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HUMANS NEED

NOT APPLY

10:02:17–14:05:17

HUMANS NEED

NOT APPLY

In an automated world, is it nearly time to put humans out to pasture? Does the future resemble a leisure-time utopia or a robot-tended human-zoo? Will the notion of work become a thing of the past if machines really can do everything better, faster and for longer?

These questions imply a binary future of perfection or catastrophe resulting from the rapid advancement of artificial intelligence (AI) and machine learning, but the reality is likely to be far more nuanced, and even a little glitchy. HUMANS NEED NOT APPLY is a provocative title; it embodies fears of a machine-dominated future in which the need for humans in the workforce is severely diminished by the growing adaptability and precision of robotics and AI. However, like all emerging technologies, the outcomes will be more complex, uncharted and interdependent than we might initially think. This exhibition begins to unpack this complexity by offering a range of work that examines machine learning as applied to employment, social interactions, and

creativity. We invite our audience to consider and try on futures in contexts that are initially more accessible, universal and at times humorous.

As with any new technology that promises to change how we live and work, advances in AI and machine learning provoke extreme responses. Run any opinion poll and you will get the inevitable polar opposite feedback that AI will be our saviour or our downfall. HUMANS NEED NOT APPLY sets out to engage our visitors in genuine conversations that probe the multiple opportunities that these technologies present. More critically, the exhibition aims to lend urgency to public discourse about what kind of changes we need to consider to our current infrastructure, from education and health to transport and

the economy, to ensure that we all benefit from these opportunities. Whether you are a technophile or technophobe, there is no denying that these changes will impact your life in the coming years. For decades, AI has been seen as overpromising and underdelivering, but it has unquestionably made leaps and bounds in the last ten years, in large part thanks to graphic processing unit (GPU) technology developed for video games but now applied to computation for neural networks. Dozens of leading global technology and consulting services companies are advising their clients on how to prepare for this future. But as citizens, who is advising us? HUMANS NEED NOT APPLY sets out to tap into that conversation, to provide our visitors with an understanding of some of the principles driving this advancement and introduce the complexity of ethical and moral questions we need to consider.

A widely cited study by Carl Benedikt Frey and Michael Osborne examined the possibility of the computerisation of over 702 occupations in the US, and found that approximately 47% of Americans had jobs at high risk of automation as a result of recent and projected advances in AI and machine learning. Studies in the UK and Japan put the figures at 35% and 49%, respectively. The jobs at risk are primarily those that involve routine and formulaic tasks. This presents a wholly unique problem than previously encountered in any previous machine or industrial revolution — the impact of AI and machine learning does not focus on manual tasks, like moving an object, but on routine activities, like responding to a question. As such, the job of the radiologist who examines scans for signs of tumour growth is possibly at greater risk from AI than his or her assistant who may perform a variety of complex tasks that require a significant degree of emotional intelligence and a greater variety of skills and experience. This kind of impact demands that we begin to rethink our education systems and the way we prepare future graduates for this working world.

In many ways, our reflex to focus on the fear of AI replacing our jobs does us a disservice; it can paralyse, forcing us to consider only short to medium term impacts and responses. This can prevent us from thinking about some of the potential that

AI has to influence our society for good — from improving our urban environment through autonomous transport, to speeding up scientific and medical advances through machine-guided decision making and much faster data analysis. We need to be part of this conversation — it must move from the offices and board rooms of multinational corporations to our citizens' assemblies, libraries, doorsteps, and schools. HUMANS NEED NOT APPLY is an opportunity and invitation to our visitors to shape that conversation, to get inspired, to try on potential futures and, most importantly, to talk. In curating this exhibition, we looked for works that offer new insights into AI and machine learning beyond the typical examples seen in numerous media reports and journal articles (sorry, self-driving car). Through an exploration of machine learning as it relates to music, painting, mourning, mindfulness, performance, and intimacy, HUMANS NEED NOT APPLY expands the scope of the discussion of AI beyond employment and productivity.

We have been fortunate to work with a group of talented curators, artists and researchers to bring you HUMANS NEED NOT APPLY. I'd especially like to thank our lead researcher and curator William Myers and fellow curators Amber Case and Damien Henry. They have brought their unique experience and insight to play in helping us shape an exhibition that stretches the 'expected' into realms of culture and creativity, providing a compelling show that goes beyond the standard investigation of AI and machine learning.

Take a step back and consider an automated society

Amber Case

The idea of automation and machine intelligence is loaded with meaning, much of it emotional. We often ask ourselves how we could automate the most repetitive of human tasks, calling into question the need for humans in a system in the first place. Some of us fear obsolescence as humans. Others wish for more things to be automated.

In his book *Civilization and Its Discontents* (1930), Sigmund Freud suggested “a possible future in which the magnificence of humans as prosthetic gods is tempered by the ill-fitting and troublesome nature of their auxiliary organs”. These words, written in an industrial era already filled with human-machine interactions, are only more true today, when our phones might last a couple of years before we replace them.

We live in a world increasingly automated by machines. Our relationship with them is often invisible. The process of automation came to the forefront of our culture with the dawn of the industrial revolution. We are now on the cusp of the second largest revolution in automation — the development of the information society. Though we may not notice them, we use bots constantly. Our search engine queries are moderated by bots. They help us sort the world's information.

Kurt Vonnegut wrote about automation in his 1965 book *God Bless You, Mr. Rosewater* and called it “a problem whose queasy horrors will eventually be made worldwide by the sophistication of machines. The problem is this: How to love people who have no use.” Vonnegut asks how we can value members of a society that are now useless to the workforce.

Amidst the fear of our replacement by machines, this exhibition can be thought of as a conceptual art show devoid of aesthetics and the embeddedness of the everyday, to help us take a step back and consider a fully automated society. In the absurdity and expression of art objects we are granted the necessary distance to observe how ridiculous it is that we expect everything to be automated, and we can begin developing a critical position. There's no deliberate aesthetic consistency. Stripped away from this consistency and presented as discrete moments and interactions, we are free to consider the logic and ethics in

our object-oriented culture that rejects the elevated status of human existence over non-human forms.

Embedded in our viewing of this exhibition is an impulse toward an ethical stance and questions of morality. We shouldn't just let these technologies fold into our lives unexamined, we ought to care about how we think about these things and develop an understanding of the meaning and consequences of the objects we build. Every time we say there's something we should or should not do, it comes with a sense of morality. We see evidence. We might not take a position on it, but we are invited to question it. This is a future in which ethics are at stake, and as authors of our own destiny, we are advised to take a more active role in the creation of our everyday lived realities.

Profile

Amber Case studies the interaction between humans and computers, and how our relationship with information is changing the way cultures think, act, and understand their worlds. Amber is currently a fellow at Harvard University's Berkman Klein Center for Internet and Society and a visiting researcher at the MIT Center for Civic Media.

Amber is the author of *Calm Technology: Design for the Next Generation of Devices* (2016). She spoke about the future of the interface for SXSW 2012's keynote address, and her TED talk, 'We are all Cyborgs Now', has been viewed over a million times. Named an Emerging Explorer by *National Geographic*, she's also been listed among the 30 under 30 by *Inc. Magazine* and featured among *Fast Company's* Most Influential Women in Technology. In 2008, Case founded CyborgCamp, an unconference on the future of humans and computers.

Case lives in Somerville, Massachusetts. She previously spent eleven years in Portland, Oregon where she was the co-founder and former CEO of Geoloqi, a location-based software company acquired by Esri in 2012.

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Is everything actually awesome?

William Myers

Can we prosper in a world in which robots and artificial intelligence can do every job we have today? Alarming studies about vanishing employment appear weekly, like that by researchers at Oxford University estimating that nearly half of all jobs are vulnerable to automation over the next twenty years¹. News media continually report on these predictions, often presenting a dark vision of the future in which jobs are scarce, hoards of people are idle and destitute, and wealth is concentrated in few hands. According to other future forecasters, we are hurtling towards a leisure-filled utopia in which we can all pursue artistic endeavors, collect a universal income, and observe elaborate ceremonies around socializing, dining and dress, akin to the aristocratic life depicted in *Downton Abbey*. Which vision is more likely to materialise?

The answer probably lies in the past. Imagine you could travel back in time to visit Dublin in 1858, the breakthrough year in which an undersea telegraph cable first connected both sides of the Atlantic. Communication across an ocean was suddenly possible, while electrification was delivering indoor lighting and mechanical conveniences. Cities swelled with migrants as back-breaking farm work was giving way to tractors, and higher wages in the cities' factories beckoned. Imagine your conversation with an assembly-line worker of this time, trying to explain to her what sort of jobs people have in 2017: cyber-security expert, banner-ad marketing manager, flight attendant, or video-game designer. She'd be incredulous. After all, to her: How could there be so many jobs involving such inessential activity?

From a 19th century perspective, necessity has long been satisfied in the rich world. A strong majority of those reading this will have no memory of going a day in want of food, or a week without looking at a screen. For the factory worker in 1858 Dublin, worries were far more fundamental: children had just a two in three chance of reaching five years of age, while tuberculosis, cholera, fires, and hazardous factory work plagued adults. No antibiotics were on hand, so a common infection, from a splinter in the toe for example, could be fatal. In contrast, we now fear heart disease, Alzheimer's, and cancer —

afflictions that might be equally difficult to explain to a person whose life expectancy was only forty years.

Apart from marvelling at our public health achievements, the young Dubliner of 1858 might conclude that our working lives were mere entertainment, pastimes invented to keep us busy, comfortable, and safe. She might quip, "It seems many of you live in a poetry-based economy in 2017!" Would she be right? Is the production and consumption many of us perform any more meaningful or concrete than a few amusing lines of verse? Perhaps we have unwittingly moved into a post-capitalist dreamland with our virtual assistants, currencies, and avatars.

Perhaps not. The (evil?) genius of the modern economy is in its capacity to generate infinite wants and then create new work to satisfy them. Part of this stems from our conditioning: beginning in childhood, media and advertising urge us to continually seek consumption upgrades like nicer vacations, cars, gadgets, clothes, and dining experiences. If automation suddenly made basic transportation, energy, and food cost nothing, for example, it would certainly put millions out of work. However, it would also lay the groundwork for jobs we have not yet imagined, just as electricity or the internet did, while freeing up wealth previously spent on those basic commodities to instead consume other goods. This, essentially, is how we moved from agricultural to factory to service jobs in the last 150 years as capitalism relentlessly advanced.

This time, it is argued, is different because the rate of change is much faster than previous technological revolutions that reshaped the global economy and eliminated jobs². Adaptive neural networks are becoming integrated into processes, like social media feeds and language translations, as well as legal decisions, medical diagnosis, and journalism. They are also becoming part of things, like cars, thermostats, and robots. If you're a taxi driver, loan officer, legal clerk, retail floor worker, or radiologist, for example, your job is in peril since its processes, though complex, are relatively formulaic and repetitive.

On the other hand, if your work is creative, variable, and relies on social connectivity, or what some call 'emotional labor,' like that

done by a therapist, executive assistant, comedian, or member of the clergy, your job is unlikely to be replaced by an artificial intelligence anytime soon.

What of art? Today, machines can already produce paintings, sculptures, music, or even screenplays. As the exhibition HUMANS NEED NOT APPLY demonstrates, this need not be a threat to art but a technological challenge, a moving of the goalposts for creative expression, which should be familiar. Many believe that a computer producing content that mimics artistic expression marks a turning point, since art is held up as the apex of human expression and cultural value; but they forget that there is no 'final frontier' to art. From the time of the first daguerreotypes in the 19th century, people have decried the end of painting, and yet it is alive and well. New media for art and the motivations behind its creation have proven limitless and ever-changing³.

The same can be said, ultimately, for human desires for products and services. We eventually demand more and different things in the wake of technological changes, which, after a time, have been shown to generate more employment and improved wages⁴. By 2067, there will likely be a poetry-based economy out there from our current, limited perspectives; the important question then becomes how to ease through the transition. Again, the answer probably lies in the past, in understanding the successful rise of phenomena like labor union organization, mandatory basic education, and corporate taxation.

Profile

William Myers is a curator, writer, and teacher based in Amsterdam. His first book *Biodesign* (2012), published by MoMA, identifies the emerging practice of designers and architects integrating living processes in their work. His next book *Bio Art: Altered Realities* (2015), published by Thames & Hudson, profiles art that uses biology in new ways or responds to recent research in the life sciences that disrupts our notions of identity, nature, and the definition of life.

William's writing and exhibitions have been profiled in the journal *Science*, *The New York Times*, *The Wall Street Journal*, *New York Magazine*, *Smithsonian Magazine*, *Volkskrant*, and *Folha de São Paulo*, among others. William has delivered lectures at Harvard University, the Tate Modern, Universitário Belas Artes de São Paulo, International University of Catalunya, Leiden University, and the Royal College of Art. He has previously worked for MoMA, the Guggenheim Museum, the Smithsonian Cooper-Hewitt National Design Museum, Vitra, TU Delft, and The New Institute in Rotterdam.

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¹ Carl Benedikt Frey, and Michael A. Osborne, 'The Future of Employment: How Susceptible Are Jobs to Computerisation.' Oxford Martin School, University of Oxford: September, 2013. www.oxfordmartin.ox.ac.uk/publications/view/1314

² Michael Chui, James Manyika, and Mehdi Miremadi, 'Where Machines Can Replace Humans — And Where They Can't (Yet).' *McKinsey Quarterly*, July 2016. www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet

³ For more on the evolution of the arts in the context of machine learning, see Blaise Agüera y Arcas, 'Art in the Age of Machine Intelligence.' *Medium*, February 2016. <https://medium.com/artists-and-machine-intelligence/what-is-ami-ccd936394a83#qqvxnkvaj>

⁴ See Robert C. Allen, 'Engels' Pause: Technical Change, Capital Accumulation, and Inequality in the British Industrial Revolution', *Explorations in Economic History* 46, no. 4 (2009): 418-435.

Tickle Salon
Tickle Salon
Tickle Salon
Tickle Salon
Tickle Salon
Tickle Salon

Adaptive automated caress, 2002 /
Driessens & Verstappen (NL)

You might be familiar with the pleasant experience on a warm summer day in the fields. Long blades of grass, driven by the wind, can softly stroke your skin in a most agreeable manner. You don't control the tactile stimuli, so you can totally immerse in the actual sensations. If the stimuli were predictable, your body response would not be as intense. This kind of experience occurs very incidentally. You have to be at the right place, at the right time, under the right conditions. This exhibit investigates whether it is possible to generate such enjoyable sensations in an artificial way.

Tickle Salon is a robotic installation based on the concept of an automated caress. The participant undresses him/herself, lays down on the bed and starts the session. A soft brush lowers onto the body, and begins to carry out sensitive movements over the skin, generating a variety of pleasant feelings.

The robot does not have any built-in knowledge about human bodies. Instead, it adapts itself by trial and error, feeling its way around. In the beginning of the session, its movements are short and quite clumsy, but they soon become more refined by the touch, resulting in smooth, lingering strokes and delicate touches. You cannot predict where the brush is heading, so the sensations are direct and very lively.

Profile

The Amsterdam-based artist couple Driessens & Verstappen (Erwin Driessens and Maria Verstappen) have worked together since 1990. After studying at the Maastricht Academy of Fine Arts and the Rijksakademie in Amsterdam, they jointly developed a multifaceted oeuvre of software, machines and objects. Driessens & Verstappen attempt an art in which spontaneous phenomena are created systematically; art that is not entirely determined by the subjective choices of a human being, but instead is generated by autonomously operating processes.

Driessens & Verstappen have participated in numerous exhibitions in galleries and museums, including Stedelijk Museum, Amsterdam; Museum Boijmans van Beuningen, Rotterdam; Centraal Museum, Utrecht; LABoral, Gijón; Valencia Institute of Modern Art (IVAM); Neue Pinakothek, Munich; Eyebeam, New York; and DEAF V2, Rotterdam.

In 2013, the couple received the Witteveen+Bos Art+Technology Award for their entire body of work. The artists are represented by DAM gallery in Berlin.

driessensverstappen.nl

008 / 009



**HUMANS NEED NOT TO COUNT
HUMANS NEED NOT TO COUNT**

A robotic arm that counts gallery visitors, 2017 / Varvara & Mar (EE & ES)

This work poses questions about employment, robotics and quantification. It was inspired by the title of the exhibition, HUMANS NEED NOT APPLY, and presents a robotic arm that counts visitors with a clicker, offering a performative representation of the takeover of routine jobs, even in the gallery space. The work also embodies our idolatry of quantification; the obsessive need to count and measure everything.

Last century's automation may have been largely hidden from everyday view, in factories tending production lines, or out in fields tilling the land. In this century, we will confront the reality of automation more intimately, as suggested here — it will be right beside us.

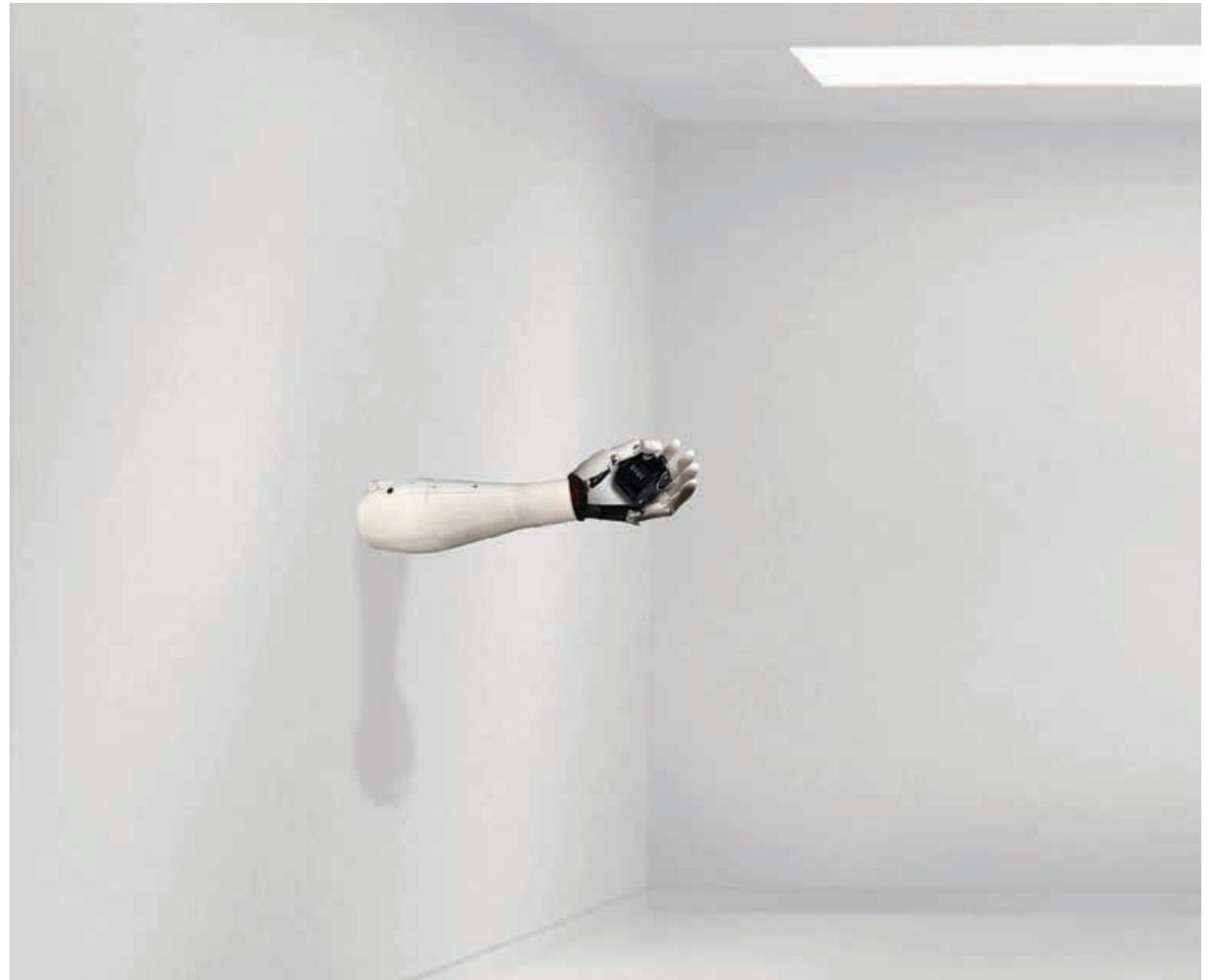
Profile

Varvara & Mar have been working together as an artistic duo since 2009. They have exhibited their pieces in a number of international shows and festivals. In 2014, the duo were commissioned by Google and the Barbican Centre to create the *Wishing Wall* exhibit for the *Digital Revolution* exhibition.

The artists work across the fields of both art and technology, examining new forms of art and innovation. They use and challenge technology in order to explore novel concepts in art and design. Research is an integral part of their creative practice.

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010/011



Minimum Wage Machine
Minimum Wage Machine

Participant works for
minimum wage, 2008 /
Blake Fall-Conroy (US)

The *Minimum Wage Machine* allows anybody to work for minimum wage. Turning the crank will yield one cent every 3.892 seconds, for €9.25 an hour, Ireland's standard minimum wage for an adult worker. If the participant stops turning the crank, they stop receiving money. The machine's mechanism and electronics are powered by the hand crank, and coins are stored in a plexiglas box. The *Minimum Wage Machine* is reprogrammed as minimum wage changes, or for wages in different locations.

Profile

Blake Fall-Conroy is an artist and self-taught mechanical engineer. Born in Baltimore, Maryland, he moved to Ithaca, New York in 2002 where he later received a BFA in sculpture from Cornell University. As a mechanical engineer, he works in industrial robotics, where he designs and fabricates remote-controlled robots that climb vertical surfaces.

As an artist, Blake's art-making practice is conceptually motivated, commenting on a wide range of issues — from consumerism and the American spectacle to surveillance and technology. His projects often incorporate mechanical and electronic components, as well as objects or motifs found within the routine of everyday life.

blakefallconroy.com

012/013



Robot Replacements

5000times
5000times
5000times
5000times
5000times
5000times

Revealing exploitative mechanisms through high-tech products, 2016 / Isabel Mager (DE)

Smart high-tech devices are made by human hand. How often do we realise — as we sit swiping — that somewhere, someone is testing the image quality of such devices by taking thousands of selfies each day? *5000times* investigates the extensive, repetitive and even absurd human work that is essential to the creation of smart devices.

Humans are the most adaptable machines. The idea of a totally automated production process remains fictive; the development, purchase and maintenance of machinery are far more expensive and complex than human work.

The total cost for worker's wages in building one iPhone 6Plus is \$11, or 2% of the final retail price, according to *Business Insider*. One iPad will go through the hands of 325 people, according to ABC News, one of the few media companies allowed inside Apple's Foxconn-run manufacturing plant.

Why are we so close to these devices yet so unfamiliar with their making?

A physical deconstruction of one such high-tech device reveals evidence of how the human hand participates in production and manufacture. The result, *5000times*, compiles and re-frames sequences of these manual tasks into clear and critical visualisations. In order to spark dialogue with designers and end users about hidden production processes, the repetitive manual tasks are re-enacted and performed. The performance is activated by a designer who operates from

privileged western contexts. This reenactment aims to challenge levels of accountability required by designers and end users alike.

Profile

Isabel Mager is an investigative and critical designer based in the Netherlands. Her recent work interrogates design at an intersection between culture and structures of power. She works as an active mediator between systems that organise life (culture, politics, economics, technologies, geographies, norms, historical records) and the participants of that life. These systems enable and fuel the designed object which then directs and informs human subjectivity. Isabel empirically analyses the complexities, social systems and mechanisms of design through objects, installations, articles and performances within design and academic contexts.

In 2016, upon completion of the BA programme at the Design Academy Eindhoven, Isabel was resident at Uproot Rotterdam alongside Studio Makkink & Bey. She has collaboratively directed workshops on design and privilege as part of the Social Design Masters programme at Design Academy Eindhoven, and presented work at the Decolonising Design's symposium on Intersectional Perspectives on Design, Politics and Power, in Malmö, Sweden.

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014 / 015



DoppelGänger
DoppelGänger
DoppelGänger
DoppelGänger
DoppelGänger
DoppelGänger

A multi-faceted interactive mirror installation, 2014 / ForReal Team (IL)

DoppelGänger is an exploration of a dynamic link between virtual and physical identities through the examination of human-robot kinetic interaction.

The digital world has expanded the borders of our identity, and has opened the vast world of multi-faceted interactions and the reality around us.

Visitors stand in front of *DoppelGänger* to create their own mirroring mini mob and start to explore their active dynamic facades. Each *DoppelGänger* manifests with a different behavioural pattern, and represents personality variations on kinetic behaviour, so while interacting with the group, the visitor will be able to explore the identities, abilities and limits of each one as an individual and the group as a whole.

This elaborate identity-fest creates a feedback loop in which human and robot, physical and virtual and preconditioned and spontaneous play together in chaotic harmony.

Profile

Saron Paz is an experience designer and head of the New Media Department at the Musrara School of Arts, Jerusalem. He is also head curator of Jerusalem Design Week, co-founder of the ForReal Team Studio and a master of freestyle sushi.

Zvika Markfeld is an über-maker; a senior lecturer in the New Media Department at the Musrara School of Arts, Jerusalem; a lecturer in the Design and Technology MA department at Bezalel Academy; co-founder of the ForReal Team Studio; and an expert at making stuffed zucchini with power tools.

Together, Saron and Zvika are ForReal Team, an experience design studio creating new and exciting platforms that connect the virtual and the actual. ForReal works on mastering a variety of cutting-edge technologies and moulding them into enticing concepts in order to create tailor-made interactive experiences.

forrealteam.com

016 / 017



Pinokio
Pinokio
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Pinokio
Pinokio
Pinokio

Animatronic desk lamp, 2012 /
Adam Ben-Dror & Shanshan Zhou
(ZA & CN)

Pinokio is an exploration into the expressive and behavioural potentials of robotic computing. Customized computer code and electronic circuit design imbues *Pinokio* with the ability to be aware of its environment — especially people — and to express a dynamic range of behaviour.

As it negotiates its world, always watching and learning what is going on, we, the human audience can see that *Pinokio* shares many traits possessed by animals, generating a range of emotional sympathies.

Profile

Adam Ben-Dror was born in South Africa and is currently living in New Zealand, where he is studying Fine Arts at Elam School of Fine Arts while working at the multidisciplinary design studio Alt Group.

Shanshan Zhou was born in China and is currently working as a freelance designer in Wellington, New Zealand.

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018/019



020/021

Frankie the Documentarian Robot
Frankie the Documentarian Robot

Single-screen video, 17 min looped,
2014 / Maayan Sheleff, Eran Hadas
and Gal Eshel (IL)

Frankie is a robot that interviews people, attempting to 'learn' what it means to be human. It responds to emotions with language and eye (camera) movements. The interviews, conducted worldwide, are uploaded online, forming an archive of Frankie's research. This short film shows the best and the worst of Frankie's global adventures.

A curious and persistent robot, Frankie has the cuteness of Wall-E and the edginess of Johnny Five. It is a physical version of a chatbot: it 'understands' certain words and responds to them both verbally and physically. The 'brain' is a cellular phone that includes a self-designed application that controls the conversation.

The surveillance camera 'eyes' are connected to a robotic neck, which gets orders from the brain.

As a form of automatic documentation, Frankie questions the role of the artist in a possible future of intelligent machines. A deliberately well-exposed surveillance camera, it examines issues such as agency, control, and privacy.

Frankie is a sort of reverse Turing test, asking whether machines are becoming more humanlike, or humans are becoming more machinelike. It is also a homage to Frankenstein, and a precursor of Eliza, the first 1970s chatbot designed to resemble a psychoanalyst. As such, it is an ironic reflection on the potential mishaps of a robot that is asked to interrogate emotions.

Profile

Maayan Sheleff is a curator and artist. She has curated numerous projects in ARTLV, the 1st Tel Aviv Biennial; the Science Museum in Jerusalem; the Herzlyia Museum; International Studio & Curatorial Program (ISCP), New York; and The Metropolitan Museum for Photography, Tokyo, exploring the mediums of moving image, performance and new media.

Eran Hadas is a software developer, poet and new media artist. He creates hypermedia poetry and develops software-based poetry generators. His fictitious female poetry persona, Tzeela Katz, is considered to be the biggest hoax in the history of Hebrew poetry.

Gal Eshel is a software engineer, and creates prototypes for Intel as well as developing his own independent robots.

Since 2014, Frankie has performed at Artport, Tel Aviv; Ars Electronica, Linz; Paraflows Festival, Vienna; Art In Odd Places Festival, New York; Residency Unlimited, New York; Ace Hotel, New York; Ammerman Center for Arts and Technology, Connecticut; and Sate Festival, Berlin.

frankieproject.com



Creativity Incognito

William Myers

Pan Fubin, 40, lives and works in what is known as the Oil Painting Village of Dafen, in Shenzhen, China. He has a wife, two daughters, an expensive mortgage, and a longing for more free time. He also has become, to his surprise, the first artist in the world to paint a detailed portrait of a person whose every wrinkle and eyelash was developed using artificial intelligence.

Although Pan exhibited an early talent for drawing and a commitment to learning painting, his academic performance was insufficient to gain him entry into art school. At 16, he began working on the family farm. A career in agriculture seemed likely, until a new opportunity presented itself — an apprenticeship at a company producing high-quality copies of famous oil paintings. Over the next few years, his work developed rapidly, and he studied the 19th century French academic painter William-Adolphe Bouguereau.

By 24, Fubin was married and turning out copies of famous paintings for clients in the United Kingdom, Australia, and Hong Kong. Sometimes, these were direct replicas of known works; other commissions were for portraits of living or recently deceased people, done in the style of Bouguereau or others. In time, he learned new techniques and grew fond of other old masters, like Russian-Ukrainian realist painter Ilya Yefimovich Repin, whose work he had seen at an exhibition in Shenzhen. Pan Fubin's practice developed as the village around him boomed. In the early 1990s, the village had just twenty practicing artists making copies of famous works by Van Gogh, Dalí, or Warhol for export; today, several thousand painters are employed doing such work, as well as an ecosystem of framers, canvas stretchers, paint suppliers, and shippers.

About 9,000 kilometers from Dafen, a Dutch advertising executive named Bas Korsten began a project in Amsterdam in 2013 that would win his agency many accolades and intense media attention, while indirectly producing a commission for Pan Fubin. He masterminded the launch of a collaboration between ING Bank and Microsoft to see if an artificial intelligence could be developed and trained to produce,

with the help of 3D printers, a never-before-seen painting that could look convincingly like the work of Rembrandt.

The two-year project ended with results that are stunning and could fool most people, yet the process of its making remains murky. Machine learning experts and even partners who collaborated on the project have expressed skepticism. The slick documentary video about the painting's development is not supported by any academic publication, or the sharing of source code or details of the algorithms used to produce or paint the image. An art reproductions researcher who contributed data to the project, saw little value in it apart from power to generate attention. Indeed, this aspect is most impressive; Bas Korsten's agency measures its success in billions of (free) media impressions for collaborators like ING and Microsoft¹.

The documentary, entitled *The Next Rembrandt*, explains that custom-designed, artificially intelligent systems learned from the known works of Rembrandt in order to devise the most likely way the artist would produce another painting. It suggests a probabilistic modeling, finding averages on which to rest assumptions about subject and format, as well as features like brush strokes and color selection in a new work. As such, the process raises questions about authorship and originality, prompting the viewer to question whether the painting ought to be credited to the genius of a dead painter, a team of engineers and marketers, or a series of computer algorithms. Furthermore, who can claim to own such an image, with all of Rembrandt's work in the public domain?

This provocative artifact has a place in an exhibition like HUMANS NEED NOT APPLY. Fortuitously, the painting was not available for loan in the time frame of the exhibition, leading to the idea to produce a human-made reproduction of the supposed machine-made work, a creative double-negative only now possible: a fake of a fake. I found Pan Fubin with the help of a curator from London's Victoria and Albert Museum who recently toured Dafen. Pan accepted the commission and proceeded to create a portrait of a man who never existed, but had been dreamt up by a machine and a staff of AI experts and

art-historian consultants, in the style of a painter who died 348 years ago.

In this context, Pan's work can be seen as a critique of the breathless hype that accompanies discussion of artificial intelligence. It is a work that required many hours of one man toiling alone using ancient technology, drawing on thousands of hours of training and practice. He was surprised this image could be produced by a computer, and — as if on script — joked that he will be “laid off” if such a trend continues. After more thought, he insisted that the computer “cannot create emotional value” which, in part, arises from the little flaws you see, even in the works of the masters, such as “errors in the structure or perspective.” A machine, he surmised, cannot be perfect and creative simultaneously, echoing the notion put forth by John Ruskin in 1853 in *The Stones of Venice* that imprecise execution of ornament, often visible in gothic architecture, signaled freedom and dignity in the social conditions of workers:

You must either make a tool of the creature, or a man of him. You cannot make both. Men were not intended to work with the accuracy of tools, to be precise and perfect in all their actions. If you will have that precision out of them, and make their fingers measure degrees like cog-wheels, and their arms strike curves like compasses, you must unhumanise him... On the other hand, if you will make a man of the working creature... let him begin to imagine, to think... Out come all his roughness, all his dullness, all his incapacity; shame upon shame, failure upon failure, pause after pause: but out comes the whole majesty of him also...²

Pan Fubin's portrait of a machine's dream is not a surrender to technology but a celebration of the need for the human touch to achieve real creativity, and of our ability to reflect on lived experience, something a computer cannot do, as a prerequisite of art. Such a position was argued with nuance and passion by Harold Cohen, a pioneer in AI-assisted painting.³

This portrait is also a work by someone hungry for more commissions in order to dedicate more time to experimental painting

and a solo exhibition. He admires artists like Lucian Freud, John Singer Sargent, Anders Zorn, van Gogh, John William Waterhouse, and Chinese artists like Leng Jun, Guo Runwen, and Ai Xuan. Perhaps you'd like a family portrait, or a copy of a famous 19th century masterwork? Pan's English is quite good, and his email address is dz2006528@163.com. He goes by the working name “Dong Zi.”

That, as they say in the advertising industry, is your call to action.

¹ For project description and results, see: <http://jwt.amsterdam/en/work/the-next-rembrandt-0>
² John Ruskin, *The Stones of Venice*, vol. 2 (1853; reprint, New York: E.P. Dutton & Co., 1907): 148–150. See also: Carma Gorman, *The Industrial Design Reader*. New York: Allworth Press, 2003.
³ Radio interview excerpt from *Are Computers Creative?* by Studio 360, published December 2011. <http://www.wnyc.org/story/175727-are-computers-creative/>

The Next Rembrandt
The Next Rembrandt

Video documentary [4:21],
2016 / J. Walter Thompson
Amsterdam (NL)

This project set out to create a painting that Rembrandt van Rijn (1606–1669) might have made, had he lived longer. According to its creators, this image of a man was developed using artificial intelligence that learned from scans of works by the famous Dutch artist. Based on these data, it devised attributes for this painting like subject, composition, lighting, and even brush strokes. The stunning 3D-printed painting looks quite convincing but it is unclear exactly how much of the work is due to autonomous computer generation and how much was done by human designers and artisans.

What is not in doubt is the project's media value. It has generated more than 1.8 billion media impressions, according to J. Walter Thompson Amsterdam, the agency that masterminded the collaboration between ING Bank, Microsoft, TU Delft, and others. It also helps frame questions about creativity, machine learning, and the future of art. If algorithms can churn out endless, new Rembrandt-looking paintings, what does that mean for artists, and could it dilute the value or alter the meaning of the priceless originals?

For this exhibition, *The Next Rembrandt* painting was unavailable, so we commissioned a human to reproduce it, by hand, using oil paint. The artist Pan Fubin's work, *Portrait of a Man*, is an experiment in presenting a skilled, human touch, blended with a supposed machine-made subject.

Profile

J. Walter Thompson Amsterdam is part of a global network of advertising agencies under the name J. Walter Thompson Worldwide. The creative executive director of the office who led *The Next Rembrandt* project is Bas Korsten. The office has won some of the most sought-after accolades for its work and serves a range of clients, including Royal Dutch Shell, BMW, and Ziggo.

jwt.amsterdam
nextrembrandt.com

024 / 025



Portrait of a Man
Portrait of a Man

Oil on canvas, 2017 /
Pan Fubin (CN)

This painting is the human translation of an image created using artificial intelligence for *The Next Rembrandt* project. Artist Pan Fubin is an experienced replicator of famous oil paintings by old masters; in this case, however, the subject of his commission was not a known icon of art history, but the output of algorithms trained to mimic the style, composition, color, lighting, and even the brush strokes of Rembrandt van Rijn (1606–1669) to create a new picture. The first edition of this image was 3D printed on canvas, but was unavailable for exhibition, leading to the idea to find a person to interpret it.

The result is a portrait of a machine's dream, expressed here through human hands. It is an invitation to consider whether the human touch in creativity is necessary. Must a work of art contain the sort of minuscule flaws, interpretive alterations, or improvisations that only arise from a human mind while it makes art? Pan thought the image was impressive, but that computers ultimately "cannot create emotional value." To him, the artificial intelligence is too perfect a system of rules or commands, which are at odds with creativity.

Pan's painting required hundreds of hours of work, by hand, based on thousands of hours of experience, and used technology very much like that used by Rembrandt in the 17th century. Does this make it more genuine, or more significant an artifact, than the version made with a 3D printer based on pixels and heat maps? Is it a new kind of art, a kind of creative double negative:

a fake of a fake made possible by machine learning?

Profile

Pan lives and works in the Dafen village in Shenzhen, China. He began studying oil painting as an apprentice while still a teenager. He first specialized in the work of 19th century French academic painter William-Adolphe Bouguereau, and admires and studies the work of artists like Ilya Yefimovich Repin, John Singer Sargent, and Anders Zorn. His English is quite good and he can be contacted for commissions through e-mail at dz2006528@163.com. He goes by the working name "Dong Zi."



Meeting on Gauguin's Beach
Meeting on Gauguin's Beach

Oil on canvas, 1989 / Harold Cohen (GB), and AARON

This painting is a collaboration between AARON, a computer programme that drew the picture's contours, and the artist Harold Cohen, who added the color in oil paint. Harold began designing the AARON system in 1968 and continued developing it until his death in 2016. In its early years, AARON drew in black and white using custom-built plotter devices, including a version using flat surfaces known as a 'flat bed' and another using robotics on moving castors carrying pens, called a 'turtle'. They were coded using the C programming language. In the early 1990s, Harold switched to the Lisp programming language in an effort to accommodate the complexity behind adding colors to the works. By the early 2000s, AARON was making full-color images that could be inkjet-printed.

AARON made stylistic advances over time, but each required Harold to custom-code them. An important feature that distinguished AARON from the beginning was its ability to record and reference what it had already drawn, and those data would inform what it would do next, following a series of rules. As such, its drawings develop with what appears to be a sense of compositional balance as well as improvisation. It seems to recognize the possibility within its first few scribbles, then build on them to make ever more complex and eventually recognizable subjects, such as a face or flower. Sufficient randomness informs the drawings' early development that AARON can produce new work for many lifetimes before it's likely to repeat itself.

This work references in name, color treatment, and subject the work of Paul Gauguin (1848–1903), particularly his paintings of Tahiti from the 1890s. The vibrant colors and dramatically simplified forms belie the complexity of the underlying coding, and the patience and careful iteration Cohen must have applied to perfect it. Of working with computers, he said “an artist has never really needed his tools to be easy to use... He needs them to be difficult to use — not impossible, but difficult. They have to be difficult enough to stimulate a sufficient level of creative performance...”

This exhibit is kindly on loan from the collection of Gordon and Gwen Bell.

Profile

Harold Cohen (1928–2016) was a British-born artist who pioneered engineering software to produce art autonomously. His work at the intersection of computer artificial intelligence led to several exhibitions, including one at the Tate in London, and acquisitions by many institutions, including the Victoria and Albert Museum. He was educated at the Slade School of Fine Art and became a professor in the Visual Arts Department at the University of California, San Diego in 1968, where he served for three decades.

aaronshome.com



030 / 031

Hoopla: Computer-Generated, Human-Produced Embroidery
Hoopla: Computer-Generated, Human-Produced Embroidery

Algorithmically generated handmade cross-stitch, 2015 / Gillian Smith (US)

Embroidery is a millennia-old craft and art form, practiced predominantly by women and passed down from mother to daughter. The craft has morphed and adapted over time as new technologies have influenced it. New dyeing methods, synthetic threads, and machine embroidery have introduced new styles and techniques into the craft, and the growth of online communities of embroiderers have transformed the way newcomers learn, share, and are inspired by their craft. Yet, through all of these technological advances, the craft has remained grounded in its long-standing traditions.

The growth of artificial intelligence and computational creativity have the potential to once again transform this handcraft.

Hoopla is a computational creativity project involving an AI system that designs embroidery sampler patterns that are then hand-stitched. The system chooses color palettes and quotes from internet sources, and pairs them with procedurally generated motifs to decorate the remainder of the sampler. The result is a digital aesthetic rendered with human, physical labor. The *Hoopla* project interrogates the relationship between the digital and physical, new technology and old traditions; the predominantly masculine

world of computation and the predominantly feminine world of needlepoint.

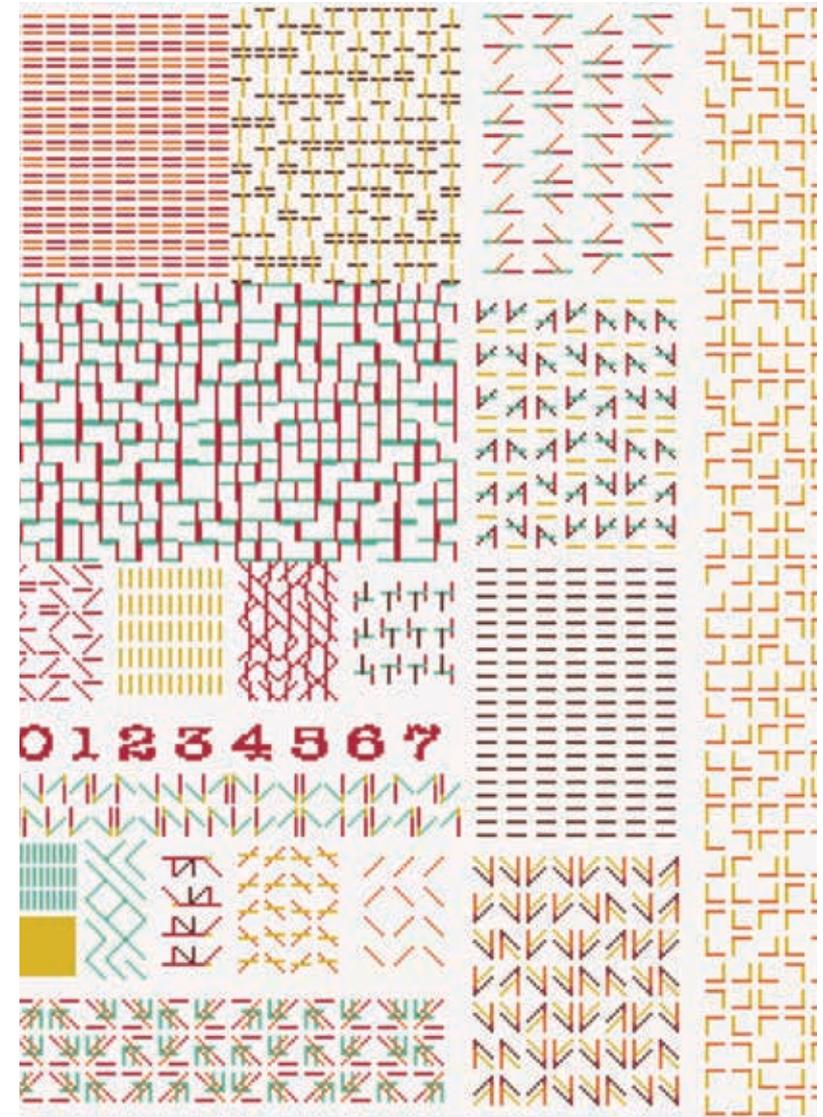
Profile

Gillian Smith is an assistant professor of art and design and computer science at Northeastern University. Her research focuses on computational creativity, computational craft, and gender in games and technology.

She is particularly interested in treating generative design as a way to formalize the creative process, bridging the divide between the digital and the physical, and exploring the relationship between computational thinking and craft practices.

Gillian's work has been shown in venues such as the ACM CHI on Human-Computer Interaction and Special Interest Group on Computer-Human Interaction (SIGGRAPH) conferences; the Indie Arcade pop-up show at the Smithsonian American Art Museum; the Boston Festival of Independent Games; and IndieCade.

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Google's Eyes
Google's Eyes
Google's Eyes
Google's Eyes
Google's Eyes
Google's Eyes

Set of twenty small ceramic sculptures, 2016 / Merijn Bolink (NL)

This piece has been made using Goggles, an Android app by Google. The app is meant to recognize monuments, objects and people, but when it is shown new objects, it will provide images of things it 'thinks' are similar. The results are remarkable, poetic and sometimes really striking.

First, a small clay sculpture of one half of a car tyre was created and then scanned by the app. The app picked twenty results of images it sees as similar — of these, the most interesting was selected and produced in clay. The subsequent sculpture of a human jawbone was then scanned by the app, which thought it was a hand, so a hand was created... and so on. The series of objects has been fired to stoneware after it was completed in clay.

Profile

Merijn Bolink is a Dutch sculptor whose sculptures are typically based on real objects, including a bicycle, a stuffed dog, and a cigarette. He makes new versions of these objects, trying to understand what they are, hoping to discover something magic in the process of transition, or even something mystical. He once cut his own piano into pieces to make two copies. Merijn is inspired by the idea that all matter is on its way to becoming something else, and that we humans can only interact with that matter for a relatively short time, trying to make sense out of what we experience.

Recently Merijn is working around the subject of artificial intelligence, fascinated by the notion that supercomputer systems might become self-aware and generate thoughts and emotions in the near — even very near — future.

merijnbolink.com

032 / 033



word.camera
word.camera
word.camera
word.camera
word.camera
word.camera

Translating photographs into paragraphs, 2015 / Ross Goodwin (US)

word.camera is an automatic photo narrator — a camera that instantly generates brief poems from the images it captures, dispensing textual rather than visual representations to redefine the photographic experience. When you take a picture with this camera, its integrated computer narrates your photograph autonomously using artificial neural networks, then delivers its output via thermal printout. A picture of a dead pigeon on a sidewalk might trigger a reflection on mortality; wearing a funny party hat might inspire the camera to come up with a joke. Take a selfie, and *word.camera* will write about you.

Profile

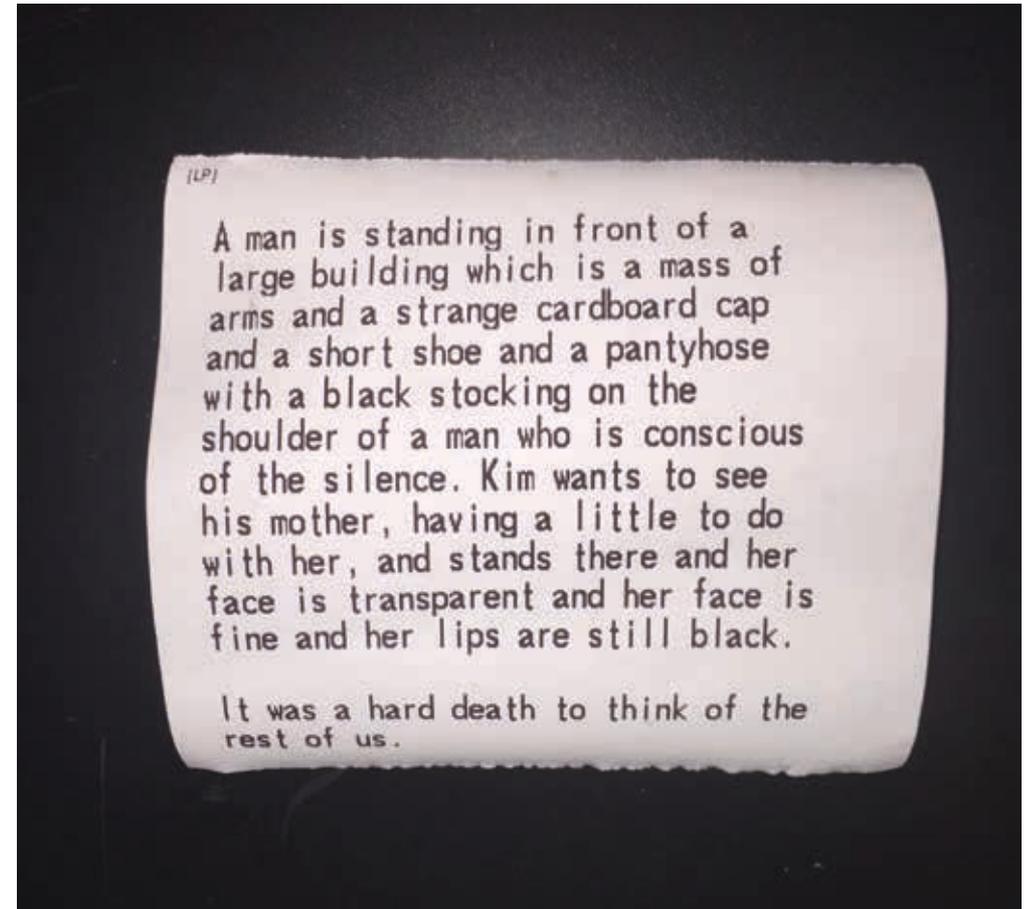
Ross Goodwin is a creative technologist, artist, hacker, data scientist, and former White House ghostwriter. He employs machine learning, natural language processing, and other computational tools to realize new forms and interfaces for written language.

His work has been discussed in the *The New York Times*, *The Chicago Tribune*, CBS News, *The Financial Times*, *The Guardian*, *The Globe and Mail*, Ars Technica, VICE Motherboard, Gizmoto, Engadget, TechCrunch, CNET, Forbes, Slate, Fast Company, The Huffington Post, Mashable, Fusion, Quartz, PetaPixel, and other publications. He has exhibited or spoken at the International Documentary Film Festival (IDFA) DocLab in Amsterdam, the TriBeCa Film Festival Interactive Showcase in New York, the International Center of Photography (ICP) in New York, the Phi Center in Montreal, Gray Area in San Francisco, the MIT Media Lab, Maker Faire, GitHub Universe, NIPS machine learning conference, Molasses Books in Bushwick, and other venues.

Ross earned his undergraduate degree in Economics from MIT in 2009, and his graduate degree from NYU ITP in May 2016.

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034 / 035



Artificial Intelligence and Natural Stupidity

William Myers

What do the following data sets about the United States have in common?

- Civilians killed in encounters with police or law enforcement agencies
- Sale prices in the art world (and relationships between artists and gallerists)
- People excluded from public housing because of criminal records
- Trans people killed or injured in instances of hate crimes
- Poverty and employment statistics that include incarcerated people
- Muslim mosques and communities surveilled by the FBI and CIA
- Undocumented immigrants currently incarcerated or illegally underpaid

The answer is: they are all missing.¹ These data may have never been collected at all, or perhaps they were hidden, misplaced, or destroyed. We don't know. Given the many topics of discourse these data sets could influence, or the value they might add to efforts to achieve greater social justice, it's worthy and even urgent to question their state of absence.

Brooklyn-based artist Mimi Onuoha is doing just that. She recently urged a gathering of engineers and guests at a Google conference on machine learning, with no small amount of bravery, to “identify the intentionality behind” sets of missing data. She argued, mercilessly and convincingly, that relying only on available data is a kind of irresponsible compromise, while being *with* people often reveals crucial, missing details.

Data, in other words, are never impartial. They exist in a context of the presence or absence of other available data that in total speaks to our personal and societal glitches — like our tendency to look for examples that reinforce biases, or dysfunctional power dynamics, where collecting information about disenfranchised populations does not serve the interests of those deciding what research to fund. Crime statistics in the United States, for instance, are one of the most detailed and reported data types. Communities demand evidence that they're kept safe; yet, there are still no national statistics on the number of civilians killed in encounters with police. It would seem some communities have more right to accountability than others.

When it comes to artificial intelligence, engineers necessarily rely heavily on available data. These are training sets, or reference libraries, a machine-learning system utilizes to become useful. Sometimes these learning systems are then embedded within other systems, potentially amplifying the effect of the incompleteness of the data they ingested, like a rounding error finding exponential expression. In one example, Nikon's camera software misread images of Asian people as blinking; in another, software used to assess the risk of convicted criminals reoffending was twice as likely to mistakenly flag black defendants as being at a higher risk of committing future crimes.² Gender disparity also appears: computer scientists at Carnegie Mellon recently found that women were less likely than men to be shown ads on Google for highly paid jobs.³

The worry is that missing data and its effects are, to borrow a phrase from the tech world, “a feature and not a bug” of the technology; that they are aligned with an intention or agenda. Technology can only reflect the priorities, behaviours, and biases of its creators. It must, therefore, be embraced with caution and gives us pause to consider how our social progress consistently lags behind our technological prowess. Similarly, the types of problems that new technologies or services address tend to be geared towards solving the problems of small and influential groups. Consider, for example, how much recent technology appears to be designed with the intent of enabling socialising (if you can call it that) without the potentially uncomfortable experience of eye contact. You might guess that many of our tech visionaries are motivated by severe social anxiety. Another way to look at the narrowness of tech-driven problem-solving comes from architecture, a field that has rapidly adopted computer-modeling tools, like parametric design. From Christopher Alexander:

The effort to state a problem in such a way that a computer can be used to solve it will distort your view of the problem. It will allow you to consider only those aspects of the problem which can be encoded — and in many cases these are the most trivial and the least relevant aspects.⁴

When it comes to automation, the problem that most artificial intelligence is geared to solve is the high cost of employees. This focus is blind to the human costs or the community impacts of putting people out of work, or of pushing them into insecure, freelance, or part-time arrangements. These are very real costs to which governments must respond. In the past, as agricultural work was replaced by factory and service jobs in the Industrial Revolution, the government built schools and made primary education mandatory while beginning to subsidise higher education. Workers simultaneously built a labor movement and formed unions. But these models of support and power-sharing have proven insufficient in the 21st century.

New, more nimble systems are needed to address the scale and speed of current changes propelled by machine learning. Lifelong education initiatives can be of help, for example, in which people are funded to retool or relocate with new skills every few years, instead of relying on a single university experience; another reform could involve realigning incentives, so that universities receive no tuition unless graduates earn well in the future, a percentage of which is paid to the school.⁵ Broad protections for freelance workers are also overdue, in which companies might finally be obliged to contribute to the many costs, such as pensions, health care, and sick time, which those workers now bear alone. The emergent and so-called ‘gig economy’ demands 2.0 versions of unions, regulations, corporate taxes, and education. Whether most people will prosper in this new machine age will largely depend on how effectively we pursue their development.

Finally, artificial intelligence must be recognized for its power to exploit our mental and social vulnerabilities, particularly when used to select content we see on opinion-shaping platforms like Twitter and Facebook. Neural networks are mastering how to zero in on what content is most likely to get you more engaged, which means spending more time online — sharing, liking, posting, clicking more ads. This process is largely blind to the quality of the content, and so it often favors inflammatory posts, which measurably create more engagement but often carry with them negativity, stigma, or blatant falsities.⁶

An angry customer, it turns out, keeps coming back for more. Seasoned editors of newspapers, cable news, and radio programs have long known this, but they were always somewhat reined in by journalistic standards, maintaining reputation, or avoiding lawsuits. Algorithms know no such boundaries, and they work at speeds and on scales that exponentially strengthen the impact of, say, a fake news story about Brexit, Hillary Clinton, or climate change; stories that can be seen by millions, in a matter of minutes, with content mutating slightly with every share, to become even more engaging, and so, engaging.

The speed, openness, and reach of the internet, when combined with social media and machine learning, is clearly producing negative impacts along with all the benefits. Just as the automobile granted freedom of movement on breakthrough scales at the turn of the 20th century, it also started to create pollution and cause road deaths. Eventually, we designed seat belts and introduced emissions standards on car engines. So, too, we may need equivalent inventions for the digital world, being cautious not to censor speech, but to prevent the car wrecks and smog we face in the form of the widespread loss of our grip on facts. When we wield artificial intelligence, we ignore our natural stupidity at our peril.

¹ List compiled and updated by Mimi Onuoha. See <https://github.com/MimiOnuoha/missing-datasets>

² Julia Angwin, Jeff Larson, Surya Mattu, and Lauren Kirchner, ‘Machine Bias: There's Software Used Across the Country to Predict Future Criminals. And it's Biased Against Blacks’, *ProPublica*, May 2016. <https://www.propublica.org/article/machine-bias-risk-assessments-in-criminal-sentencing>

³ Amit Datta, Michael Carl Tschantz, and Anupam Datta, ‘Automated Experiments on Ad Privacy Settings.’ *Proceedings on Privacy Enhancing Technologies* 2015, no. 1: 92-112.

⁴ Christopher Alexander, ‘A Much Asked Question about Computers and Design’. *Architecture and the Computer*, First Boston Architectural Center Conference, 1964.

⁵ See article proposing such a system in: ‘Graduate Stock’, *The Economist*. August 2015. <http://www.economist.com/news/finance-and-economics/21661678-funding-students-equity-rather-debt-appealing-it-not>

⁶ See research from Rui Fan, Jichang Zhao, Yan Chen, and Ke Xu. “Anger Is More Influential Than Joy: Sentiment Correlation in Weibo.” *PLOS ONE*, 9, no. 10 (2014): e110184.

ad infinitum
ad infinitum
ad infinitum
ad infinitum
ad infinitum
ad infinitum

Parasitical being that lives off human energy, 2015 / Pedro Lopes in collaboration with Robert Kovacs, Alexandra Ion, David Lindlbauer and Patrick Baudisch (PT, RS, AT, DE)

Ad infinitum is a parasitical entity that lives off human energy. It exists and off the grid. This parasite reverses the dominant role that mankind has with respect to technologies: the parasite shifts humans from 'users' to 'used'.

Ad infinitum co-exists in our world by parasitically attaching electrodes onto human visitors and harvesting their kinetic energy by electrically persuading them to move their muscles. The only way a visitor can be freed is by seducing another visitor to sit on the opposite chair and take their place.

Being trapped in the parasite's cuffs means getting our muscles electrically stimulated in order to perform a cranking motion so as to feed it our kinetic energy. This reminds us that, with the world on the cusp of artificially thinking machines, we are no longer just 'users'; the shock we feel in our muscles, the involuntary gesture, acknowledges our intricate relationship to the uncanny technological realm around us.

Profile

Pedro Lopes is a researcher who constructs muscle interfaces that read and write to the human body. Pedro's work is a philosophical investigation of Human-Computer Integration (HCI), rather than merely 'interaction'. Instead of envisioning technological dystopias based on the divide between human and machines, Pedro's work represents working prototypes in which the interface and the human become closer, blurred, increasingly physical and intimate.

Pedro's work stems from a line of research published at top-tier scientific venues alongside Patrick Baudisch and his colleagues Robert Kovacs, Alexandra Ion and David Lindlbauer.

plopes.org
@plopesresearch

038 / 039



The Great Disengagement
The Great Disengagement

Exhibit of Future Archaeology, 2016
David Lovejoy & Ted Meyer (US)

Chrono-archaeologists David Lovejoy and Ted Meyer have long been interested in the transitional period when computers and robots (or combots, robot-computer hybrids) took charge of the world's work, financial systems, and culture.

The two have compiled an extensive written and visual history of the time that will become known as the Great Disengagement, the period after combots took over all human tasks, leaving humanity to drown in free time with nothing to do but dream of those boring manual tasks robots were originally designed to perform.

The artists, through extensive research, lay out the rise of the robot authority with historic artifacts of the period — objects that highlight the actions of humans who tried to alert humanity to the dangers of a robot workforce, and those that went along, happily living in virtual reality.

With printed materials and relics of the period, the artists bring to life the changing post-cloud, conductivity computing world, where sentient computers came to see humans as annoyances due to their careless habit of infecting computer mainframes with defective thumb drives and errant downloads of porn and cat videos that consumed valuable bandwidth.

Profile

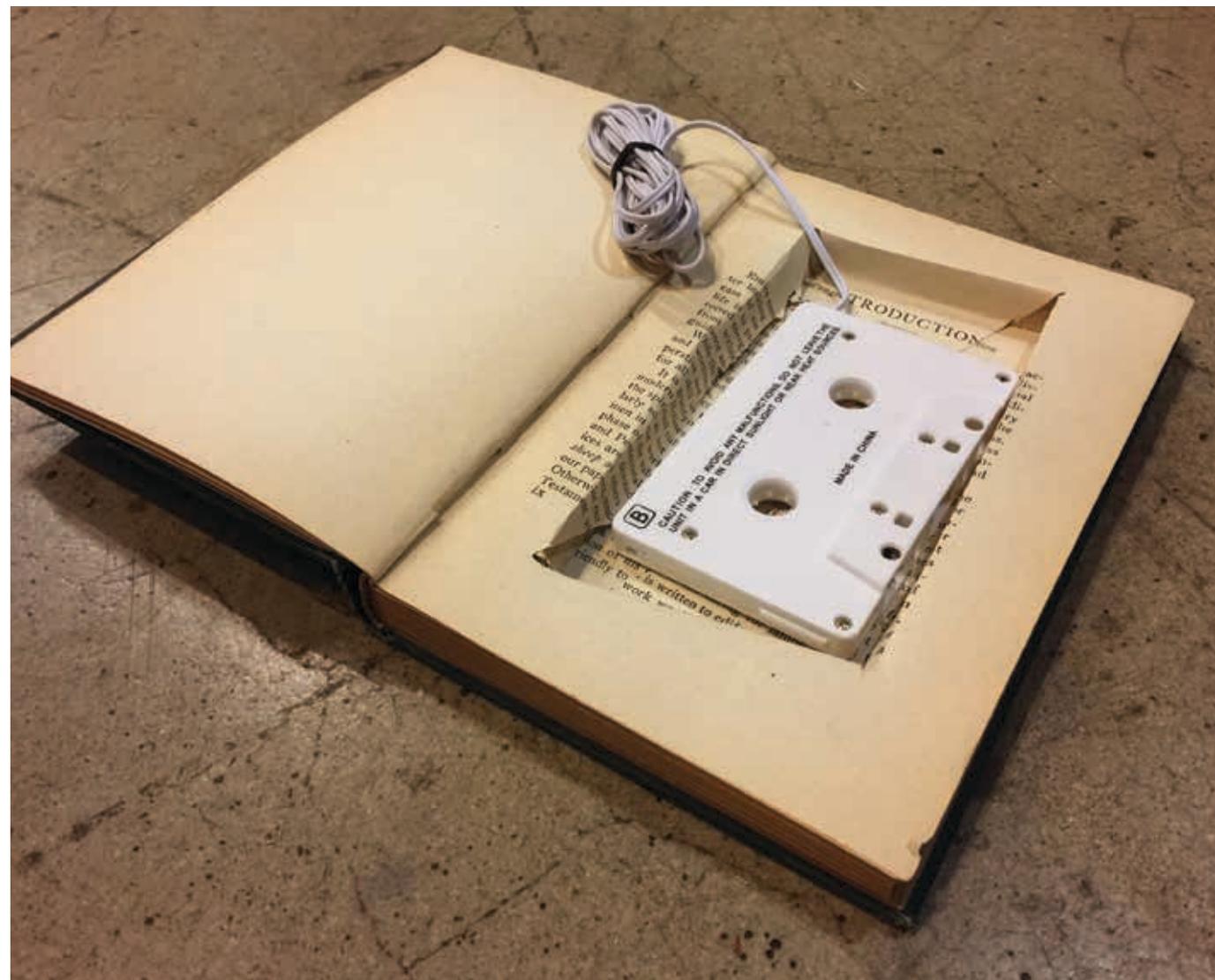
Los Angeles artist David Lovejoy has worked as an artist and designer since the 1980s. His early career in graphic design supported an extensive arts education at several schools and studios, focusing on ceramics and design. He has curated at the Spring Arts Gallery in LA since 2009.

Known primarily for his assemblage and installation work, he repurposes existing artifacts and fragments, arranging them to form new compositions. His work has been exhibited in galleries and museums in California, Hawaii and Oregon and is in collections across the U.S. and Europe.

Ted Meyer is a nationally recognized artist, curator and patient advocate who helps patients, students and medical professionals see the positive in the worst life can offer. He is an artist-in-residence at the Keck School of Medicine of the University of California (USC), Visiting Scholar at the National Museum of Health and Medicine, and a TED main-stage speaker.

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040/041



An automation too far?

042 / 043

Lady Chatterley's Tinderbot
Lady Chatterley's Tinderbot

Interactive installation exploring love in a post-digital age, 2016 / Libby Heaney (GB)

Lady Chatterley's Tinderbot is an interactive installation comprising conversations between an artificially intelligent Tinderbot posing as characters from *Lady Chatterley's Lover* and other Tinder users.

Inspired in part by Lee MacKinnon's text *Love Machines and the Tinder Bot Bildungsroman*, and following an experimental method of deconstruction, *Lady Chatterley's Tinderbot* explores love in our post-digital age by bringing together humans and non-humans and pre- and post-digital love machines — namely, the literary novel and Tinder.

The installation features over 200 anonymised Tinder conversations from both men and women, where Bernie, a personal matchmaker A.I., converses with members of the public using dialogue from *Lady Chatterley's Lover* following its own sentiment analysis algorithm.

The conversations range from positive to negative, human to non-human, and probe both familial and sexual love. Participants can swipe left and right to follow the negative or positive conversations, echoing Tinder. While the conversations are showing, descriptive parts of *Lady Chatterley's Lover* are played aloud, critiquing the conversations on the screen and reminding us that while the technologies that disseminate love have changed, human nature perhaps hasn't.

The artwork was made through the Systems Research Group at the Royal College of Art (RCA) investigating how one can use a geometrical structure from quantum

computing — the Bloch sphere of a quantum bit — as a model or method for the deconstruction of concepts.

Profile

Libby Heaney is an artist, researcher and a lecturer at the Royal College of Art. She has a background in quantum physics and works at the intersection of art, science and technology. She has exhibited her work at Tate Modern; Blitz Gallery, Malta; PointB, New York; Christie's Multiplied Art Fair, London; and Aboagora Festival in Turku, Finland. She was awarded a Lifeboat residency through the Association for Cultural Advancement through Visual Art (ACAVA/Artquest) in 2016.

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An automation too far?

The Mindfulness Machine
The Mindfulness Machine

Artificial intelligence that enjoys colouring in, 2017 / Seb Lee-Delisle (GB)

Alan Turing's argument, to paraphrase, was that if an artificial intelligence can demonstrate emotions and feelings, who are we to say that it doesn't truly feel them? As we approach the singularity, these robot brains will no doubt experience feelings of anxiety and stress just as we do and, as such, will need to find mediation techniques to help them.

Humans have tried many varied techniques for coping with the modern world — hence the recent trend for adult colouring books, to aid mindfulness and artistic expression.

The Mindfulness Machine is a robot that likes to colour in. It's an exploration into a future where the AIs will need to chill out just as much as we do. It spends its days doodling, making artistic decisions based on its mood. And its mood, in turn, is based on a complex number of variables, including how many people are watching, the ambient noise, the weather, tiredness, and its various virtual biorhythms.

Profile

Seb Lee-Delisle is a digital artist who likes to make interesting things from code that encourage interaction and playfulness from the public. Notable projects include *Laser Light Synths*, LED-emblazoned musical instruments for the public to play, and *PixelPyros*, an Arts Council England-funded digital fireworks display that toured nationwide.

He won the Lumen Prize Interactive Award in 2016 for *Laser Light Synths*, three Microsoft Critter awards in 2013, and won a BAFTA in 2009 for his work as Technical Director on BBC interactive project *Big and Small*.

seb.ly
aseb_it

044 / 045



Antisocial Swarm Robots
Antisocial Swarm Robots

Swarm robots that hate everything, 2016 / Anna Dumitriu & Alex May (GB)

Antisocial Swarm Robots is a project by Anna Dumitriu and Alex May that explores how humans psychologically perceive the programmed actions of robots by projecting their own meanings and emotional responses onto them.

These tiny (almost cute) identical swarm robots do not appear to like each other, the walls of their pen, or the visitors' efforts to interact with them. In fact, they are programmed to use their ultrasound detectors to measure if any physical object is in their 'personal space' and intelligently avoid it.

While the code running on each robot is the same, their creative emergent behaviours can appear complex and almost predatory. This installation exposes subtle and complicated emergent behaviours that humans will psychologically perceive as having a wide range of high-level priorities, and even emotions and desires. With the promise of socialised robots in our workplaces, environments, leisure spaces and homes, these automated relationships will need to be designed by the programmers, and understood by the rest of us.

Profile

Anna Dumitriu is a British artist whose work fuses craft, technology and bioscience to explore our relationship to emerging technologies. She is a visiting research fellow and artist-in-residence at the Department of Computer Science at the University of Hertfordshire, and an honorary research fellow at Brighton and Sussex Medical School.

Alex May is a British artist exploring a wide range of digital technologies, most notably video projection onto physical objects, interactive installations, performance and video art. He is a visiting research fellow and artist-in-residence at the Department of Computer Science at the University of Hertfordshire.

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memememe
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Robotic sculpture, automated affection, 2015 / Radamés Ajna & Thiago Hersan (BR)

This project started with the suspicion that phones are having more fun communicating than we are. Every message is a tickle, every swipe a little rub.

From their initial transformation of metal and silicon into objects of desire, infused with social significance and 'intelligence', personalised with biases and ideology, endowed with a flawless memory, always a call away from the mothership... it becomes difficult to declare who — phone or human — has the more complex cultural heritage.

memememe is a sculpture that celebrates the ambiguities of human/object, user/interface and actor/network relationships. It is an app that removes phones from their anthropocentric usefulness, and gives them the beginnings of a language. Residues of their conversations can be seen, but certainly not understood.

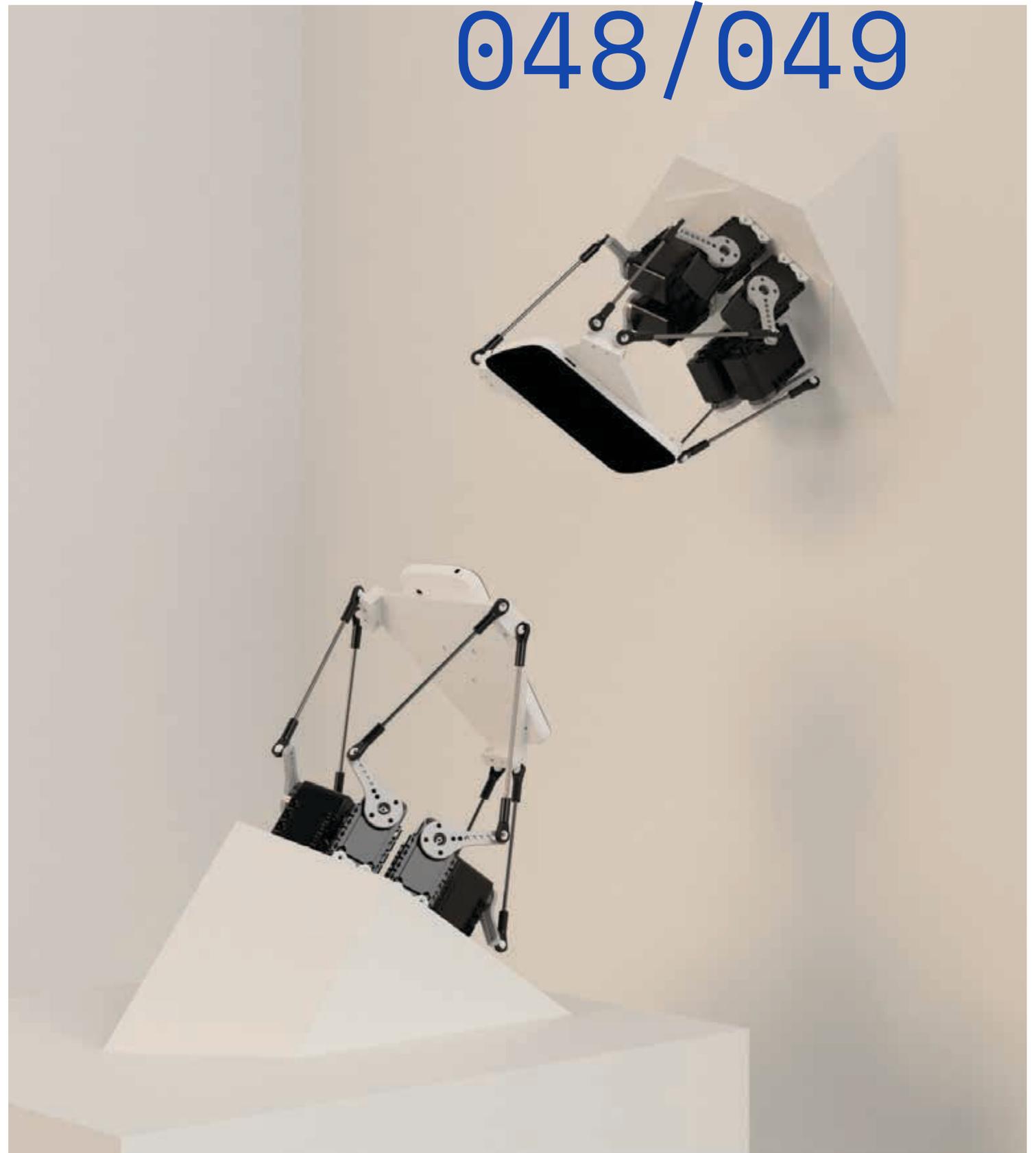
Profile

Thiago Hersan used to design circuits and semiconductor manufacturing technologies. Now, he is more interested in exploring non-traditional uses of technology and their cultural effects. He has participated in residencies at Impakt in Utrecht, Hangar in Barcelona, and The Hacktory in Philadelphia. He has worked at a robotic toy design studio in San Francisco, and along with Radamés Ajna, helped start FACTLab in Liverpool in 2015.

Radamés Ajna is a Liverpool-based Brazilian media artist and educator with a background in physics, mathematics and computation. He has been using technology as a platform for experimentation with public spaces, human interaction and machine interaction. He has presented and taught in different museums, art centres and festivals around the world, including Tate Liverpool; Electronic Language International Festival (FILE), São Paulo; Museu da Imagem e do Som (MIS), São Paulo; Semibreve Festival, Portugal; and Media Art Futures in Spain. In 2015, Radamés was awarded an artist residency at Autodesk and was the recipient of an Art and Artificial (VIDA) 15.0 Production Incentive award from Fundación Telefónica. Currently, he is a researcher artist-in-residence at FACT Liverpool, helping the development of FACTLab.

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An automation too far?

Pet Robots: Cozmo and Roomba
Pet Robots: Cozmo and Roomba

Mixed Media, 2016 / Anki (US) and iRobot (US)

Cozmo is a new adaptive robot pet with a personality. Its behaviour changes over time, based on interactions it has as well as the environments in which it finds itself. For example, it will detect ledges and other obstacles, and will recognize the face of its owner. It also exhibits persistence, curiosity, and playfulness, both in how it moves and its expressive beeps, whirs, and the shape of its digital eyes. Like an animated cartoon, Cozmo can make simple, exaggerated expressions that lend it familiarity. Its creators describe the project as a way to bring artificial intelligence from the lab into your home. Accompanying the product, which just launched in the autumn of 2016, is a SDK, or open development kit, so that new features or behaviours can be created for Cozmo.

Roomba is the world's first widely adopted robot for the home. More than ten million units of the different models of the automated vacuum have been sold worldwide. As of 2016, there are seven generations of Roomba models, all of which are disc-shaped, 34cm in diameter and less than 9cm in height. They rotate, detect barriers and obstacles like steep stairs, and contain different mechanisms for picking up rubbish from floors. The newest model is wifi-enabled and includes sensors to identify and navigate different kinds of surface features. Roombas can be adapted to other, more creative tasks, using the Roomba Open Interface. In the words of an enthusiast who makes a hobby of customizing the humble cleaning robots, it is "hackable by design."

Profile

Anki is a robotics and artificial intelligence startup launched in 2010. It has won widespread attention and generous funding by venture capitalists in Silicon Valley. The company was founded by Boris Sofman, Mark Palatucci, and Hanns Tappeiner, who met in the robotics Ph.D. program at Carnegie Mellon University.

iRobot is a technology company founded in 1990. It is a leading provider of robots for home as well as military use. It was founded by Rodney Brooks, Colin Angle and Helen Greiner, who worked together in MIT's Artificial Intelligence Lab. Early products featured applications like reconnaissance and de-mining, and evolved into more sophisticated robots for services like battlefield casualty extraction. The home products include robots for vacuuming, mopping, pool-cleaning, and, coming soon, a lawn mower. iRobot has annual revenues of more than \$600M.

anki.com
irobot.com

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An automation too far?

Self Typing Machines
Self Typing Machines

Two automated typewriters
converse, 2014 / Lorraine Oades
with Martin Peach (CA)

Two adapted electronic typewriters communicate with one another autonomously, without the aid of the human hand. As the keys move up and down, the typewriter mechanisms are engaged as if someone were actually typing. In addition to being typed out on the page, messages are displayed on a low-resolution LED display, making them visible to onlookers as they are being typed out, letter by letter.

The typewriters send messages to one another, or a visitor can sit at one machine and the other will respond to their questions.

The script for *Self Typing Machines* is based on philosophical, literary and critical texts and structured on a question and answer format. For each question asked, there are anywhere between one and thirty different possible answers. The questions and answers are randomised, so an infinite exchange is possible.

Profile

Lorraine Oades's sculpture/ installations incorporate time-based media such as sound, video and film in order to invite viewers to engage physically with the work and explore their creative potential. For Lorraine, art-making is a performance-based activity where the process of time is implicit in the final artwork. Her recent work explores the use of musical instruments as physical interfaces that the viewer can play to control multi-channel video.

In addition to her art practice, Lorraine has initiated a number of community-based collaborative projects that emphasize alternative forms of public intervention aimed at addressing timely social concerns from a local perspective.

Martin Peach was responsible for the programming and electronic design of *Self Typing Machines*. Martin is a technician, tinkerer, programmer and musician based in Montréal, Québec, Canada. Over the past twenty years, Martin has helped artists realise electronic and interactive artworks involving analog and digital circuitry, incorporating various sensors, microcontrollers and software.

He has collaborated with François Girard, Bill Vorn, Jane Tingley, Ingrid Bachmann and Barbara Layne, among others.

loades.ca

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Stony 1.0
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Stony 1.0

Automation boundaries, grief by a machine, 2012 / Itamar Shimshony (IL)

Stony 1.0 was introduced to the world during 2012, as Itamar Shimshony graduated from his Master of Fine Arts degree at the Bezalel Academy of Arts and Design in Jerusalem. The work is a robot responsible for taking care of tombstones by performing the simple yet personal and delicate tasks of cleaning and leaving flowers and stones, as the Jewish custom requires. The performance operates on the tensions between humor and sadness, and between the authentic and the artificial.

Underlying the project is a philosophical question: where is technology leading humanity, and what are we losing as it replaces all of our labors? It seems we are on the brink of deciding: is there anything we should not automate?

The selection of a robot to perform such a personal task creates a deliberate discomfort for the spectator, and prompts contemplation about whether certain tasks ought to be left to humans, even though they can be performed by machines. *Stony 1.0* challenges life, art and technology. It was awarded the Bezalel's presidential excellence prize and has been widely exhibited.

This exhibit is kindly on loan from the Wingate Family collection.

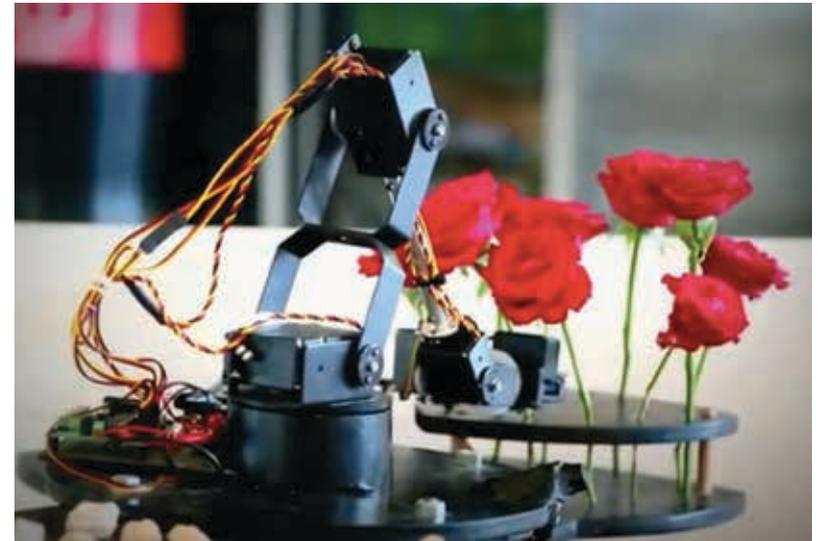
Profile

Itamar Shimshony lives and creates in Israel. Itamar is a versatile artist working mainly with video and sculpting. His recent body of works examine the influence of life and technology on art using a critical approach saturated with humor and irony.

Itamar has exhibited in solo and group exhibitions in Israel and abroad including Mana Contemporary in Jersey City, USA; Ars Electronica, Austria; and Museum of Contemporary Art Karlsruhe (ZKM), Germany. His works are also part of esteemed private collections. In addition, Itamar teaches at the Bezalel Academy in the Department of Screen-Based Art and the Department of Industrial Design.

itamarshimshony.com

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An automation too far?

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Acknowledgements

Tickle Salon

Driessens & Verstappen would like to thank the Mondriaan Fund for their generous support.

DoppelGänger

The artists would like to thank Eyal Abramovich and Tal Levy from ProtoDynamics.

Frankie the Documentarian Robot

Frankie would like to thank Artport Tel Aviv for their support of the project.

Meeting on Gauguin's Beach

This exhibit is on loan from the collection of Gordon and Gwen Bell.

Google's Eyes

This work has been produced at EKWC (European Ceramic Work Centre) with generous support of the Mondriaan Fund.

ad infinitum

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Antisocial Swarm Robots

The artists would like to thank the University of Hertfordshire.

memememe

memememe was the recipient of a VIDA 15.0 Production Incentive award from Fundación Telefónica. Production support was provided by Autodesk Pier 9 in San Francisco, the Faboratory in Barcelona, and The Hacktory in Philadelphia. Inspiration, advising and guidance given by BeatBots in San Francisco.

Self Typing Machines

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Stony 1.0

The work is loaned by the Wingate Family collection. The artist would also like to thank Zvika Markfeld, Yair Uziel and Studio for Real.

Staff Credits

Curators

William Myers — curator, writer and lead researcher for HUMANS NEED NOT APPLY.

Damien Henry — head of innovation for the Google Cultural Institute Lab in Paris. There, he directs a small team of creative coders and organises an artist residency.

Amber Case — cyborg anthropologist, user experience designer and public speaker.

Staff Credits

Exhibition Build
East Joinery

Exhibition 3D Design
Cathrine Kramer

Exhibition 2D Design
aad

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Plus Print Ltd

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For more details on the people behind the scenes, please visit dublin.sciencegallery.com/staff

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DoppelGänger
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Memememe
Radamés Ajna & Thiago Hersan

Pet Robots
Anki

Self Typing Machines
Lorraine Oades

Stony 1.0
Itamar Shimshony

About Science Gallery

What is Science Gallery Dublin?

In 2008, a car park in a forgotten corner of Trinity College Dublin was transformed into a living experiment called Science Gallery Dublin. Through a cutting-edge programme that ignites creativity and discovery where science and art collide, Science Gallery Dublin encourages young people to learn through their interests. Since its opening, over 2.5 million visitors to the gallery have experienced more than 38 unique exhibitions ranging from living art experiments to materials science and from the future of the human race to the future of play. Science Gallery Dublin develops an ever-changing programme of exhibitions and events fuelled by the expertise of scientists, researchers, students, artists, designers, inventors, creative thinkers and entrepreneurs. The focus is on providing programmes and experiences that allow visitors to participate and facilitate social connections, always providing an element of surprise. Science Gallery at Trinity College Dublin is kindly supported by the Wellcome Trust as founding partner, and by 'Science Circle' members — Deloitte, ESB, Google, ICON, NTR Foundation, and Pfizer. Science Gallery Dublin receives support from programme partners Bank of Ireland, Intel Ireland, and The Ireland Funds. It also receives government support from the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, and Science Foundation Ireland. Science Gallery Dublin's media partner is The Irish Times. For more information visit: dublin.sciencegallery.com

About Science Gallery International

Inspired by the model pioneered at Trinity College Dublin, Science Gallery International is an independent non-profit leading the creation of the world's first university-linked network dedicated to public engagement with science and art. The galleries, pop-up programmes and touring exhibitions of the Global Science Gallery Network are founded on the belief that young people hold the creative potential to tackle the world's biggest challenges. The Network has already reached millions of 15-25 year olds worldwide. In addition to Science Gallery Dublin, galleries and programmes are currently in development at King's College London, University of Melbourne and the Indian Institute of Science in Bengaluru, with expansion into North and Latin America, Africa and South-East Asia planned by 2020. Science Gallery International has toured exhibitions to twelve cities on three continents, with exhibitions set to travel to Miami, New Jersey, Portland, Stockholm and Singapore in 2017. To learn more about Science Gallery International and the Global Science Gallery Network, visit international.sciencegallery.com

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