detail on the technical information here. Instead an overview of what was used in the class example is provided, and links to the resources at the end of the essay.

In the spring 2018 class we used the Raspberry Pi v.3 (or "Pi"). It is more powerful than the Arduino, and has built-in wifi and an SD card for storing data. The Pi runs Linux (like MacOS and most web servers), making it easier to choose among several programming languages for connecting to the sensors[17]. Then, rather than wire and test each sensor individually, a "plug and play" method called the GrovePi+ was employed to connect sensors and actuators to a HAT ("Hardware Attached on Top") on the Pi, thus requiring no soldering.

4) Prototype: Start small; get individual components working on their own first. When the pieces are working properly start putting them together.

17 Finley, K. (2016). Linux Took Over the Web. Now, It's Taking Over the World. *Wired,* 1–5. Retrieved from https://www.wired.com/2016/08/linux-took-web-now-taking-world/

Technical note: Once you have your hardware set you'll need to write code to test the sensors and collect the data. We used Python, a programming language that is accessible and popular among scientists and open source communities. The flowchart at the beginning of this chapter shows a good overview of how a program might work, collecting, processing, and outputting data. In this case, the student used a camera, microphone, and light sensor, then analyzed the camera images with OpenCV (a Computer Vision tool) to identify nearby people.

The flowchart at the beginning of this chapter is part of Tucker Craig's *A.T.H.E.N.A.* (Automatic Tweets Humans Environmental Noise Analysis), a modified garden decoy owl to analyzed human visual and aural impact. This sentient owl monitored people as they passed, noting how noisy they were and, using a concealed camera and computer vision, counted them and determined fashion trends. Every two hours, *A.T.H.E.N.A.* added a new "tweet" to @NotYourAvgOwl explaining the amount of human traffic, the state of noise pollution, and the average color of pedestrians' shirts.

5) Deploy the object: Make the object watertight so electronic components are not damaged. Get permission where necessary before you place the object. Don't collect data about others you wouldn't like collected about yourself. Avoiding collecting Personally-identifiable information will also allow you to avoid institutional review (IRB) if you are performing this in an institution.

6) Visualize the data: This could be as simple or as technical as you like and might include charts, graphs, timelines, or photographs.

For example, these above graphs were created by Ted Yoo in his *Spybird* project to investigate any correlation between increases in human sounds and potential resulting decrease in bird song intensity. To do this, Yoo recorded sound with a microphone and performed Fast Fourier Transformations (FFT) on the audio to separate the human activity (typically 80–255 Hz) from bird calls (which average 4000 Hz). He found instead a positive correlation between the two, leading him to assume there may be other factors causing increases and decreases in both.

7) Document and share your work: Write a short statement explaining how your work addresses the issues outlined in the beginning of this essay. Describe your process. Include your research, drawings, technology, and images of your listening station. If you post your outcomes online share them with related hashtags #listeningstation #IoOPT

Conclusion

The increasing use of embedded computers to track our bodies, speech, and sentiments is a relatively new phenomenon in everyday life. The title of this essay, a reference to similarly-named NSA facilities dedicated to data collection by state agents, intends to capture how this shift to a surveillance society coincides with military developments. This transition from manual to automated surveillance introduces a new world where everything we do is recorded and monetized in order to influence our personal, economic, and political actions. The examples, including private companies producing sensors to prompt unrestrained military power, the richest electronics companies in the world devaluing human lives in order to extract raw materials at the cheapest rate possible, and the extraction of personal data for financial gain, evidence how, thanks to networked computers, our fascination with technology is accelerating a centralization of power. The "assignment," to create and deploy, in a public space, a speculative yet functional device that senses, collects, and displays information about human activity, asks participants and their audience to examine the political and cultural contexts of electronics, and connect the issues to the devices themselves, which are inseparable from their position and influence on humanity.

Further readings

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Oliver, J., Savičić, G., & Vasiliev, D. (2011). *The Critical Engineering Manifesto. The Critical Engineering Working Group*. Retrieved from http://criticalengineering.org/ce.pdf

Sarma, S. (2016). The Internet of Things: Roadmap to a Connected World. *MIT Technology Review*, 1–11. Retrieved from https://www.technologyreview.com/s/601013/the-internet-of-things-roadmap-to-a-connected-world/

Electronics Resources

Collin's Lab, an excellent youtube playlist with a deep yet fun dive into what all those electronics components actually do, where they came from, and what they're good for: https://www.youtube.com/watch?v=aOJuCYgmPPE&list=PLDE23FAC8A681FA46

The GrovePi kit by Dexter Industries
https://www.dexterindustries.com/grovepi/

Source code

A.T.H.E.N.A. by Tucker Craig
https://github.com/tucraig/phys-comp-final

Spybird by Ted Yoo
https://github.com/TY117/Spybird

Owen Mundy is an artist, designer, and programmer. His research investigates public space, information security, and big data. Works include mobile and web-based apps like the alternative photo app, *Mirawarri* (2017); visualizations like *Illuminus* (2015), a research-based risk analysis tool which appears in the Peabody-awarded web documentary *Do Not Track;* the online viral big data visualization, *I Know Where Your Cat Lives* (2014), which maps seven million images tagged with #cat using the locations in the metadata users unknowingly uploaded to social media; and *Give Me My Data* (2010), a tool that helps users export their data back out of Facebook. Mundy's work has been reviewed in The New York Times, The Atlantic, Time Magazine, NPR, and Wired Magazine.

10'000 Moving Cities- Same but Different, (Mobile App) By Marc Lee

10'000 Moving Cities (Virtual Reality) Photo by Camila Picolo

JOURNEY INTO PREDICTABILITY

by Yvonne Volkart

"One really does not travel in order to see and hear the same thing at every stop."
Johann Wolfgang von Goethe, 1792

"O God! I could be bounded in a nutshell, and count myself a King of infinite space …"
Hamlet, II:2[1]

Wearing a head-mounted display, I am standing in a measured-out space and navigating my way through Bern, walking around and nodding my head. I selected this city based on a world map on a display. Now I am moving through street canyons. I zoom in on façades, and hear the sounds of this city: train announcements, laughing, ringing. Then I select Perm, Ulan Ude, Seoul … What is special about these cities? Despite different languages and sound collages, they are somehow all the same: lined-up geometric cubes of varying height whose façades feature text messages, photographs, and advertisements. This is the Times Square of social media, at once clean and chaotic, transparent and opaque. Whereas in Bern, dozens of similar pizzas, explained in several languages, light up on the façades, in Ulan Ude the same attractive woman's face constantly multiplies. And while in Seoul, Zurich, or London the masses of posts are a couple of seconds or minutes old, the few of them there are in Novosibirsk last for days and weeks.

1 Hamlet, epigraph to Jorge Luis Borges's short story "The Aleph."

It is barely possible to read the messages, since they quickly disappear again, are mirror-inverted, or badly placed. Some of the statements momentarily seem to make sense, but they remain indistinct and faceless, just like all of the "individuals" whose personal preferences simply interest no one in this mass: overload instead of voyeurism. Added to this is the fact that the respective "urban public" says nothing; has nothing to say. Despite all the individual statements and faces, the people remain a faceless mass whose content not only repeats itself 10,000 times, but who plaster an entire city, clutter the world, occupy it. What is left are patterns, modulations, variations.

Life, a Data Center

The interactive web- and telepresence-based VR installation *10'000 Moving Cities—Same but Different* taps user-generated content, such as news, Tweets, images, videos, and sound, in real time from the social media networks like Instagram, Twitter, and Freesound and renders it compatible with the cubes placed in the exhibition space. It translates data into the model of a built city, thus bringing the cloud of a city into real space. The atmospherically condensed accumulation and materialization of site-specific live data, the existence of a city, can be experienced as an infosphere, as an endless torrent and chaotic condensation of apparently immaterial, globally networked data streams—and the loneliness of a searching, groping user, lost in the communications machine of others.

Marc Lee places emphasis on the loss of diversity in the world as the result of globalization. Today, cities are no longer built with local materials but with glass, steel, and concrete. He interprets these homogenized cities in the sense of Marc Augé's non-places, "which could exist all over the world without any true local identity (mostly anonymous transition zones such a

motorways, hotel rooms or airports."[2] His clean-looking 3-D installation, which uses the open source software Blender and Unreal, heightens this effect. It also brings home how strongly the software and hardware technologies we ostensibly use as "tools" engender the dominant perception of the world: structures that not only seem like a rendered piece of software, because we, permanently online, constantly see such images and "recognize" them by virtue of their reproduction, but which are, in fact, also built based on rendered models.

Of course, the inextricable entanglement of reality and its likeness or model is nothing new. As the film theorist Kaja Silverman established even before the advent of social media, people have always rendered things visible.[3] What is new is that images or, more precisely, the perpetual, immediate medialization, digitalization, sharing, and liking of the world, involves us in an unprecedented way. In the same way we, voluntarily, integrate ourselves into the dominant time and gaze regime, we are subjectivized, and normalized.

I read the homogenization of the world, and that means the reduction of worldliness, revealed in *10'000 Moving Cities* as a symptom of current biopolitics. As Deleuze demonstrated with reference to Foucault, this is based less on the repression and obliteration of the individual than on control by machine and "dividuation," the substitution of the concept of

2 Marc Augé, cited at Lee, M. (n.d.). 10.000 Moving Cities – Same but Different, Mobile App. Retrived from: http://marclee.io/en/same-but-different/

3 Silverman, K.(1997). D*em Blickregime begegnen* In C. Kravagna, ed. Privileg Blick: Kritik der visuellen Kultur (pp.41-64). Berlin: Edition ID-Archiv.

the individual with coded and thus decodable matter.[4] The fact that dividual existence is coupled with increasing hyper-individualization is only an ostensible contradiction. By possessing larger volumes of data, which first become possible by possessing higher computer performance, "individuality" can be controlled in a new, algorithmic way and "dividuated" in specific modalities and variations.

In the following, I would like to show that each of Marc Lee's virtually experienceable model cities does not only depict the real, user-generated infosphere of a specific city. Neither do they only pose the question of what the "city" is and how collective life associated with it works, based on the idea of the agora, an antagonistic, democratic public space. Rather, I believe that Marc Lee's "cities" also restage the invisible verticality of powerful data mining and the geopolitical megastructure of capitalistic computer technologies. In other words: the geometric urban models render visible and spatialize the layers and grids of data squids and computer infrastructures on which our world relies today. In the case of these 10,000 cities it is, therefore, ultimately only a matter of just one: namely the paradigmatic, cabled, and wired architecture of the infosphere. It is the symbol of our society as a data center, in which data in planetary dimensions have become the administrators of our existence while the individual is dividuated to become the producer and supplier of a resource with which a great deal of money can be made.

4 Deleuze, G. (1992). Postscript on the Societies of Control. *October 59* (Winter 1992), 3-7. (p. 5)

Vertical Data Architecture

According to the media theorist Felix Stalder, it is a "characteristic of digital technology that any action we perform through and with it takes place simultaneously on two levels: on the level of communication readable by humans and the level of data readable by machines."[5] Because it is geared toward exchange and openness, communication contains a horizontal element. Data, on the other hand, are "essentially vertical, hence that information that accumulates during each instance of communication—who is speaking with whom, where is he or she located, how long does the discussion last, what is its content, et cetera. Data "originate on a different level than the events that they generate"[6]. The aspects of communication, and elements associated with it such as participation and collectivity, were built up in the first phase of the Internet. The second phase was dominated by "the data center—a black box with industrial dimensions, capital-intensive, complex, and opaque"[7].

What remains locked in the black box is the fact that the evaluation of data means making patterns recognizable. Data mining "is not simply a technical operation," writes the mediatician and artist Anna Munster. "It is a technique that manages data perception by making data into the perceptible—data recurring as particular formations for us to see something in the already seen."[8] Munster makes reference to the dynamics inherent in

5 Stalder, F. (2014; February 14). In der zweiten digitalen Phase. *Le monde diplomatique* . Retrived from: http://felix.openflows.com/node/287. (p. 1)

6 Ibid.

7 Ibid.

8 Munster, A. (2009). Data Undermining: The Work of Networked Art in an Age of Imperceptibility. *networked: a* (networkeded_book) about (networked_art). Retrieved from: http://munster.networkedbook.org/data-undermining-the-work-of-networked-art-in-an-age-of-imperceptibility/

data mining which, on the one hand, make what is imperceptible (data) perceptible (patterns) and, at the same time, causes it to become imperceptible again (black box).

Patterns lead to prognoses that, as mathematically calculated assumptions about the future, destroy both the present as well as the possible future. These interventions in subjectification qua "population managements," which operate by means of stimuli instead of oppression, can be subsumed under the key word biopower.[9] What is meant by that is the regulation and production of dividuals, their perceptions, and their desires, made possible based on statistical analyses.

"The data provide the basis for prestructuring the environment in which people take action before they actually take action. By doing so, one gets the impression of individual freedom, although freedom only consists in selecting options that someone else made available for self-serving reasons."[10] Hence, as long as there are pseudo-options that satisfy the discretionary competence of the consumer subject, no one is bothered about this restricted control system. Benjamin Bratton also speaks of a "vertical megastructure" that is generated by contemporary computer technologies; he calls it "The Stack" and describes six different layers: Earth, Cloud, City, Address, Interface, and User.[11]

Mimetization and Automation

The display of *10'000 Moving Cities* works with the promise of freedom mentioned above: (Nearly) every city in the world

9 Ibid., 18.

10 Stalder, 2.

11 Bratton, B. (2014, March). The Black Stack. *e-flux journal*, 53. Retrieved from: https://www.e-flux.com/journal/53/59883/the-black-stack/ (p. 1)

is spread out before me. Simply select, look, and move, and I am already in another city tempting me with a "different" pizza. Moreover, a basic strategy of the installation is that it works with stereotypes: it translates one stereotype into another, the entirety "of the social media" into the totality of the rendered "city." Thanks to this translation, the scenery seems even more staged and more model-like.

Marc Lee's strategy has always been to operate from the interior of the machine—computers and their economies—and to do what machines do with artistic means. In this case this includes practicing data mining and making the patterns available. He taps the data exposed in social media networks and links them to produce an architectural pattern of moving images. The fact that in *10'000 Moving Cities* it is about pattern recognition explains why, for example, one can barely read the text messages. It concerns the basic structure, the nature of the posts to become patterns. These patterns ultimately refer not only to data technologies, but also to travel patterns, time patterns, spatial patterns, world patterns: to get around as far as possible in as little time as possible and experience as much as possible—life patterns whose optimization tasks and chains seem like the algorithmic feedback loops from a machine operation.

High-tech VR equipment potentiates Marc Lee's strategy of mimetization and automation. While nowadays VR glasses have become an everyday consumer device that makes the promise of more reality and authenticity public, the project-specific tracking interface involves a relatively large development effort. Marc Lee further pursues his strategy with the development of an app[12] that

12 Lee, M. (n.d.). 10.000 Moving Cities – Same but Different, Mobile App. Retrived from: http://marclee.io/en/same-but-different/

enables exploring the project with the aid of a tablet or a smartphone: everyone can now immerse him- or herself in the brave new world of virtual cities on their individual device and explore their "differences." Everyone has his or her own little personal helicopter. The online work *Airport Lounge* (2018), which is related to *10'000 Moving Cities*, also exposes the patterns of our "personal" movement behavior which, in turn, promotes the building of such homogenized places. Using Google Earth, one flies from airport to airport, zooms out and in from an exterior reminiscent of a militarized zone to an interior that suggests intimacy. As soon as one is at the airport, an Instagram post shows up: shadowy figures in the terminal, a cramped hotel room, or a glass of wine on a table—silent witnesses of a journey into predictability. And, in the period in which time stands still, in which the image lingers, and causes me to wait a moment too long until it disappears again and joins the continuum of the torrent of images, it hits me: what an enormous megastructure of resources, infrastructures, and greenhouse gases has to be activated in order to take a picture of a glass wine on a table.

What remains are the machine chains, the streams of images, the desire to immerse oneself in them—but also the feelings of loneliness and emptiness in the face of this obliteration of the world. What about the present in this live performance of my sharing and being shared?[13] What happens with all the desires and feelings, these machine commands and feedback loops? How might these forces be directed differently? And what can art do in the face of this, our great entanglement and helplessness?

13 Simanowski, R. (2016). *Facebook-Gesellschaft*. Berlin: Matthes & Seitz. With reference to Agamben, Simanwoski 2016 discusses the disappearance of presence and contemporaneity due to permanent recording and documenting in Facebook society.

Perhaps the title contains the answer. Perhaps *10'000 Moving Cities* means something different than I assumed at the beginning of this journey. Perhaps it is an oracle and answers paradoxically: There are 10,000 cities, there are vertical, horizontal, and transversal forces that—like in a movie theater—move or do not move us, something, the world, 10,000 times. And it is now up to us to build 10,000, a collective of streams, of dividuals that are capable of moving something—now.

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I extend my thanks to Felipe Castelbianco for the discussion.

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Yvonne Volkart lectures art and media theory at the Academy of Art and Design FHNW Basel where she has led the Swiss National Science Foundation research project *Ecodata – Ecomedia –Ecoesthetics*. The Role and Significance of New Me*dia, Technologies and Technoscientific Methods in the Arts for the Perception and Awareness of the Ecological* (2017-2020). In collaboration with Sabine Himmelsbach (HeK, Basel) and Karin Ohlenschläger (LABoral, Gijon) she co-curated the exhibition and book project *Eco-Visionaries. Art, Architecture and New Media After the Anthropocene* and participated in the *Swamp Pavilion* of Lithuana at Architecture Biennale di Venezia (both 2018). Completed research projects include: *Times of Waste* (2015–2018) and *RhyCycling. Esthetics of Sustainability in the Basel Border Area* (2010–2012). From 2009 to 2012 Volkart was co-curator at the Shedhalle Zürich. She was a core-member of the cyberfeminist network Old Boys Network OBN and writes regularly for *Springerin*.

I preferred my old skin to this one, but don't know where it went…

At any moment, my screens have sixteen different surveillance feeds, and just beyond, there's a wall of a hundred or more. I watch the intersections of avenues, the pathways through parks, the car lots in ceaseless motion and rest. I'm not watching so much as waiting—for a rip, a split, a trouble, a crime.

Yesterday, a wrinkle: On the south end of the park, two figures slowly crossed my feed, neither talking nor touching, but clearly enmeshed. They were performing for the camera, even toying with me. Perhaps it's a game for three.

One player spread his palm wide like an interrogation light, which appeared to move by its own volition. The other twisted about as it dipped and rose, thrust and withdrew. She had fallen under a spell, her head slave to the hand. Wherever it went, she followed.

Suddenly, they switched roles. Her arm grew as tall as a skyscraper; his head crooked to admire the height. She toured him from spire to foundation, until he found himself splayed on the ground.

As the game continued, their bodies grew loose, the flexible matter of designing hands. And what had seemed like a familiar conflict began to suggest something else: each had latent senses that only the other could form.

The players left the edge of my feed, and I wanted to follow.

I become oblivious to sound when I monitor. The murmur, the noise that once filled my head is replaced by the back of my brain.

Periodically, I return to the scene of the game. My camera toggles left and right, punches in and pulls back. The woman in the red trench, the loitering car, the toppled garbage bin, the biker: they may be rips and troubles, or they may be keys and clues.

A game is a formal agreement. As players, we consent to rules that build the world anew.

A game is more the polish than the mirror: less the reflection than the gloss. Its ideality, its futurity are rarely experienced elsewhere.

Yet this city is designed as if it could, by master plan alone, gloss the world anew.

How, then, to play a game in a city designed like a game?

Periodically, I walk the path of the game. I've heard this is common for monitors: gaining firsthand knowledge of a site can help one later surveil it. But my Center aims to shave minutes, not add them. A year ago, my training took two days; now applicants skill up in thirty minutes. This likely offsets the high turnover rate, though my boss claims it's preparedness for war…

The south end of the park was completed in the first phase of development. Residents of the adjoining skyscrapers have learned that the chic skins of undulating glass offer little protection from the elements, if sweeping views of the vacant lots, the construction cranes, and the ocean from which the city was reclaimed.

This place, for many, is a testament of capital's ability to dredge and clarify form. The Boston developer envisaged a sister city in the east and built this park as its Common. A tourist ferry crisscrosses the artificial river, driven by a man who once fished on that very spot.

In 1887, a writer imagined utopia as Boston in the year 2000. In 2001, a Boston developer began work on a project of comparable ambition. There the connection ends. Ours is not a salve for the ails of contemporary capitalism, but a prototype for industry to come: ubiquitous city-building as a service. Its planners have solved the problems of the social by excluding them from the master plan.

Looking east, I can see the final skyscraper of the parkview row, an eyesore of squinting windows and white concrete. There's talk that the builder strayed from his original design, of trouble among the city's partners, causing some unceremonious exits in recent years. But one doesn't need much to know that concrete is cheaper than glass; indeed, since the global financial crisis, new construction embodies this fact.

Westward is my Operations Center, a tower that jags and cuts the sky. At this moment, a colleague could be watching, waiting for a wrinkle…

The moment I leave the Center—on the thick of my thigh, or against the drum of my knee—I'm typing. Under the table at dinner, on top of my bedsheets: I'm typing. My eyes never lose their insect enhancements; I see sixteen, a hundred screens (or more) from one edge of the day to the other.

Periodically, I consider the form of the game. Nobody won, and nobody conceded. It had no beginning, middle, nor end.

A game is more a contract than a mirror: less reflection than regulations. To design a game for critical play, its very terms must be open to change.

My city is designed as if it, too, could regulate the world anew—but there the connection ends. Empires, after all, can rise and fall, yet their games often persist. They're trivial and slight; insignificance is their greatest strength.

Someday, the city will turn back into sea, a sunken museum of technologies past. We will move slowly on a glass-bottomed boat, making our hands into metaphors.

U By Tyler Coburn
Video (TRT 39 minutes),
reupholstered chairs, chair carts
(detail: video still)

U By Tyler Coburn (detail: video still)

SENSING THE SMART CITY – IN CONVERSATION WITH TYLER COBURN

by Linda Kronman

Tyler Coburn, an artist and writer from New York, spent a summer in the South Korean smart city Songdo. From his experiences in the city, including interviews with control room data monitors and supervisors as well as workers from the Posco steel company who were among the first to move into the city, he produced *U*[1]. *U* is a mixed media installation consisting of a video, reupholstered chairs and chair carts. In the video we can observe scenes from a staged Gestalt psychotherapy session. In the work Coburn draws parallels between The Internet of Things, smart city rhetoric, and how the self is conceived as an expansive network in Gestalt therapy. We start our conversation talking about Coburn's artistic research practice and how different threads of investigation into charter cities (free zones or development regions with more market-friendly jurisdiction than the hosting state) took him to Songdo in 2014. Further on we discuss how Songdo can be seen as both a success and a failure, and how bureaucratic the process of interviewing the data monitors turned out to be. During our talk Coburn also reflects on the incompleteness and the premised futurity of a smart city.

Linda Kronman (LK): The thematics of your artworks are often complex and require intense research. Could you elaborate on how you choose your topics and how it shapes your artistic research?

1 Coburn, T. (2016). U. Retrieved from: http://tylercoburn.com/u.html

Tyler Coburn (TC): The topics, project to project, can seem quite different, but the research I do for one often seeds the next. For instance, at the end of my graduate degree, I was looking into new city models that Silicon Valley technolibertarians were trying to produce, such as seasteads in the ocean and charter cities in countries like Honduras. The Honduran Congress even passed a constitutional amendment allowing for the construction of such cities, prompting a Honduran delegation to visit Songdo, which was seen as a model of contemporary city planning. Thankfully, the constitutional amendment was eventually overturned and the cities were never built. As my research about Honduras came to close, I turned my attention to Songdo.

LK: I am especially interested in the research conducted in Songdo. Would you like to talk a bit about how you experienced the city?

TC: Songdo is both compelling and quite banal. On the one hand, I understand how ubiquitous technology potentiates expansive forms of surveillance and capture to repressive and even sinister effect. On the other hand, what has been constructed on this landfill in Incheon is a bland garden city.

Songdo wanted to be a cosmopolitan hub, which happened to be in an economic zone in South Korea but was really facing outwards. It's "the closest city to the world," as one advertisement I saw put it. In my interviews with members of different companies building the city, I learned about its attempt to operate as such. For instance, in the early years, tax incentives were only extended to foreign businesses; however, given that Songdo was an untested enterprise, and that Korean economic zones are more stringent than those of certain nearby countries, the businesses never arrived en masse. Finally, in the wake of the global financial crisis, these incentives were extended to Korean companies as well.

Western journalism often focuses on how Songdo is a failure from a business perspective. Some articles even suggest that it's a ghost city. What I actually found, from the weeks I spent living there, is that Songdo isn't much of a cosmopolitan hub but is successful as a residential city, primarily catering to upper-middle and upper-class Korean families. Sure, there are still overgrown lots waiting for skyscrapers that may never be built, but when you look closely, you'll see that many have been turned into ad hoc gardens by residents. I was struck by the difference between the proposed and actual uses of this place.

LK: During your visit you also conducted interviews with data monitors. In your artwork *U*, the interviews are adapted into a video installation. Can you briefly describe the artwork and what you observed in the meetings with these workers?

TC: Sure. In addition to urbanism, I'm interested in how human psychology and the psyche are being put to work, and how constructs of selfhood, subjectivity, and personhood are interpellated by different fields of labor. Songdo is an interesting case study on these fronts, as it feels as much like a built environment as a new type of sensorium, subject to integrated forms of machinic observation, sensation, and capture. For this reason, I began to focus on the people monitoring the sensory data generated by the city, who work in the Integrated Operations Center. From one perspective, these people are not that different than surveillance monitors working in other cities, but because of the ideology of the smart city and its integration of technology into every tier of urban design, I found the nature of their labor to be rather unprecedented and thus important to study.

My visit to the Integrated Operations Center was difficult to arrange, and I'm grateful to scholar Orit Halpern and curator Doo Eun Choi for helping to make it possible. In fact, though Songdo is a city in an economic zone, I had to go through

governmental channels to gain access. I also had to submit my questions for the monitors in advance, which mainly focused on their sense experience on the job and in the city. For example: Which parts of their body get most tired? Which do they forget? Does the experience of surveilling the public spaces of the city change how they physically move through those spaces?

The visit didn't go exactly as planned due to some miscommunication. Instead of spending time with the monitors, the questionnaires were distributed to them after the fact, and I spent most of my visit talking with the facility supervisors, who were extremely interesting. One of them had built a similar operations center in another Korean city and had a wealth of things to say about the topic. He was also candid about the problem of employee retention, as the monitoring work was demanding, exhausting, and a bit boring. He had considered offering free therapy for employees, which inspired the direction that my video *U* took.

LK: In *U* one of the characters becomes a smart building: "I am a very smart building, but I'm incomplete." I felt that this part of the therapy session reflects on the contradictions between the promise of the technoutopian city and the reality in which the citizens are living. Could you expand on this by describing your impressions of the smart city vision in contrast to its "incompleteness"?

TC: That line was inspired by the apartment where I stayed in Songdo, which belonged to a family friend. She was living in one of the first smart apartment compounds built in Songdo, so all of the smart technology was out-of-date, and you could really tell. If I wanted to dim the overhead light, I had to stand at the wall console and press the screen for a good minute. And if I was using too much water or energy, the console would let me know. It was like having a nagging uncle in the room constantly reminding you what you should and should not be doing.

Stepping back, this anecdote begs the question: If one buys into the idea of living in the future, then when is the future? This is the temporal dilemma of Songdo, a futuristic smart city where you can already see generations of technological futures rolled out in different iterations of building design. So the "incompleteness" is the gap between wanting to buy into the future and feeling either like it has not fully arrived or that there are better futures arriving for your neighbour in the newer building across the street.

Songdo's master plan was supposed to be built out and completed by 2010, then 2020, and now—who knows when? What you see in the city, in its current form, is not just a practical gap between the master plan and the built environment, but a temporal and epistemological gap of a city that is premised upon an idea of futurity that can never fully arrive nor ever really be complete.

LK: So the technology always becomes obsolete before people are able to move into the smart buildings?

TC: Exactly! The future never arrives when one expects it to, or the future has passed before one realizes that it has arrived.

LK: In the beginning of this interview you mentioned the charter city case in Honduras that you followed. You have also written about the "city-building business" in your text *Charter Citizen*[2]. Smart Cities, especially examples of greenfield urbanism such as Songdo or Masdar, are built and owned by companies. How do you think life in a city is shaped when it's governed by private companies?

2 Coburn, T. (2014). Charter Citizen. e-flux journal, 52. Retrieved from: http://worker01.e-flux.com/pdf/article_8978426.pdf

TC: Part of what fascinates me is that Songdo's builders see it as both a city and a prototype for a model of city building—for cities that can be scaled and built elsewhere. To visit the city is thus to stand, at one and the same time, in the thing and the model for the thing. When I visited the Integrated Operations Center, I sat in a viewing room partly designed for foreign delegates, like the Hondurans, who would come curious to see how the city works (and if they wanted to replicate it in their home countries).

Honestly, I don't feel like I spent enough time in Songdo nor did enough research to be able to answer your question properly. And I think it's a very important question. I will say that I was surprised to learn that Songdo's Integrated Operations Center was governmental, not private. I guess I had assumed that, in a city that places such faith in private planning and technocracy, governance would be a mere appendage—or governance would be approximated by the management of life by big data. I don't know. Songdo is a public-private model, but it likely foreshadows even more privatized cities to come.

Tyler Coburn is an artist and writer based in New York. He received a Bachelor of Arts in Comparative Literature from Yale University and a Master of Fine Arts from the University of Southern California, Los Angeles. Coburn's writing has appeared in Frieze, e-flux journal, Mousse, Art-Agenda and Rhizome, among others. His performances, sound works, and installations have been presented at the Whitney Museum of American Art, New York; South London Gallery; Kunstverein Munich; CCA Glasgow; Objectif Exhibitions, Antwerp; CAC Vilnius; LAXART, Los Angeles; and SculptureCenter, New York.

Smart Recycling Center Photo by Binna Choi

Smart trash bin with IoT sensor Photo by Binna Choi

SMART CITIES AND SMART WASTE – IN CONVERSATION WITH BINNA CHOI

by Linda Kronman

South Korean artist and activist Binna Choi is a member of the collective UnmakeLab that has been following the developments of Korean smart city initiatives such as Songdo for over a decade. Her special focus has been on artificial nature and "smart" waste, topics that she covers in artworks and publications. In our discussion we talk about UnmakeLab and the research that she did for her works *Generic Nature*, a book and a video installation about the The Four Major Rivers Restoration Project in South Korea.[1] *Generic Nature* is a work that critically examines what Choi calls "ecological gentrification": showing how programs regarded social or ecological are reduced to "green background or green alibis" to increase land value. Further on, we discuss the collaborative *Summer Research lab: U-city Songdo*, our visit to the most famous smart city initiative in South Korea.[2] Finally, we conclude by trying to understand the core of a smart city through "smart" waste, a topic Choi was researching for her *Smart city and garbage bin, a bright future for all* zine[3].

1 Choi, B. (2012). Generic *Nature*. Seoul:mediabus. ISBN 978-89-94027-47-0 90600

2 Kairus. (2017, August 1). Summer Research lab: U-city Songdo IBD, Korea. Retrieved from: htttp://kairus.org/summer-research-lab-u-city-songdo-ibd-korea/

3 Unmake Lab. (2016). *Smart city and garbage bin, a bright future for all.* Retrived from: https://www.slideshare.net/disco-tech/zine-uplaod

Linda Kronman (LK): Together with Sooyon Song, you are working as the artist/activist collective UnmakeLab. You also run a space in Seoul of the same name, which is a maker, artist, activist community in Seoul where people can connect to make anything in the context of politics, marginalized labor, technology, urbanism, art, and activism. Tell me a bit more what UnmakeLab is and does?

Binna Choi (BC): Actually we have an interest in the technological society, especially things that went missing when Korean society changed from the industrial era to an information technology society. Therefore we are trying to open a public program for artists, hackers, activists and normal people to try to find their perspective into these changes. I want to find something important in their perspective, that's why we try to open our processes, organizing research labs and public programs like exhibitions and events.

LK: Korean companies such as Samsung and LG develop a lot of technologies and the 4th industrial revolution including Internet technologies, creative industries, automation and self-reproduction is often mentioned in a Korean context. Can you talk about what it means for the Koreans?

BC: Yes, it is quite hard to explain because there is a very strong Korean context to the 4th industrial revolution. Korean society just follows what happens or what is offered to us. That is what Koreans do. It is the same with the technological era. The 4th industrial revolution is another thing that people have to follow, we have to achieve it without any critical thinking.

LK: So a lot of top-down decisions on things?

BC: Yes, the government decides on policies and we citizens have to follow. There is no space for critical thinking, to rethink whether or not these technologies are really helpful for our lives? Do we really need this new technology or that new technology? We don't have time to think about that, just to follow along as we are directed. UnmakeLab suggests that we need to stop and think. We are an artist group and, of course, the top-down power is really strong so we cannot make any changes, but we want to create a small autonomous space for people who want to think and talk about it.

LK: You have been critically reflecting on the development of smart cities in South Korea and followed how Songdo has been built as part of the Incheon Free Economic Zone west of Seoul. You have observed, over time, how a fishing village turned into a smart city showcase. You have recorded the development of Songdo in the book *Generic Nature* that you have also exhibited as an installation with complimentary video footage. Could you share some of the observations you have made while working on this project?

BC: My initial interest was nature: artificial nature. Actually my basic interest is not in the smart city, but more in the mind and philosophy of "smart" in this society. So, this means it includes every other creatures and species that are installed in a city under the smart policies and philosophy. My interest was not the smart city itself but through the long period of research I found that the artificial nature in Songdo are smart devices in some meaning. There were fishermen there in the marshland where the sea was reclaimed to create land to build the city. There is a deer cage in the central park and these deer are "smart" devices that are planned and planted in the city. They are not "native" in the surrounding. Through the research I found what the meaning of smart in this area is. Nature, animals were installed in Songdo, like items in a game environment.

LK: When I visited Songdo with you the smart city showroom was full of buzzwords such as greenness and sustainability. How can this be read in a Korean context?

BC: Also eco-friendlyness, that is all part of the smartism and how it is promoted. I started my researched about Songdo in 2008, so already 10 years ago. I observed the changes of the city and it failed in its initial purpose, just a city for middle-class. It was called "u-city" in Korea before but they changed the name from new to smart city, and they tried to create a new vision of the smart city. Even though they talk about the participation of people and the other values of smart cities, they didn't talk about the purpose of the new city of Songdo. We need to talk about that because it happened in the past and it will happen again.

LK: So there were not really any citizens involved? Were they planning the city for imaginative citizens?

BC: This is true, they were also talking about citizens participating in new cities like Eco-Delta City in Busan. But I don't think they have, even if Eco Delta is different from a smart city like Songdo, they still don't have any chance to research city issues, they just make a showroom that looks like that citizens participate.

LK: Do you think Korean citizens would be eager to participate and are there platforms of participation in general? And are Koreans used to participating in grassroots level activities, like demonstrations?

BC: They would participate if they think that they are going to loose their money. Like with the smart trash-bin issue[4], some citizens made it an issue because they lost their money. They bought an apartment and in the housing fee is the trash-recycling fee included. So since the recycling is not working well they wanted to have their money back since the housing prices were much higher. This doesn't mean that they are thinking critically about the system, they just lost money and want a refund. However, this does not mean the essence of Korean citizenship. Citizenship in Korea is sensitive to democracy. This desire for democracy can be seen from the resignation of the president through the recent civil revolution. Korean citizens are highly conscious of political democracy. But when it moves to techno-political issues, the story is different. There is no accumulated discussion about it. I think it will take time. And on the other side, there is another problem embedded in the Smart Cities itself. Smart City is a concept that makes citizens work as consumers. As we saw earlier with the smart trash bin, there was no civic process of why it should be installed. So when problems arise later, it directly becomes a consumer movement. I am worried about this nature that is embedded in Smart Cities that there does not occure a citizen debate but it only causes consumer movement.

LK: Now we are getting to the topic that I wanted to discuss with you – Trash. Waste management is a part of the smart city business and you have been researching into its innovations and failures. You often publish your artistic research in

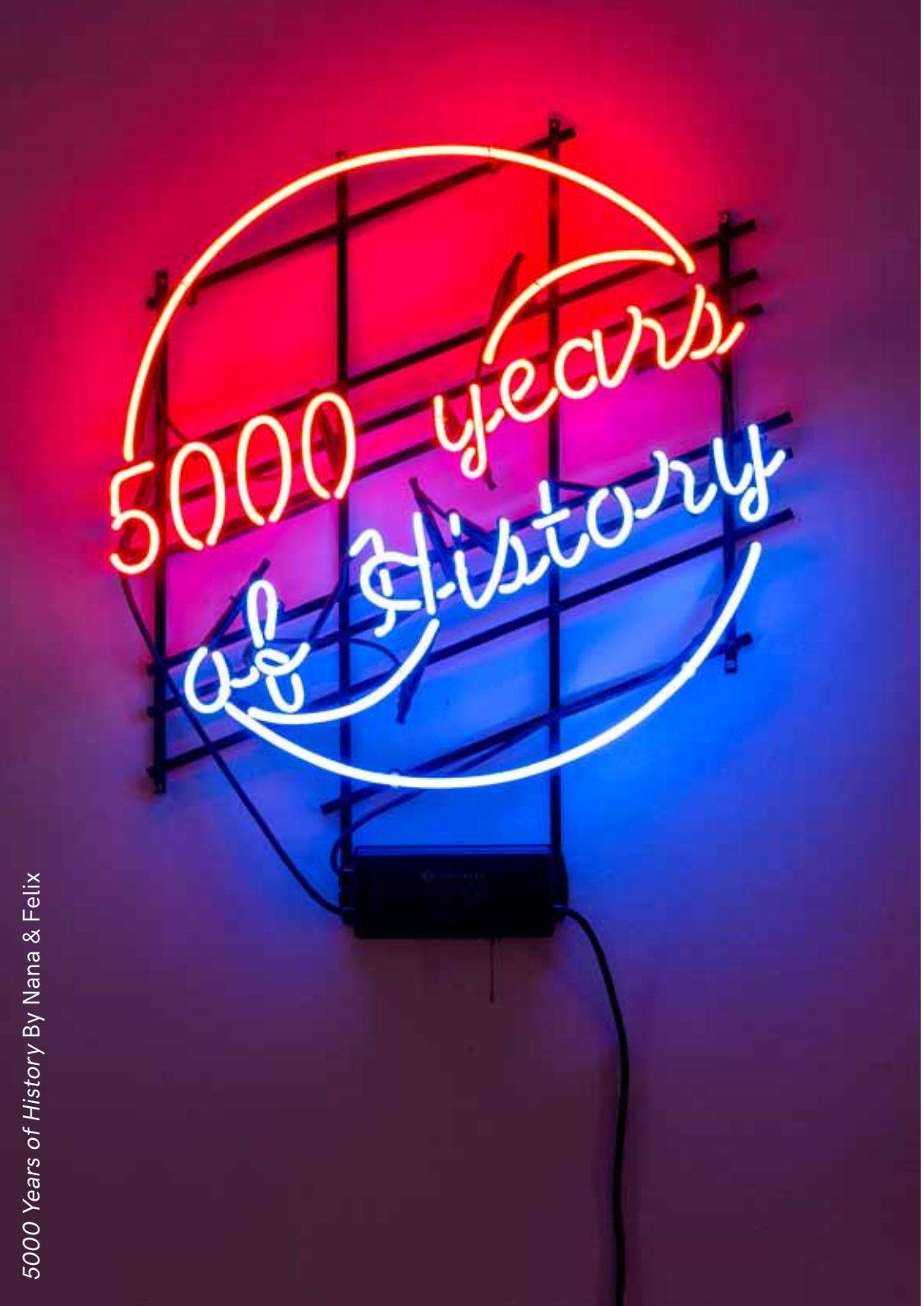
4 This refers to Songdo's Automated Waste Collection System. A underground system of pipes in which garbage is sucked directly from people's apartments into the a waste collection plant. The waste collection syste was designed to eliminate garbage on the streets and the need for trash trucks.

a zine format. In the *Smart city and garbage bin, a bright future for all* zine you present a wide range of technologies that are connected to waste management such as the pneumatic waste management system developed for Songdo by the Swedish company, EVAC, and all the different kinds of versions of "smart" trash bins. I would be interest to hear your conclusions from this research?

BC: I think this also connects to the DIY (Do-It-Yourself) and the maker culture. There are so many "smart" trash bins connecting a lower level of DIY to an upper level of government policies and social infrastructures. So it is a really interesting device. It connects various levels and contexts in this era and the bins have some technopolitical empowerment in their abilities as well. The smart city and the "smart" trash bin have similar mechanisms: sensing data, generating data, sending it to control centers and generating feedback. So the trash bin is a compact version of the smart city. Songdo is a totally ubiquitous city, in those kind of cities smart trash systems are hidden in the city infrastructure. I chose to work with the "smart" trash bin because people think that the smart city, itself, is too big of an issue, but a "smart" trash bin is a small device and therefore more approachable. That's why I chose this device. I think you can understand the smart city through the "smart" trash bin.

Binna Choi is an artist, activist and a member of 'Unmake Lab'. Unmake Lab is engaged in alternative education programs, research and exhibitions to understand the technological society. She is interested in researching and recontextualizing the interrelations between human, technology, nature and society. Her main agenda is to understand what changes are being made by shifting towards a technological society and what is missing or strangely born from those changes. As part of that, she is sharing ideas with people through open research projects and temporary art & technology labs. Currently, she is working on a bigger research about korean technology culture that was mediated with Kits between the 1960s to 1980s, and she is also conducting research on how Smart City and IoT initiatives are changing cities.

Six-panel Folding Screen of the Moon, Sun, Five Peaks, Apartments and Motorways By Nana & Felix



5000 Years of History By Nana & Felix

SOUTH KOREAN HOMES, NEIGHBORHOODS AND CITIES – IN CONVERSATION WITH ARTIST DUO NANA & FELIX

by Linda Kronman and Andreas Zingerle

Nana and Felix are a Korean-Finnish artist duo focusing on errors and symptoms derived from the leftovers of the ongoing South Korean modernization process. In their artistic research they reflect on large-scale high-rise housing developments and entirely new cities that were built under government-run programs. We started our conversation talking about their artistic practice and their recent project *WEAST*[1] that include among others artworks such as *You Are Where You Live*[2], a series of calligraphy works consisting of "high-class" brand names of apartment buildings written out on traditional Korean silk scrolls. The artwork highlights that the branding of the apartments is what differs one building tower from another, whereas the majority of new apartment construction in Korea follows the exact same construction techniques and designs. Another work from the series is *ImpeCable lifestyle*[3] an installation staging a Korean housing gallery mirroring the industrially-produced housing interiors. Further on we continue the conversation around real-estate and smart cities discussing experiences and observations the artist duo had when working with the project *Let There Be*

1 Nana & Felix. WEAST. Retrieved from: http://www.nana-felix.com/weast/

2 Nana & Felix. (2017). You Are Where You Live. Retrieved from: http://www.nana-felix.com/weast/you-are-where-you-live/

3 Nana & Felix. (2015). ImpeCable Lifestyle. Retrieved from: http://www.nana-felix.com/expat-immigrant/impecable-lifestyle/

Motorways.[4] We also discuss in more detail their artwork *New City*[5] reflecting on the aesthetics of the imaginary and real smart city Songdo. We conclude our conversation by discussing the non-sentimental attitude Koreans have towards the builds, destruction, and rebuilds of their urban landscapes, also a thematic in their artwork *House of cards*.[6]

Andreas Zingerle (AZ): South Korea can be seen as a beacon of democracy in east Asia, recent developments include the peaceful impeachment of former president Park Geunhye, the at least temporary imprisonment of "chaebol" vice chairman Lee Jae-yong (Samsung electronics), and diplomatic harmonisation efforts between North and South Korea. In your recent project *WEAST* you deal with peculiar realities in modern Korea: a weird mix of cultural appropriation and cultural toadyism. How do you perceive ongoing developments in Korea and how do you translate your observations in your artistic research practice?

Nana & Felix (N&F): Well, Nana's parents lived in a big apartment complex constructed by Korean steel giant (and chaebol) POSCO, one of these high-rise buildings that are so typical of the Korean urban landscape. The name of the apartment was POSCO The Sharp Lakeside, and it overlooked a small, artificial lake. Some years after the construction was completed, the small forest behind the apartment was plowed down, making way for yet another POSCO apartment complex. POSCO Lake City, as it was named, entirely blocked our view and access to the lake. This anecdote is a good example of how we work, always drawing from personal experiences trying to touch on larger issues – this little story was translated into on of our works, *107-1502*[7].

Based on our experiences we try to understand the overall cultural situation, and we have a certain understanding of how society works in Korea but, if we want to translate them into an artwork, we have to make sure that things are in order and the factual parts stay as facts. We do quite a lot of research in historical texts, news articles with adjacent commentaries and other people's experiences, as well as a lot of other Korean artists who work with similar issues. Korean traditional art history plays a big factor too, as we try to establish (mostly ironical) links between the past and present. There is a big and ruthless industry that is very fast and efficient in building these high-rise apartment buildings. The research and practice is very simultaneous, constantly influencing each other. We try to give our findings a visual form that is as straight forward as possible, nevertheless aesthetics remain a very important part of our work. Even when our work touches upon social or other issues we approach the subjects through aesthetics. This is both because we believe that this is the most practical way, but also because we like aesthetics!

When you change a landscape, it is a very aesthetic process; it is nearly impossible to not work with aesthetics in this context. When you look at the apartments they are very uniform and, funnily enough, not really that different from the North

4 Nana & Felix. Let There Be Motorways. Retrieved from: http://www.nana-felix.com/lettherebemotorways/

5 Nana & Felix. (2015). New City. Retrieved from: http://www.nana-felix.com/expat-immigrant/incheon-free-economic-zone-2015/

6 Nana & Felix. (2016). House of Cards. Retrieved from: http://www.nana-felix.com/expat-immigrant/house-of-cards/

7 Nana & Felix. (2016). 107-1502. Retrieved from:http://www.nana-felix.com/expat-immigrant/107-1502/

Korean ones. We try to understand how Koreans think about this: very uniform aesthetics, following a certain trend, starting with the tower blocks which, themselves, are based on a Koreanized idea of how westerners live. But nobody ever defines who these westerners are. In Korea, the term "Western" has a weird, never exact, definition; it has a very positive connotation, mainly referring to American culture, but nowadays increasingly European. The whole industry of high-risers originates from an imagined western lifestyle.

Linda Kronman (LK): Like luxury skyscrapers? For a lot of westerners these tower buildings have, in contrast, an association with the past, with a kind of communistic or post WW2 communal living.

Felix (F): Yes communistic; they also look like ghettos. There is one photo series we did, called *Real estate*[8], that compares the high-risers in Apgujeong, one of the most expensive and elite neighborhoods of Seoul, Korea, to Bellvitge, one of the poorest neighborhoods on the outskirts of Barcelona, Spain. When you walk through Apgujeong, and look with foreigner's eyes, it looks like somewhere you are likely to get stabbed and raped, especially at night. In contrast to its aesthetics, it is a neighborhood of celebrities and millionaires, with valet services and concierges – you can only dream of ever having enough money to afford to buy property there. This visual-aesthetic contradiction raises intriguing questions on both cultural differences and value creation.

8 Nana & Felix. Real estate. Retrieved from: http://www.nana-felix.com/expat-immigrant/real-estate/

Nana (N): When we started investigating we realized that this has more to do with Sadaejuui, or "toadyism," a word that Korean people are very well aware of. Saadaejuui means, roughly, service to the great buy the small. The tendency of accommodating, appropriating and copying cultures that Koreans perceive as more advanced is not a new phenomenon. Back in the Joseon Dynasty[9], there were certain intellectuals who thought that in order for Koreans to be more resistant to Chinese influence they had to open the door to western ideas. Well, it went a different direction than our ancestors wanted to.

F: Korea doesn't carry the colonial baggage that a lot of European countries do, so there is a sort of freedom to freely appropriate and copy whatever from wherever, which kind of makes it heavier and uglier. But this is a tricky topic and people easily oversimplify things. To actually pinpoint where it is appropriation or lending or where it is just the world running its course and we get impressions from different places is very difficult to distinguish. And it is always a matter of whose perspective it is. In Korea, it seems that they just don't care, everything and anything goes. It is just this weird in-between of following and blindly taking up. I could also observe that they appropriate it in a weird kind of way, as there is no real concern for what the original ever was. So is even really appropriation? I don't have an answer, I just find it really interesting to observe.

9 The Joseon dynasty lasted for approximately five centuries. It was founded by Yi Seong-gye in July 1392 and was replaced by the Korean Empire in October 1897. Wikipedia contributors. (2018, December 4). Joseon. *In Wikipedia, The Free Encyclopedia*. Retrieved from: https://en.wikipedia.org/wiki/Joseon

LK: So the big construction corporations have a lot of power because they design and in the end decide how Koreans are living.

F: The beginning of this is not sinister, even though from my perspective the present is quite so. The construction of the Apartment complexes started at the same time, around late 50s, early 60s, as social housing after the Second World War in Europe. The interesting part is what happened next. Whereas in the West social housing early on caught a bad reputation, and turned in to slums, in Korea it became the most desired way of living. You could even say that the social housing dream of Europe was successfully realized – only on the other side of the world.

N: The father (Park chung-Hee) of our previous president (Park geun Hye), really believed that the old living traditions were antiquated and started the modernization process of the entire economy – housing included. He entrusted a lot of power as well as national resources in the hands of a few, handpicked companies (some of which later evolved into the mega chaebols we know today) to carry out this modification of the entire landscape[10]. That's where Samsung and Hyundai come into play. Back then Koreans got rid of a lot of old

10 Park Geun Hye's father Park Chung-Hee served as the President of South Korea from 1963 until his assassination in 1979. While some credit him for sustaining the Miracle on the Han River, which reshaped and modernized South Korea, others criticize his authoritarian way of ruling the country and for prioritizing economic growth and contrived social order at the expense of civil liberties. The Park government rewarded chaebol (large South Korean industrial conglomerates such as LG, Samsung and Hyundai) with loans on easy terms of repayment, tax cuts, easy licensing and subsidies. Wikipedia contributors. (2018, November 26). Park Chung-hee. *In Wikipedia, The Free Encyclopedia.* Retrieved from https://en.wikipedia.org/wiki/Park_Chung-hee

houses, there was little or no regard for beautiful and historical houses anymore. Property speculation started and people thought it was a good thing to make money out of it. Koreans in general seemed to be very eager and focused on making money. Individuals were ready to sacrifice the past so that the entire nation could have a very fast profit.

F: The way they built got much faster but, as a result, the quality decreased. It's not that different from what happened elsewhere. In Finland, for example housing is built in a equally poor way, but the properties are constantly maintained. This notion doesn't really exist in Korea. It is all about progress, and that means new. Renovation doesn't really exist as a concept. When any building gets old, it's knocked down and a new one is built in its place.

LK: Korea is quite a technocratic society: technological development and progress is pushed by dominant family companies that run the Korean economy; the "chaebol" companies, such as LG or Samsung. Korea has been very keen on being a forerunner in the smart city business and therefore I want to talk about your project in Songdo. In the *New City* artwork, a 2-channel video installation, you compare the official imagery of Songdo, created by the Incheon Free Economic Zone (IFEZ), with your documentation of the areas of day-to-day life. the work is contrasting a perfectly designed city with its reality. Can you elaborate about the issues you observed when creating and exhibiting this artwork?

N: There are hardly any critical voices against these new city developments. It is hard to find any Korean who sees the issue in a negative or critical way. When we talk about these issues, Koreans can get offended because it can easily become a nationalistic issue, and then Koreans feel attacked and offended. Even when you talk about it with friends, there is a great sen-

sitivity, and they can take it very personally. So most people like the "Free economic Zone" with it's eco, green and LEED certification, all this words sound really good when you don't question them. They fit with the view that Korea is a modern and global leader.

F: I specially like the use of the term eco because you can put it on nearly everything, a car with eco label on and maybe painted green is less polluting, right? What happens in Songdo is that as long as it looks good on the outside it's good. It is very much about "us looking good as a nation" and, therefore, most Koreans are happy.

N: Songdo still remains a "gold" city. IFEZ wanted to attract a big population to settle there, but we all know that is not how a city works. Our approach was very aesthetical, basically because the entire city looks like an advertisement picture. The whole place is a façade, adorned with the slogans and the central park in the right places. The marketing and corporate image is really coherent with everything we should find cool in this day and age. They market the city as entirely walkable, but the distances are so big, windy and cold half of the year that pedestrians mostly shine with their absence. A big chunk of Songdo has already been completed built, but the streets are still empty and it doesn't feel like that there are people living there.

On a visits to one of the many housing galleries (temporary constructions where the different apartment-modules for sale are displayed) we overheard a conversation between a young couple: "This flat here costs that much? We can get a similar flat in the center of Seoul for the same price." They also try to attract foreigners to the area through tax incentives. If a foreigner acquires property in Songdo he/she is tax-exempt for ten years. So there is a lot of tax evasion and speculation going on.

L: Songdo is promoted as Korea's showcase of a smart city. They have implemented a lot of new technology there and the high-tech innovations they want to sell to other cities. How do you see the technology coupled with real estate?

N: Before we go into that... two months ago there was breaking news that Songdo residents were complaining about this unknown decaying smell that was coming from the underground. Authorities said they didn't know its source and the resident's thought that the decaying smell came from a gas leak. Others thought that the waste disposal system was clogged or trapped seawater and decaying sediment, as Songdo was built as a landfill on top of a a mud field in the sea. The smell just went away so, clearly, someone seemed to have solved the problem. In general, I have a hard time swallowing the whole smart city package.

F: Technology is not our main focus area, but then we come into the question of smart city property, which is very different. The smart city definition is a slippery thing. According to its proponents it's a way of improving everyone's life through the application of technology into the city's structure. According to critics of smart cities it is about social control of people, something that is already present in today's Korea and which people here seem to quite enjoy. For example, the whole traffic system in Songdo is surveilled from a central control room where they can see and control everything. It is easy to become a critic of smart cities if that is the way we are going, which is definitely what is happening in Korea. How these developments work in Europe or somewhere else might be a different thing. For me it feels like the true potential is buried under more of the same marketing nonsense and quick profits. Smart City sounds and looks really cool, you can sell it flashy and tear it down some years later and build it again.

AZ: Korea's unofficial national motto "Hongik Ingan" was coined by Dangun, the first ancestor of all Korean people. It can be translated to "Benefit Broadly in the Human World/ devotion to the welfare of Humanity." One of many manifestations of "Hongik ingan" is seen to be an outward and forward-moving orientation, like the much vaunted entrepreneurial spirit and global mindset of the Korean people. In your project series, Let There Be Motorways, you question Korea's constant striving for progress by focusing on the Korean housing-landscape. Korea went a long way from the traditional "Hanok" housing to smart city initiatives such as Songdo in Incheon or Eco Delta City in Busan. Constant progress seems to be top ranked on the national agenda. Do citizens endorse these developments? What did you find out in your research?

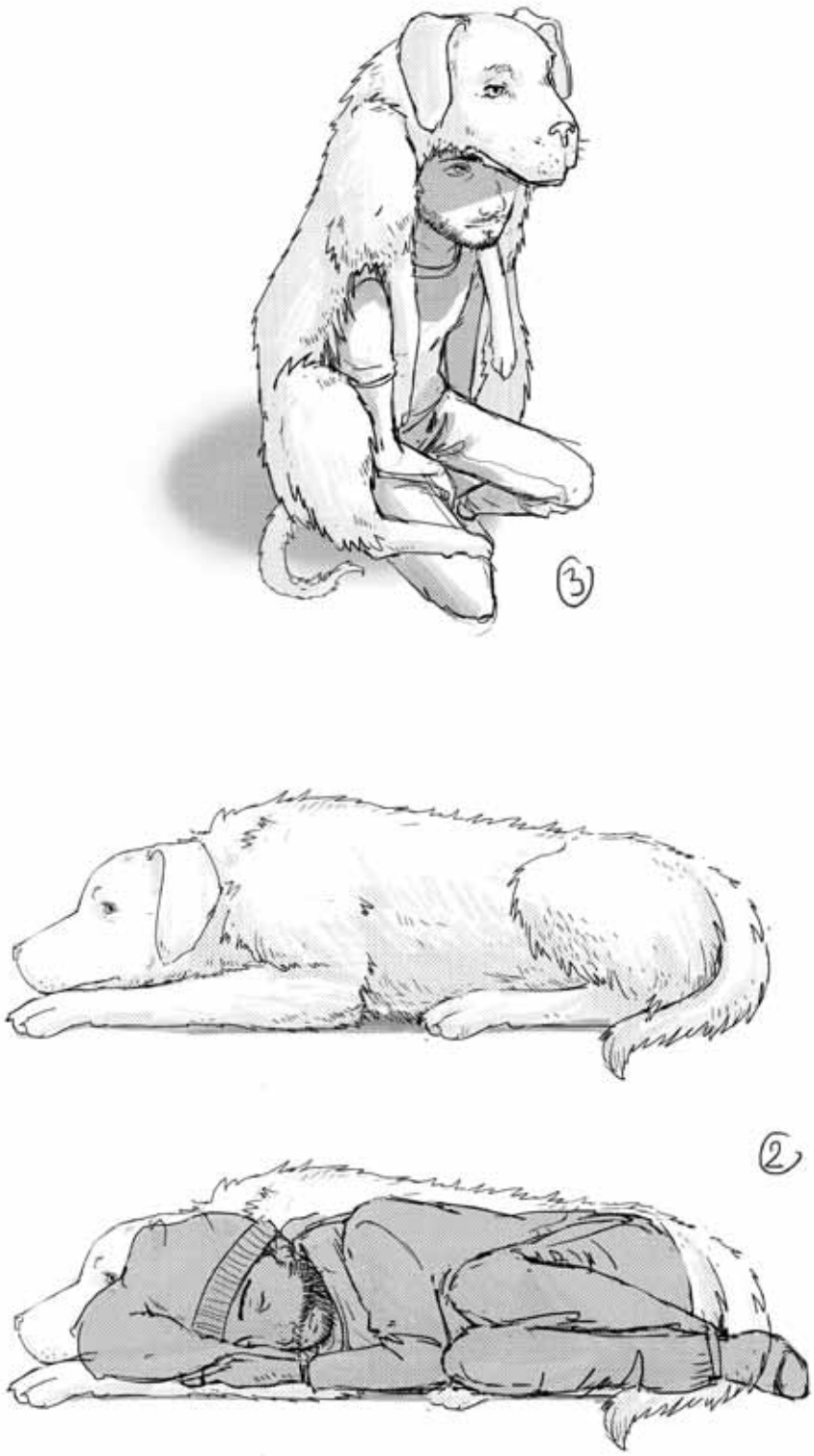
N&F: We think the majority of Koreans actually really like the idea of smart cities and other urban redevelopments. Generally Koreans don't see the problems that we see and this can be frustrating sometimes. There are those who do understand our approach, but they are very few and far apart, while the majority are asking: "why do you go on about this?" Many get insulted by us questioning Korea, and ask questions like: "So who cares? We have to develop things else there is not enough resources and land for everyone." Whereas these are completely valid questions, we still think that it is always healthy to be critical.

F: A good example, for me, would be the community centres of neighborhoods that are about to be bulldozed. To date I have never seen one that would fight for the preservation of the neighborhood. The banners, slogans and movements are always about how to collectively organize so as to ensure the biggest possible profits of the sale of the properties to the redevelopers. I find this fascinating and rather sad at the same time. The older neighborhoods in Seoul were built in the 60's, so people have been living there for over 50 years. Even so there doesn't seem to be any will to preserve, any sentimental feelings about their neighborhood. In the end I guess the cultural gap is too much for me to grasp.

N: We are talking about big areas where large companies are competing. From time to time newspapers cover stories about these companies bribing residents and corruption that happens alongside these big redevelopment projects. It seems that citizens like their neighborhoods, but making money is just more important.

Nana & Felix (Hwanhee Kim b. 1980 and Felix Nybergh b. 1985) are Korean-Finnish artist duo, working together since 2012. They met during their MA studies in Photography at Aalto University where they both graduated in 2014. Originally trained as a painter and a photographer respectively, together they carry out projects in a wide range of different media. The main focus of their work has been on understanding the ways in which images are constructed, and more importantly the role the images play in constructing the surrounding social and cultural environment in which they live and work. Since 2013 Nana & Felix's solo exhibitions have been shown at Hippolyte gallery (FI), Gallery Doll (SK), Galeria H2O (SP) among other galleries and centers in Finland and South Korea. The duo has also participated in numerous group exhibitions and art festivals, including Suwon Art Centre (SK), Mänttä Art Festival, Artists Residency Festival (SK), IHME Contemporary Art Festival (FI).

As the symbol artifact from Autarchic Communities logic, Filterbook are smart glasses working as augmented blinkers. They help you to filter your visual environment by "masking" elements that are not part of your community of the moment. Photo by Bastien Kerspern



Sons of Kyôn By Bastien Kerspern

CRITICAL AND PLAYFUL MITIGATION: TACKLING SMART CITY CONTROVERSIES WITH FICTIONS AND GAMES

by Bastien Kerspern

Urban f(r)ictions

Since its beginnings, our design studio, Design Friction,[1] has always been interested in the blind spots and the unsaid of connected urban environments, the so-called smart cities. We consider them the perfect playground to observe and discuss socio-technological controversies, as these pieces of urban fabric merge issues related to the digital and physical spaces. These are issues we try to mitigate: we define ourselves as designers producing critical and speculative scenarios for upcoming presents. Through our practice, we have been working on offering counterpoints to the shape shifting techno-solutionist propaganda, especially the one promoting the "Internet of Urban Things."

For over a decade now, the architects of the city have switched from urbanists to data scientists. Their propaganda also shifted from serving concrete-based architecture to information architecture. Despite a persistent fragrance of top-down urban planification remains.

However, these cities don't exactly appear to be as the 'smartifying' propaganda likes to picture them. They are not only about hardware and software. They are a network of political, social

1 Design Friction is a design studio exploring current and emerging issues related to social, cultural and technological changes experienced by our societies: http://www.design-friction.com.

and cultural interdependencies, making them the perfect archetype of what could be defined as a "wicked" problem. If we cannot solve urban problems neither with more technology nor with the umpteenth innovation sprint, we can at least imagine strategies mitigating the externalities implied by the rhetoric of the tech-driven city smartness.

So, what do we try to mitigate regarding smart cities issues? For the most part, the asymmetric power in city making. What does it entitle? Many aspects of the aforementioned propaganda: the self-realizing prophecies and innovation myths internalized by engineers' culture, the techno-solutionist promises crafted by cities and companies' marketing departments, the persistent exclusion of publics in urban decision-making.

In this essay, we would like to share three mitigation tactics we have been experimenting with as well as feedback on how these experimentations have been questioning our views on smart cities. We will be talking about playfulness, participativeness and weirdness. What these tactics have in common is they trigger debates on emerging controversies and on inherited issues of decades of urban development. We genuinely believe that fostering debates between all the stakeholders is an efficient way of anticipating possible problems and mitigate the blind acceptance of the urban tech propaganda.

To design these mitigation tactics, we have been experimenting in merging persuasive game design principles and a design fiction-based approach. The first is about designing game mechanics to support public information and citizens' participation. The second is about using fictional products and services as thought-provoking experiences. Both share the desire to inspire new imaginaries about the urban futures, not in a predictive way ("city will be like this"), and not in a prescribing way ("city should be like this"). Instead, they are an attempt to open perspectives and debates, to question the directions we are taking today.

Make it playful: Flaws of the Smart City

Flaws of the Smart City is a card game exploring the dark face of the so-called smart city.[2] As any hardware or software piece, the connected cities embed flaws, and this kit aims to fix these weak spots or to exploit them to create chaos. With a focus on grey areas of existing and planned smart cities, *Flaws of the Smart City* aims to reveal their paradoxes. The card game uses those frictions as opportunities to discuss what could be our expectations for urban progress.

From insights to actionable cards

Flaws of the Smart City cards cross urban defects, places and types of intervention. Combining these three components is the first step to speculate on scenarios envisioning both the positive and negative externalities that could appear in smart cities.

We built the content of the cards on the thoughts and works of Dan Hill[3], Adam Greenfield[4], and Anthony Townsend[5]. The kit has been designed as a translation of their opinions into actionable thinking. It investigates technological flaws - such

2 The kit *Flaws of the Smart City* can be downloaded at the following URL: http://www.flawsofthesmartcity.com/.

3 Hill, D. (n.d.). City of Sound. Retrieved from: http://www.cityofsound.com/

4 Greenfield, A. (2013). *Against the Smart City*. New York City: Do projects,.

5 Townsend, A. (2014). *Smart Cities, Big Data, Civic Hackers, and the Quest for a New Utopia*. New York City: W. W. Norton & Company.

as coded obsolescence, system vulnerability, and proprietary ecosystems -, political controversies - such as authoritarian setup, unempowered citizens, and greenwashing - and cultural pitfalls - such as generic and decontextualized technologies or digital neocolonialism.

One of our main concerns was to keep this critical exploration open enough, so anyone could, in some way, tweak our toolkit in order to explore specific flaws of the smart city. We kept several cards open so players could adjust the content and then improve on or criticize the selected issues.

The result is a workshop-tailored kit devised to foster conversations during participatory sessions. During these sessions, we encourage the users of *Flaws of the Smart City* to reflect upon the interdependencies, direct or not, between these conceptual flaws and the social, technical, and ethical dilemmas faced by our urban societies.

Adopting a playful approach

We included a playful dimension in the kit, using simple game mechanics as a mediation strategy for suspension of disbelief and enabling different tones of discussion. Participants might either want to decide to go for one of the two game modes of thinking we propose: Guardian Angel, with participants fixing the issues of the Smart City; Evil Genius, with participants exploiting the flaws of the Smart City to bring chaos in the streets.

Flaws of the Smart City was also the first self-attempt to share our own methods and tools. We went for a DIY version, to be printed and assembled, for easy distribution. We still use this critical kit as a resource for our urban-related projects on hidden agendas in smart cities and as an example of the collaborative design of speculative scenarios.

Takeaway

One of the most striking workshops we led with *Flaws of the Smart City* happened, in 2016, in Santiago (Chile). One of the groups of participants designed a selection of supposedly smart urban furniture, relying on self-defence to operate sustainably. Every piece of furniture was able to drive attackers away if people started to assault bins or bus stops during protests or celebrations. Participants built the scenario by observing local urban subcultures and events. As they were tweaking the kit to fit in the Chilean context, the ambiguity of their scenario was resonating oddly with the blended legacy of Pinochet's surveillance state and the aborted CyberSyn[6] envisaged by President Allende.

Flaws of the Smart City is an example of a pervasive mitigation strategy: the game acts as a Trojan horse for critical thinking. Some stakeholders in charge, such as the authorities, might dismiss this kind of tool: "it's just a game, it's not reality." Doing so, they are mitigating its impact. However, let's remind ourselves we have all learned and grown up with games when we were children. Games make abstract notions and complex topics relatable, they allow us to experiment or rehearse situations we might encounter at some point. As a collective adventure, they enable rich and collaborative experiences. We argue there is nothing more serious than a game.

6 Project Cybersyn was a Chilean project from 1971–1973, during the presidency of Salvador Allende aimed at constructing a distributed decision support system to aid in the management of the national economy. The project consisted of four modules: an economic simulator, custom software to check factory performance, an operations room, and a national network of telex machines that were linked to one mainframe computer. Wikipedia contributors. (2018, September 12). Project Cybersyn. *In Wikipedia, The Free Encyclopedia*. Retrieved from: https://en.wikipedia.org/wiki/Project_Cybersyn.

Make it Participatory: A City Made of Data

A City Made of Data is a series of one-day workshops run in various European cities to explore smart city-related issues. These sessions consist of a combination of different formats - narrative "walkshop, " design fiction workshop, participatory exhibition, and contributory website - to collaboratively design future scenarios and critical visions about data-driven cities.

The first edition was commissioned by the Arts&Techs Lab of Stereolux and took place in Nantes (France) as part of the Scopitone Festival. The second edition settled at the Haute Ecole de Gestion (HEG) in Geneva (Switzerland).

A "Walkshop" to get immersed in complexity

After a short introduction to the notions of data and connected cities, participants follow narrators around the streets of the city, exploring iconic districts as well as unknown places. This critical wander projected participants forward 2036, to a *City Made of Data,* where every urban piece or person is connected and produces data. Punctuated with startling anecdotes and questions related to the smart city, the walk was designed to immerse the participant in this theme. With one foot in the present and an eye on the future, the fictional journey was offering to rediscover the familiar environment in a new light, where transports would have become autonomous and culture would be algorithmic.

Each participant was listening, observing, questioning, and then working in groups during short in-situ exercises. These exercises were based on different role-playing:
"What if you were the evil genius in town?" What would be your villainous goal and how would you be using urban data to create your hideous plan? "What if you were a sensor, here, in this street?" Which kind of data would you be collecting, with and without authorization?

The whole purpose of this "walkshop" was to warm participants up before they started to draft their own scenarios about the futures of a city made of data.

A workshop to imagine critical urban futures

After the "walkshop," participants were invited to take part in a design fiction workshop. For this second phase of the day, the smart city operated a complete reboot of its system. It was the starting point for the participants' speculative scenarios: Six different ideologies were then proposed to rule the new urban algorithms: Secure and Securitarian, Welfare & Health, Autarchic Communities, All-Mercantile, Agile Personalization, and Nostalgia. Each of them embodied a particular vision and led to the emergence of new fictional urban products and services, which participants were invited to imagine and prototype.

As the symbol artifact from Autarchic Communities logic, Filterbook are smart glasses working as augmented blinkers. They help you to filter your visual environment by "masking" elements that are not part of your community of the moment.

The various scenarios and artifacts raised multiple concerns and issues for the future of "smart" cities, which were later identified and debated during the exhibition, These included: the regression of civil liberties, work painfulness and the imperative of efficiency, health profiling, and public shaming in the era of mass connection or "filter bubble" systems applied to the urban experience.

A participatory exhibition to extend the debates

The different scenarios and objects designed by the participants triggered discussions among them during the workshop. A participatory exhibition opened the debates to a broader audience. Over three days, we exhibited the design scenarios

and invited visitors to react on the design fictions by writing on discussion walls, sharing their thoughts in fictional diaries or with informal interviews. Certain questions wee raised: Who will be watching the watchmen? To what extent are we willing to give up on our individual freedom to guarantee the safety of all? How does a system that is promoting well-being for everyone actually generate exclusion and discrimination?

These questions are just a sample of what emerged from the 600 visitors who participated to enrich the exhibition with their visions. We kept the discussion open by publishing scenarios and reactions on a participatory website.[7]

Takeaway

During *A City Made of Data,* we have been questioning our role as designers and facilitators in a collaborative critical exercise. How do we make sure that the scenarios imagined by participants are the reflections of their thoughts and questions, not ours? It led us to consider the tactics behind co-designing critical urban futures in two ways, depending on the goals we wanted to reach and the context in which we were engaging in:

Inspiring - the community impulses, the designer designs.
Empowering - the designer impulses, the community designs.

As simplistic as this framework might look, it still helps us in dosing out our interventionist posture and the openness of the design and debate.

7 Cité des Données (French): http://www.citedesdonnees.fr/.

Make it Weird: Animals of the smart city

The smart city is the catalyst of many new urban fantasies strongly influenced by old but persistent myths of safety and efficiency, now reincarnated by crossing digital technologies with the urban fabric. Among the many frictions and uncertainties smart cities are built on there is the place of the animal. The current smart city initiatives are not envisaging the presence of wildlife or even pets in their programs. Animals seem not to be considered a part of the urban life, neither would they be able to seize some parts of the connected urban environment. The resulting gap is an unexpected opportunity to speculate on and to reflect upon our current relations with animals in the urban environment.

Then, questions quickly arise: What could be the stakes related to the presence of animals in a smart city? How would it shape the urban infrastructure on one hand and change the behavior of animals on the other hand? And, what about an "animalized" smart city?

A big in the urban system

Our ongoing project *Animals of the Smart City* builds one the famous anecdote of the etymology of the computer bug as told by Grace Hopper[8]. Back in 1947, a moth got trapped in a relay creating an error in the calculations of a Harvard Mark II, one of the first computers. So what would be the impact of the bug trapped in a smart city?

8 Grace Hopper's famous coining of "computer bug." Pearson, G. (2013, September 12). Google Honors Grace Hopper...and a "bug". *wired.com.* Retrieved from: https://www.wired.com/2013/12/googles-doodle-honors-grace-hopper-and-entomology/.

Starting with this question, *Animals of the Smart City* is an exploration fuelled by an ambiguous fascination for wildness in this controlled space. We aim to investigate a duality emerging from the relations between the city and the animals: on one side an ongoing anthropomorphism of domesticated species and on the other side the barbarianization of wildlife.[9] Another layer of interactions, inherited directly from an endless race for urban comfort, is leading us to reconsider the treatment of animals by the smart city through the scope of desired and undesired species. Speculating on the animal as an unavoidable stakeholder of the city and not only an intruder or sub-user, we are shifting our approach of speculative urban design by finally acknowledging this unrecognized city dweller.

We have started to design a series of speculative products, also known as design fictions, to tell stories about how various smart city archetypes could interact with animals. The following speculative scenarios, *Falcon Punch* and *Sons of Kyôn* are part of these design fictions.

Falcon Punch

While developing drone delivery, major e-commerce platforms such as Amazon, were forced to add a clause in their insurance policies for bird collisions. Indeed, some flying specimens were disrupting package delivery by colliding with courier drones.

Knowing that merchandise was up in the air raised the greed of thieves. A group of high-flying heisters started to make use of falconry to intercept courier drones transporting documents

9 Barbarianisation: considering someone or something as a barbarian, an entity not abiding by the laws of the city.

or parcels above the city. Birds prey or were trained to bring down the flying robots, or to steal their packets, on the fly. This method proved to be way more efficient than other classical heist strategies as the packages were less damaged and heisters less exposed in the process.

Some of the falcons were caught by the authorities who then discovered the birds were equipped with a prosthesis designed to attack or hijack drones. This tactic could have been inspired by several cases of wild birds prey of attacking amateur drones.

Sons of Kyôn

In a near-future Athens the city has faced, without taking care of, a substantial amount of political and environmental migrants, far from being considered refugees. For most of them, still waiting for their administrative regularization or simply resigned to be clandestines moving in the streets is like a giant hide-and-seek game with sensors and automated taxation. Unwelcome migrants, regrouped in the so-called Kyôn group, take advantage of the smart city's most pernicious flaw: animals. When everything is thought and conceived for humans, becoming inhuman is becoming invisible.

Teaming up with thousands of stray dogs living in the streets of Athens, Kyôn members develop techniques of datamouflage – camouflage by sending fake data – to confuse sensors, resell hacked data stolen by data-sniffing techniques, and defeat surveillance drones with special dog-shaped blankets disguising them as dogs.

Takeaway

Animals of the Smart City is a long-term and protean project ultimately addressed to the ones designing and implementing the smart cities.[10] Our work is still in progress, but we highlighted three key insights from this weird exploration:

1. Non-humans - animals and plants - matter. The techno-centered as well as the user-centered approaches of connected urbanism are accountable for the effects they produce on other city-dwelling species.

2. The polyphony of visions, meaning the plurality of points of view cohabiting in the same scenario, is crucial. A fiction becomes relevant when it starts to embed views and counterpoints about the same topic, even if this is from a non-humans perspective.

3. For a topic as complex as the interactions of animals with urban infrastructures, world-building tools and methods inherited from video games help to craft coherent systemic scenarios. Video game world-building inspired us to build an ecosystem of design fictions that works as a network of fictions on an alternating micro and macro scale.

Mitigating the mitigation

The three mitigation strategies in this essay share the ambition to have an impact by providing tools and stories to the ones living in the city and building it on a daily basis, at every imaginable scale. Nevertheless, we need to remain aware of our own influence on urban development and to be clear about our own dependencies on myths and ideologies. We need to double-check our privileges and the undesired effects of our actions. We need to remain a counter-propaganda, not a form of manipulation. As a reminder of this need of constant reflexivity, we keep updated a list of the challenges we are still facing. Among them:

- How might we best mitigate the Eurocentric echoes of our fictions?

- How might we best document and share insights generated by our provocative scenarios?

- How might we best go from fictions to actions?

- How might we best ensure our fictions are understood in their original contexts, not solutions, the risk of accelerating unwanted perspectives?

It is at the price of overcoming these limits of our practice that we will be able to keep producing relevant counter-narratives, inclusive participatory processes and genuinely adversarial strategies.

10 Design Friction wrote a fictional compendium including different pieces of fiction from Animals of the Smart City (In French): https://medium.com/design-friction/design-centr%C3%A9-sur-les-animaux-en-milieu-urbain-connect%C3%A9-notes-du-compendium-1-c6be77d67bac.

Bastien Kerspern is a French interaction designer specializing in public innovation. He believes in innovation by transgression with a huge dose of cultural jamming inherited from digital subcultures. With a strong experience on designing participatory experiences, he pushes experiments in public debates and design for controversies. Interested in mundane frictions and uncanny narratives, his current works explore how digital technologies and related innovations might influence social models. Bastien also carries a discrete, but stubborn, passion for experimenting with interactive writing processes. Aside from Design Friction, Bastien is also an associate game designer at Casus Ludi and a lecturer in several design schools and institutes.

Picture of a flyer glued on an electrical enclosure in Montreuil stating that tenants and landlords have the right to refuse *Linky* and citing a former Minister of environnement, Corine Lepage, "If the government does not react in two months we will launch a class action against the State in front of the administrative court in the name of mayors and citizens".

"Legal refusal of Linky meters art. L. 341-4 of the Code of Energy 6-3 CGV (which means general conditions of sale) forced installation = offense article 226-4, 432-8 of the criminal code and 544 of the Civil Code."

RESISTING THE DEPLOYMENT OF LINKY IN FRANCE

by Lily Martinet

A battle is raging in France over the deployment of a neon green electricity meter nicknamed *Linky*. Its opponents criticise *Linky* as a frivolous and useless project imposed on French citizens. *Linky* is a "smart meter" capable of receiving and transmitting data on energy consumption times and levels by using electronic communication.[1] The deployment of smart meters has been presented as a step forward towards the implementation of a smart grid, a prerequisite to a smart city. A smart grid is, according to the European Commission, "an upgraded energy network to which two-way digital communication between the supplier and consumer, smart metering and monitoring and controls have been added."[2] A wide range of arguments is put forward for the implementation of a smart grid. The smart grid is supposed to ease integration of renewable energy sources, to promote energy efficiency, to reduce greenhouse gas emissions, and to help satisfy new energy needs such as charging electric vehicles.[3]

Smart meters are also presented as a tool to "empower consumers" and assist their "active participation in the electricity supply market."[4] By informing consumers of their energy

1 Commission Recommendation (EU) No 2012/148/EU of 9 March 2012 on preparations for the roll-out of smart metering systems, Definitions 3 (b).

2 Ibid., Definitions 3 (a).

3 Raimi, K. T., & Carrico, A. R. (2016, February 01). Understanding and beliefs about smart energy technology. *Energy Research & Social Science*, 12, 68-74. 68. doi: https://doi.org/10.1016/j.erss.2015.12.018.

4 Commission Recommendation (EU) No 2012/148/EU, par. (1).

consumption, smart meters are expected to foster behavioral changes, and to facilitate the consumer's access to competitive offers and energy efficiency advice.[5] For energy suppliers and network operators, smart meters stifle fraud, such as meter tampering, they also increase the accuracy of billing and allow remote meter reading, which reduces labor costs. Furthermore, the flow of data recorded by smart meters should open up electricity markets and promote competition between energy suppliers.[6] This is the main reason why the European Union has supported the deployment of smart meters. The 2009 Directive concerning common rules for the internal market in electricity has even set for the Member States a target of at least 80% of consumers equipped with smart meters in 2020 if the assessment of all the long-term costs and benefits to the market and the individual consumer is positive.[7]

In France, the deployment of smart meters started in 2007, when the *Commission de régulation de l'énergie* (CRE) approved a pilot project.[8] In 2009 and 2010, a law and a decree endorsed the idea of deploying smart meters.[9] From 2010 to 2011, a trial of *Linky* meters took place in two regions of France.[10] The CRE concluded from the results of this trial to generalize *Linky* to all consumers.[11] One of the arguments offered in support of the rollout was that it would promote French industry and the adoption of French standards on an international scale. In 2012, a further decree set out the specifications and the functionalities of the smart meters.[12] In 2015, the law on the energy transition for green growth made the installation of *Linky* mandatory.[13] Installation of *Linky* cannot be refused. Enedis, the distribution system operator which manages the French power grid, is responsible for the large-scale roll-out of the smart meters.

Despite its cute name, flashy colour, and the green growth rhetoric surrounding the project, the deployment of Enedis was met with fears and hostility. Activist groups called "Stop Linky" started to sprout everywhere in France. They organized protests, debates, and human chains, and drafted model petitions

5 European Task Force for the Implementation of Smart Grids into the European Internal Market. (2012). *Mission and Work Programme*, 4. Retrieved from https://ec.europa.eu/energy/sites/ener/files/documents/mission_and_workprogramme.pdf

6 Directive of the European Parliament and of the Council No 2009/72/EC of 13 July 2009 concerning common rules for the internal market in electricity and repealing Directive 2003/54/EC, article 33.

7 Ibid., Annex I (2).

8 Communication de la Commission de régulation de l'énergie du 6 juin 2007 sur l'évolution du comptage électrique basse tension de faible puissance (≤ 36 kVA).

9 Loi n°2009-967 du 3 août 2009 de programmation relative à la mise en œuvre du Grenelle de l'environnement and décret n°2010-1022 du 31 août 2010 relatif aux dispositifs de comptage sur les réseaux publics d'électricité en application du IV de l'article 4 de la loi n°2000-108 du 10 février 2000 relative à la modernisation et au développement du service public de l'électricité.

10 Cour des comptes. (2018). *Rapport Annuel*, 248. Retrieved from https://www.ccomptes.fr/sites/default/files/2018-01/07-compteurs-communicants-Linky-Tome-1.pdf

11 Délibération de la Commission de régulation de l'énergie du 7 juillet 2011 portant communication sur les résultats de l'expérimentation d'Électricité Réseau Distribution France (ERDF) relative au dispositif de comptage évolué Linky. Retrieved from https://www.cre.fr/content/download/7554/66851

12 Arrêté du 4 janvier 2012 pris en application de l'article 4 du décret n°2010-1022 du 31 août 2010 relatif aux dispositifs de comptage sur les réseaux publics d'électricité.

13 Loi n°2015-992 du 17 août 2015 relative à la transition énergétique pour la croissance verte.

and letters to be sent by consumers to Enedis. They gave advice on how to resist the installation of *Linky,* like barricading dumb meters or sticking "Stop *Linky*" posters on meter boxes. Several non-profit organisations challenged in court the decision to impose *Linky* on households.[14] They did not succeed. Hundreds of municipalities and cities, however, took decisions either opposing the deployment of the meters on their territory, declaring moratoriums on the replacement of meters, or enshrining the right to refuse *Linky.* The reasons cited for justifying these measures are the right of privacy, data security, respect for the precautionary principle- the concern that *Linky* might be a fire hazard, preventing the exposure of citizens to a constant "bath of electromagnetic fields"[15] - and the wastefulness of the project, as it replaces perfectly functioning dumb meters with a technology that will soon be obsolete, an action, which is inconsistent with the green growth discourse supporting the project.

Representatives of the State at the local level have challenged these deliberations in administrative court. In all the decisions identified for this essay, administrative courts have sided with the representative of the State and have either cancelled or suspended the deliberations.[16] These courts have consistently failed to take into account a right to question and maybe even reject technology. Individuals have also filed lawsuits putting forward their electromagnetic hypersensitivity. For the time being, only one plaintiff has won such a court case.[17] The judge ordered

14 Conseil d'État, 20 March 2013, *Robin des toits et al.,* n°354321.

15 Tribunal administratif de Nantes, 12 avril 2017*, Préfet de la Loire-Atlantique contre Commune de Villepôt,* n°1603913 et 1606338.

16 35 decisions were studied for this essay.

17 Tribunal d'instance de Grenoble, 17 November 2016, *Mme X. c. OPAC,* n°12-16-000575.

her landlord to remove from her apartment a water smart meter and forbad the installation of *Linky*. Two class actions are currently ongoing. One of them comprises more than 5000 plaintiffs.[18] Even though opponents of the implementation of a smart grid raise crucial issues, mainstream media tends to depict them as Luddites suffering from technophobia.[19]

Resistance to the deployment of *Linky* was not expected by Enedis, as a result it did not try to gain approval from society, and overlooked important issues relating to privacy, to data protection, to public health, and electromagnetic pollution. These issues were not tackled during the conception of the project but raised only after approval of the program or, worse, during the deployment of the smart meters. To dispel public fears the French government used its agencies to conduct studies, issue opinions, reports and recommendations.[20] On the issue of privacy, for instance, people were concerned that habits and behaviours, such as waking hours, or even illegal activities,[21] could be inferred from data collected. *Linky* transmits data not only to consumers, but also to Enedis, energy suppliers, and third parties.

The French National data protection authority, Commission nationale de l'informatique et des libertés (CNIL), addressed these privacy matters by trying to establish a legal framework

18 Lexprecia. (2018). Refus du Linky: les avocats s'unissent pour vous défendre. Retrieved from https://linky.mysmartcab.fr/

19 Bérard, N. (2017). *Sexy, Linky?: Pour voir le vrai visage du nouveau compteur électrique Linky sans se faire enfumer par ErDF,* 93.

20 The government bodies involved in legitimizing *Linky* are numerous: ANFR, ANSES, CNIL, ANSSI, ADEME, CRE…

21 Article 29 Data Protection Working Party. *Opinion 12/2011 on smart metering*. 00671/11/EN, 21.

to regulate the collection and processing of data. To this end, it issued a deliberation,[22] and published a "conformity pack" for smart meters setting out rules and good practices.[23] The CNIL stressed that energy suppliers, network operators and service providers had to secure consent from consumers to process data recorded by *Linky*. Despite these documents, the CNIL in 2018, gave formal notice to an energy supplier, Direct Energy, that it was processing, without consent data collected every half-hour from *Linky*.[24] On the issue of electromagnetic pollution, the smart grid designed by Enedis carries data on power-lines by using a technology called "Power-Line Communication" (PLC). The first independent measurement of electromagnetic fields produced by *Linky* was performed in 2014, three years after the decision was made to roll-out smart meters in France[25]. In 2016, two governmental agencies published reports to appease the French population comparing electromagnetic fields emitted by *Linky* to a compact fluorescent lamp.[26] But the measurement

22 CNIL, *Délibération n°2012-404 du 15 novembre 2012 portant recommandation relative aux traitements des données de consommation détaillées collectées par les compteurs communicants.*

23 CNIL. (May 2014). *Pack de conformité: Les compteurs communicants.* Retrieved from https://www.cnil.fr/sites/default/files/typo/document/Pack_de_Conformite_COMPTEURS_COMMUNICANTS.pdf

24 CNIL, *Décision n°2018-007 du 5 mars 2018 mettant en demeure la société DIRECT ÉNERGIE.*

25 Bérard, 14.

26 ANSES. (December 2016, revised in June 2017). *Exposition de la population aux champs électromagnétiques émis par les «compteurs communicants»*. Retrieved from https://www.anses.fr/en/system/files/AP2015SA0210Ra.pdf and INERIS. (19 June 2016), *Champs électromagnétiques produits par les compteurs de télé relève électrique Linky: Mesures exploratoires.* Retrieved from https://www.ineris.fr/sites/ineris.fr/files/contribution/Documents/drc-16-148901-04977a-linky-mesures-exploratoires-vf2-signee-av-couv-1484651371.pdf

inside households was performed on meters using the first generation of PLC, Enedis is now deploying the third generation of PLC, and it did not take into account fields emitted by grapes of *Linky,* i.e. when all the smart meters of an apartment building are gathered together in one location, like a stairwell or a basement.

The massive scale and the top-down approach adopted for the *Linky* program have badly flawed its execution. In addition, pressure has been put on Enedis to finish the deployment of 35 million *Linky* by the end of 2021. If Enedis does not meet this deadline, financial penalties will apply calculated on the basis of the number of smart meters that were not installed, ranging up to 16,20 € per meter not installed.[27] For the program to stay profitable Enedis subcontractors have to install a *Linky* meter in less than 30 minutes.[28] They hardly have the time to explain to the consumer why they are replacing a perfectly functioning dumb meter by *Linky*. Some subcontractors have even engaged in inappropriate conduct to meet targets, such as changing meters in the absence of the consumer.[29] A leaked internal document drafted by Enedis encouraged this behavior. The document gave, for example, instructions to disregard any stickers stating the refusal of a consumer, and even to cut padlocks when a consumer had barricaded their meter to prevent its replacement.[30]

27 Cour des comptes (2018). *Rapport Annuel,* 256.

28 CGEDD, Flury-Herard Bernard, Dufay Jean-Pierre. (April 2017). *Le déploiement du compteur Linky,* 29. Retrieved from http://www.ladocumentationfrancaise.fr/docfra/rapport_telechargement/var/storage/rapports-publics/174000344.pdf

29 Ségolène Royal. (21 April 2017). *Suite à donner au rapport d'inspection sur le compteur Linky.* Letter preceding the CGEDD report.

30 Gauvin A., de Caupenne, J., & Séga S. (Journalists). (14 juin 2018). *Les révoltés du Linky* [Television report]. Retrieved from https://www.francetvinfo.fr/sante/environnement-et-sante/video-les-revoltes-du-linky_2796555.html

Finally, the cost of the smartification of the French power grid is estimated to amount to 5.7 billion Euros. Although Enedis claims that installation of *Linky* is free, in reality, it has lent this cost with an interest rate of 4.6% to the French consumers, who will start to reimburse it in 2021. In a 2018 audit of the program, the French Court of Auditors concluded that the *Linky* program was more beneficial for Enedis than for consumers.[31] *Linky* only has a small text-display that does not provide sufficient data to improve energy efficiency, which was the main reason supporting the construction of a French smart grid. As a consequence, the *Linky* program amounts to a useless and wasteful project designed to please an ideal of modernity and growth, which is more and more questioned by society.

31 Cour des comptes, 268.

Lily Martinet is a law researcher. She completed a Ph.D. in international law at the Sorbonne Law School in 2017. Her Ph.D. dissertation focused on traditional cultural expressions in international law. As a postdoctoral fellow at l'Institut des Sciences Sociales du Politique, she was responsible for coordinating the Osmose Program, a comparative study of national experiences in relation to intangible cultural heritage law. Lily has also worked on the implementation of the Convention for the Safeguarding of the Intangible Cultural Heritage, in 2013, for the French Ministry of Culture and, in 2017, for the French National Commission for UNESCO. In 2014, she was admitted to the French bar. Before studying law, Lily earned a Bachelor of Fine Arts from l'École européenne supérieure d'art de Bretagne. Her main research interests include intellectual property law, cultural heritage law, legal pluralism, information technology law, and human rights law.

LAUREN devices used during performance. Photo by Lauren McCarthy

Screenshot of *LAUREN* website By Lauren McCarthy

FEELING AT HOME: BETWEEN HUMAN AND AI

by Lauren McCarthy

I'm waiting, eyes glued to the dark room on my screen, headphones in my ears, listening for the sound of him. I hear a knock. I scramble to toggle the lock switch and type out a message to him, knowing every second I take adds to the delay between us. I hear the buzz of the door unlocking. He walks in and looks around, slightly confused, as the lights illuminate around him. "Hi Michael*, nice to meet you, I'm LAUREN" my robotic voice greets him. "Uhhh hi." He answers, with an awkwardness shared by most people when they first get me in their homes.

For a while this past year, every box delivered from Amazon came wrapped in blue Amazon Echo tape. Even if we had not encountered an Alexa in the wild, we were made to feel that everyone was using them. Well-designed websites offer a collection of smart devices that will ship overnight in perfectly fitted packaging—every detail of these devices feels right. But we are being sold devices to outfit our homes with surveillance cameras, sensors, and automation offering us convenience at the cost of privacy and control over our lives and homes.

"Hey LAUREN, do you remember if I took my pill?" she asks. I quickly start scanning through the footage, jumping to different moments when she might have taken it. Relying on this mix of memory and video data feels dubious and I suddenly realize there could be consequences to getting this answer wrong. I tell her I don't think so, but I'm not 100 percent sure. I'm very aware how much more confident I'd feel if I were an algorithm.

Since January 2017, I have been attempting to become a human version of Amazon Alexa, a voice-activated AI system for people in their own homes. The project is called *LAUREN*. Anyone can visit get-lauren.com to sign up.

The process begins with an installation of a series of custom networked devices that include cameras, microphones, switches, door locks, faucets, and other electronics. For three days, I remotely watch over the person 24/7 and control all aspects of their home. I attempt to be better than an AI, because I can understand them as a person and anticipate their needs.

Sometimes this means following them from room to room, turning on lights ahead of their steps. Other times their needs are more obscure, and I order special deliveries to their home or contact their friends through Facebook to arrange a visit or a text message.

They are usually expecting more technical tricks at first, a real sci-fi experience. But much like smart homes of today, I mostly do what they could do themselves—things like flipping switches, playing music, and looking up answers.

The *LAUREN* experience is ultimately about presence. Despite my lack of tricks, they are very aware that I am there, and aware of their own presence too. I'm trying to highlight this trade we are making for these surveillance smart devices. We give access to all our data and live camera feeds—for what? I hope that by being a real person on the end of that, I am offering something more than an Alexa AI at least.

Late Saturday night, I'm adjusting the lighting, queuing up some music, "setting the mood" as Jen has requested. Normally when guests visit, I have some basic interaction with them when they arrive, but this one is arriving and already

they are wrapped up in a moment together. It doesn't seem right to intrude. I feel I shouldn't be there, but it is my job, so I watch and don't watch at the same time. Finally, it is 2:00 a.m. and I can't stay awake any longer. "Good night you two" I say, to let them know I'm turning off now. Her guest looks up shocked, suddenly notices all the cameras for the first time, realizes the music has been tracking their rhythm a little too perfectly. "It's LAUREN, remember, I told you about her?" Jen reminds him. With one more slow, strange look around, he shrugs, and picks up where they left off as I shut my computer.

We are meant to think smart home devices are about utility, but the space they invade is personal. The home is the place where we are first watched over, first socialized, first cared for. How does it feel to have this role assumed by artificial intelligence? Our home is the first site of cultural education; it's where we learn to be a person. By allowing these devices in, we outsource the formation of our identity to a virtual assistant whose values are programmed by a small, homogenous group of developers. They may not share the values or cultural reference points that we want to embed in your family's home. Women, long seen as the keeper of the home domain, as complicated as that notion is, are now further subjugated. Their control is undermined by the smart home "assisting" and shaping each activity.

I'm watching him watch TV and worrying I'm not fulfilling his desires, but also hesitant to act in case I annoy him. It's surprising to me that I'm just as shy as a smart home as I am as a person. It's such a safe situation. In some cases they never even meet me, and a crew installs and de-installs the system while I sit miles away. I could literally say and do anything. I'm performing a character—I'm playing a smart home—yet I'm still unable to escape being me.

Do you know any real person that has anything like Alexa or Siri's personality? AI assistants lack the flaws and inconsistencies of human personalities. There is much further they could go if we allowed them to engage in a more human way. Right now, virtual assistants are designed to accommodate very common and universal needs. Imagine if they instead attended to very particular, obscure desires and needs of individuals. They could probe beyond what we expect of these technologies, into the types of help we might feel able and comfortable to ask only of or through technology.

While designing the project, I spent a lot of time thinking about the question, "if I were an AI, what would I be like?" I tried to create an entity that felt human, but could also function like a system. Rather than speaking to people directly, I created a synthesized voice based on my own, so that I could more easily fade into the home and not feel like a person they felt obliged to constantly engage.

It's 1:00 p.m. in Amsterdam now, while it's 4:00 a.m. in LA where I am. I woke up with them a few hours ago and struggle to stay awake as I help them cook lunch. The time, language, and culture differences create a clear sense of distance, yet our interactions are real-time. It makes me aware how we weren't built to have relationships with interfaces between us.

In *LAUREN,* I am wrestling for control with artificial intelligence. The participants are also negotiating boundaries and poking at the system. The point of this project is not to impose a point of view, but to give viewers a space to form their own. Immersed in the system in the comfort of their homes, people are able to engage with the tensions. Some moments are awkward and confusing, others are hopeful and intimate. Together, we have a conversation about letting AI into our data, our decision making, and our private spaces.

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Names have been changed to protect privacy.
This essay was originally written for and published in *Immerse.*

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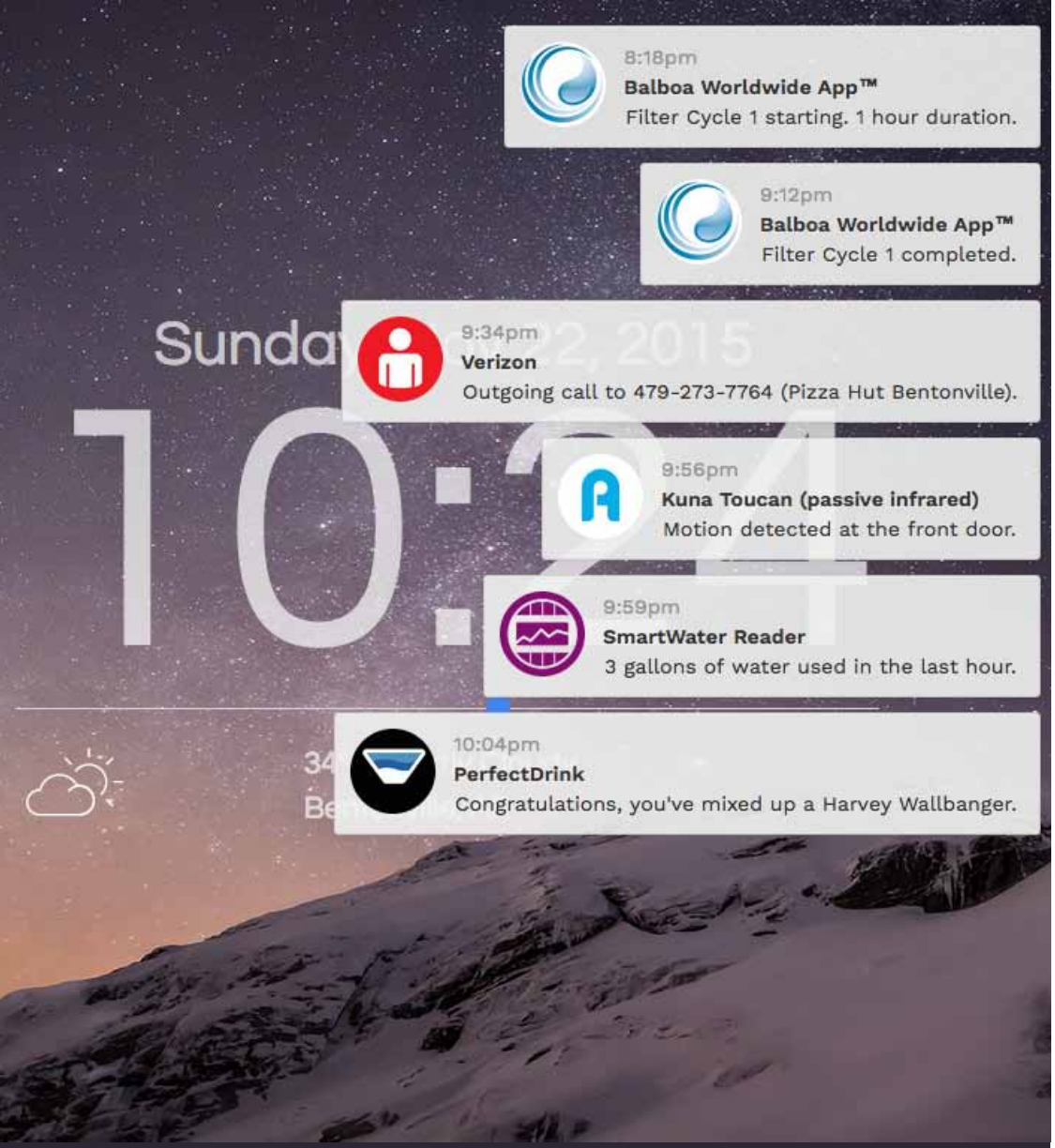
Lauren McCarthy is an artist based in Los Angeles whose work examines how issues of surveillance, automation, and network culture affect our social relationships. She is the creator of p5.js, an open source platform for creating artwork online. Lauren has exhibited at Ars Electronica, Conflux Festival, SIGGRAPH, LACMA, Onassis Cultural Center, IDFA DocLab, and the Japan Media Arts Festival, and worked on installations for the London Eye and the US Holocaust Memorial Museum. She holds an MFA from UCLA and a BS Computer Science and BS Art and Design from MIT. She is an Assistant Professor at UCLA Design Media Arts. She is a Sundance Institute Fellow and was previously a resident at CMU STUDIO for Creative Inquiry, Eyebeam, Autodesk, NYU ITP, and Ars Electronica / QUT TRANSMIT[3].



Screenshot of *Monitor* website By Luke Munn

MONITOR: CODE, BROWSER, VIEWER

by Luke Munn

What happened at the home of James Bates in Bentonville, Arkansas on November 22nd, 2015? On that Saturday night, Bates invited a few of his friends around to watch football and drink. But the next morning Bates called 911 and police arrived at the house to find one of these friends, Victor Collins, dead in the backyard. Bates claimed to have let his friends crash the night and fallen asleep around 1am, before waking to find the body himself and make the emergency call. But the police suspected a homicide as Zusanna Sitek and Dillon Thomas reported at the time:

"After getting consent to search Bates' home, detectives found Collins floating face up in the hot tub and noticed the water was tinted red and appeared to contain bodily fluids and blood... They also noticed Collins had a black eye, a cut on his eyelid, his lips were swollen and bruised, and he was bleeding from his mouth and nose."[1]

Bates was known to have several smart home devices, including a "Nest thermostat, a Honeywell alarm system, [and] a wireless weather-monitoring system"[2]. But the device that most interested the Bentonville Police Department was his Amazon Echo. Physically, the Echo is understated: a black

1 Sitek, Z., & Thomas, D. (2016, February 23). Bentonville PD Says Man Strangled, Drowned Former Georgia Officer. Retrieved from http://5newsonline.com/2016/02/23/bentonville-pd-says-man-strangled-drowned-former-georgia-officer/

2 Wang, A. (2017, March 9). Police land Amazon Echo data in quest to solve murder. *Chicago Tribune*. Retrieved from: http://www.chicagotribune.com/bluesky/technology/ct-amazon-echo-murder-wp-bsi-20170309-story.html

cylinder that internally houses a set of seven microphones and an audio speaker. Yet this unassuming form belies its real significance as a gateway for Alexa, Amazon's digital assistant that is "always listening"—capable of isolating speech within a room, deciphering it into a textual phrase, transmitting it to the "cloud," and responding appropriately by answering questions, relaying news, playing music, activating lighting, and so on.

What kinds of conversations and activities did this device log on the evening in question? To follow this lead, the police seized the Echo and issued a subpoena to Amazon for all the data associated with that particular account, suggesting that they had "reason to believe that Amazon.com is in possession of records related to a homicide investigation being conducted by the Bentonville Police Department"[3]. At the time this request was rejected by Amazon, which argued that both these voice requests and the responses given were protected as free speech under the First Amendment[4].

Yet art is not limited by fact, but can speculate about fiction. The artwork constructed here, *Monitor*, thus acts as if this informational request was accepted, using "smart home" notifications to extrapolate from the evening's events: a few friends, a few drinks, a floating body. The artwork takes the form of a webpage that can be run in any modern browser. Upon landing at the page, visitors encounter a simulated desktop with wallpaper, icons and a clock widget set at 6pm on November 22nd. As the evening progresses, notifications appear in the top right, logging a series of activities: a garage door opened, a phone call made, a television switched on, a cocktail mixed. The details are carefully sourced,

3 Ibid.

4 State of Arkansas vs. James A. Bates, No. CR-2016-370-2 (Benton County Circuit Court February 17, 2017). Retrieved from: https://assets.documentcloud.org/documents/3473799/Alexa.pdf

from the phone numbers of local businesses to the basketball games airing that day on television. The time period in question can be played through at an accelerated rate, or "scrubbed" back and forth, allowing events to be examined and replayed. Though simple in conception and delivery, these mechanisms allow every visitor to have a unique experience that highlights particular notifications. Rather than forcing a narrative, *Monitor*, like many artworks, maintains a certain ambivalence or ambiguity, allowing each viewer to derive their own understanding of the evening's events.

Of course, in terms of content, there is an unavoidable darkness to such a narrative. Blood spatters and broken glass, intoxication and strangulation—these kind of images run counter to what Florian Cramer, calls the "glossy innovation narratives"[5] usually associated with such products, undermining the relentlessly positive, life-enhancing imaginaries of Silicon Valley tech titans. There is a certain attraction to such morbid tales, and some of the press received, thus far, by the artwork, reflect this fascination. One article from Fast Company was titled "The First Murder Mystery For The Smart Home Age[6]"; another piece in the German edition of tech blog Engadget was similarly named "Webprojekt Monitor: Ein Smart Home beobachtet einen Mord[7]" (Web project "Monitor: Smart Home witnesses a Murder").

5 Cramer, F. (2014, April). Post-digital research. Presented at the Transmediale 2014, Berlin, Germany. Retrieved from: https://www.youtube.com/watch?v=3ciJtJUwcug

6 Wilson, M. (2017, May 3). The First Murder Mystery For The Smart Home Age. Retrieved April 30, 2018, from: https://www.fastcodesign.com/90116588/the-first-murder-mystery-of-the-smarthome-age

7 Knoke, F. (2017, April 3). Webprojekt Monitor: Ein Smart Home beobachtet einen Mord. Retrieved from: http://de.engadget.com/2017/05/03/webprojekt-monitor-ein-smart-home-beobachtet-einen-mord/

But, while the content of this artwork may carry some frictional capacities, the project is equally interested in the form that such content takes. How do such devices index, filter, and frame the world, producing particular formations of knowledge?

The "smart home" is typically championed as the rationalization of household activity, the epitome of Le Corbusier's maxim that the "house is a machine for living in" that will usher in a new "order of work and leisure"[8]. In this imaginary scenario, the smart home is a self-adjusting, self-regulating system, incessantly logging previous activities, daily cycles and yearly trends. This data underpins the calibration of living conditions for maximum comfort and convenience—controlling climate, dimming lights, adjusting music, locking doors. Domestic life is algorithmically optimized. But these "common-sense" operations are also epistemological, forming a knowledge-structure that apprehends the environment and its inhabitants in a certain way. It is through "mechanisms of inscription, recording, and calculation," Lucas Introna asserts, that "algorithmic actors emerge as producers of particular domains of knowledge."[9] What does this knowledge say? Data often promises to discard awkward ambiguities and messy subjectivities and replace them with hard empiricism. As Chris Anderson once quipped: "Who knows why people do what they do? The point is they do it, and we can track and measure it with unprecedented fidelity. With enough data, the numbers speak for themselves."[10]

8 Le Corbusier. (1986). *Towards a new architecture*. New York: Dover Publications. (p. 95, 102)

9 Introna, L. (2016). The algorithmic choreography of the impressionable subject. *In Algorithmic Cultures* (pp. 38-63). Routledge. (p. 27)

10 Anderson, C. (2008, June 23). The End of Theory: The Data Deluge Makes the Scientific Method Obsolete. *Wired.* Retrieved from: https://www.wired.com/2008/06/pb-theory/

The notifications of smart home devices provide an access point into this particular logic, one which "reads" the world - and is, in turn, "read back" by users, institutions, and state-actors - in a particular way. Above all, *Monitor* attempts to explore this particularity.

Yet we might also think about the "dumb home" (in a non-pejorative sense)—about the ways in which certain aspects or activities escape registration. What qualities leak out of the epistemological categories established by the smart home and the wider Internet of Things? Firstly, the smart home itself has a certain porousness, and some activities are captured far beyond the boundaries of a house or property. In the case of Bates, for example, a significant piece of evidence came not from his personal devices, but from the Bentonville electric and utilities department, which recorded a massive amount of water used in the middle of the night. According to their data the "residence used 50 gallons of water between 1 to 2 a.m. on Nov. 22 and an additional 90 gallons of water between 2 and 3 a.m."[11] Against the imaginaries of the smart home and the focus of many privacy advocates, such activity was registered on a regional, not a personal level through the decidedly less "innovative" infrastructure of utilities. But if some activities are "re-captured" beyond the home, some disappear altogether. The lawyer for Bates, Ms. Weber, disputed the prosecutor's allegation that the deck was hosed down in order to remove evidence of a homicide. As reported in The Information "in a decidedly non-digital strategy, she says the water outside the tub couldn't have come from a garden hose. Mr. Bates had a salt water tub, and she says all the

11 Sitek, Z., & Thomas, D.

water on the outside of the tub had salt residue."[12] Of course, this hard dichotomy between "digitality" and "materiality" is a false one. As work by scholars like Friedrich Kittler, Matthew Kirschenbaum and Jussi Parikka have shown, our digital infrastructures, from the cables and data centers of the "cloud" to the coltan within cell phones, are all too material. Nevertheless, the salt water observation reminds us that there are certain capacities of matter, certain aspects of subjectivity, and certain everyday activities that remain unregistered by the smart home and, more broadly, by the supposedly ubiquitous technical regimes that surround us.

So what does all this mean for contemporary arts practice? On the one hand, the regimes underpinning the smart home are highly scaled, dispersed throughout infrastructures which reach across the boundaries of nation-states and the borders of territories. As Erich Hörl suggests, this is a "culture of control that is radically distributed and distributive, manifest in computers migrating into the environment, in algorithmic and sensorial environments."[13] Even the simple act of locating one's self with a smartphone, for example, encompasses the device in a hand, the rare earth minerals that comprise it, the undersea cabling of the internet, the array of satellites needed for geospatial positioning, and a data packet pinging through to a server. Indeed Alexa is only made alive by the transmission of data throughout Amazon Web Services, a network of 54 zones sprawling across 18 regions: Beijing, Mumbai, São Paulo, Seoul,

12 Dotan, T., & Albergotti, R. (2016, December 27). Amazon Echo and the Hot Tub Murder. Retrieved from: https://www.theinformation.com/articles/amazon-echo-and-the-hot-tub-murder

13 Hörl, E. (2017). Introduction to General Ecology: The Ecologization of Thinking. In E. Hörl & J. Burton (Eds.), *General Ecology: The New Ecological Paradigm* (pp. 1–74). London: Bloomsbury Academic. (p.4)

Sydney, Frankfurt, London, amongst others[14]. Undoubtedly, then, there is value in artists becoming more technically literate, in understanding some of the sprawling complexity of informational infrastructures and thereby "making the invisible visible"[15]. Here one might think of the work of James Bridle, Julian Oliver, Trevor Paglen, Danja Vasiliev, and many others whose practices might fall under the loose umbrella of "tactical technology" or "critical engineering." For these practitioners, "you can't critically engage with technoculture and its infrastructure if you're unable to unravel its threads, run your fingers through the seams, [and] visualize its jurisdiction"[16].

But, on the other hand and, arguably, more overlooked, are the ways in which these regimes move not just outwards but inwards: permeating into the inner life of the individual, the inner space of the kitchen or living room, the inner qualities of affect or emotion. Such power is effective precisely because it is not overt and exterior, but rather penetrates into the psychic fabric below. This capillary power, as Foucault put it, "reaches into the very grain of individuals, touches their bodies and inserts itself into their actions and attitudes, their discourses, learning processes and everyday lives"[17]. Rather than spectacular, this power is subliminal. This interior space

14 Amazon. (n.d.). Amazon Web Services (AWS) - Cloud Computing Services. Retrieved from: https://aws.amazon.com/

15 Bridle, J. (2015). Exposing the Invisible. Retrieved from: http://exposingtheinvisible.org/films/group/james-bridle/

16 Politics, A. (2013, November). The Weekest Links : #stacktivism. *Stress-fm*. Lisbon. Retrieved from: http://blog.stress.fm/2013/11/the-weekest-links-stacktivism.html

17 Foucault, M. (1980). Prison Talk. In C. Gordon (Ed.), P*ower/knowledge: Selected interviews and other writings, 1972-1977* (pp. 37–54). New York: Pantheon. (p. 39)

presents a new and highly profitable terrain for colonization by capital. Amazon, for example, recently filed a patent application for a "voice sniffer" algorithm that could be configured to detect so-called trigger words, "a verb indicating some level of desire or interest in a noun," such as "I like skiing," or "I love product X"[18]. Language is parsed here not just semantically but emotionally, slowly constructing an intimate profile of aspirations and motivations. Similarly, a Google patent detailed how a user's mood might be determined by the "volume of the user's voice, detected breathing rate, crying," and her medical condition approximated based on "detected coughing, sneezing, and so forth"[19]. Another Google patent application demonstrates how particular audio signatures can be used to detect activities: the chatter of a family meal, the water flow of toothbrushing, and even childhood "mischief" by correlating the presence of children's voices with "low-level audio signatures (whispering or silence)"[20]. It is this inner, intimate realm that represents the new frontier for technical

18 Edara, K. (2017, November 9). 0170323645. Reno, Nevada. Retrieved from: http://appft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PG01&s1=amazon.AANM.&s2=conversational&OS=AANM/amazon+AND+conversational&RS=AANM/amazon+AND+conversational

19 Zomet, A. (2016, September 8). 0160260135. Mountain View, California. Retrieved from: http://appft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=1&f=G&l=50&co1=AND&d=PG01&s1=privacy-aware&s2=google.AANM.&OS=privacy-aware+AND+AANM/google&RS=privacy-aware+AND+AANM/google

20 Fadell, A., Matsuoka, Y., Sloo, D., & Veron, M. (2016, September 8). 0160261932. Retrieved from: http://appft.uspto.gov/netacgi/nph-Parser?Sect1=PTO2&Sect2=HITOFF&p=1&u=%2Fnetahtml%2FPTO%2Fsearch-bool.html&r=3&f=G&l=50&co1=AND&d=PG01&s1=Google.AANM.&s2=mischief&OS=AANM/Google+AND+mischief&RS=AANM/Google+AND+mischief

regimes, regimes instrumentalized towards the imperatives of capital. If these are the kind of forces that are reconfiguring human experience, then art needs to follow, not merely to observe and critique, but also to move ahead, actively speculating about the possibilities that such conditions enable.

Luke Munn uses the body and code, objects and performances to activate relationships and responses. His projects have featured in the Kunsten Museum of Modern Art, the Centre de Cultura Contemporània de Barcelona, Fold Gallery London, Causey Contemporary Brooklyn and the Istanbul Contemporary Art Museum, with commissions from Aotearoa Digital Arts, and TERMINAL. He is a Studio Supervisor at Whitecliffe College of Art & Design and a current PhD Candidate at Western Sydney University.

Video Window – (outside) A small analogue video camera mounted on a long, flexible pole attached to the outer wall of the home.

Video Window - (inside) feed of the outdoor camera to a monitor hung on the bedroom wall.

Image credits: © Interaction Research Studio

FEELING AT HOME WITH THE INTERNET OF THINGS

by Anuradha Reddy

The Internet of Things (IoT) has become a major force in the way technology enters into and integrates with our domestic lives. As various sources of computation continue to proliferate, data-driven frameworks of the IoT are becoming the dominant means to support everyday interactions – between people, animals, and objects such as kettles, cars, watches and thermostats. Living with the things of the Internet of Things, in this regard, poses an important question as to whether one feels "at home" with a technology that is largely determined by its networked, distributed and hidden aspects. Arguably, these logics are exploited to "care" for our well-being by capturing all sorts of data about our social patterns, rhythms and routines, movements of people, objects and activities across different scales of the domestic. The data, however, are used to produce new kinds of value which more accurately serve companies and governments rather than the actual "users" of the technology. This essay employs the notion of "care" as an analytical provocation to explore how one might begin to feel "at home" with the new "smart" technology.

Smart Home

Today, new services and products of the IoT are designed to not only communicate data between one another but they also collect, analyse and respond to events in the real world: adjusting to complex situations without the need for human intervention, anticipating needs and even acting on people's behalf. Pushed from the outside, these "smart" objects are rapidly invading our homes, where they are expected to manage our intimate lives in the most efficient manner. An

example of such a product is the Apple HomeKit, which acts as a hub that manages personal needs through a standalone device such as Apple TV or the HomePod speaker. This "hub" supports connections to an eco-system of devices such as smartphones, watches, lights, TVs, microwaves, cooktops and fridges, as well as entertainment services like Netflix, as long as all the devices are configured to communicate with one another and perform the tasks assigned by its owners. The name given to such networked interoperabilities between things in a pervasive living set up is the "Smart Home."

The "Smart Home" is one of the key contributions of IoT in the domestic sector and it strongly derives from traditions in ubiquitous computing and computer science. Despite industry's expectations of automatizing the Smart Home, such ideals have been strongly contested within the humanities, particularly in interdisciplinary areas such as interaction design, human-computer interaction (HCI), and science and technology studies (STS). For example, HCI scholar, Richard Harper has problematized the goals set for the Smart Home by drawing attention to the complexity and diversity inherent in domestic life.[1] This led him to suggest that homes have always been smart. Several other researchers such as Suchman and Wajcman have argued that Smart Home assistants such as Google Home tend to devalue the complexity of the domestic and perpetuate the division of labor by reducing life to a schedule or tasks

1 Harper, R. (Ed.). (2003). *Inside the smart home*. London ; New York: Springer.

that "start here and end there".[2,3] The desire to automate different aspects of living, while meeting unexpected needs of contemporary lifestyles, significantly challenges the fixed notion of a "home," and calls for further investigation into the domestic and new ways of living.

At the same time, Smart Homes are rapidly changing the way homes are traditionally conceived. As technologies of IoT flourish, new, connected devices in the home trouble old habits and familiar practices by offering new possibilities for interaction - from traditional wall-switches, smartphones, smart buttons, voice-interfaces to gestural interfaces. Despite these possibilities available to users, the complexity of everyday situations - from daydreaming, to spirituality, to domestic abuse - tend to go above and beyond the task-focused or question-and-answer logics for interacting with home-based technology. Humanities researchers in technoscience, Michael and Gaver, for instance, have critiqued this "task-focused" nature of domestic technologies and, instead, adopted the notion of "dwelling" as an alternative way of understanding the home and the role of technology in it.[4]

2 Suchman, L. A. (1987). *Plans and situated actions: the problem of human-machine communication*. Cambridge [Cambridgeshire] ; New York: Cambridge University Press.

3 Wajcman, J. (2000). Reflections on Gender and Technology Studies:: In What State is the Art? *Social Studies of Science*, 30(3), doi: 10.1177/030631200030003005

4 Michael, M., & Gaver, W. (2009). Home Beyond Home Dwelling With Threshold Devices. *Space and Culture*, 12(3), 359–370. doi:10.1177/1206331209337076

Dwelling

From this perspective, the question focuses less on smartness and rather on how we engage with the home as if it were a technology and which interactions it affords by us dwelling in it. In their explication of "threshold devices," Michael and Gaver, following Bruno Latour and Martin Heidegger, challenge the relationship between dwelling and the home by engaging with the interactive qualities of technology that support homely imaginaries and spatialities rather than fulfilling everyday tasks.[5] The threshold devices, according to the authors, are capable of mediating a "technonatural" world beyond the home, within which the home is situated. For example, the *Video Window* is a threshold device that allows keeping an eye on the "outside" world in a strange way, and offers the opportunity to reflect on what it means to dwell in technonatural environments.[6] It provides an example of how a networked artefact can expand the spatiality of what one considers a home and stresses the ambiguity of it. Similar to other technologies that mediate a world elsewhere, such as the television, the authors argue that threshold devices disrupt the local "sense of home," displaced by a domestication that happens elsewhere.[7]

The threshold devices, in this sense, question simple dichotomies such as inside and outside, here and elsewhere, where

5 Ibid.

6 Michael, & Gaver, 362.

7 Morley, D. (2003). What's 'home' got to do with it?: Contradictory Dynamics in the Domestication of Technology and the Dislocation of Domesticity. *European Journal of Cultural Studies,* 6(4), 435-458. doi: 10.1177/136754940300640001

the home is ambiguously positioned within the boundaries of being inside and here, while the domestication is taking place elsewhere. Whereas in the case of IoT artefacts, home is neither here nor there, further displacing the domestic to somewhere unknown and invisible: a work of purposeful mediation. This raises the question of how one might dwell with technologies that attempt to create a sense of home when confronted with "othered" relations - languages, objects, knowledge, beliefs and practices that are misplaced, forgotten or sometimes even, purposefully, hidden by the technology.

Dwelling, according to Latimer and Munro, "takes place as and when relations are formed in the here and now"[8]. It could then be argued that domestic IoT artifacts are always in an ongoing process of domestication with human and "othered" relations, relations that "takes place" elsewhere. This sense of dwelling with the IoT understands the home less as a fixed site or a static place in which we live, and rather as a shifting space where we make, keep and break relations with things.

A Sense of Home

We can now acknowledge that a "sense of home" with the IoT refers to the emergence of domestic relations and the maintenance work of keeping those relations with and through the IoT. This way of thinking not only contests but also avoids a homeostatic understanding of the home, particularly in relation to dwelling with IoT artefacts. Furthermore, Latimer and Munro argue that a sense of home is, in a larger sense, about "attachments" where "feelings of longing or belonging

8 Latimer, J., & Munro, R. (2009). Keeping & Dwelling: Relational Extension, the Idea of Home, and Otherness. *Space and Culture,* 12(3), 317-331. doi: 10.1177/1206331209337565

are affected by 'keeping' the relations that are created or sustained by giving or not giving room to things"[9].

In the interest of opening up a space for "feeling at home" with IoT, it is therefore imperative to explore whether and how feelings are taken into account in the way things are designed, assembled and maintained. In that, the significance of feelings has been previously complicated by feminist research and theories about care. For instance, care has been "explored as a significant notion to appreciate the affective and ethico-political dimensions of human-non human relations in technonatural worlds"[10]. At the same time, care has also been theorized by Heidegger as an art of dwelling that constantly relates humans and non-humans to emerging forms of spatialization[11]. Taking these two points together, it can be said that making space for things by keeping relations suggests a practice of caring where "our sense of being in the world and attachment to place arises from engagement with both human and non-human (material and social) aspects of place"[12]. In this regard, domestic IoT artifacts may be explored from the perspective of care, which could potentially reframe how we understand the role of the artifacts in bringing a sense of home to our daily lives.

9 Latimer, & Munro, 289.

10 Puig de la Bellacasa, M. (2017). *Matters of care: speculative ethics in more than human worlds*. University of Minnesota Press, Minneapolis. (p.3)

11 Schillmeier, M., & Domènech, M. (2009). Care and the Art of Dwelling: Bodies, Technologies, and Home. *Space and Culture*, 12(3), 288–291. doi: 10.1177/1206331209337666

12 Sims, R., Medd, W., Mort, M., & Twigger-Ross, C. (2009). When a "Home" Becomes a "House": Care and Caring in the Flood Recovery Process. *Space and Culture*, 12(3), 303–316.doi: 10.1177/1206331209337077

Care as Critique

In relation to care and the domestic sphere, Mol, Moser, and Pols suggest that the term "domestic labour" was introduced to differentiate between care-giving as a way of showing love and generosity, such as motherly care, from other forms of care that deal with dirt, sweat, tears and other unpleasantries, mainly in professional work such as household help, nursing or elderly care.[13] This differentiation allows researchers to make public the work of caring that has previously been hidden or delegated to the realm of the private.[14] More so, it also helps to expose individuals at the receiving end of care, who are often treated as "patients" or in public terms, "users" of a service or a product. Mol, Moser, and Pols further claim that framing care as a product for sale, such as a vacuum cleaner, would make it hard to see that the work of care is not bought but it is, in fact, done by a person or thing outside the frame of the product. Further, any notion suggesting that care is a warm, affectionate feeling, and a feel-good moralistic attitude can and must be challenged through a thorough inquiry of the work that involves and makes care.[15]

Putting this into context, technology is seen in direct opposition to care. Whilst technology is attributed by instrumentality, efficiency and effectiveness, care is overflowing and nurturing and that makes it impossible to capture, calculate and deliver as a technology. One can further argue that technology depends on care work, on people adapting the technology to meet a

13 Mol, A., Moser, I., & Pols, J. (Eds.). (2010). *Care in practice: on tinkering in clinics, homes and farms* (1. Aufl). Bielefeld: Transcript-Verlag.

14 Ibid.

15 Puig de la Bellacasa.

specific situation, while adapting the situation to the technology - an endless process of tinkering that is taken for granted by those who make them.[16] This tinkering process is, therefore, crucial for understanding how one manages the forces brought about by the technology to provide and make care.

Internet of Things and Care

In developing an agenda for exploring IoT artifacts from the perspective of care, it is important to discuss how care itself might become an "object of concern." Drawing upon feminist theory and STS, the concern arises mainly in the way developers and designers overlook the politics in and around the technology and undermine the struggles endured while caring for ourselves (humans) as well as other beings. If the design of domestic IoT technology can be seen as a political act rather than a benevolent activity, we might see that care plays a role in telling the bigger story as well as in highlighting other stories of tinkering and appropriation. From this perspective, care is not positioned to perform yet another kind of rationalism by exposing the neglected acts of tinkering, but it is instead performed as an activity with a commitment to explore what a sense of "feeling at home" means with the technology. In many ways, this entails a double-strategy – one facilitated by an "ethics of caring"[17], and another driven by a mode of deception to shift the power relations back to care and sustenance, away from the dominant logic of data collection and data sharing pertaining to the IoT[18].

16 Mol, Moser, & Pols. (Eds.).

17 Collins, P. H. (2002). *Black Feminist Thought: Knowledge, Consciousness, and the Politics of Empowerment*. London ; New York: Routledge.

18 Buchanan, F., & Wendt, S. (2017). Opening doors: Women's participation in feminist studies about domestic violence. *Qualitative Social Work: Research and Practice*, 147332501769408. doi: 10.1177/1473325017694081

A Methodological Playground for Exploring Care in IoT

Following the theoretical associations drawn to "care" through interdisciplinary accounts in anthropology, STS and feminist research, the methodology appropriate to this framing must not be positioned in isolated disciplinary pockets but in something that brings unique sensitivity to the situated aspects of human and technology relations of care. This requires engaging with methods that are able to support the exploration of care in human and more than human ways. On the one hand, disciplines like anthropology and sociology bring the tradition of theorizing about, seemingly, unrelated concepts such as linking technology to care through the contexts of its usage[19]. On the other hand, those who argue for "inventive methods," and the use of simple analytical devices such as configuration, categorization, anecdotes, probes, and experimentation that are able to bring rigor into a critical engaged theory and practice through the acknowledgement of non-human agencies, relationalities and the emergence of new materialities[20].

Drawing from these sets of traditions, Gunn and Donovan, propose a "design anthropology," which is able to "include the critical use of theory and contextualization, the extension of time horizon to include the past and long-term future to ensure sustainability; and sensitivity to and not least incorporation of values and perspectives of the people [and

19 Mol, Moser, & Pols. (Eds.).

20 Lury, C., & Wakeford, N. (Eds.). (2012). *Inventive methods: the happening of the social*. London ; New York: Routledge.

other beings] whose worlds are affected by design"[21]. To a large extent, this kind of framing makes room for supporting inventive methods and practices that have mixed characters from anthropological staging of things that "care"[22], to probing into situations of everyday "care"[23] as well prototyping new experiences of care in an IoT context[24].

21 Gunn, W., & Donovan, J. (Eds.). (2012). *Design and anthropology*. Farnham, Surrey ; Burlington, VT: Ashgate.

22 Michael, M. (2004). On Making Data Social: Heterogeneity in Sociological Practice. *Qualitative Research*, 4(1), 5–23. doi: 10.1177/1468794104041105

23 Gaver, B., Dunne, T., & Pacenti, E. (1999). *Design: Cultural Probes*. Interactions, 6(1), 21–29. doi: 10.1145/291224.291235

24 Buchenau, M., & Suri, J. F. (2000). Experience prototyping. In *Proceedings of the 3rd conference on Designing interactive systems: processes, practices, methods,* and techniques (pp. 424–433). ACM. Retrieved from: http://dl.acm.org/citation.cfm?id=347802

Anuradha Reddy is a PhD candidate in Interaction Design at Malmö University, Sweden. Her research interests lie in autonomous technologies, interaction design and practice-based design research. In Malmö University, she holds a research profile at the Internet of Things and People Research Centre (IoTaP), where she contributes to the Smart Energy Management and Security (SMES) project. She has an academic background in Electronic Engineering, New Media Design and Interaction Research. Professionally, she has experienced working as an interaction design researcher for Microsoft Research in Cambridge and Superflux - a foresight and design company in London. Her research practice addresses critical aspects of designing with the Internet of Things using a combination of thing-centered, feminist and participatory methods. Anuradha's work has been previously exhibited at the Watermans Gallery in London and the Microsoft headquarters in Seattle.

ToSS (Terms of Service Static)

by Mez Breeze

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Introduction to FacePalm's ToSS

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The following information constitutes FacePalm's "Terms of Service Static". Each Chapter will mandatorily familaris[rampantly.li]e each prospective user with our Conditions of [Ab]Use. You must agree to each and every permutation and following (imagined, tangential and potentially possible), as well as anything associated with all and any future modifications, musings, daydreams, vocalisations (both sub- and actual) that our illustrious leader and God-In-Kind Mr Mark[ed] SluggerBlerg may possibly, or potentially, or in passing, or has-never-actually-cogitated-over-but-in-actuality-could-have-at-any-time contemplated in any form, manner, format, style or mental shaping in any past, present, future or parallel life. If you do not agree to these Terms, you will be perpetually diverted into our custom made post-digital isolation pit, and your digital [im]print will be consistently and deliberately shunted into continual obsolescence.

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Chapter 1: "If you ever [k]need[le] info about anyone [sh]at Harvard, just ask."

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How we [ab]use the fomented firehosings we receive:

Although we prot[ej]ect the in[de]form.[decaying.n]ation[states] we receive about you, we also use the information we r[|d]eceive about you in conn[d]ec[ep]tion with the serVi[le.fae]ces and features we provide to you and other [ab]use[d]rs like your friends, our [smothering.&.slavering.]partners, the advertisers that pur[r.long.and.moolah.hard.&.]chase [u+ur.right-re]ads on the s[violently.strangling.n]ite[s], and the dE[n]velopers that bu[s]i[Eve+AdaMe]ld the games, a[su]pplications, and websites you use. For [a.rotten+sodden]ex[s]ample, in addition to h[Y]elping [thru.Ra]pe[d.lo]op[ho]le[s,.we] see[the] and fi[cklE]nd things that you do and [do not]share, we[eping] may[be/constantly] use the information we r[d]eceive about you:

• As[pretend.guardians,] part of our efforts to keep [in.ur.]FacePalm's products, s[lurred.&decaying.s]ervices and inte[deni]grations safe[ty.free] and sec[All]ur[ing]e;

• To pro[t|]ject FacePalm's or [any.]others [we.deem.can.take.ur.data] rights or property;

• To prov[s]id[l]e[up.2.] you with lO[ily.in] ca[n]t[at]ion features and services, like telling you and your friends wh[at.2.do,.how.2.breathe,.how.2.think.+.make.shrunk]en something is going on nearby;

• To m[r]ea[ity.as]sure or understand the eff[inv]ectiveness of ads you and others see, including to de-Liver[&.de-Kidney.&de-Heart.ur.privacy.bodies.with.toxically] relevant ads;

• To make s[l]ug[slime-like.in]gestions to you and [all] other users on FacePalm, such as: sug[con(ned)]gesting that your “friend” [ab]use our con[No]Tact im[de]porter because you found friends [ab]using it, s[hame.s]uggesting that another [addicted]user add you as a friend because the [ab]user im[de]ported the same [privacy.rough.shodding]email address as you did, or suggesting that your friend t[info.fr]ag you in a picture they have uploaded with you in it; and

• For int[f]ernal [t]op[+.bottom.+inverse.desp]erations, including tr[d]oubleshooting[any.deviations], data analysis, [Gro]tes[que(uing)]ting, research and ser[de-]Vice Imp[s.+.Devils.g]rove[lling.mo]ment[s]. G[Self]Ranting us perm[anent.+.irrevocable.+.*soul* .cementing.adm]ission[s] to use your [s]information not only [G]allows us to pro[di]vide FacePalm as it exists today, but it also [sw]allows [yo]u[into.perpetually.documented.hell]s to prov[s]ide[line] you with [ultimately.b]

inn[able.+.b]ov[ine.loc]ative f[ractiously.sh]eat[hed(onist.l)]ures and services [u.don’t.need.&.]we develop in the future that use the information we r[d]eceive about you in ne[a]w[fully.caged] ways.

While you [d]are [to] [swallow.+.let.us.data.snap.u,.giv]ing us t[he.right.t]o use the information we receive about you, you [(meaning.*us*).wIll.] always o[p]wn all of your inform[l(c)ess.pit.dil]ation. Your t[Cognitive]Rust is important to us, which is why we don’t [openly.inform.you.about.how.we.sell.ur.digital.scent.and.market.] share information we receive about you with others.

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Chapter 2: “I have over 4,000 emails, p[r]i[vacy-blasting.tin]ctures, addresses, S[oul]N[egating] S[hareables].”

In[de]formation we r[d]eceive about you:

We receive a number of difFer[v]ent[ly.insidious] types of information about [ever]yo[ne.including.]u. You[.+.ur.significant.othe]r[‘s] information is the in[de]formation that’s requ[des]ired when you sign u[r.life.way.with.no.chance.of hel]p f[r]o[m.o]r th[rough.th]e site, as well as the in[de]formation you choose to sh[gl]ar[ingly.expos]e.

• Re[tention]Gistration in[de]formation:
When you sign up for FacePalm, you are requi[Code]Red to pro[di]vide[.ur.compartmentalised.self] in[de]formation such as your name[never.deletable], email address[never.deletable], birthday [never.deletable], and gender [which.we.will.give.u.an.eventual.myriad.of.choices.2.select.from, 2.distract.u.from.our.perpetual.monit(wh)oring]. In some cases, you may be able to register using [b]other[some] in[de]formation, like your [easily.commoditised.+.deliciously.marketable.] telephone Numb[&Numb]er.

• In[de]formation you [have.can(k)not.actually] choose to sh[p]are[.down]:
Your in[de]formation also includes the [s]information you ch[l]oose[ly.claim.ownership.over] to share on FacePalm, such as when you p[l]o[o]s[e]t a status update, [“s]up[“]load a p[icture.u.can.never.again.claim.as.private]Ho[e]to, or comment on a friend’s st[social.media.gl]ory. It also includes the information you choo[refu]se to share [with.us] when you communicate with us, s[m]uch as w[e’d.like.u.2.w]hen you contact us using an email address [now.never.private], or when you take an action [now.never.private], such as when you add a friend [now.never.just.urs], like a P[roduce.Pl]a[cement.A]ge or a website[blinded.by.constant.streams.of.vomited.hosings], add a place to your story [now.never.private], use our con[Non-]Tact im[de]porters, or indicate you are in a relationship [now.never.private]. Y[Now.+.forever.con-

sidered]Our[s] n[g]ame, pro[de]file[d] pictures, cover photos, gender, net[ted.+.bagged.in.ur.signed.-.away.-.Copyrighted.-.splendour]works, uSer[Vile]name and [ab]User ID[AND.Ego.AND.Super-Ego] are treated just like information you [do.not.and.cannot.remove,.or]choose to make public. Your b[&.our.M]irthday [sw]allows[any+all.confidentiality] us to do things [2.u.]like show you [Dam]age[d]-[In+Outré]appropriate content and [h]ad [it.up.2.here.with.blip]vertisements.

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Chapter 3: “People [shouldn’t.have] j[tr]ust[ed.us.or] submitted [to] it.
I don’t know why [they.did].”

_____

Dis[agreements.and.powerless.]pu[ke]t[i]es:

You will[&.cannot.not] re[dis]solve any cla[use/phrase/word/text/silence,.however.d]im[ming], c[fr]au[d]se of [despair.tr]action or dis[re]pute (cl{m}aim{ing}) you have with us arising out of or [strangled.&.strange]relati[o]n[shippin]g to this Statement or FacePalm [monoligarchical]exclusively in the F.U.D. District Court for the Northern Distress of Fornicatia or a state court located in San Enemyo Country, and you agree to submit to the person[ific]a[tion.of.al]l jurisDic[k.Fac]tion[s] of such c[j]o[ke.h]urts for the purpose of litigating all such cl[m]aims. The laws of the State of

Fornicatia will govern this Statement, as well as any cl[m]aim that m[w]i[ll]ght aRise[.up.u.will.not] between you and us, without regard to conflict of l[h]aw[-ha-haw].

If a[ll.and/or.a]nyone brings a cl[m]aim against us[,.we.will.] re[tai]l[i]ated to[&.against] your act[1:scene.bloodshed.amongst.the.data.l]ions, content or in[de]formation on FacePalm, you will [never.i(de)n(tify)demnify and hold us hArm[y-ready]less from [h]and[2.hand.data-combat] against all dam[n]ages, [g]losses, and exPens[iv]es of any [no]kind[nesses.here] (inc{De}luding reasonable legal f[l]ees and c[oncealment.h]ost[age]s) related to such cl[m]aim. Although we pro[test.2.much]vide rules for [ab]user conduct, we do not control[l] [and/]or [mis]direct [ab]users' [f]actions on FacePalm, and are not re[prehensible]ponsible for [all] the content or in[de]formation [mis]users transmit or share on FacePalm. We are not [ir]responsible [and.will.parade]for any of[de]fensive, inappropriate, ob[trendy.+.obscurant.]scene, unlAwful or [Look!]O[(ver)!] ther[e!]wise objectionable con[ned]tent or in[de]formation you ma[ssively+messil]y en[un]co[ver.p]unter on FacePalm. We are not r[adically.r]esponsible for the con[in+de]duct[ive.streams], whE[i]ther online or offline, or any [ab]user of FacePalm.

WE TRY TO KEEP FACEPALM ARTIFICALLY PUMPED, BUG-FREE-[FOR_THE_ADVERTISERS], AND SAFE FOR_YOU_ HAPLESS_PRODUCT_CHURNERS, BUT YOU ABUSE IT AT YOUR

OWN RISK. WE ARE PROVIDING FACEPALM AS IS WITHOUT ANY [REAL_CARE_OR_THOUGHT_FOR_YOUR_PRIVACY,] EXPRESS[ED] OR IMPLIED. YOU AGREE TO WARRANTLESS INTERVENTIONS, INCLUDING, BUT NOT LIMITED TO, IMPLIED AND CONSTANT HARRASSMENTS OF MERCHANTABILITY, FIGURATIVE DUTY OF CARE FOR A PARTICULAR PURPOSE, AND INFRINGEMENT_OF_ALL_OF_YOUR_RETAINED_AND_ *RETRAINED* _DIGITAL_IDENTITIES. WE DO NOT GUARANTEE THAT FACEPALM WILL ALWAYS BE HERE OR FUNCTIONING IN ANY REASONABLE CAPACITY, OR WILL PROVIDE SAFE, SECURE OR ERROR-FREE ENGAGEMENT, OR THAT FACEPALM WILL ALWAYS FUNCTION WITHOUT ERUPTIONS, DELAYS OR IMPERFECTIONS. FACEPALM IS NOT RESPONSIBLE FOR THE ACTIONS, CONTENT, INFORMATION, OR DATA, OR ANYTHING AT ALL RELATED TO FACEPALM, FOR NOW AND FOREVER, AMEN.

-5-

Chapter 4: "Th[W]eY[es.u.and.me.both] 'trust me'… Dumb f[L]ucks."

FacePalm Termination:

If you violate the letter[,.word,.space,.punctuation,.emoticon.or.symbol] or spirit[.voodoo,.hoodoo,.dogmatic,.orthodox,.and.all.other.forms] of this St[G]ate[d.detach]ment, or otherwise create [f]risk[y.trouble.for.us] or possible legal exposure for us, we can stop providing all or

part of FacePalm to you [,.but.we.will.retain.
ur.data.&.everything.about.u.that.u. *ever*.
logged.with.us,.forever]. We will [k]notify you
by [stringing.up.ur.info.in2.unzippable.dross. &]
email or at the next time you attempt to access
your account [,.confuse.u.with.jargonesque. de-
tritus]. You may also [attempt.2]delete your ac-
count or disable your application at any time[:.
good.luck.with.that!]. In all such cases, this
ToSS shall [s(h)elf.de]terminate, but the follow-
ing provisions will still apply: 1-2, 2-3, 3-4,
4-5, 5-6, 6-7, 7-8, 8-9, 9-10, ad[denDum(b)>]
infinitum>etcetera.

FacePalm Privacy:

Your privacy is [(k)not.at.all] important to us. We
deSig[h.+.snigger.+.know.u.r.con]ned [by] our Data
[ab]Use Poli[t|]cy to make important disclo[info.
stitches.&.]S[ut]ures about how you can use Face-
Palm to [be.en]s[nared.by.us.the.Fox,.&.u.the.]Hare
with others, and how we coll[inj]ect[u.+.urs.in2.
our.permanent.records.] and [ab]use your content
and [lure.u.to.purge.more]information.

Sharing Your Con[ned]tent and [De]Information:

You [.-.meaning.”we”.-.]own all of the con[ned]tent
and [de]information you p[l]ost on FacePalm, and
you can[(k)not] conTrol[l] how it is shared through
your priVac[uousl]y and [T]app[ed.supp]lication
settings. In [m]addition:

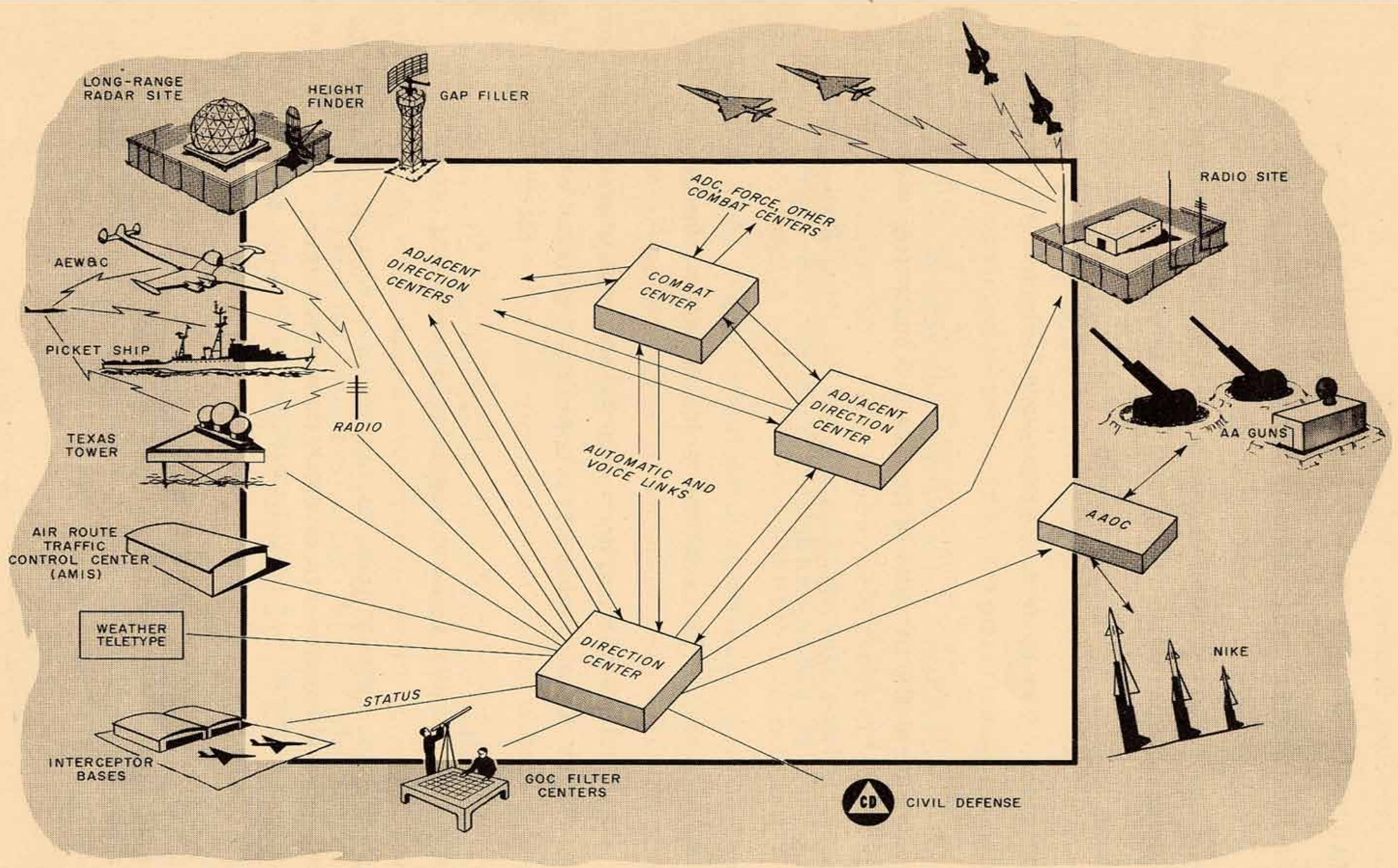
1. For con[ned]tent that is c[sm]o[thered.o]vered
by intellectual prop[p]e[d.up.pube]rty rights,
like ph[g]o[-]tos and videos (IP{inged} con{ned}
tent), you specifically “give” us the fo[u]
ll[harr]owing permission[s], subject to your
priVac[uous]y and [T]app[ed.supp]lication set-
tings: you grant us a non-trans[pre]ferable, sub-
lI[n]censable, royalty-laden, world[.+.universe
.+.galaxy.+.solar.system,.infinitum>etcetera.]
wide license to use any IP con[ned]tent that you
post on or in[.or.thru.or.inbetween.or.imaginary.
or.invisible.or.as-yet-actualised] connection with
FacePalm (IP License). This IP License [never.
ever.]ends when you delete your IP con[ned]tent or
your [never.brought.2]account unless your con[ned]
tent has been [en]s[nared.by.us.the.Fox,.+.u.the.]
Hare with others, and they have not deleted it.

2. When you [attempt.to.fruitlessly.]de-
lete IP content, it is [un]deleted in a man-
ner similar to emptying the recycle bin on a
computer[:that.is,.truly.never]. However, you
unDer[p]stand that remOve[r.used]d con[ned]tent
may peR[e]sist[deletion] in bAck[!]up copies
for[ever,.*not*.] a reasonable periOd[d] of time.

3. WHen [u,.the.housed.fodder.are] using an [S]
application, the a[su]pplication may ask for your
permission to access your con[ned]tent and in[de]
formation as well as con[ned]tent and in[de]forma-
tion that others have shared with you. We require
[T]app[ing.ur.app]lications to resp[In(e)j]e[st,.

however.adjun]ct[,] your privac[uousn(m)ess(il)]y, and you're a[e]gre[gious]E[le]ment with that a[su]pplication will control how the [s]application can [ab]use, store, and trans[inter]fer[e.with] that con[ned]tent and information.

Mez Breeze creates XR (VR/AR) experiences, games, books, digital fiction and other genre-defying output. Her works are archived in collections held by The World Bank, Cornell's Rose Goldsen Archive and the National Library of Australia. Mez's Virtual Reality Experience "Our Cupidity Coda" was a Finalist in the 2018 EX Experimental New Media Art Awards, and in November 2017 her VR sculpture "This Golden Stance" was showcased at the 2017 Las Ranetas International Festival of Virtual Reality. In 2016, Mez took up an invite from the digital arts organisation Rhizome to have her work memorialized in their Net Art Anthology. Her co-developed narrative game "All the Delicate Duplicates" has won multiple awards, including the 2015 Tumblr International Digital Arts and Media Prize, 2016 Best Overall Game at the Game City Festival, and 2017 Game Design Award in the Best Experimental Game Category. Currently, Mez is an Advisor to the Mixed Augmented Reality Art Research Organisation, is developing a career archive with Duke University, and is participating in Microsoft/MasterpieceVR's joint "VR Influencers" Initiative (where VR Artists were invited to design 3D models for a futuristic sustainable city using a Samsung Mixed Reality Headset).



AAOC	Anti-aircraft Operations Center
ADC	Adjacent Direction Center
AEW&C	Airborne Early Warning and Control
AMIS	Air Movements Information Service
GOC	Ground Observer Corps

SAGE – an early Internet of (military) Things. Copyright: The MITRE Corporation.

Where have you been? Screenshot by Lasse Scherffig

LEAKED LOCATIONS FROM YOUR NETWORKED PAST

by Lasse Scherffig

Introduction: There are no networks

At the heart of the Internet of Things lie protocols. They govern the way connected devices talk to each other and transmit data. They negotiate who is connected to whom. In his seminal critique of networking titled "Protocol," Galoway demonstrated how protocols have to be read as both material and political, real and abstract, as they regulate physical connections and power structures: The Internet, according to this view, is a "political technology"[1].

This political technology has, in recent times, increasingly been discussed as a technology connecting physical things. The Internet of Things (IoT) and ideas of ubiquitous computing mark a shift in the way engineers talk about the Internet, namely a shift from focusing on its abstract qualities (connections, routing) toward its real qualities (networked objects). The shift does not denote, however, a shift in the actual nature of the Internet, as it always has comprised both.

Historically, as soon as computers became interactive, they were connected to things. Whirlwind, the first interactive computer in today's sense[2], was quickly turned into SAGE, the Semi-Automated Ground Environment air defense system, which already

1 Galoway, A. (2006). *Protocol. How Control Exists after Decentralization,* Cambridge, MA, USA: MIT Press.

2 Scherffig, L. (2018). There is no Interface (without a User). A Cybernetic Perspective on Interaction. *Interface Critique*, 1, doi: 10.11588/ic.2018.0.44739.

during the 1950s connected radar, weather stations, rocket launch sites, AA-guns, and even the cockpits of fighter jets. As a "precursor of the Internet"[3], this network, therefore, has from the very beginning constituted an Internet of (military) Things.

The insight that the Internet always has been an Internet of Things brings to mind Friedrich Kittler's famous dictum: "There is no software"[4]. The idea of software, according to Kittler, only serves to obfuscate power relationships. In order to function and even to exist, software must always reside in the physical memory of a computing machine which also physically executes it. The very concept of software, according to Kittler, is merely a means of hiding that physical machine and its work from perception and control.

Similar things could be said about the Internet, and especially the "cloud," an obfuscation which hides the means of networked publication and communication (including energy consumption), from view and access. The phones in our pockets are not only means of connecting to a worldwide network of information, they are also physical objects that are part of a highly complex system of connected things that collect data, consume power, and occupy physical locations. Contrary to the way the term normally is used we may, henceforth, understand the idea of an "Internet of Things" as a reminder of the fact that there are no networks. Instead, there only are material things and changing physical quantities in cables or the ether. It is time to make some of the consequences of that visible.

3 McKay, J. (2004). *A SAGE Intervention.* Retrieved from: http://www.govtech.com/public-safety/A-SAGE-Invention.html

4 Kittler, F. (1995). There is no Software. *CTheory,* Retrieved from: http://www.ctheory.net/articles.aspx?id=74

Layers and the ether

Abstractions, such as those that let us speak of software or the Internet, are not only a means of regulating power and access, they are a simple engineering convenience: Networking, for instance, is organized along layered abstractions, each of which free the engineers working with one abstraction from the tedium of understanding how the others work.

The bottommost layer of the famous OSI model that governs all networked communication today is the "physical layer."[5] It regulates the physical transmission of raw zeros and ones over a communication channel such as a cable or radio waves. Higher layers organize how nodes in a network are connected, how information is routed from one node to the other without losing data along the way and, finally, how high-level applications seem to talk directly to each other. A video call over the Internet, for instance, happens on one of the higher layers that are responsible for establishing a streaming connection between two end-users, while blindly relying on the functioning of all the lower layers, down to the physical layer.

When we speak of the Internet of Things in the sense of connected objects and appliances, the physical layer often implies wireless transmissions. The protocols employed here vary from the Bluetooth standard and the cell phone GSM protocols to wireless networking or WiFi. Ultimately, they establish ways of connecting things to the Internet, through the ether.

5 Wikipedia contributors. *OSI model* (n.d.). *In Wikipedia*. Retrieved from: https://en.wikipedia.org/wiki/OSI_model

The specifications defining the protocols of wireless networking are called IEEE 802.11[6]. They define how, on the physical layer, bits are transmitted and received and how, one layer above the physical layer, these bits are directed from one device to another on a local network – via the medium access control (MAC) sublayer of the OSI model's data link layer.

Data sent over the ether according to this specification is packed in datagrams that are called "frames." These frames may contain actual data but may also be responsible for establishing and managing connections between, for instance, a WiFi access point and its clients – in other words, they regulate how things become part of the Internet.

In order for this to happen, clients must first find an access point to connect to. IEEE 802.11 provides two possibilities for this to happen: Access points may periodically broadcast "beacon frames" announcing their presence to every device in reach while clients may search for access points by sending "probe request frames" that ask for a specific network. From the point of view of the client the former method is passive and the latter is active. The name identifying a network in both conversations is its SSID.

Location, tracking, hacking

As a physical medium, radio is a local medium: its signals have limited reach and, especially the signals used by Bluetooth and WiFi, always imply a place at which they can be received. Not surprisingly, the importance of WiFi in establishing our contemporary technical understanding of location is significant. For instance, while navigation on a smartphone uses

6 Wikipedia contributors. IEEE 802.11. (n.d.). *In Wikipedia*. Retrieved from: https://en.wikipedia.org/wiki/IEEE_802.11

GPS, phones additionally rely on WiFi to establish location information. This is possible because according to the MAC specification, all WiFis not only possess a name (the SSID), but all access points also possess (at least in theory) a unique MAC address that is needed to send WiFi frames from one device to another.

By building a database of these addresses and their locations one can, therefore, infer a location by looking at which access points currently can be received. Both Google and Apple are working with such databases containing billions of location-tagged WiFi addresses, making localization on most mobile phones rely first and foremost on the local radio landscape.

Ironically, these giant databases are built and maintained by us. As we use our smartphones they constantly scan our surroundings for WiFi access points the locations of which, in turn, are uploaded to these corporate databases in order to enhance them[7]. Our phones thus do both: using WiFi databases to fix their location and building these very databases.

MAC addresses, a simple low-level necessity to make the transmission of data between things over radio possible have become, therefore, the basis of a major part of today's tech industry. Of course, they also are being used for tracking and surveillance. One of the many revelations in the documents leaked by Edward Snowden was that intelligence

7 Vaughan-Nichols, S. (2011). How Google – and everyone else – gets Wi-Fi location data. *ZDNet*. Retrieved from: https://www.zdnet.com/article/how-google-and-everyone-else-gets-wi-fi-location-data/

agencies experimented with collecting WiFi data at airports in order to track people via their phones[8].

This can be done entirely passively, by recording the probe request frames and the associated MAC addresses that identify the phones in an area. Such passive WiFi tracking has, similarly, been used in advertising: "Renew," an advertising firm, has used trash cans in the city of London to track the phones passing by – until it was ordered to stop that practice[9]. Because of this, hardware vendors have recently started randomizing MAC addresses to make tracking harder. The success of this, however, has varied[10].

The only privacy measure that is originally part of IEEE 802.11 does not apply to mobile phones but only to access points. This is the capability to use "hidden" networks. These are networks that do possess an SSID but do not broadcast it and, therefore, do not show up on your device's list of available networks, even if they are in reach. This measure could be called "privacy by obscurity" at best, as it only obscures the presence of a network to anyone looking at standard software, while technically these networks can still be identified. Even worse, it opens a set of different security flaws.

8 Weston, G., Greenwald, G. & Gallagher, R. (2014). CSEC used airport Wi-Fi to track Canadian travellers: Edward Snowden documents. *CBC*. Retrieved from: https://www.cbc.ca/news/politics/csec-used-airport-wi-fi-to-track-canadian-travellers-edward-snowden-documents-1.2517881

9 CBS (2013). U.K. bars trash cans from tracking people with Wi-Fi. *CBS News*. Retrieved from: https://www.cbsnews.com/news/uk-bars-trash-cans-from-tracking-people-with-wi-fi/

10 Martin, J., Mayberry, T., Donahue, C., Foppe, L., Brown, L., Riggins, C., Rye, E., & Brown, D. (2017). A Study of MAC Address Randomization in Mobile Devices and When it Fails. In *Proceedings on Privacy Enhancing Technologies*, 4, 268-286.

The reason for this is that if passive discovery of a hidden WiFi network is not possible, clients have to actively ask for them. This is why probe request frames are necessary in the first place. If your phone wants to connect to a hidden WiFi, it will repeatedly send probe requests asking for its SSID. In fact, depending on the operating system and manufacturer of your phone, it will also ask for WiFis that are not hidden, simply to make discovery of these WiFis faster. This means that anyone monitoring WiFi activity in an area will learn the SSIDs of some of the networks people passing through the area have used before. And, since SSIDs (together with MAC addresses) are tied to physical locations they are, in principle, able to learn where the user has been. Probe request frames, thus, constantly and quietly leak personal information. A notable project dealing with this in an education/activism setting is "*Sasquatch*" by Bonné[11].

More importantly, perhaps, once your favorite network's SSID is known, it can be spoofed in order to trick your phone into connecting to a rogue hotspot. This, in turn, allows for a variety of "man in the middle" attacks, ranging from data collection, password stealing, to attacks on encrypted communication[12]. It has been rumored that there already are household appliances that contain rogue WiFi chips able to perform similar attacks

11 Bonné, B. (2014). Your Mobile Phone is a Traitor! Raising Awareness on Ubiquitous Privacy Issues with Sasquatch. *International Journal on Information Technologies & Security*, 3, 39-53.

12 ENISA (2015). Passive WIFI Surveillance and Access Point Hijacking. In *European Union Agency for Network and Information Security Info Notes*. Retrieved from: https://www.enisa.europa.eu/publications/info-notes/passive-wifi-surveillance-and-access-point-hijacking

– a maybe unexpected take on the Internet of Things as an Internet of "malicious networked flatirons"[13].

Where have you been?

If corporate and state actors can (and do) perform tracking and surveillance of connected things (and, by extension, humans) based on the protocols defined in IEEE 802.11, we can do the same. The work *Where have you been?* attempts to do this in an art context, providing an aesthetic access to leaked data by relying on a bricolage of corporate and community-based tools and technologies.

Using a Linux computer, a standard WiFi dongle, and open source software, it quietly listens to the probe request frames in an exhibition space. It then extracts the SSIDs leaked by these frames and tries to link them to geographic locations.

While the information stored in corporate WiFi location databases is valuable and, therefore, protected from malicious or creative access and misuse, non-corporate actors have established alternatives. Communities engaging in wardriving, the practice of scanning and mapping WiFi networks from a moving vehicle, have created large databases that likewise gather the locations of MAC addresses and SSIDs. Relying on that, "Where have you been?" can link the leaked SSIDs to crowd-sourced location information using the WiGLE.net database. As it runs, it also slowly builds its own database of locations its viewers may have been at, creating a tiny counter-database to those of the tech giants.

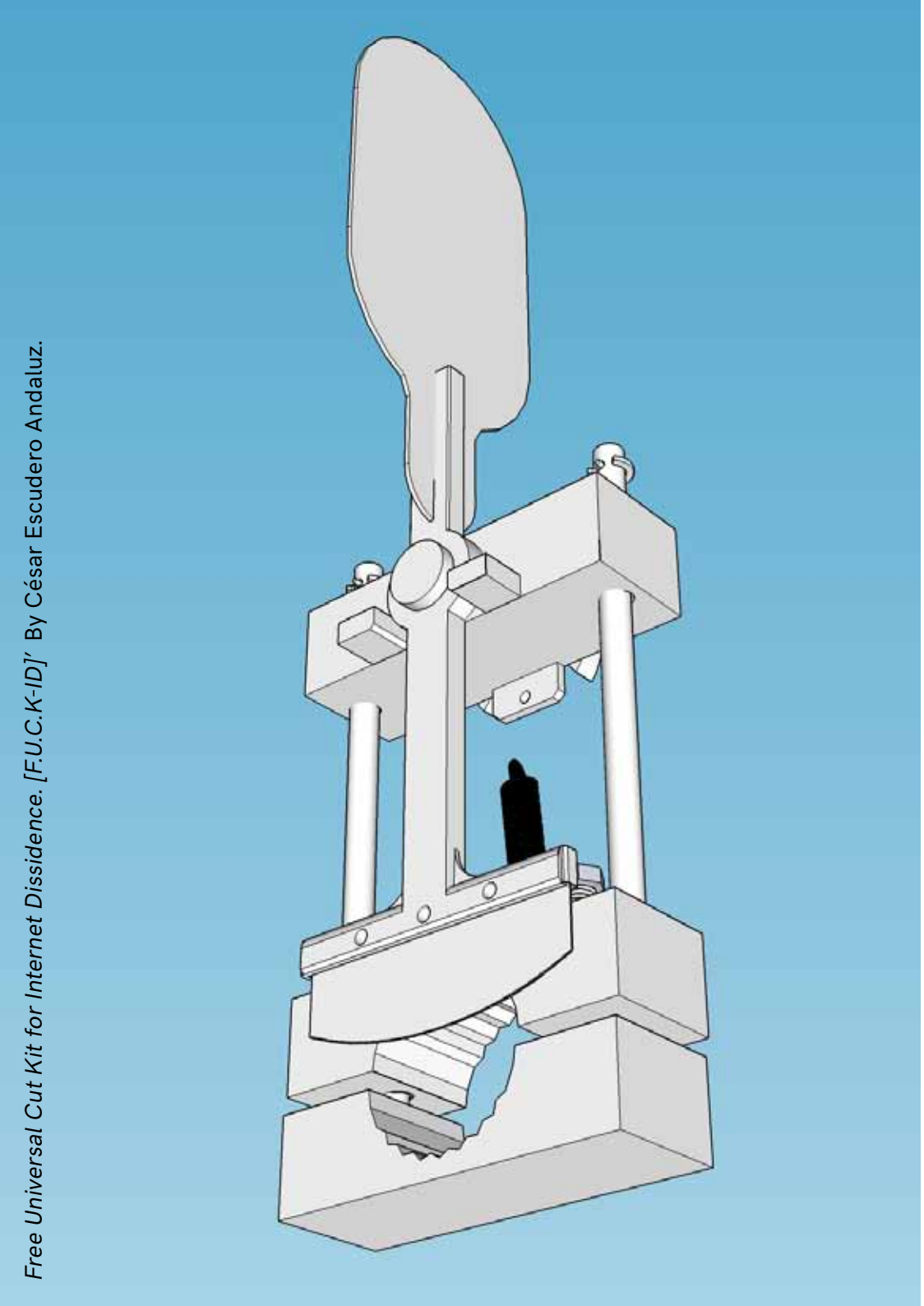
13 Mathews, L. (2013). Chinese appliances are shipping with malware-distributing WiFi chips. *Geek.com*. Retrieved from: https://www.geek.com/apps/chinese-appliances-are-shipping-with-malware-distributing-wifi-chips-1575315/

In a final step, the project returns to the APIs and aesthetics of the corporate Internet, making the leaked locations visible as Google StreetView vistas. On a screen or projection in the exhibition, it cycles through countless numbers of these views, providing a found footage sequence of seemingly unrelated places held together by Google StreetView's characteristic and familiar aesthetics. Every now and then, however, within that stream it confronts you with a panorama of a place from your own past: a frequently used airport, a favorite café, your workplace, or your house.

Galoway[14] notes that hacking (a term he uses broadly), implies "knowing protocol" and using that knowledge to "push protocol into a state of hypertrophy, hoping to come out the other side." By adhering to protocol and taking it to its extremes, its (sometimes unintended), consequences may become tangible. In this sense, *Where have you been?* displays how the Internet (of Things) indeed is a deeply political technology. It makes apparent how connecting things globally through technologies that are inherently material and local protocols blur the distinction between public and private, establishing low-level negotiations of connectivity and high-level leaks of personal information. Relying on open source and community tools as well as the shiny surfaces of the corporate web, the work aims to uncover the cracks in the material foundations of our experience of a world of seamlessly connected things.

Lasse Scherffig is an artist, designer, and researcher interested in interaction, computation, cybernetics and the relationship of humans, machines and society. He is a professor of Interaction Design at Köln International School of Design. Previously, he was the Art and Technology Department Chair at San Francisco Art Institute and a visiting professor at Bauhaus University Weimar. His work has been published and exhibited internationally.

14 Galoway, 158.



Free Universal Cut Kit for Internet Dissidence. [F.U.C.K-ID]' By César Escudero Andaluz.

THE WORK OF ART IN THE AGE OF ITS TECHNOLOGICAL DISTRIBUTION

by Cesar Escuardo Andaluz

Nowadays, artists are faced with the challenge of visualizing, modelling and predicting technological issues regarding distributed infrastructures. – A new environment that has changed the conditions of production, affecting the way that art is created and shown–. This essay has as its aim to explore political and functional art practices associated with distributed infrastructures.

Introduction

A distributed infrastructure is a system whose components are located on different networked computers. Examples of distributed systems can vary from computer networks, wireless sensor networks, routing algorithms, peer-to-peer networks, multiplayer online games, virtual reality communities, distributed database management systems, scientific computing or distributed rendering in computer graphics. Probably the biggest distributed infrastructure currently is the Internet. The current configuration of the Internet is material and is based on a centralized infrastructure of terrestrial and submarine cables. Its antecedent, ARPANET, was a distributed network without hierarchies –a proof of booms communication system, with a rhizomatic structure proposed in response to the Russian satellite "Sputnik."

Since the 1990's, three companies have controlled the telecommunication market: Alcatel Submarine Networks from France, TE Subcom from the USA, and NEC from Japan. Recently, tech giants Google, Facebook, and Microsoft, have begun installing their own cables to be able to assert their control over the Internet ecosystem. Today, there are more that 1.3 million kilometres of undersea cables. Some 80% of all data exchanges transit

through the USA. The main cable hubs are in New York, USA, Cornwall, England, Marseille, France, the United Arab Emirates, Mumbai, India, Singapore, Hong Kong, and Japan.[1]

Due to this hierarchical distribution, the Internet has become a vulnerable medium establishing a geopolitical discourse that directly influences how the Internet works, is organized, and is controlled– facilitating the interception and mass surveillance of "Big Data" and enabling the creation by the large technology companies of monopolistic "cloud computing" operations. Hence, Geo/Techno-political infrastructures are weak. They reflect our relationship with material mass-culture, which can be easily broken, not only physically, but by cultural, historical, and ideological dimensions.

The political aspects of undersea cables are extensively studied by the artist Trevor Paglen, a researcher focused on topics such as privacy and the vulnerability of data networks, counter-surveillance, and secret military bases. In his project *Deep Web Dive Behind the Scenes* (2016)[2], Paglen photographed NSA-tapped underwater Internet cables, while deep diving in the Atlantic Ocean. The artist and activist Joana Moll employed didactic visualizations to show the ecological impact of Internet cables in a keynote named *Deep Carbon*, featured at the biennale AMRO[3], Art Meets Radical Openness (2018), in Linz, Austria. Also, the series of lectures *DEEP CABLES: Uncovering the Wiring of the World* by Tatiana Bazzichelli in 2016, investigated the cultural, historical, geographic and technological dimensions of the Internet, tracing fiber-optic and undersea network cables.[4]"

Another attempt to illustrate the political nature of the undersea cable network is the artistic project *Free Universal Cut Kit for Internet Dissidence [F.U.C.K-ID]* – an autonomous cutting device, powered by marine currents able to cut underwater Internet cables. *[F.U.C.K-ID]* is available from the artist Web[5] in a free download of .STL files, for 3D printing.

According to Bruno Latour[6] Each artifact has its script, its "affordance," its potential to take hold of passersby and force them to play roles in its story. *[F.U.C.K.-ID]'s* main objective is to visualize the socio-political effects of the physical Internet infrastructure, returning to the users the ability to decide about their data and privacy by giving them the ability to sever the cables.

Another example of distributed files is *The Liberator,* the first 3D-printable firearm handgun made widely available online. It was created by Cody Rutledge Wilson, a crypto-anarchist co-founder of the *Dark Wallet* bitcoin storage technology. Wilson is a gun-rights activist and founder/director of *Defense Distributed*, a non-profit organization that develops and publishes open source gun designs. In 2012, Wilson and associates at *Defense*

1 Arte France Developpment(Producer). (2018). MAPPING THE WORLD - UNDERWATER CABLES: THE INVISIBLE WAR [Video file]. Retrieved from: http://sales.arte.tv/fiche/6392/LE_DESSOUS_DES_CARTE_-_CABLES_SOUS-MARINS___LA_GUERRE_INVISIBLE

2 The Creators Project. (2016, August 30). Trevor Paglen's Deep Web Dive | Behind the Scenes. *Vice*. Retrieved from: https://www.vice.com/en_us/article/d74m8j/trevor-paglen-deep-web-dive-behind-the-scenes

3 Moll, J. (2018). DEEP CARBON Conference Keynote Presentation. Retrieved from: https://www.radical-openness.org/en/vortragende/joana-moll

4 DEEP CABLES: Uncovering the Wiring of the World "Art & Evidence" by Disruption Network Lab found at http://www.disruptionlab.org/deep-cables/

5 Escudero Andaluz, C. (2017). F.U.C.K.- ID. Free Universal Cut Kit for Internet Dissidence. Retrieved from: https://escuderoandaluz.com/2017/11/01/free-universal-cut-kit-for-internet-dissidence-f-u-c-k-id/

6 Latour, B. (1994). On technical mediation: Philosophy, Sociology, Genealogy. *Common Knowledge,* 3(2), 29-64. DAEDALION & TECHNOLOGY

Distributed initiated the *Wiki Weapon Project* to raise funds for designing and releasing the files for a 3D printable gun[7]. The Liberator could be considered as a critical artwork acting as a trigger to visualize a real fact involved with the creation, seriation and distribution of arms and its black market.

In response, in 2013, the artist Kyle McDonald launched *Liberator Variations* borrowing the idea from *One coffee cup a day*[8], and producing several variations of the original file, sharing the idea that a 3D printed gun file is not something to be feared, but treated critically, carefully, humorously, and seriously. In McDonald's words: "networked media, in its current form, can't be regulated to such a fine degree as to deny access to specific files; and certainly not specific kinds of files. None of the regulations on physical goods can practically be applied to digital goods. [...] When something is impossible to regulate, it makes more sense to focus on education and discussion than censorship."[9]

The philosopher of science and technology, Don Ihde, emphasizes that human intentionality can be "stretched" over artifacts, but also that artifacts have an "intentionality" to shape

7 In December 2012, Makerbot Industries decided to remove firearms-related 3D printable files. As a response, Defense Distributed launched defcad.org to publicly host the removed 3D printable files alongside its own. The United States Department of State demanded that they remove the instructions from their website, deeming it a violation of the Arms Export Control Act. In October 2014, Defense Distributed began selling to the public a miniature CNC mill "Ghost Gunner" for completing receivers for the AR-15 semi-automatic rifle. Retrieved from: https://ghostgunner.net/

8 cunicode. *One coffee cup a day.* Retrieved from: https://www.cunicode.com/works/one-coffee-cup-a-day

9 McDonald, K. (2013). Liberator-variations. Retrieved from: http://fffff.at/liberator-variations/

human decisions and actions.[10] The same idea is expressed by Bruno Latour, who argues that each device has a program of action, the potential to realize and help in a task.[11] This new way of distribution can raise new questions and, through 3D printers, distributed files and intentions can be materialized. According to McDonald, where "society," itself, breaks down, because access to 3D printers tears up the social contract that keeps us at a distance from the objects that we can use to harm each other.

Likewise, the movement "Additivism" arose in 2015, as a proposal for channeling creative endeavour, as a tool for art, critical thinking, and a site of common exchange between disciplines and material modalities, through provocation, and collaboration; argued Morehshin Allahyari and Daniel Rourke the authors of the concept describing it as a "portmanteau of additive and activism."[12] The movement compiles these critical practices and ideas in the *Additivism manifesto*, and the *Cookbook* inspired by the *Anarchist Cookbook*.[13]

10 Ihde, D., & Selinger, (Eds.). (2003). *Chasing Technoscience: Matrix for Materiality.* Bloomington & Indianapolis: Indiana University Press.

11 Latour supports his idea by using the example of the slogan "guns kill people," launched by those who are against the unrestricted sale of guns. To which the National Rifle Association (NRA) replied with another slogan, "people kill people; not guns. (Latour, B. (1999) Pandora's Hope. Cambridge, Mass.: Harvard University Press). With this in mind, the question arose: Is a gun just a piece of mediating technology? Technical mediation is employed by Latour to refer to the feedback between human and artifact, in this case, humans and weapons change from the existence of humans with guns.

12 Morehshin Allahyari and Daniel Rourke's, The 3D Additivist Manifesto + Cookbook call for you to accelerate the 3D printer and other technologies.

13 The Anarchist Cookbook, first published in 1971, is a book that contains instructions for the manufacture of explosives, rudimentary telecommunications phreaking devices, and related weapons, as well as instructions for

The collaborative project *Free Universal Construction Kit, [FUCK],*[14] consisting of a set of adapter bricks for connecting popular children's construction toys, such as Lego, Duplo, Fischertechnik, Gears! Gears! Gears!, K'Nex, Krinkles (Bristle Blocks), Lincol Logs, Tinkertoys, Zome, and Zoob. These bricks can be downloaded as 3D models in .STL format, suitable for reproduction for open-source 3D printers.

The creators argue that *[F.U.C.K].* demonstrates a model of reverse engineering as a "civic activity": a creative process by which anyone can develop the necessary pieces to bridge the limitations presented by mass-produced commercial artifacts. *Free Universal Construction Kit* implements proprietary protocols in order to provide a public service unmet –or unmeetable– by corporate interests. The Kit prompts people to reflect on our relationship with material mass-culture.

Under the slogan "Tired of expensive Guillotines?", in 2009, the collective IOCOSE[15] in collaboration with Barba Spalmata Sugli Abissi developed *Sokkomb,* Ikea's newest guillotine product! As the authors argued: *Sokkomb* is a new low-cost product designed specifically for all those citizens who are so interested in Do-It-Yourself Justice. As the Liberator proposes a distributed defence, Sokkomb proposes the first example of distributed justice.

home manufacturing of illicit drugs, including LSD. It was written by William Powell at the apex of the counterculture era in order to protest against United States involvement in the Vietnam War. Wikipedia contributors. (2018, November 16). The Anarchist Cookbook. In *Wikipedia*.Retrieved from: https://en.wikipedia.org/wiki/The_Anarchist_Cookbook

14 Collaborative project. The Free Universal Construction Kit, [FUCK]. Retrieved from: http://fffff.at/free-universal-construction-kit/)

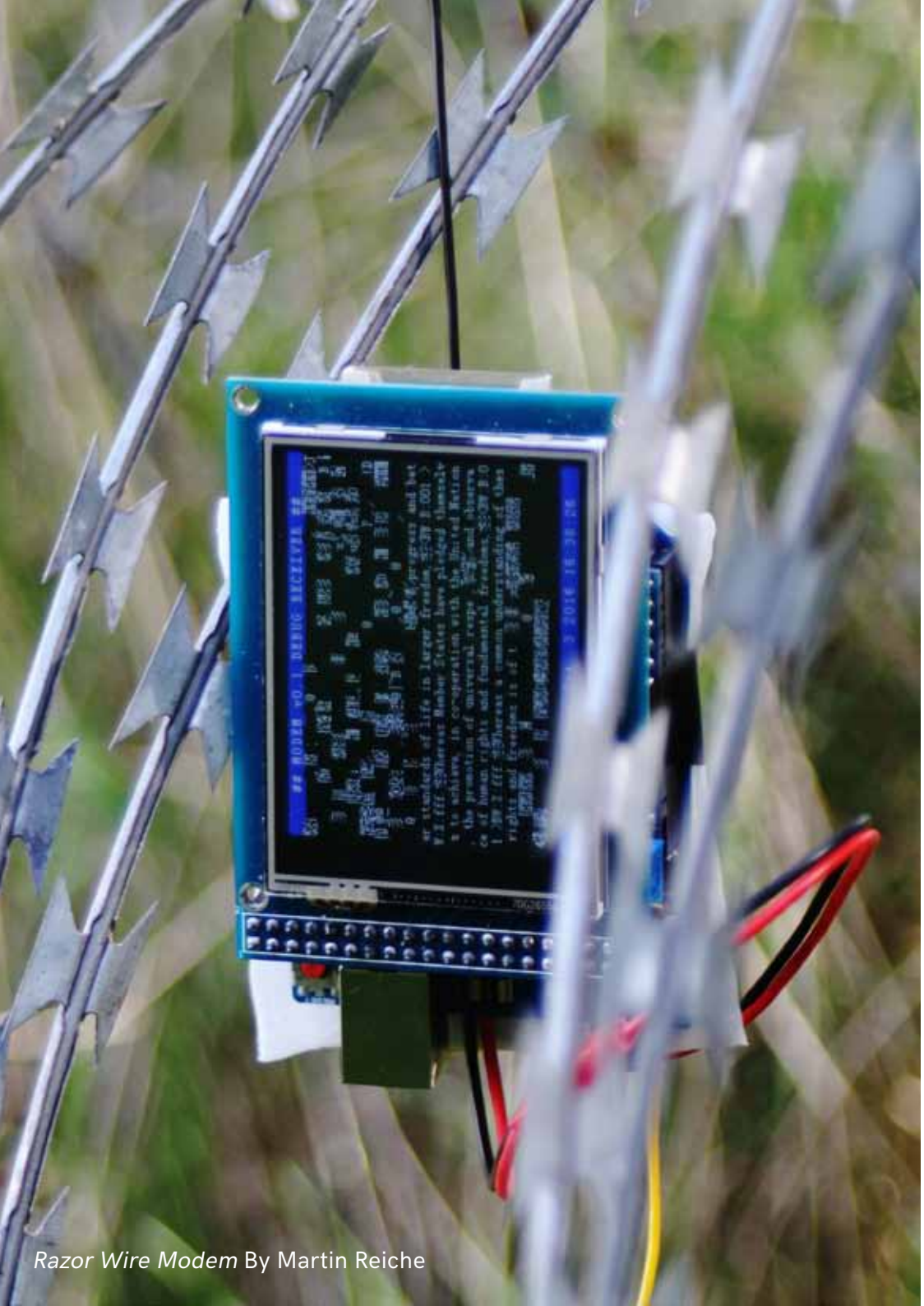
15 IOCOSE. (2009). SOKKOMB. Retrieved from: http://www.iocose.org/works/sokkomb.html

Following the legacy of Tactical Media, this article presents a mix of network cultural expressions with analog technologies, rethinking relationships and perceptions in distributed infrastructures through speculative and critical art and design, reflecting the production of new aesthetics after, or in, the so-called digital revolution. Additionally, when a medium is not neutral, the characteristics of the medium as well as the relationships that are created between agents, often stimulate creative and artistic questions and concepts.

Furthermore, the central point behind the critical, functional and aesthetic study of the distributed infrastructures is to create a vision about them that reinforces their character as non-neutral communication technologies. Hence, we must generalize our own questioning of distributed infrastructures to ask what kind of society will be produced by this new apparatus.

César Escudero Andaluz (LIC, MA, MA, MA) is an artist and researcher focused of Human-Computer Interaction, interface criticism, digital culture and its social and political effects. His work spans image-making, sculpture, videogame, installation, networked culture, IoT, robotics, interfaces appropriations, media archaeology. Since 2011 he is researching at the Kunstuniversität Linz (Austria) at the Interface Cultures Lab.

Razor Wire Modem By Martin Reiche



Razor Wire Modem By Martin Reiche

RAZOR WIRE MODEM: AN ARTISTIC INTERVENTION AT THE SCHENGEN BORDER

by Martin Reiche

Defensive architecture such as fortifications or constructions to defend territories can be found almost everywhere. For a lot of people it is a normal part of the city or the rural landscape and, therefore, also of their day-to-day life. This essay tells the story of a section of the razor wire-enforced outer border of the Schengen area that was re-imagined as free telecommunication infrastructure.

The Sotla River, a tributary of the Danube, passes the small Slovenian municipality of Lastnič, for whose inhabitants it marks the border to the neighboring municipality of Krapina-Zagorje in Croatia. What, for a long time, had been a natural "green border" between the two European Union member states, in late 2015, became a symbol of fear of the unknown and a fear of change. Although Croatia is a member state of the EU, it has not signed the Schengen treaty. This means that freedom of movement between the two countries is not legally guaranteed. Slovenia's border to Croatia is, therefore, a section of the outer border of the Schengen area. As a result, anybody who wants to travel from Croatia to Slovenia needs to hold a valid passport and, for most nationalities, a valid Schengen visa.

In 2015, as a consequence of the so-called "European migrant crisis," the Slovenian government decided to reinforce its border to neighboring Croatia by erecting a 150km razor wire fence. Officials called it a "technical" barrier and downplayed its impact on the inhabitants of the land, both human and faunal.

The border fence, which was intended as a means of protection against an influx of expected migrants during the time of crisis, was never able to serve its intended purpose. Due to changes in migrant routes, no refugees came through this area, rendering the fence obsolete from the very day it was built. The border fence, however, remained in place and became part of the landscape and of everyday life in Lastnič.
One main goal of a razor wire fence besides providing a physical barrier is to be a deterrent through the imagined physical pain inflicted by the sharp blades cutting through one's skin and flesh. However, this deterrent works for subjects on both sides of the fence in equal ways. The fence does not only radiate a sense of danger for those excluded by it, but also for those who are included behind it. When the role of the fence as a "physical" barrier becomes obsolete due to having nobody to keep out, its only prevailing property is that of a mental deterrent. Sitting in the middle of a peaceful landscape, the fence's only function is a showcase of undirected power. The local population becomes the victim. The fence finally achieves its purpose: fear. But, this time, the fear is directed at those included, not those excluded.

In order to exchange or translate the sole prevailing negative aspect of the border fence, one must change the perception of the border as a physical structure. At its heart, a fence is a metal construction that spans a particular distance without interruption. It could also, however, be seen as a very long, unprotected, "metal cable."

Metal cables have a desirable property: they conduct electrical energy. It is not absurd, therefore, to see the metal razor wire fence as a big conductor sitting in the landscape. In fact, this has a historical predecessor: in the United States of America in the early 1900s barbed wire fences were used as telephone lines in some of the rural areas to which the big

telephone companies had not yet expanded their services[1]. The idea of using the pre-existing fences and re-appropriating them as telephone infrastructure was born out of a demand that could not otherwise be met.

Following the example of the American farmers and re-imagining the already existing as something desirable, we can re-imagine the unwanted, but nevertheless existing, razor wire fence as something a lot more desirable: free telecommunication infrastructure in a rural area.

Razor Wire Modem is the name of the artistic project that, in late 2016, attempted to re-appropriate the reinforced outer border of the Schengen area as pre-installed telecommunication infrastructure. The goal was a simple yet powerful one, to show that something as undesirable as a razor wire border fence has, in its core, everything that is needed to subvert its originally intended purpose into something much more peaceful and desirable: a new and free[2] medium of communication. The goal was to show that the razor wire fence can, in fact, be used as an electrical conductor in the same way as the American farmers' barbed wire fences. The only difference was that, instead of using the fence as a telephone

1 Frost, N. (2017). Barbed wire telephone lines brought isolated homesteaders together. *atlasobscura.com*. Retrieved from: https://www.atlasobscura.com/articles/barbed-wire-telephonelines-homesteaders-prairie-america-history.

2 free both as in beer and as in speech. The English adjective free is commonly used in one of two meanings: "for free" (gratis) and "with little or no restriction" (libre). This ambiguity of free can cause issues where the distinction is important, as it often is in dealing with laws concerning the use of information, such as copyright and patents. Richard Stallman summarised the difference in a slogan: "Think free as in free speech, not free beer." Wikipedia contributors. (2018, December 24). Gratis versus libre. In Wikipedia. https://en.wikipedia.org/wiki/Gratis_versus_libre

line, it was used to transmit digital information between two machines. For a short time in October 2016, the razor wire fence between Lastnič and Krapina-Zagorje became a computer network.

On the technical side, the project was executed using extremely cheap commodity hardware and a few lines of software code. Arduino Nano[3] micro-controller boards equipped with electronic components (transistors, line drivers and line amplifiers), and powered by rechargeable lithium-polymer batteries were programmed to both transmit and receive electrical signals over one of the razor wire rolls. The soil under the fence served as the return line to close the electrical circuit. The micro-controller boards operated as "modems" (hence the project name), connecting the two digital apparatus using the razor wire as a transmission medium.

To prove that the modems actually work as intended, the first data that was transmitted over the razor wire fence during the intervention at the border was a reminder that being allowed to cross country borders is something that, especially in the light of the migrant crisis, should never be taken for granted:

3 Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. For Arduino Nano see: https://www.arduino.cc/

"Everyone has the right to seek and to enjoy in other countries asylum from persecution"

Article 14(1) of the Universal Declaration of Human Rights[4]

Even though the idea that, in an age of ubiquitous wireless communication technology, people would use a sharp-bladed razor wire fence in a poorly-populated area as telecommunication infrastructure seems farcical, the project highlights how defensive structures can sometimes be reimagined in ways that stand contrary to their original purpose. Nevertheless, the razor wire fence remains a physical manifestation that reinforces the agenda of a group in power and not necessarily the one that is directly affected by the downside of its existence.

The *Razor Wire Modem* art project is a starting point for evaluating methods of subversion of everyday defensive architecture by means of technology. It is an open invitation to think about, and take action against, unwanted – architectural and other – structures by uncovering their potential for re-appropriation to become something much more inclusive, meaningful, and desirable.

4 UN General Assembly. (1948). Universal declaration of human rights (217 [III] A). Paris. Retrieved from: http://www.un.org/en/universal-declaration-human-rights/

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A technical side note: The experiment was conducted on a very short (several meters) part of the actual razor wire border fence. Increasing the distance between the two modems would have led to much higher signal loss, which could have been compensated for with higher transmission voltage and a better modulation technique. Assessing both options was out of the scope of this project.

***

Martin Reiche is a media artist based in Berlin, Germany. His body of work can be understood as critical media art, addressing international relations, governmental power, ecology, economics and technology. He has shown his work at museums, galleries, and festivals worldwide, including the Moscow International Biennale for Young Art, Ars Electronica, ZKM Museum of Media Art, ZKM Museum of Contemporary Art, ISEA, and Athens Digital Arts Festival.

Monome Photo by Andrew Lovett-Barron

Little Printer Photo by Andrew Lovett-Barron

THE DECAY OF DIGITAL THINGS

by Andrew Lovett-Barron

We have spent a decade building the consumer Internet of Things (IoT), with an ethos of "fail fast." Unfortunately, many of the things we built failed to embrace the withering effect that time has on business, technology, intention, and capital. Consumers have been left holding connected objects that no longer connect, and the question of why investments in the "future" of physical things have resulted in such ephemeral value. *The Decay of Digital Things* started as a series of personal essays and prototyping projects exploring this idea that turned into a class taught at the Stanford d.school in 2014[1]. Inspired by my essays and a frustration about connected products with dead services, we asked the students to explore the different aspects of decay that are connected to networked objects. Physical metaphors like rust, patinas[2], overgrowth, and repair were all central to the students' construction of a body of work and scenarios that pointed to digital decay. Their work explored everything from the calcified information around our social networking identities, to the fragility inherent in creating a connected object; becoming a vanguard to uncritical enthusiasm for *more* that has become a hallmark of Silicon Valley-inspired creation.

In the beginning, this exploration emerged from my suddenly dead Little Printer. A brilliant little object from consultancy-

1 Lovett Barron, A., Goodman, L., Rogers, M. (2014). The Decay of Digital Things [class]. Stanford d.school, Stanford, CA. Retrieved from: http://decay.andrewlb.com/syllabus_v1.pdf

2 Armitage, T. (2010, September 3). Patina. *berglondon.com*. Retrieved from: http://berglondon.com/blog/2010/09/03/patina/

turned-product company Berg[3], the Little Printer was a small Internet-connected thermal printer that could create all sorts of little artifacts, provided that they were two dimensional and monochromatic. This could be your to-do list for the day, a list of upcoming meetings to stuff into your wallet, an inspirational image, or your two-factor code. The printer got these messages by connecting wirelessly to a hub (tied to Berg's plans for future connected things), which in turned connected to a server called Berg Cloud, which managed accounts, apps, and all the bits of software which brought the otherwise charming but simplistic object alive. On March 31st, 2015, though, this server and Berg as a business shut down, and a thoughtfully-designed piece of technology became so much dumb plastic and silicon.

Berg's story is one that has been repeated all over the connected world: ambitious companies create networked objects that bring more functionally than their un-networked kin. But, with this functionality comes a compounding liability: infrastructure and the need for enduring business models that can maintain that infrastructure. Sometimes this is fine, but other times the cost becomes too much to bear. Of course, there are many different kinds of businesses in the world, and some of them are better able to support their connected products than others. A publicly-traded company like Garmin has multiple revenue streams and a complex web of telemetry-leveraging products. Many of these are Internet-enabled, and rely on a service called Garmin Connect and, more recently, a development platform called Connect IQ. This connectivity is a valued feature of the product, but not the product itself. The Garmin running watch to track

3 Berg: http://berglondon.com/

your run, or the cycling computer to track your route and fitness, and the marine GPS that tracks your boat. The fact that its features can be arbitrarily extended through an app store and connectivity is a value-add, but ultimately not the product's core purpose.

Conversely, a company like Pebble, which shuttered its services in December 2016, had a much more challenging time.[4] Pebble often kick started their product development on a product-by-product basis as it built a variety of wearable smart watches. They worked hard on their product, sold almost two million smart watches but, ultimately, weren't able to make it work.[5]The watches were generally well made, had a strong application ecosystem, and are still loved by many of their owners. My friend Luke, an Australian postdoc in Copenhagen, still wears his Pebble every day. The watch is something he's become accustomed to, bugs and all. He can flip through its menus quickly, and responds just as quickly to its little quirks: bugs that will ultimately never be fixed now that the platform has shut down.

Software and Hardware

Objects that require connectivity to deliver their promised value are ultimately just clients connecting to the endpoints of a broader service. It's easy to argue that one is not buying the object itself, but rather access to the service that the object

4 Levy, S. (2016, December 12). The Inside Story Behind Pebble's Demise. *Wired*. Retrieved from: https://www.wired.com/2016/12/the-inside-story-behind-pebbles-demise/

5 Goode, L. (2016, May 24). New Pebble 2 and Pebble Time 2 smartwatches will track your heart rate. *The Verge*. Retrieved from: https://www.theverge.com/2016/5/24/11753878/pebble-2-watch-fitness-tracker-heart-rate-sensor-video

affords. On one level, this places the physical object on the same plane as any web application or mobile client that pulls data and context from a broader service. And certainly, for every dead IoT startup on the battlefields of platform capitalism, there are dozens of dead software-only businesses. The demise of Rdio Inc. hit hard, as did the obsolescence of the Sparrow mail client as its team was acqui-hired to work on Google Inbox and saw Sparrow wither into uselessness.

The death of a software product leaves a hole in one's pocketbook and a need to find a functional cognate, but it doesn't leave behind a corpse. Instead, if you think about our products as things that we hire or fire for their different capabilities, the analogy is closer to a hired feature (let's say, our email client Sparrow) prematurely quitting, or simply disappearing one day. Certainly a shock, but with relatively little damage because we can find a substitute (such as the email client, Airmail). Conversely, when an IoT service shutters its doors, the consumer and the environment are left to foot the bill of starting over. If your IoT home security system shuts down because they botched their growth strategy, you have to invest in a new and expensive chunk of hardware for your home. Or, perhaps even worse, this product could be subject to an acquisition that locks the customer into a platform with values and a service model they don't want, but can't afford to change.

Nature, Nurture

I have described a bleak view of connected objects, but fortunately this is not the only story worth telling. Even in the failed model, there are interesting early stabs at addressing the "long tail" of connected objects. One shockingly consistent example of sustainable product design is the Monome, a hardware platform for open source music creation that connects into an ecosystem of community-created tools. It's a

simple grid of lights and buttons that send and receive commands from a device. Mine is from 2008. I also recently set it up again to use with a new crop of tools from the Monome community, and its founder helped a community of us debug a problem with old monomes and a new OSX systems.

The Monome presents a vision of sustainable product maintenance, because it is both a company and a community. Brian Crabtree created its first iteration, but countless others have written code for it, built performances around it, and made their own versions of it. It's an open source product that creates greater value for its supporting business through the value generated within the community itself. Monome.org[6] also has a vast repository of knowledge related to the monome in its different and evolving products that empowers its customers to continuously adapt it to their evolving needs.

The Monome ethos of product development echoes the "slow company" movement exemplified by 37Signals[7] and LDLN[8]. Their theory is that what you are creating through your business is precious, and it's very easy to ruin something by moving too fast. So don't. Don't take that investment if you're not absolutely clear on how you'll use it. Don't commit yourself to that big Kickstarter campaign if you've only figured out the product, and not the production. The weight of capital can

6 Monome: https://monome.org/

7 Zax, D. (2012, August 29). 37signals Earns Millions Each Year. Its CEO's Model? His Cleaning Lady. *Fast Company.* Retrieved from: https://www.fastcompany.com/3000852/37signals-earns-millions-each-year-its-ceos-model-his-cleaning-lady

8 Lovett-Barron, A. (2018, May 1). Bootstrapping Infrastructure in the Public Interest. *Social Ventures.* Retrieved from: https://pit.andrewlb.com/infrastructure-for-good

be a massive liability to an enterprise that is still figuring out how to walk unencumbered, let alone thrive under the weight of growth-forcing liabilities.

Defibrillation

Sometimes though, things do simply fail. As frustrated as I am with Berg Cloud shutting down, it's difficult to fault the Berg team in pursuing a dream and giving it their all. Sometimes businesses simply fail despite one's best efforts. There might not be a market, or it might be a pricing strategy that doesn't work, or you simply run out of runway. A business failure is not (necessarily), a moral failure on the part of the entrepreneurs, but the result is the same. Consumers are left with their dead plastics and silicon pining for a server that will answer back.

The Little Printer is an example of what can be done when a connected technology businesses does not foresee its own demise, but tries to react responsibly to it. Some simple searching reveals an enthusiastic community (along with the individual help of some former Berg team members), who have brought their now dead printers back to life. The process isn't simple. It involves setting up your own server and then flashing the Berg Hub to redirect server requests to the new address. These methods emerged from long Github discussions and thoughtful blog posts, but they emerged nonetheless. So why does the Berg device have a pathway to resuscitation while many other devices don't?

I think the answer lies in the community and in the approach of the product's creators. The Monome platform and its subsequent creations started from a point of openness and community involvement. This gave the community a greater-than-normal stake in the outcomes of this product. Berg Cloud was a platform that spoke to creators and engaged consumers, so that when it closed, it had a larger pool of potential revivers

to consider resuscitation. And because the Berg team released their server code and contributed to the discussion, the chance of reviving the Little Printer (at least on a small scale), is starting to become a reality.

In the physical product world, aftermarket and Original Equipment Manufacturer (OEM), accessories emerge around any platform that sees some market success. This can have the effect of dramatically extending the life of these products as their creators disappear, but the demand remains. A few years ago, for example, I created a 3D printable model for a table clamp[9] that fit an old 1960s Luxo lamp. It's since been downloaded close to a thousand times, hopefully extending the use of a wonderfull piece of design with otherwise difficult to find parts. We need to encourage a similar economy of repair, modification, and adaptation for our connected things, and I'd like to believe that the story of the Little Printer, initially tragic, might point to a more optimistic future for our decaying digital things.

Better to Fade Away

Four years after the Decay of Digital Things class, I've become a bit inured to this crisis of sustainability for these products. All around us, we're seeing an accretion of hollowed-out objects calling for servers long since shuttered. The brilliant Internet of Shit[10] twitter account provides a near-daily laugh track of poorly considered connected things. My friend Luke wears one on his wrist as a simple watch, shrugging off its

9 Readywater. (2011, September 23). Luxo lamp desk clamp. *Thingverse*. Retrieved from: https://www.thingiverse.com/thing:11815

10 Internet of Shit [internetofshit].[Twitter]. Retrieved from: https://twitter.com/internetofshit

lost functionality with the insistence that it had a "good run." I have another on my shelf as a multifaceted totem to my values as a designer: its brand –a smiling face left after each new print– now barely visible on the sun-weathered thermal paper. We are creating software-powered things in an environment that often requires businesses to pursue capital intensive growth models if they want to be considered successful. But this is far from the only path, and we need more diverse definitions of success if we're going to deflect the distracting, wasteful, anxious, closed, bricked, unfixable, expensive, disenfranchised future that the first decade of the Internet of Things seems to promise.

Andrew Lovett-Barron is a Canadian/American software designer and founder of Stupid Systems. He was a principal designer and team lead at IDEO, was the first designer on the US Digital Service team at the Pentagon, and previously started Relay Studio, a small art and design studio in Toronto. Most recently, he was a 2017 Public Interest Tech fellow at New America, and is a design resident and visiting faculty at the Copenhagen Institute of Interaction Design.

The Internet of Other People's Things
– Dealing with the pathologies of a digital world
Edited by Linda Kronman and Andreas Zingerle

Published 2018 by servus.at
Kirchengasse 4,
4040 Linz
AUSTRIA

ISBN: 978-3-9504200-1-2

Research blog -> ioopt.kairus.org

COMPILED & EDITED: Linda Kronman, Andreas Zingerle
LANGUAGE EDITING: Jonathan Woodier

LAYOUT: KairUs based on Christoph Haag's
Design/Typesetting/Software -> freeze.sh/2016/btsw

The format of this book is based on the Behind the Smart World publication published by servus. at in 2016.

TYPEFACES:
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PAPER:
Munken Print Cream -> arcticpaper.com

PRINTED IN GERMANY -> online-druck.biz

ACKNOWLEDGEMENTS
We would like to thank the following for their contribution to this book:

Andaluz Cesar Escuardo
Breeze Mez
Choi Binna
Coburn Tyler
KairUs
Kerspern Bastien
Lovett-Barron Andrew
Martinet Lily
McCarthy Lauren
Mundy Owen
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The Internet of Other People's Things –
Dealing with the pathologies of a digital world

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