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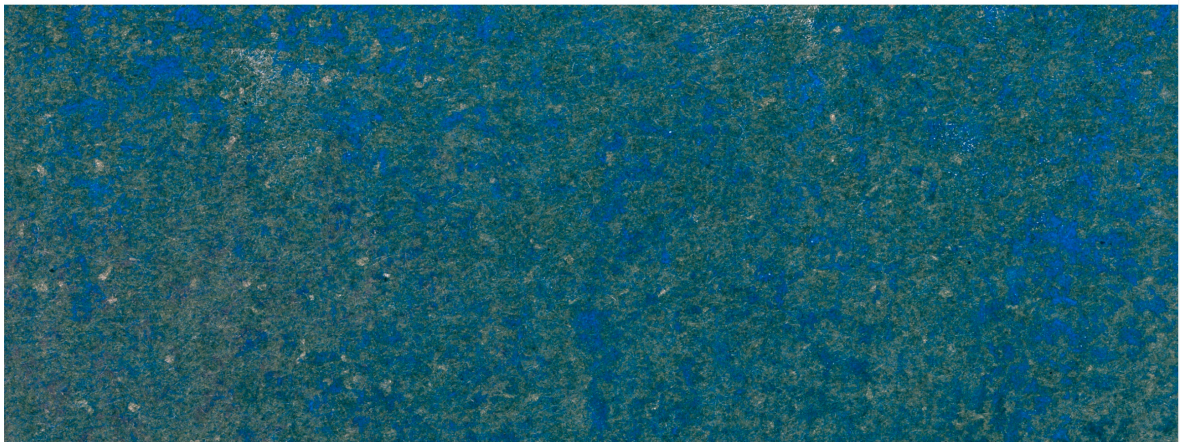
ART PAPERS

Courtney McClellan, "Trevor Paglen: Vision After Seeing," *Art Papers*, March 2022

Trevor Paglen: Vision After Seeing

Athenaeum, University of Georgia, Athens, GA

Text / Courtney McClellan



Vision After Seeing investigates the fallacies of surface as a means to address geopolitical complexity. The exhibition consists of a silent video, five large-scale photographs, and artist-designed wallpaper. The works appear to offer concision, yet upon further inspection, each initiates a story about boundaries and disclosure.

Paglen, an internationally recognized artist who served as the 2019–2020 University of Georgia Dodd professional chair, toys with the homophones *sight* and *site* by partaking in a centuries-long visual art conversation: landscape. Like 19th-century plein air painters, the artist records his environment and collapses vast space into two-dimensional form. Unlike his historical counterparts, Paglen renders the environment by using contemporary image-making tools: cameras, scanners, satellites, and drones. In doing so, Paglen positions photography not as a medium that promises representative fidelity but, instead, as a method with which to collect evidence.

Trevor Paglen, The Last Pictures (an Entangled Bank), 2012, C-print, 48 x 60 inches [courtesy of the Athenaeum]

Drone Vision (2010) is Paglen's early exploration into what machines see. It is a pixelated, silent projection that pulses with measurements, metrics, and a telescopic vernier. The imagery, collected by an amateur satellite hacker, surveys unnamed terrains. According to the video's associated text, Paglen said, "Every kind of technology has an inbuilt vision of a society, and it creates that society." In this work, the viewer is placed behind the unidentified scope of a camera—or, perhaps, a weapon.

On one wall are three lush but seemingly docile images: a diffused-light seascape without a horizon; dense greenery reflected in water; a soft blue sky streaked by a now-absent plane. The images, void of the human figure, appear as familiar descriptions of place. Yet they produce an unease, a lurch in the stomach. The dissonance between what you see and what you *feel* is described by the wall text. In the case of *The Last Pictures (an Entangled Bank)* (2012), the text tells the following story: Paglen selected 100 images, many from the public domain, and launched them into space on a unique archival disc he designed with scientists at Massachusetts Institute of Technology. The photographs are projected to circle the earth for the next billion years, outlasting the world and the humans who made it. This grand, ominous, orbital trajectory exists in contrast with the ordinariness of the presented images.

Perhaps the greatest enigma in the exhibition is *Blue #3 (Chelsea)* (2016), a rich, abstract blue-green speckled photograph. Unlike the distant, arial vantage point in many of the other works, this image explores proximity as a means of obfuscation. The source material is a courtroom sketch from the 2013 trial of Chelsea Manning, a US Army intelligence analyst and whistleblower, who leaked classified documents and was sentenced to 35 years in federal prison. Paglen repeatedly documented the drawing at a granular level with a microscope lens. By stitching the photographs together into a large abstraction, Paglen acknowledges Manning while providing her with anonymity. Manning's sentence was commuted in January 2017, and she was released four months later.

Trevor Paglen, Vision After Seeing, installation view, 2020 [courtesy of Athenaeum]

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Bloom (2020), the most recent work on view, was created for this exhibition during the Covid-19 lockdown. The large-scale brown and pink floral image covers the gallery's entrance wall. The work depicts the idea of flowers, as opposed to their reality. A composite, the photograph was created by computer vision algorithms after analyzing portions of actual photographs. The colors are distorted, aged as if created with a sepia-tone filter. Here, the familiar beauty of a blooming flower was not found but constructed.

Nature continues to escape the limitations of human sight. Paglen considers how technology fails to recapture the natural world. Paglen wields transgression to become an unexpected storyteller whose work implements narrative and image without relying upon illustrative allegory. Each work speaks to topography but expands upon the visual environment to include the problems of statehood and ongoing ecological disaster. Landscape—here contained within a rectangular frame—recalls romanticism but, more importantly, is where tactical bids for control and dominance often go unseen. For Paglen, description is contentious.

Vision After Seeing is the inaugural exhibition at the Athenaeum, a kunsthalle-style gallery in downtown Athens, GA. The Athenaeum is an airy 5,000-square-foot exhibition space that is affiliated with the University of Georgia and curated by Director of Galleries in the Lamar Dodd School of Art Katie Geha. In addition to the gallery, the site includes workspace and a reading room featuring audiovisual materials relevant to the current show, selected by UGA Art Librarian Lindsey Reynolds. Talks, performances, and other related programming will activate the gallery throughout the run of its exhibitions. The Athenaeum promises to be an exciting destination in the American South for globally relevant contemporary art.

Trevor Paglen, Bloom, installation view, 2020 [courtesy of Athenaeum]

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Left, Center: Early rockets were based on Nazi V-2 designs and developed in collaboration with German scientists after World War II.
Right: The "Peacekeeper" ICBM was designed to shower Earth with multiple nuclear warheads from space.

It's naïve to think that space was ever about much more than creating planetary weapons systems. The first spacefaring vehicles—Nazi V-2 rockets—were designed for mass murder. After the war, the US and Soviet Union famously imported German rocket scientists to develop their own generation of rockets. The launch vehicles that put the first satellites in orbit weren't designed to explore the universe; they were designed to deliver nuclear weapons. In a very real sense, spaceflight is a byproduct of global war. But some of the outlines began to change with the new millennium.

Over several years observing satellites, I began to notice that the weaponization of space was entering a new phase. Nuclear weapons and strategic reconnaissance were still very much a part of it, but warfare in space itself seemed poised to get a lot more active. The American military in particular was taking a much more aggressive stance towards the domination of orbital space. It began in 2001 when the US pulled out of the Anti-Ballistic Missile Treaty and continued in 2004, when the US Air Force articulated a policy of "Offensive Counterspace Operations…" designed to target an "adversary's space capability… using a variety of permanent and/or reversable means."[1] In 2006, the US cast the single dissenting vote against a UN General Assembly resolution prohibiting all weapons in space. As the new millennium developed, the United States continued to veer away from international conventions about the use of space, developing much more aggressive attitudes towards operations in space.

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This new era in the weaponization of space isn't just a collection of policies. It involves new weapons, new spacecraft, and new mission profiles. In 2005, the US launched a spacecraft called XSS-11 (Experimental Satellite System-11), a small satellite designed to intercept other satellites in low-earth-orbit. The following year, a pair of satellites called MiTEx (Micro-Satellite Technology Experiment) were deployed to geostationary orbit. Like XSS-11, these were interceptors designed to surreptitiously inspect (and potentially covertly attack) other satellites.[2] Early 2007 saw China demonstrate its own anti-satellite weapons, shooting down one of its own Fengyun weather satellites and creating over 2,000 pieces of trackable debris. The US responded in turn by shooting down one of its own failing military satellites, USA-193. Since then, there's been a new and largely secret space-race between China, Russia, and the United States to develop overt and covert anti-satellite capabilities and assert dominance over the heavens.

MiTEx 1 photographed by astronomer Marco Langbroek

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This is the context that *Orbital Reflector* emerged from. In my work as an artist I'm always trying to find ways that allow us to see forms of power and infrastructure that we otherwise blindly accept as given fact. One method for doing that is to stage a provocation. The stated goal of *Orbital Reflector* (and the series of "nonfunctional satellite" sculptures I began exhibiting in 2012) has always been to create a satellite that has no military, commercial, or scientific function. A satellite whose only purpose is to reflect sunlight in the night sky and to harmlessly disintegrate in the upper atmosphere after a few months. In other words, *Orbital Reflector* was designed to be the opposite of every other satellite that's ever been built.[3] In doing so, my intention has been to bring some awareness about how profoundly compromised space has become by the world's militaries and corporations.

I want people to ask questions about the legitimate uses of space. I want people to think about who should have the right to put what into space, and to what ends. I want people to ask why the secret USA-276 satellite was buzzing the International Space Station last year. And I want to ask why the fuck anybody at all is ok with Elon Musk sending a Tesla-shaped advertisement out towards the asteroid belt.

So let's get pissed off about *Orbital Reflector*, and then let's get pissed off about Russia's Object 2014–28E, the US' X-37B, and the weaponization and privatization of space… And then let's look back down at earth and spend some time thinking about how to create the world we want.

And if we can do that, I'll call *Orbital Reflector's* two-month mission a resounding success.

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Notes:

[1] "Counterspace Operations." Air Force Doctrine Document 2–2.1. August 2, 2004. Available here from the Federation of American Scientists.

[2] I wrote an article about all of this at the time. Entitled "What Greg Roberts Saw," it goes into a lot more detail about the politics of these spacecraft. See Paglen, Trevor "What Greg Roberts Saw: Visuality, Intelligibility, and Sovereignty—36,000 km over the Equator" in Mirzoeff, N. (ed.) *The Visual Culture Reader*, London: Routledge, 2013.

[3] A few commentators have imagined that light reflected from OR could interfere with astronomic observations. For numerous reasons, this is incredibly unlikely. First of all, the likelihood of OR passing through the field of view during an optical astronomical observation is infinitesimally small. Secondly, few astronomical observations are even conducted by single-point optical telescopes anymore. Third, OR has a very short lifespan. (With tens of thousands of pieces of space-debris currently in orbit, anyone doing optical astronomy or photography—myself included—is already very acquainted with mitigation techniques). Another critique of OR is that I'm putting "useless" things into space. To that charge, I plead guilty. I think public art is a good thing. The "uselessness" of public art doesn't bother me at all. In fact, it's one of the things that makes it worthwhile.

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Orbital Reflector is co-produced with the Nevada Museum of Art.
It is scheduled to launch in November 2018

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The New York Times

Haigney, Sophie, "'Impossible Objects' That Reveal a Hidden Power," *The New York Times*, September 9, 2020

'Impossible Objects' That Reveal a Hidden Power

The artist Trevor Paglen peers into the history of photography and its relationship to state surveillance.

The American artist Trevor Paglen, whose work explores the power and ubiquity of surveillance technology. Credit...Aubrey Trinnaman for The New York Times

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By Sophie Haigney

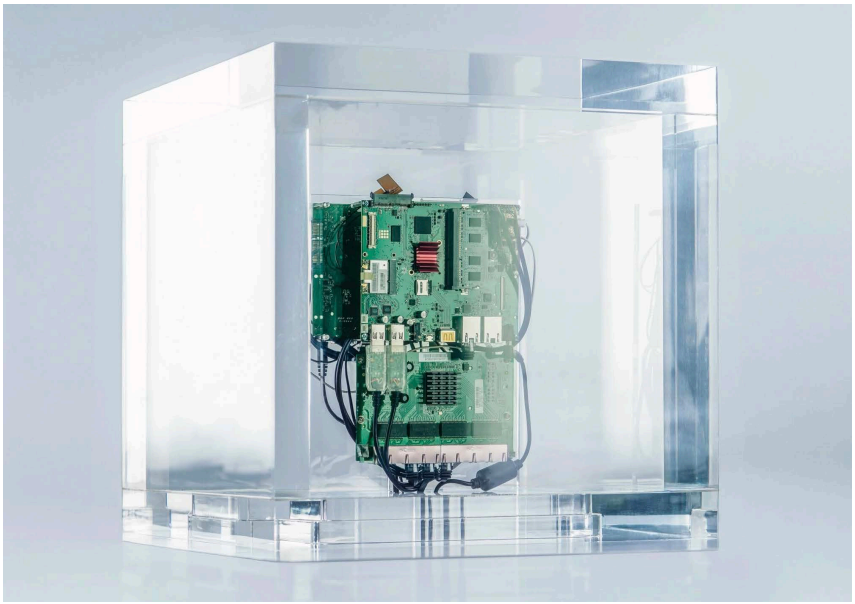
Tucked into a small gallery in the Carnegie Museum of Art in Pittsburgh is a plexiglass cube filled with computer parts. It's about 16 inches on each side, reminiscent of a Donald Judd box, updated for the digital era.

It's also an open Wi-Fi hot spot to which you can link your phone. But before your phone connects to the internet, it routs traffic through the Tor Project's network, which anonymizes your phone, location and activity. Once you connect, you can move through the museum totally untraced. This sculpture, titled "Autonomy Cube," is the kind of object for which Trevor Paglen, 45, has become known, as one of the foremost artists drawing attention to the power and ubiquity of surveillance technology.

"It's part of a series that I think about as impossible objects," he said of his latest work in a recent phone interview. He has also launched a satellite sculpture into space that he described as "a giant mirror in the sky, with no commercial or scientific value, one with purely aesthetic value."

He has also sent a time capsule with 100 images from throughout human history into perpetual orbit, micro-etched onto a disc and encased in a gold-plated shell. These objects might be thought of as "impossible" because there is no incentive for their creation in a world where technological development has been commercialized, where surveillance is commonplace and where space remains largely militarized. Is making them, then, an act of optimism?

"I wouldn't use the word 'optimistic', but what you're getting at with that word is there," Mr. Paglen said. "They're very self-contradictory and contradictory of the systems they're in."



Mr. Paglen's "Autonomy Cube" (2015), at the Carnegie Museum of Art in Pittsburgh, doubles as a Wi-Fi hot spot.Credit...Trevor Paglen and Metro Pictures, New York

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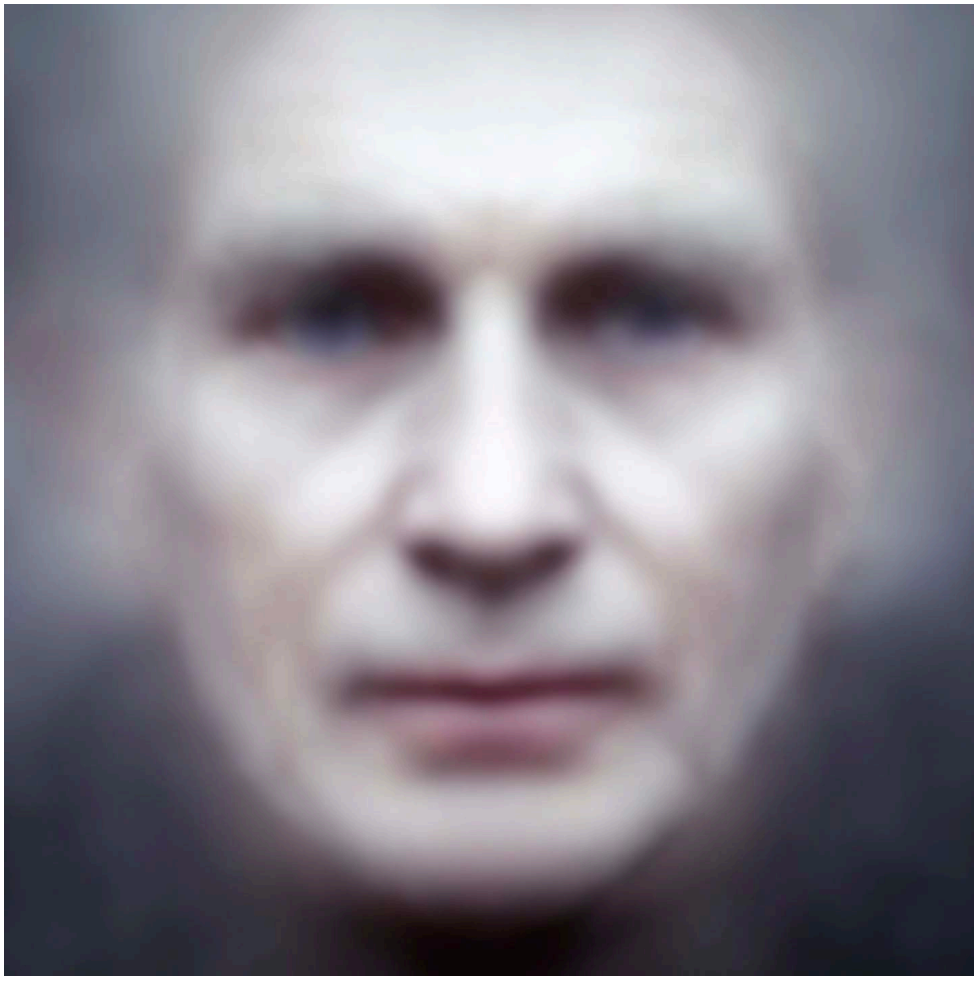
"Autonomy Cube" is installed at the Carnegie Museum in an exhibition of Mr. Paglen's work titled "Opposing Geometries." Organized as part of the 2020 Hillman Photography Initiative, an incubator for innovative thinking about photography, the show will be on view until March 2021.

Like almost all of Mr. Paglen's work, the exhibition takes contemporary technologies as its central subject, but many of the works here look backward too. The show, which features photographs, overarchingly demonstrates that even though "surveillance" and "computer vision" and "machine learning" have become today's buzzwords, they have a long history that is bound up with photography.



His "Beckett,"(from the 2017 series "Even the Dead Are Not Safe"), a portrait of Samuel Beckett generated by mixing images that facial recognition programs tagged as him.Credit...Trevor Paglen and Metro Pictures, New York

The exhibition includes images from Mr. Paglen's series "They Took the Faces From the Accused and the Dead ..." which assembled thousands of photos from a National Institute of Standards and Technology database, an archive of mug shots that was used to test early facial recognition software programs without the subjects' consent. In Mr. Paglen's versions, parts of the subjects' faces are blocked out, leaving haunting square-shaped holes that are at once a reference to their stolen identities and also a means of returning them to anonymity.

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An image from Mr. Paglen's "They Took the Faces From the Accused and the Dead…)," 2019, a series that assembled photos from the American National Standards Institutes database, an archive of mug shots that was used to test early facial recognition software programs without the subjects' consent.Credit...Trevor Paglen and Pace Gallery, New York

"The show is looking at historical forms of photography and the relationship between those forms of photography and different kinds of police power or state power," Mr. Paglen said. "What is that relationship between photography and power?"

The multiplicity of meanings in Mr. Paglen's work are part of their appeal to technologists and thinkers. "There's lots of rhetoric about how A.I. is going to change the world, and people don't realize how much technology has already changed the world and then when they do come to realize it, they often have the reaction of being scared or otherwise feeling powerless," said David Danks, a philosophy professor at Carnegie Mellon University whose work focuses on ethics and technology, and who is on the creative team of the Hillman Photography Initiative. "I think a really important aspect of Trevor's work is that it doesn't just elicit a reaction, it doesn't just educate. I think Trevor's very good about indirectly giving people clues about how to be empowered."

Many of the works in this show are extensions of Mr. Paglen's longtime interest in the relationship between photography and artificial intelligence — including his ImageNet Roulette, a digital art project and app that went viral last fall and allowed users to upload their faces to see how A.I. might label them. Often the results were racist, sexist and otherwise stereotypical — a shock to users, which prompted ImageNet, a leading image database to remove half a million images.

In “Opposing Geometries,” though, Mr. Paglen — who has a Ph.D. in geography and an M.F.A. — is thinking about the history of images as well as the future. “If you look at these histories of technical image-making, they’re always, if not part of a military project, adjacent to one and nurtured by it, so in some ways we have these very contiguous histories,” he said.

“The Black Canyon Deep Semantic Image Segments,” 2020, dye sublimation print.Credit...Trevor Paglen and Altman Siegel, San Francisco

Karnak, Montezuma Range Haar; Hough Transform; Hough Circles; Watershed, 2018, a triptych of gelatin silver prints that are part of Mr. Paglen’s ongoing exploration of the history of photography and the American West.Credit...Trevor Paglen and Metro Pictures, New York

Among these intertwined histories are that of photography and the settlement of the American West. While indelible images of places like Yosemite taken in the 1860s have long been ingrained in American mythmaking, Mr. Paglen is interested in them as early assertions of military control. The War Department (now known as Defense) funded several reconnaissance missions into the West in the 1860s and 1870s and sent photographers as part of a push to capture the new territory. Yet these sublime photos, Mr. Paglen said, were like "the eyes of the state on a new territory," a theme he explores in his Carnegie Museum exhibition.

Some of Mr. Paglen's photographs do look uncannily like Carleton Watkins's early photographs of Yosemite, and were in fact created using a historical printing process called albumen. But he also ran the photographs through computer vision algorithms, which struggle to identify objects in their natural environment, generating instead lines and shapes on the images' surface. The resulting photos are once hyper-modern and antiquarian, tying the past and present through technology.

"There are more pictures today made by machines for machines to interpret than all the pictures that have existed for humankind," said Dan Leers, the curator of "Opposing Geometries." "But rather than throwing his hands up, Trevor is going back through the history of photography, and in some cases specifically reusing existing images, and in other cases, acknowledging historical processes in his making of these pictures."

"The show is looking at historical forms of photography and the relationship between those forms of photography and different kinds of police power or state power," Mr. Paglen says of his current exhibition at the Carnegie Museum of Art in Pittsburgh.Credit...Aubrey Trinnaman for The New York Times

This is the first new exhibition that will open at the Carnegie Museum post-lockdown, and its themes have particular resonance after months when our lives moved mostly online. Mr. Paglen, whose main studio is in Berlin, and who normally travels frequently, spent the lockdown in Brooklyn, where he has a secondary studio.

“I’d never used Zoom before this,” he said. “So what is this layer of technology that has become so much a part of the ways in which we interact with each other? Especially when these forms of technology are also surveillance platforms, and are highly invasive tools.”

During that time in New York, he made a series of new works that responded to the natural world in full-blown spring but also to the ways the pandemic was reshaping life and death. An exhibition of these works, titled “Bloom,” will be on display at Pace Gallery in London beginning Sept. 10.

In Pittsburgh, even the physical layout of the exhibition highlights the ubiquity and insidiousness of certain aspects of virtual life. The works are placed in three main spaces around the museum, and the intent is to mimic.

“For us that was really important because it gives an idea of infiltration,” Mr. Leers, the curator, said. “The surveillance that happens through algorithms and photography is quite hidden, and requires digging and sleuthing to find out how it’s working.”

Someone wandering through the museum might stumble serendipitously on Mr. Paglen’s work, getting a glimpse of how the systems of surveillance are built seamlessly into the fabric of our everyday lives.

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Art in America

Chayka, Kyle, "Algorithms Can't Automate Beauty," *Art in America*, September 21, 2020

ALGORITHMS CAN'T AUTOMATE BEAUTY

By Kyle Chayka September 21, 2020

Trevor Paglen: Bloom (#9b746d), 2020, dye sublimation print, 40½ by 54 inches.
COURTESY TREVOR PAGLEN AND PACE GALLERY

You feel the subtle effects of algorithms while using digital platforms: Spotify automatically plays another song based on what you already like; Instagram shows you the stories first from the accounts you interact with most often; and TikTok, dispensing with agency entirely, just gives you a feed of videos "For You," no choice about who to follow required. Algorithms are designed so that you don't necessarily recognize their effects and can't always tell whether or not they're modifying your behavior. A new body of work by the interdisciplinary artist and technology activist Trevor Paglen—on view at Pace Gallery's London venue, with a virtual version online—attempts to visualize their workings.

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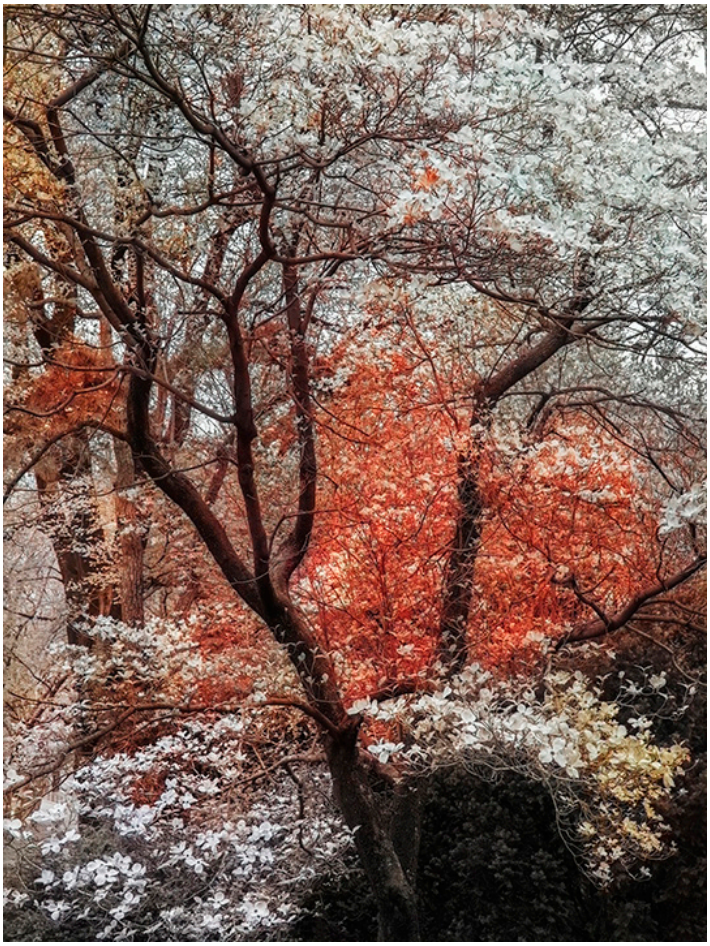
“Bloom” is a series of high-resolution photographs of flowering trees. The sprays of blossoms are tinted different colors in variegated sections, a slightly nauseating spectrum of reds, yellows, blues, and purples. The colors are the biggest sign that something inhuman has happened: they don’t seem to follow a single logic and their arrangements are too granular to have been executed by hand. As Paglen explains in a video published by Pace, the colors have been assigned by machine-learning algorithms developed by his studio that dissect the images’ textures and spatial arrangements, then apply colors to mark differences. Flowers might stay bright white while the trees’ leaves and branches recede into blues. Looking at the images means trying to decode what the computer was evaluating when adding color.

Flowers are a perennial artistic subject, from the Dutch Baroque memento mori that Paglen references in the video to Andy Warhol’s screen prints. But his visualize how a machine perceives an image. The algorithms interpret no symbolism; there’s no ephemerality or tragedy latent to a springtime blossom. The colors emerge from a mathematical process that could be applied to any other image. The elegiac quality of the series comes from the contrast between the content of the images, familiar to human viewers, and the coldness of the machine’s gaze. We don’t really know what it’s looking for, or at.

View of Trevor Paglen’s exhibition “Bloom,” 2020, at Pace Gallery.
COURTESY TREVOR PAGLEN AND PACE GALLERY. PHOTO DAMIAN GRIFFITHS

Paglen's recent work, both at Pace and in a concurrent exhibition at the Carnegie Museum of Art, evokes the uncanniness that we feel when using Spotify, Facebook, or Tinder. These platforms purport to calculate our judgements and tastes and then replicate them, serving us our own desires so quickly that we don't have time to consider how well our identities are being reflected by the algorithms' decisions. Over the past decade, since he earned a PhD in geography in 2008 from the University of California at Berkeley, Paglen has become famous for using his practice to reveal things that are hidden, making media headlines as much as exhibitions. He moves between formats—photography, collage, renderings, and installations of technological devices—to expose contemporary artifacts like the physical cables that undergird the Internet and souvenir badges from classified Pentagon programs. In recent years he has shifted his attention to artificial intelligence, exploring how machine vision is shaping our perception of the world.

"Bloom" shows that beauty can't be automated—at least, not by the technology we currently have. More than a series of visual alignments or colors, beauty lies in our memories of the world, the connection of a flower to the experience of spring inevitably passing. Algorithms lack any understanding of this context; they can only approximate it.



Trevor Paglen, Bloom (#79655d), 2020, dye sublimation print, 26 by 19½ inches.
COURTESY TREVOR PAGLEN AND PACE GALLERY

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In his "CLOUD" series (2019), Paglen uses algorithms to analyze transcendental photos of the sky; he has continued exploring this technique using the mountainous landscapes in the American West, as seen in the Carnegie exhibition. He applies calculations like Hough Circle Transform, first introduced in 1962 to detect circles in images, and then retains the results on the print so that the viewer knows what the machine has seen: thin white circular outlines with dots at the center identify patterns that the human eye would otherwise pass over. The algorithmic lines recall the jokey meme in which the golden ratio is superimposed on any image and always fits something, like Donald Trump's hair. Paglen's series appears ominous—machines attempt to perceive beauty by reducing it to straight lines and perfect shapes—but it's also a little goofy. The patterns don't change our understanding of the photographs, and the photographs don't educate us about the algorithms. They function as illustrations.

Paglen tends to hide his critical epiphanies in sumptuous visuals. Viewers may get lost in color or pattern and turn away after a few seconds. Paglen's activist bent—the artist as investigative journalist or social educator—competes with his urge to make compelling objects. In the best examples, like the "Bloom" series, these goals merge. Art history meets the technological filter through which we now experience much of visual culture, via iPhone cameras, Instagram posts, and TikTok feeds. Once we learn to recognize the influence of algorithms, Paglen hopes, we might figure out how to counter it and reclaim some of the humanity of our vision.

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The QUIETUS
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Barry, Robert, "A Politics Of the Image: An Interview With Trevor Paglen," *The Quietus*, October 12, 2019

Craft/Work

A Politics Of The Image: An Interview With Trevor Paglen

Robert Barry , October 12th, 2019 08:09

With his new installation, From Apple To Anomaly, just opened at London's Barbican Centre, Trevor Paglen talks to Robert Barry about AI, machine vision, and shutting down the internet

Portrait of Artist Trevor Paglen. The Curve, Barbican. 26 September 2019 – 16 February 2020 © Tim P. Whitby / Getty Images

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Running Trevor Paglen's face through the Image Net Roulette app he developed with researcher Kate Crawford, the little green tag labels him a "micro-economist, micro-economic expert." This is not, of course, an accurate description of the American author, artist, and digital provocateur's profession. Since … he has… . But then accuracy of description was never quite the point of Image Net Roulette.

The website, which allowed users to upload photos to be classified by a deep-learning framework trained on Image Net's fourteen million-plus photographs into one or more of the 2,833 subcategories recognised by the widely-used picture data set, is intended to show what Paglen calls, "the deep forms of bias, prejudice, and cruelty that can be built into machine learning systems that classify people."

As he wrote in the essay 'Excavating AI', coauthored with Crawford and published online at the same time as the app, Image Net Roulette was intended to "shed light on what happens when technical systems are trained using problematic training data." Contestants in an annual machine vision competition have managed to achieve a 97.3% success rate recognising objects using neural networks trained on the data set. But that contest specifically excludes items in Image Net's 'person' subcategory. With pictures tagged by anonymous Amazon Mechanical Turk users paid an average of two bucks an hour, Image Net's non-object subcategories range from the seemingly innocent ("Boy Scout", "Cheerleader", "Grandfather") to the more subjective – even offensive ("Hypocrite", "Jezebel", "Fucker", not to mention a whole swathe of racist and misogynist slurs).

But then chatting to Paglen in the Barbican's Curve Gallery, I started to wonder if this leaky system hadn't succeeded, in spite of itself, in recognising something behind the artist's mild-mannered demeanour and silvered goatee. Clearly the man has a head for figures and an eye for detail – possesses, too, a politician's knack for batting away personal or provocative questions with an easy chuckle and a deft swerve back to the pre-prepared spiel.

So do you think there's nothing redeemable at all about the whole online world? I asked him at one point in the conversation, more or less trying to get a rise out of him. Scrap the whole thing? Burn it down?

"I think that's a very legitimate question," he replied, with studied equanimity, "and I think it's a conversation that we need to seriously have. It's long overdue that we take a collective step back and understand that if we build systems to do certain kinds of things, how will that shape the societies that we live in, and do we want societies to be shaped in those ways?"

Trevor Paglen: From 'Apple' to 'Anomaly'. Installation view. The Curve, Barbican. 26 September 2019 – 16 February 2020 © Tim P. Whitby / Getty Images

We met at the press view for his latest installation, *From 'Apple' to 'Anomaly'*, which layers the Curve's snaking walls with some 30,000 photographs from the Image Net library, progressing in

grouped clumps from the humble fruit to the more elusive identifier of the work's title, via such potentially tricksy tags as 'bottom feeder', 'redneck' and 'creep'. Along the way there are pictures of anchovies, orchards, and open-cast mines, of 'porkers' and positivists and pipe smokers.

Along the way, there are a few oddities. A man clutching a Casio VL-Tone keyboard is labelled 'programmer'. Jimi Hendrix and Meryl Streep are controversially both dubbed 'money grubber'. Barack Obama turns up in a remarkable number of categories – under 'oligarch', 'racist', 'drug addict' and 'traitor' among others ("definitely the Where's Waldo figure of the installation," Paglen says, before pointing out that the Image Net set dates back to 2009, around the height of Obama's newsworthiness "And so you see that moment in history built into the substrate of any machine learning system that would be built on this database").

This being a gallery sourced online, naturally, all the suns are in the midst of setting and there is a teeming profusion of cats. It also notable that the group marked 'drug addict' skews overwhelmingly black and latinx, the 'hunk's are overwhelmingly white, and almost every 'artist model' is female and Asian.

"I think a lot of us would look at images of apples and we would all agree, that's a picture of an apple," Paglen says. "But as you go through the arc of the installation, those categories get more and more abstract and more and more relational, to the point where it ends on the concept of an anomaly. Now 'anomaly' is a very different type of noun than 'apple' is. And yet it is a category that is built into the training set. And as you go through this arc of nouns and how concrete those nouns are and what kinds of images are included in those categories, I think you start to get a sense of the worldview and the forms of politics that are built into the machine learning systems that are trained on this particular dataset."

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Trevor Paglen: From 'Apple' to 'Anomaly'. Installation view. The Curve, Barbican. 26 September 2019 – 16 February 2020 © Tim P. Whitby / Getty Images

But Paglen isn't content just to gradually chip away at our certainties. "There's a catch," as he says. Right from the get-go a seed of doubt in the possibility of ever comfortably classing image sets – and it's twist that links *From 'Apple' to 'Anomaly'* to concerns that have animated art history for much of the past century.

"*Ceci n'est pas un pomme*," – 'This is not an apple' – wrote Magritte over his Braeburn portrait, *The Treachery of Images*. But Image Net disagrees. At the start of Paglen's Curve installation stands a copy of Magritte's painting that's been put through the Image Net Roulette app. The familiar green box girds the fruit. "Red and green apple," it asserts confidently. "That image really encapsulates a lot of what the installation is about," Paglen tells me, "which is about:

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what is an image? Who gets to decide what the meaning of an image is? And what's at stake in those decisions?"

"In the past, images required people to look at them in order to come into existence somehow. That's not true anymore. You can build computer systems that look at images and interpret them for you – one of the things I'm really interested in, of course, is what forms of politics are built into that. Ways of seeing always have cultural assumptions built into them. The meaning of images change over time as societies change, as the stories we tell ourselves change. And the meaning of images changes according to who is looking at them. So I want to see, in technical systems, how those kind of processes repeat themselves."

Trevor Paglen's From 'Apple' to 'Anomaly' is at The Barbican's Curve Gallery, London, until 16 February 2020

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THE ART NEWSPAPER

Ruiz, Cristina, "Trevor Paglen on questioning the intelligence of AI," *The Art Newspaper*, October 2, 2019

INTERVIEW | TREVOR PAGLEN

Trevor Paglen on questioning the intelligence of AI

US artist's new show at the Barbican continues his exploration into how artificial intelligence is shaping how organisations control us

CRISTINA RUIZ
2nd October 2019 14:54 BST

Paglen says the surveillance conversation must extend beyond computer scientists Photo by Tim P. Whitby/Getty Images for Barbican Centre

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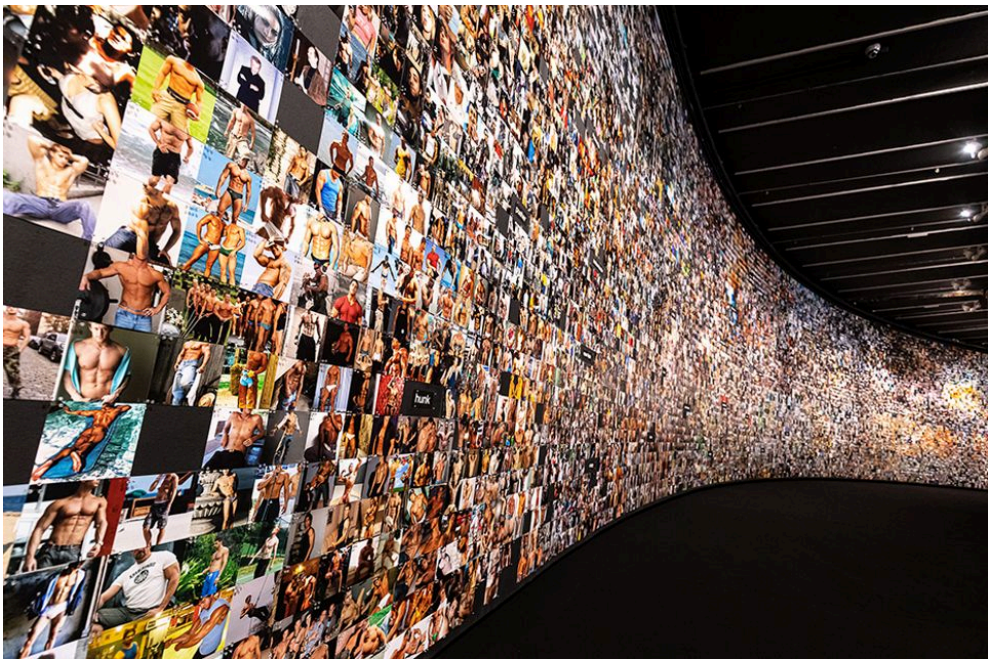
Trevor Paglen explores the unseen networks of power that monitor and control us, documenting secret US government bases, offshore prisons and surveillance drones. In the run up to his show at Milan's Fondazione Prada (until 24 February 2020), Paglen collaborated with the artificial intelligence researcher Kate Crawford to launch ImageNet Roulette, an online interactive project which revealed the often racist or misogynistic ways in which ImageNet—one of the largest online databases that is widely used to train machines how to read pictures—classifies images of people.

At London's Barbican, Paglen is again examining ImageNet's classifications, starting from everyday objects like apples and moving towards more abstract concepts to arrive at the category of "anomaly". We spoke to him about surveillance, AI and how we can begin to imagine a different future.



Tim P. Whitby/Getty Images for Barbican Centre

The Art Newspaper: In 2015, I joined you on a scuba-diving expedition off the coast of Florida to see the fibre-optic cables that carry internet communications between continents. You found them as part of your exploration into how governments spy on their citizens. Is your latest research related to that inquiry?

Trevor Paglen: All of these projects morph from one to the next. Looking for the ocean cables was a result of being involved with *Citizenfour* [the documentary about the whistleblower Edward Snowden] and trying to understand the infrastructures of surveillance. There's the National Security Agency and the Central Intelligence Agency but there is also Google, which modulates our life in different ways but is much bigger.

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Looking at how large-scale computing and data collection platforms incorporate images leads to a whole series of questions: what are the practices that go into machine learning applications? What are the politics of collecting photographs on an enormous scale? What happens with that shift away from people reading photographs?

There are two ways in which training sets of images for machine learning are made. One is done by universities and shared through people doing research and we can look at those sets—for example, ImageNet, which was created by researchers at Stanford and Princeton in 2009. These sets were made with images taken from people's Flickr accounts without their permission. They were then labelled [by crowdsourced workers], sometimes in really misogynistic or racist ways. Ethically, it is very murky. What does it mean to go out and appropriate these images, label them and then use them in machine-learning models that are ubiquitous? What are the politics behind it?

The other training sets are created by companies like Facebook and Google, and are proprietary.

These machine-learning sets are used for facial recognition technologies. Won't this increased surveillance make us all safer?

We have a desire to want to find technological solutions to questions that are political and sociological. Technology is seductive. It offers the promise of a quick fix or the illusion that it is objective and less messy than the hard work required when thinking about very difficult cultural questions. I want to think very carefully about what problems you are trying to solve with this kind of technology. The other thing to bear in mind is that we're not talking about machine learning in the abstract in a conceptual vacuum. Google, Amazon, Facebook and Microsoft are companies that are in the business of making money.

At his Barbican show the US artist embarks on a journey into ImageNet's classifications, beginning with everyday objects like an apple and progressing towards abstract categorisation © Trevor Paglen, Courtesy of the Artist, Metro Pictures New York, Altman Siegel, San Francisco

And yet we all freely choose to give them our data.

I don't think we consent to giving all our data to these platforms all the time. I could not do my job without a smartphone. So, I am compelled to use Apple or Google and give them my data. The more these technologies become a part of our lives, the less ability we have to actively consent to participating in them. We cannot change things on an individual level: if one person throws away their smartphone, it's not going to change the business model of the internet. We should think about larger, regulatory structures. I'm not saying this has to be done on a government level, but it's certainly not on an individual level.

There are a lot of different levels on which these debates can take place.There are widespread, public conversations that involve a lot of people. That's important. Another important conversation is among technology professionals, the people building these systems trying to critique these problems. Within the arts it is also very important to think about these issues. We are the people who make images. We can think of facial recognition as political portraiture attached to law enforcement.

It's important to bring people who have relevant expertise but don't necessarily have a background in computer science to bear on this because these conversations are often restricted to computer science departments where people don't necessarily have the expertise to think about how societies and images work; so it's really vital that we are all engaged.

So, what's an alternative vision for the future?

It's important to imagine futures in which things are not inevitable. Right now, it feels like it is inevitable that Facebook and Amazon and Google are going to suck up data; we think it's inevitable that we are going to be under surveillance and policed. We should not accept this. We don't really give our information to Facebook. Facebook and other platforms take it. They don't even know why; they just think it might be useful in the future. There's nothing inevitable about that. What do we want our mobile phones to do? How do we articulate a response to surveillance capitalism? We need to think about this.

• Trevor Paglen: From "Apple" to "Anomaly", *the Curve at the Barbican Centre, London, until 16 February 2020*

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Loos, Ted, "Artist Trevor Paglen Takes the Long View," *Cultured*, 2018

CULTURED
ART

ARTIST TREVOR PAGLEN TAKES THE LONG VIEW

TED LOOS

PHOTOGRAPHY BY WOLFGANG STAHR

The artist Trevor Paglen has taken up surveillance as one of his great subjects, but he doesn't seem too concerned when I turn on my iPhone's voice recorder during our interview at Metro Pictures, his New York gallery, in Chelsea. After all, he has bigger things to worry about: This month, he's launching his own satellite into space—not something you hear every day— as part of his deep exploration of how technology and science are influencing life as we know it.

You could say he's not overly insecure about being un-secure. Even though, yes, he's one of those people who has the camera on his laptop covered up. "One of the guys that I work with in the studio is really much more secure than I am, which means he doesn't have a cell phone, doesn't have an email address," says Paglen, smiling. "Basically, he can never communicate."

As an artist, Paglen must communicate, and these days, he is doing extraordinarily well at that. A couple of weeks after our chat, he's awarded a MacArthur Fellowship, a.k.a. a "genius grant." In other words: Paglen has struck a nerve, and his approaches and ideas are being recognized.

At 43, with a bushy beard and a bald pate, the confident and thoughtful Paglen could be any successful creative dude in Brooklyn—a furniture maker or marketing executive. Instead he is a lauded thought leader operating between Berlin, New York and San Francisco. The largest exhibition of his work to date, "Trevor Paglen: Sites Unseen," will be on view at the Smithsonian American Art Museum in Washington, D.C. from June 21 through January 6, presenting the last decade or so of his practice. He also has a show at Altman Siegel Gallery in San Francisco on view through May 5.

TREVOR PAGLEN'S *THEY WATCH THE MOON*, 2010.

There is perhaps some irony in a Smithsonian show, given that it's a government museum and much of what Paglen tackles in his work is the overreach of the state into our lives. "Exactly," he says when I bring this up. "The Smithsonian museums are free, open to the public. They are among the most visited museums in the world. So it's great to be able to have that kind of platform." Although sincere, Paglen doesn't come across as too eager to please, either. His ideas are his ideas, take them or leave them.

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Certainly his satellite, Orbital Reflector, is his highest-profile piece—in all senses of the word: It will circle in low Earth orbit at a distance of some 350 miles up. “It’s a kind of giant diamond structure that’s 100 feet long and 6 feet high,” Paglen explains, “and it is just designed to reflect sunlight down to Earth. It will be up there for about two months.” The launch, from California’s Vandenberg Air Force Base, will be on one of Elon Musk’s SpaceX rockets, and the project is funded by the Nevada Museum of Art, a sponsor of important earthworks in the past. “Hopefully it’ll work,” Paglen says, laughing.

For the artist, what Orbital Reflector doesn’t do is the key. “The idea behind it is, ‘Can you build a satellite that has no military, commercial or scientific purpose?’” he says. “In other words, can you build a satellite that’s the exact opposite of every other satellite that has ever been made, one that is as close to a purely aesthetic gesture as possible?”

Orbital Reflector will be visible as a light in the night sky from time to time, and there will be “star parties” at museums for group viewing. Paglen will also document the project in a film.

Such work requires talents more akin to a project manager or foreman rather than the conventional artist skill set. Just the permissions involved in launching something into space were daunting, and there was the issue of insurance—turns out Prudential doesn’t have a standard policy for purely aesthetic satellites.

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TREVOR PAGLEN IN HIS STUDIO,
BERLIN, GERMANY.

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"The launch will be insured, so if the rocket blows up we're good," says Paglen. But insuring for a satellite that gets deployed but then doesn't work? The cost of that was prohibitive. So he and his team got creative. "We figured out it's cheaper to build two satellites and have one as a back-up than it would be to build one and then insure it."

Born in Maryland, Paglen went to the University of California at Berkeley, returning there later for a PhD in geography; in between those stints, he got an MFA at the School of the Art Institute of Chicago. He had his first New York show, at a now-defunct gallery, only in 2006—in other words, he has come to prominence pretty fast.

At his Metro Pictures show last fall, he showed the impressive array of technology he deploys. He has had to harness it to warn us about the dangers of tech itself. There's a temptation to imagine Paglen making these pieces in an underground lair surrounded by walls of rare equipment, but he sets me straight. Although it takes multiple machines and lots of hardware, he notes that "you can do it on your home computer." He also acknowledges that "it's expensive in terms of doing the research and development, and my power bill has tripled."

Paglen is worried about what happens when humans are taken out of the decision-making process, particularly in matters related to artificial intelligence and mass surveillance. He's one of a group of artists critically mining the same territory, including his friend and collaborator Laura Poitras, in whose former Berlin studio he now works.

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TREVOR PAGLEN'S *NATIONAL SECURITY AGENCY SURVEILLANCE BASE, BUDE, CORNWALL, UK*, 2014.

But Paglen employs a wicked sense of humor in his take on the subject, as when he trained two different algorithms to debate what he calls “monsters of capitalism.” One program, the “generator,” draws zombies, vampires and other subjects and the other, known as a “discriminator,” tries to read them. “So they go back and forth to the point where the generator makes an image and the discriminator says ‘Yes, I believe you, that’s what you say it is.’” The artworks that result from this include Vampire (Corpus: Monsters of Capitalism), 2017, a print hung on the wall that Paglen terms an “adversarially evolved hallucination”—and it is spooky indeed, with a horror-movie face and an even scarier back story.

A more straightforward-looking work in that show, *It Began as a Military Experiment*, also from 2017, is a grid of 10 photographic portraits, but when you the know the piece’s genesis, it takes on a different cast: The images are of some people whose features are the basis for facial recognition software as developed by the Defense Advanced Research Project Agency. “They are like the Adams and Eves of facial recognition,” says Paglen.

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They are wholly average looking, and these placid faces are the ones who help computers to talk to each other. “You don’t need the human seer anymore,” says Paglen. “Most of the images made in the world are made by computers for other computers.”

Paglen raises so many questions with each work that it can be dizzying at times; you’re going to need wall texts, catalog essays and more to sift through and comprehend it all. But he can sum up his overall project pretty succinctly, too. “What forms of power do these systems amplify, and at whose expense?” he asks. “For me, that’s the larger thing I’m trying to get at.”

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AD
ARCHITECTURAL DIGEST

Gendall, John, "Meet the Artist Who Won the 2018 MacArthur Genius Grant," *Architectural Digest*, November 10, 2017

ART + AUCTIONS

Meet the Artist Who Won the 2018 MacArthur Genius Grant

Artist Trevor Paglen has many muses: the ocean floor, CIA black sites, and outer space, to name a few

TEXT BY JOHN GENDALL · Posted November 10, 2017

As the infrastructure of surveillance continues to proliferate around the world, artist Trevor Paglen continues to find new ways to locate and represent those seemingly invisible systems. In extreme ways, the setting of his work diverges—the ocean floor (where he photographed NSA-tapped internet cables), CIA black sites (which he photographed using ultra-long-distance lenses), or, as he is soon to focus on, outer space (where he will send an objet d'art into orbit)—but the subject remains consistent: that is, representing invisibility. Just last month, this growing body of work earned him a MacArthur Fellowship, the so-called "genius award." In anticipation of his upcoming project in outer space, and on the occasion of his MacArthur win, *AD* spoke with Paglen about his work.

Architectural Digest: Your CV has an unusual line item for an artist: PhD in Geography. How did that come about?

Trevor Paglen: I've always been part of a "landscape" tradition, very broadly defined. In other words, I'm obsessively curious about the basic questions: "How do humans shape the earth, and how are humans, in turn, shaped by the ways in which we've shaped the earth?" I've always done art, and did a PhD in Geography because I wanted to be able to ask questions and do research for my artwork with a level of seriousness that I didn't think would be possible without more formal training in social science. I'm basically just curious about the world and am always interested in how different fields of knowledge approach very similar kinds of questions from different perspectives.

AD: Your work defies easy categorization. How do you place yourself in an art history context?

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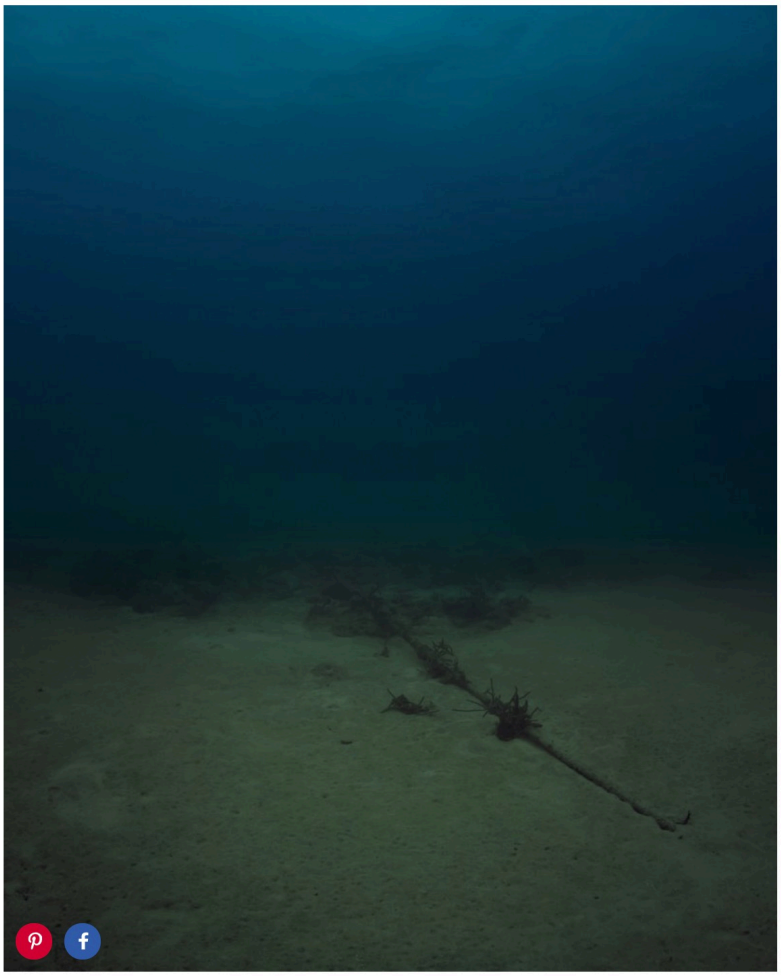
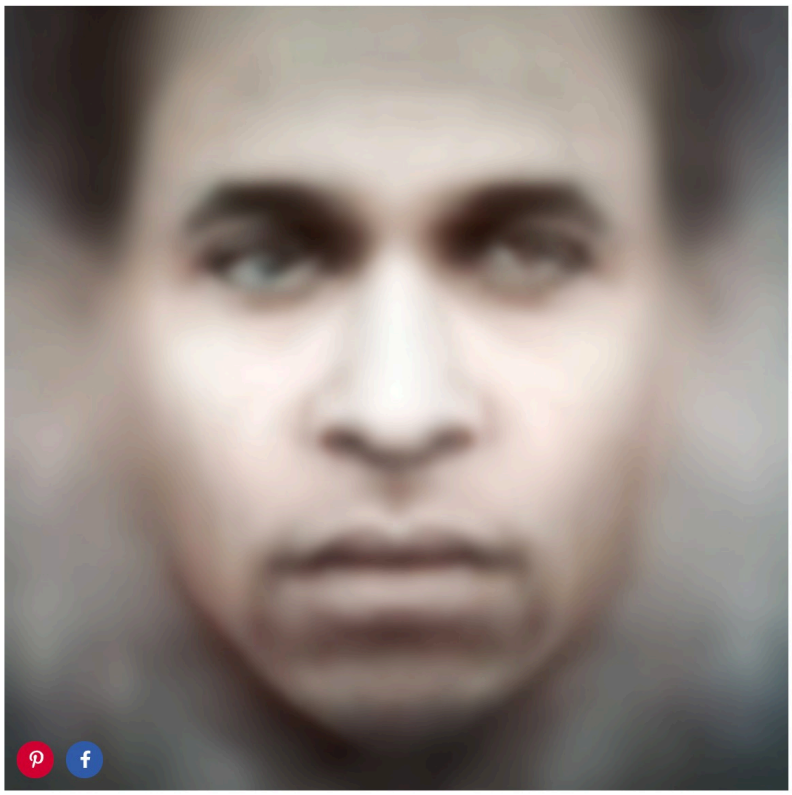
TP: I think that when you're making art, you're in a conversation with the other humans that are alive today but you're also in a conversation with your ancestors and your descendants. That conversation across history is what we call Art History. History always rhymes, to paraphrase Mark Twain, and I learn a lot from seeing how artists in the past responded to moments in political and social history that may rhyme with our own. At the moment I've been thinking a lot about surrealism, on one hand, and Russian avant-gardism, on the other. Lately I've been making images using artificial intelligence networks. There's a kind of gothic-surrealist aesthetic that emerges, which feels like it very much speaks to the moment in history we find ourselves in—a strange world where facts seem to have been unmoored from reality and are floating on an ocean of horror.



Trevor Paglen Bahamas Internet Cable System (BICS-1), NSA/GCHQ-Tapped Undersea Cable, Atlantic Ocean, 2015, c-print, 60 x 48 inches.

AD: The subject of your work is so resonant now, with secrecy and surveillance a growing part of our landscape. Can you comment on the political context of your artistic curiosities?

TP: What I want out of art is things that help us see the historical moment we find ourselves living in. I see my job as literally trying to see what the world looks like and learn how to see some of the forces that are strongly shaping it. I think it comes from a commitment to engage with the world. Unlike the abstract painters of yesteryear, I'm not someone who goes in the studio everyday and imagines a world for myself. My projects come out of an engagement with the world "out there."



Trevor Paglen "Fanon" (Even the Dead Are Not Safe), Eigenface, 2017, dye sublimation metal print, 48 x 48 inches.

Photo: Courtesy of Trevor Paglen and Metro Pictures, New York

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AD: Your definition of "out there," though, is more expansive than most. You work has taken you to some remote spots like the ocean floor and CIA black sites. Can you tell us about your upcoming project—in outer space?

TP: Orbital Reflector is a project to design and develop a satellite whose only purpose is to be an art object. It's a small satellite that inflates into a 100-foot-long diamond-like shape in space that will reflect sunlight down to earth. It's been in development for many years, and I'm excited that we're going to be launching in summer of 2018 on a Falcon 9 rocket.

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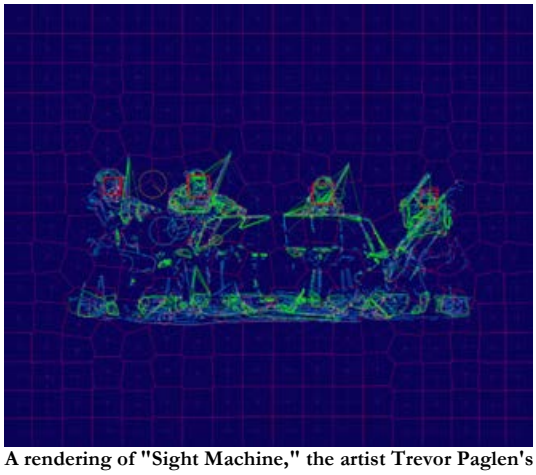
THE NEW YORK TIMES STYLE MAGAZINE

Baumgardner, Julie, "A String Quartet Concert, With an A.I. Assist," *T: The New York Times Style Magazine*, January 13, 2017

"I really don't think art is good at answering questions — it's much better at posing questions, and even better at simply asking people to open their eyes," says the artist Trevor Paglen. With a rigorous practice involving investigation, technology and image-making, Paglen has spent his career crossing boundaries, both disciplinary and physical — "which, for me, is kind of the point of art," he says.



A rendering of "Sight Machine," the artist Trevor Paglen's upcoming multimedia piece that visualizes a performance by the Kronos Quartet in real time using A.I. technology.

To date, Paglen is best known for his work on government surveillance and data collection, in particular an investigation into the C.I.A.'s "extraordinary rendition" program. (His practice has led to far-flung places, including space: he launched a collection of 100 images, titled "The Last Pictures," into space on the EchoStar XVI satellite in 2012 for aliens to find.) As of Jan. 1, he's also the artist-in-residence at Stanford University's Cantor Arts Center; and this Saturday, he's staging his first multimedia performance on Pier 70 in San Francisco's Dogpatch district. "He just thinks so big," says Paglen's longtime gallerist, Claudia Altman Siegel, who was offered the location by Alison Gass, chief curator of the Cantor. "I brought it to Trevor, like, 'Here's this construction site, what do you want to do?' And the next day, he comes up with a performance with the Kronos Quartet."

The performance, titled "Sight Machine," combines image-making and artificial-intelligence technology: On Saturday, the avant-garde string quartet will play a concert while Paglen's own A.I. mapping system projects machine-generated images of the musicians behind them in real time. Paglen programmed code, akin to surveillance A.I. algorithms, which processes a live video feed of the performance to create "images of what a particular algorithm is 'seeing,'" he says, which in this case is the musicians' movements. "I wanted to make an artwork that really underlined the contradiction between how machines see and how humans see," Paglen explains. "Because music is so affective and is just as corporeal as it is cerebral, I thought coupling a music performance with machine vision adds up to something that work on an emotional, aesthetic and intellectual level."

An alternative rendering of "Sight Machine."

However, Paglen's piece is no awe-struck homage to the capabilities of technology. "There's a profound shift happening in visual culture, which has to do with the fact that most images nowadays are primarily made by machines for other machines. I think that as the audience experiences the overall

piece, they'll get the sense that the machine-vision and A.I. systems that are 'watching' the same performance are experiencing something entirely different than the humans are," he says. "By pointing out that discrepancy, I want to plant some doubts about the exuberance I see around me over an increasingly automated society."

Trevor Paglen.

While A.I. may be associated with flashy futurism, Paglen wants to remind us that one thriving branch of the technology — machine-to-machine image-making — is very much part of day-to-day society. How can people breeze through toll lanes every morning? Images generated by a machine are sent to another machine, with no human ever intervening. These "invisible images," as Paglen calls them, warrant our attention. "Image-making, along with storytelling and music, is the stuff that culture is made out of," he says. "We're now handing over the ability to tell those stories to artificial intelligence networks and machine-vision systems," which in turn "strongly influence our social and political relationships." Every new technology, whether the wheel, a superconductor or an iPhone, is designed with intention, and often not with its abuses in mind. Paglen's work on machine vision, he says, "has to do with learning how to ask the right questions about the new relationships between images and power that we see developing throughout society."

Later this year, Paglen will use the same title, "Sight Machine," for a series of work he'll develop at the Cantor, immersing himself into the university's A.I. and machine-learning labs to bolster his technical capabilities in understanding software architecture. "In the very near future, I guarantee that the pictures you post on social media will affect your credit rating, health and auto insurance policies, and much more. It will all happen automatically. In a very real way, our rights and freedoms will be modulated by our metadata signatures," he says. "What's at stake, obviously, is the future of the human race! I'm actually serious here."

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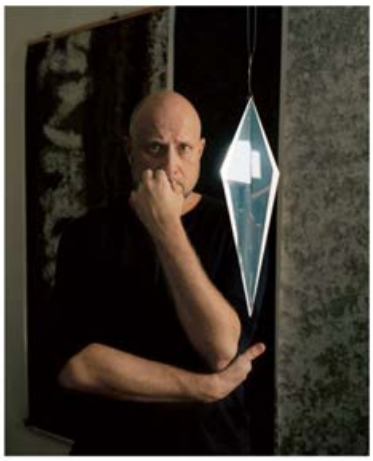
THE NEW YORK TIMES STYLE MAGAZINE

An image of a Soyuz rocket launch in Kazakhstan, which Trevor Paglen sent into space on a communications satellite in 2012 as part of his series "The Last Pictures."



Paglen, photographed in Berlin with a 3D model of his Orbital Reflector satellite. Janina Wick

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THE NEW YORK TIMES STYLE MAGAZINE | https://nyti.ms/2vGl5DH

ART

Art for a Post-Surveillance Age

By MEGAN O'GRADY AUG. 29, 2017

"Are we being watched?" I ask Trevor Paglen at his central Berlin studio. The prewar apartment was once surely the most surveilled place in the city, having formerly belonged to his friend Laura Poitras, the director who helped Edward Snowden go public. "We're always being watched," he replies. The space is filled with computers: Against one wall, an assistant writes code while another researches data used to train artificial intelligence. Opposite is a long credenza filled with art monographs and topped by a slightly sinister collection of *objets*: a Dungeons & Dragons-style dragon trophy with a shield and saber; a toy model of the stealth submarine U.S.S. Jimmy Carter; and "Black Ops" military patches, including some Paglen made himself. In one of them, dinosaurs of the future look up in wonder at the derelict satellites left behind by extinct humans.

There's a certain irony in the artist and author being based in the former G.D.R., where citizens were once pressured into spying on one another for the Stasi, which left behind miles of documents when the wall fell in 1989. Fifteen years later, **Paglen**, who already had an M.F.A. from the School of the Art Institute of Chicago, was working on his doctorate in geography at the University of California, Berkeley, when he saw redacted portions of a map of the Mojave Desert and began photographing classified military installations, outfitting cameras with special lenses used in astrophotography. Ever since, he's been documenting the ways in which humans have transformed the surface of the Earth, and how we, in turn, have been transformed by those changes. (A survey of his career will go on view at the **Smithsonian** next summer.) The resulting photographs are vertiginous and strange, illuminating the increasingly uneasy space between ourselves and our perceived

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world: a tiny, is-it-a-seagull-no-it's-a-drone set against a Technicolor sunset; the dystopian white radomes of a surveillance station tucked into an English pastoral; a placid seascape, beneath which lies a key communications choke point. "People like to say that my work is about making the invisible visible, but that's a misunderstanding," Paglen says. "It's about showing what invisibility looks like."

Paglen was already well known for his surveillance pieces when Snowden leaked a trove of NSA documents in 2013, but even he was stunned by the revelations — both their magnitude and their specificity. "I just sat, jaw dropped, for 14 hours straight, reading," says the 42-year-old, who is both affable and ultra-intense, with blue eyes, close-shorn blond hair, motorcycle boots and a kind of native restlessness. His footage of NSA bases was included in "Citizenfour," Poitras's Academy Award-winning documentary about Snowden.

Paglen, who has lived in Berlin since 2015, travels frequently to give talks about the many ways in which secrecy "nourishes the worst excesses of power," as he wrote in one of his six books. He is one of art's more unusual figures, a kind of adventurer-philosopher whose work is often conceptual and highly technical, but can also be delightfully gonzo: He learned to scuba dive in order to photograph fiber-optic internet cables snaking across the ocean floor. After being questioned in Germany for shooting classified sites, he held a contest for the best photos of "landscapes of surveillance" in that country. He made a cube-shaped sculpture from irradiated glass sourced from Fukushima. He sent a time capsule into deep space of images etched on a silicon disc chronicling human history — from the Lascaux cave paintings to political protests. For a series he's including in his show opening this month at Metro Pictures gallery in New York, Paglen is examining the automation of vision itself, and the way in which the kinds of technologies used in facial recognition software, self-driving cars and social media are creating an entirely new landscape of pictures we never see, whose judgments we can't challenge. "I don't have fantasy projects," he tells me, "because I'm stupid enough to think that you can actually do this stuff."

Paglen is currently at work on his most radical project yet. This spring, he plans to send a satellite — a reflective, faceted Mylar inflatable — into low orbit, where it will be visible at night from Earth for eight weeks or so, literally twinkling like a

diamond in the sky before it disintegrates in the atmosphere. If all goes according to plan, it will be the world's first space sculpture, unprecedented in contemporary art.

The Orbital Reflector, as Paglen calls it, seems at first glance almost romantic, even deliberately naïve. It has no scientific purpose; it doesn't even carry a camera. But under closer scrutiny, it can be seen as an elaboration of the artist's ongoing thesis about art, technology and the impossibility of separating either from a specific moment in time. "It began as a thought experiment in which we imagined that spaceflight was the opposite of what it actually is," he explains over lunch at Soho House, at a table overlooking the Berlin TV tower, with its iconic dome evoking Sputnik, Earth's first satellite. In the American mind, space is a frontier: "We imagine going to the moon and planting a flag, going to an asteroid and mining, going to Mars and setting up a colony," he says. "And I think that expansionist mentality is very self-destructive, especially given the kind of precarious relationship we now have to the ecosystem here on Earth, because it allows us to imagine that Earth is disposable." Billionaire entrepreneurs may dream of colonizing Mars, but in fact, space is not going to save us. Aliens are not going to grant us absolution. "People expect this kind of profound cosmic altruism, which is very religious in a way. Space is completely wrapped up with this kind of stuff, which is what makes it interesting."

The Orbital Reflector draws a clear parallel between contemporary art and space exploration: the ideal of a purely visionary gesture, and the less starry reality. While the satellite — a small, five-kilogram box called a CubeSat, from which a 100-foot-long inflatable structure will deploy — has no commercial or military purpose, its success depends on the very systems of power Paglen has spent more than a decade critiquing. Built by an aerospace contractor called Global Western, it, likely along with a governmental reconnaissance satellite, will launch from California's Vandenberg Air Force Base on a Space X rocket into low orbit. The project illustrates how unfeasible it would be to execute any other way: For all the talk of civilian spaceflight, it remains a thoroughly militarized domain.

Managing the project is Zia Oboodiyat, a retired engineer who ran large communications satellite programs for the San Francisco-based Space Systems/Loral. He first met Paglen in 2011 while the artist was working on the time

capsule; Oboodiyat oversaw the construction of the satellite the disc was attached to and advocated for the project. When Paglen approached him about the Orbital Reflector, Oboodiyat immediately recognized its potential lyricism. "You don't have to be rich to see it; you don't have to be tall to see it," he says. "You don't have to be American. Anybody anywhere on Earth has equal opportunity to see something that gives humanity hope."

Paglen's partner in the project, the Reno-based Center for Art + Environment at the Nevada Museum of Art, is fund-raising to cover the $1.3 million cost. The center's collection includes extensive material from the giants of land art, including Walter de Maria and Michael Heizer. The Orbital Reflector places Paglen (for the moment, anyway) in this tradition — an artist defying the laws of nature and practicality in order to create a work larger than himself. "It is a high-risk proposition — rockets do explode; CubeSats sometimes fail to open," says David Walker, the museum's executive director. "But it's exciting, too, because we see outer space as the ultimate mirror for human aspiration." The Orbital Reflector is like the inevitable conclusion to the land art movement; Paglen's work, like Heizer's, may start in the desert, but will eventually leave the Earth entirely.

Paglen moved to Berlin partly for financial reasons — "I wanted to hire people, not spend $10,000 a month on a studio in Sunset Park" — but seems to have found a home amid the city's young expat artists and WikiLeaks types. At a Vietnamese restaurant, he bumps into a hacktivist friend who looks all of 17. "These guys have guts," Paglen notes, after saying hello. "He was way up the butthole of the F.B.I. I probably shouldn't talk about it."

Paglen doesn't describe himself as a dissident — "I'm as American as it gets, a product of these contradictions" — but it's impossible not to connect the themes in his work to a childhood spent on military bases. His father was an Air Force ophthalmologist; his mother, one of the first female Episcopalian priests. In third grade, in the San Francisco Bay Area, Paglen got in trouble for skipping school to sneak into lectures on dinosaurs at Berkeley — the same lecture halls in which he'd later be working toward his doctorate. The family moved to Wiesbaden, Germany, when he was 12, and he spent two years in a German school in a nearby village,

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where, as a foreign student, he was ostracized. "When you're not the beneficiary of privilege, suddenly you see it for what it is," he says.

An ongoing theme in Paglen's more satirical work is the puerile machismo of military culture's symbology and nomenclature, "the collective unconscious of this world of secrecy and violence," as he puts it. One afternoon, Hanna Mattes, who oversees Paglen's studio and helps manage its external production, is consulting with the artist on one of the sculptures he's making for the fall show: an enormous dragon inspired by the small trophy in his studio. The trophy, Paglen explains, is presented to members of the 315th Network Warfare Squadron upon retirement. Paglen's version will be a 12-foot sculpture inscribed in fetishistic detail, like medieval armor for the cyber age. The best way to preserve the details, they conclude, will be to 3D-print the mold in four sections, lightly polishing them to remove any marks. Another concern is the weight: The finished dragon, cast in bronze, will weigh two tons. Paglen mentions a crane. Mattes looks at him. "Maybe we should just paint the form for the exhibition."

The dragon will be included in the 2018 Smithsonian exhibit. This year's Metro Pictures exhibit will showcase Paglen's ongoing work with different kinds of artificial intelligence technologies, taking viewers down a rabbit hole of imagery, from the now quaint-seeming pictures first made by humans in the early 1990s to train military facial recognition software, to the kind of "invisible images" computers hallucinate for themselves — say, when we post an image on Facebook — in order to make sense of the external world. "This is how an A.I. brain sees a shark," Paglen says back in his studio, looking at a weirdly beautiful Abstract Expressionist-like swath of blues and grays that results from a computer creating a visual amalgam of thousands of images of the animal in water. The exhibit invites critical questions about the extent to which artificial intelligence algorithms, with their potential for programmed-in bias, are governing our reality. It's also aesthetically provocative: "Man," a distillation of figurative imagery, vaguely recalls a Francis Bacon portrait; "Rainbow" — a blend of cosmic-like rainbows — a Dali-esque dreamscape. "It's like I'm relearning art history," Paglen says.

So how does an artist who has devoted his career to empirical scrutiny of those things that will shape our future, from artificial intelligence to the annexation of

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space, respond rationally to a time in which reason itself — when it comes to political discourse, at least — seems to be increasingly endangered? "Those are foundational questions for me," Paglen says. "Nothing that you make in the world exists in isolation from the social and political and ecological dimensions of it." He hasn't given up on art's ability to spark the imagination — and to make us see the things we might prefer not to. The Orbital Reflector presented an opportunity to "get messy . . . to make something that's beautiful, but also self-contradictory, and tries to challenge common sense." It's Carl Sagan meets Dada for a new millennium's inhumanity.

As we talk, the sky darkens in Berlin, and the first blinking glimmerings appear. "For me, there's something very romantic about going and looking at the stars and trying to photograph spy satellites," Paglen says. "Ultimately, what it comes down to is looking at the sky and trying to understand something about one's place in history. People have been doing this for tens of thousands of years. This is kind of a variation on that. What if we could imagine a sky that wasn't out to get us, you know?"

A version of this article appears in print on September 10, 2017, on Page M2106 of T Magazine with the headline: They're Watching.

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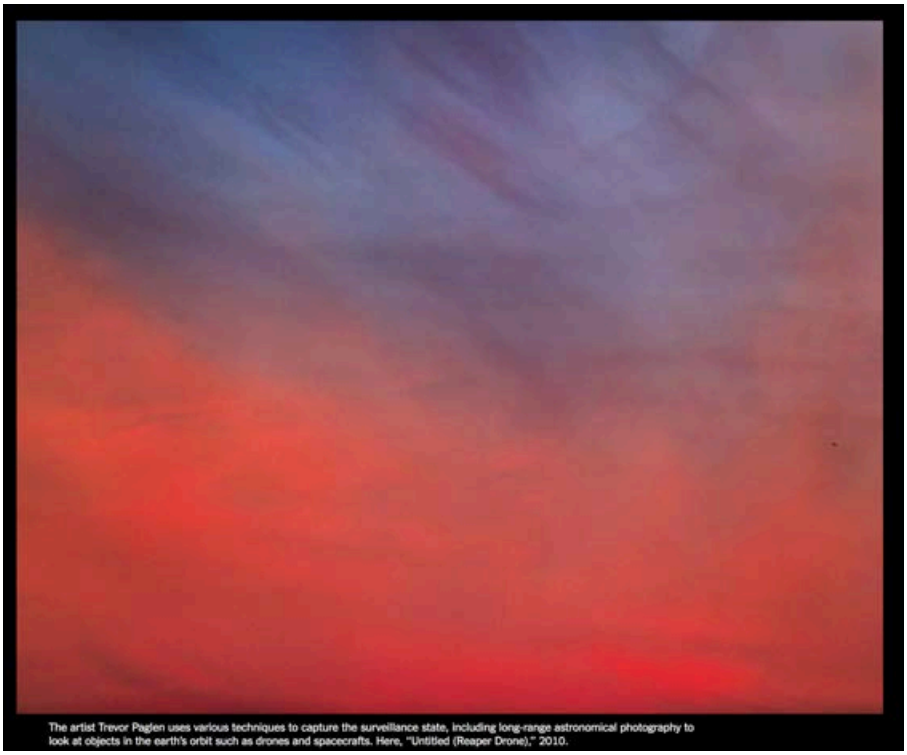

The artist Trevor Paglen uses various techniques to capture the surveillance state, including long-range astronomical photography to look at objects in the earth's orbit such as drones and spacecrafts. Here, "Untitled (Reaper Drone)," 2010.

"Dead Military Navigation Satellite (Cosmos 985) Near the Disk of the Moon," 2012.

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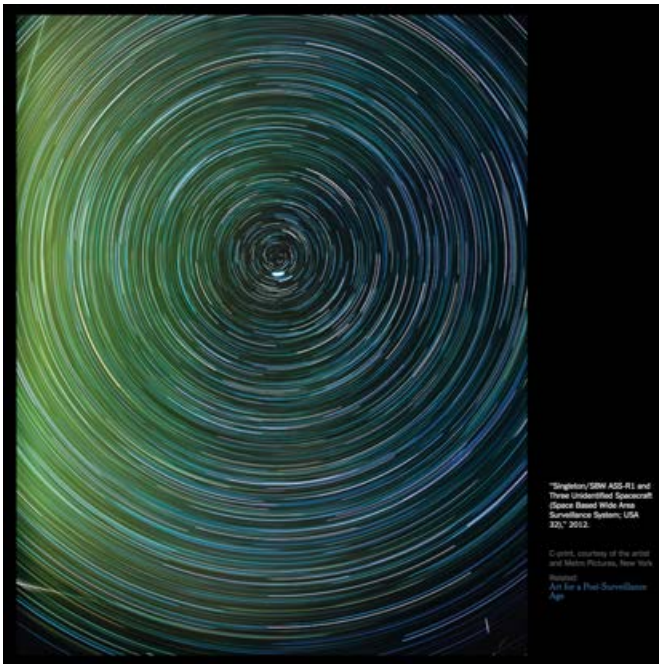

"Singleton/SBW ASS-R1 and Three Unidentified Spacecraft (Space Based Wide Area Surveillance System; USA 32)," 2012.

C-print, courtesy of the artist and Metro Pictures, New York

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Paglen employs so-called limit telephotography to capture classified military bases from great distances and has learned to scuba dive to photograph Internet cables on the ocean floor. Here, "Bahamas Internet Cable System (BICS-1) NSA/GCHQ-Tapped Undersea Cable Atlantic Ocean," 2015.

C-print, courtesy the artist and Metro Pictures, New York

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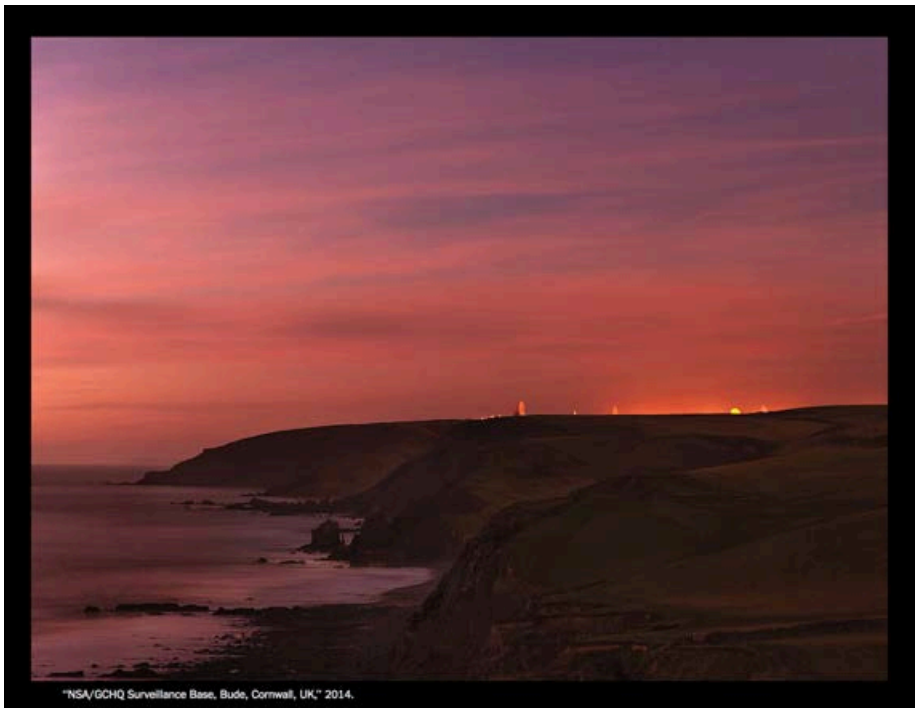

"NSA/GCHQ Surveillance Base, Bude, Cornwall, UK," 2014.

"LACROSSE/ONYX II Passing Through Draco (Radar Imaging Reconnaissance Satellite, USA 193," 2007.

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Adams, Tim, "Trevor Paglen: art in the age of mass surveillance," *The Guardian*, November 25, 2017

Art
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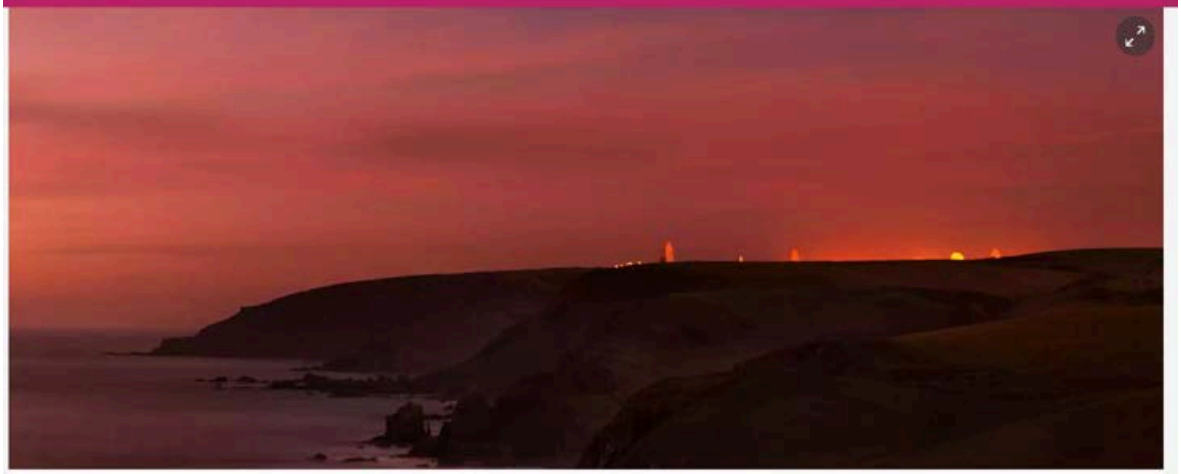
Trevor Paglen: art in the age of mass surveillance

The artist tells how his work provides a map of the digital world's hidden landscapes and forbidden places



NSA/GCHQ Surveillance Base, Bude, Cornwall, UK, 2014. Paglen uses high-powered optics to capture classified military and surveillance bases. Photograph: Courtesy Trevor Paglen / Metro Pictures, New York

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Trevor Paglen describes himself as a landscape artist, but he is no John Constable. The landscapes Paglen frames extend to the bottom of the ocean and beyond the blurred edges of the Earth's atmosphere. For the last two decades, the artist, a cheerful and fervent man of 43, has been on a mission to photograph the unseen political geography of our times. His art tries to capture places that are not on any map - the secret air bases and offshore prisons from which the war on terror has been fought - as well as the networks of data collection and surveillance that now shape our democracies, the cables, spy satellites and artificial intelligences of the digital world.

There is little abstract about this effort. Paglen has spent a good deal of his artistic career camped out in deserts with only suspicious drones for company, his special astro-telescopic lenses trained on the heavens or distant military bases. ("For me, seeing the drone in the 21st century is a little bit like Turner seeing the train in the 19th century.") He trained as a scuba diver to get 100ft beneath the waves in search of the cables carrying all of human knowledge. He recognises few limits to his art. In April, he will launch his own satellite and, with it, the world's first "space sculpture", a manmade star that should be visible from most places on the Earth for a few months, "as bright as one of the stars in the Big Dipper".

I meet Paglen in Berlin, in a prewar studio apartment, which is his current home and the centre of his operations. We sit in a high-ceilinged room among banks of computer screens and bookcases of art monographs. Two of his assistants, Daniel and Eric, are at work on an artificial intelligence project. Paglen is mostly either here directing that and five other projects with them, or "on airplanes trying to figure out how to pay the rent". In the week that we meet, that latter process has become a little easier as he is named one of this year's recipients of the MacArthur "genius grant", with its stipend of $625,000 (£470,000) over five years.

Paglen likes to joke that the airy apartment itself is probably one of the "most surveilled" spaces in western Europe. It was formerly home to the documentary-maker Laura Poitras, Paglen's friend, who was instrumental in helping CIA whistleblower Edward Snowden go public about the staggering level of state-sponsored monitoring. Paglen's footage of National Security Agency bases was included in *Citizenfour*, Poitras's Academy award-winning documentary about Snowden. In some senses, being watched goes with the territory. The apartment is also a couple of hundred yards from the archives of the old East German Stasi: millions of pages of paper records in manila files that until recently would have represented the most comprehensive data collection in human history, before Facebook and Google, the NSA and the rest upped the ante.

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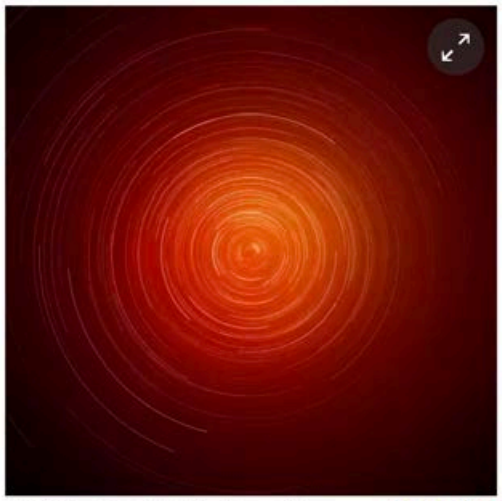

STSS-1 and Two Undentified Spacecraft over Carson City (Space Tracking and Surveillance System, USA 205), 2010. Part of Trevor Paglen's project The Other Night Sky, in which he used long exposures to record the transit of satellites and space debris. Photograph: Courtesy Trevor Paglen/Metro Pictures, New York

Sitting on the edge of his seat, Paglen talks slightly reluctantly about his journey here. He is by turns animated and wary, excited by his projects but careful not to make them seem anything more than they are. "I am not a journalist or an academic," he says, "I don't feel it incumbent on me to make sense of everything. What I am saying is, 'This is an image of something in our world'. You might think you know what it is, but I am going to tell you something different..."

He resists autobiographical interpretations of his work, though you can't help but feel that a psychologist might at least see them as worthy of mention. Paglen was born at Andrews air force base, in Maryland, where his father was an ophthalmologist. As a boy, he lived on bases in Texas and California, before his family settled when he was 12 at the US army airfield in Wiesbaden, Germany, where he stayed with his father until university after his parents separated. His first experience of the ways in which politics can shape geography was in this divided country; he had not long started school here when the Wall came down.

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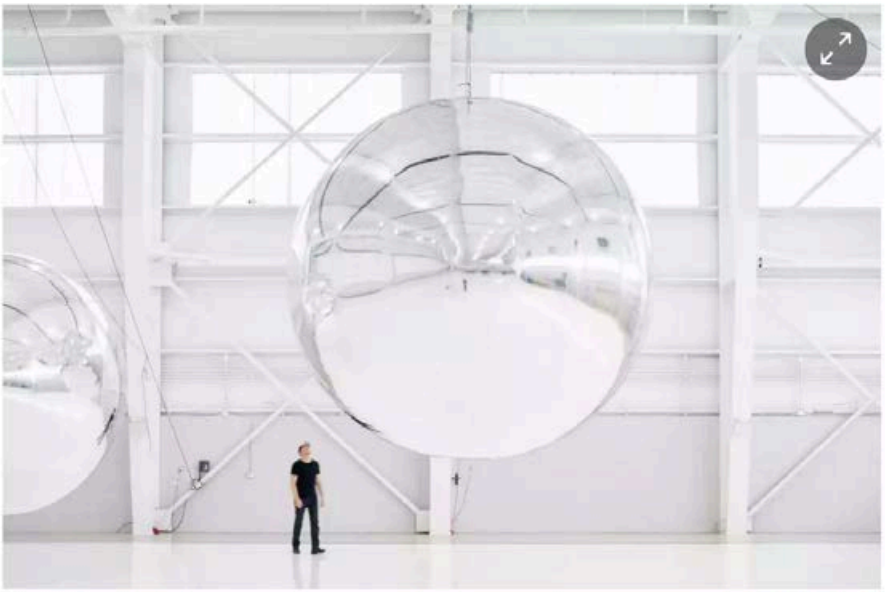
Paglen's academic career, too, looks in retrospect like a perfect primer for his artistic practice. He studied the philosophy of religion, then fine art, then did a Phd in geography ("looking at the ways humans shape the surface of the Earth and how that in turn shapes us"). He also drifted a little, played unhinged bass in a punk band called Noisegate, and was into Californian surf culture.

Paglen first became interested in hidden places while studying at Berkeley with a project he did on the architecture of the American prison system, during the years in which mass incarceration became America's unspoken political philosophy ("a form of revenge against the civil rights movement," he says now). He photographed the enormous prisons out in the Californian desert and came to think of them as places that were both inside and outside American society. After 9/11, when it became clear that the US was setting up secret prisons around the world, the most visible symbol of which was Guantánamo Bay, he started to see a resonance between his project and the war on terror.

That set him thinking about the history of secret places. In 2003, he made the first of many camping trips to the blueprint of all these off-grid locations, Area 51, the highly classified air force base in Nevada, pitching up on snow-topped Tikaboo Peak to see what he could see. That started him on his artistic odyssey into the world of "rendition and drones and extra-judicial spaces".



Prototype for a Nonfunctional Satellite, 2013. Part of a series exploring the idea of launching a decorative sculpture into the night sky. The object would remain in low orbit for several weeks before burning up on re-entry. Photograph: Courtesy Trevor Paglen/Metro Pictures, New York

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"I think a lot of that work was animated by a kind of anger," he says. "But also equally by curiosity - what did these places look like?" When the Snowden files were released, he homed in on the fact that "nearly all the documents were about infrastructure - and they gave addresses". He did a lot of work pinpointing the key underground and undersea junctions of cabling, where much of the listening took place, and photographing them. "Just trying to learn how to see the landscape of the internet as it were," he says.

How often does his quest for this language brings him up against the authorities?

"Well, every time," he says, with a laugh. "The military is quite predictable in a way though. What I am more wary of in the desert is coming across crazy people doing drugs or whatever. Those encounters are often the most disconcerting."

In some ways, I suggest, it as if he is engaged on a postmodern "right to roam" protest, making a physical argument against official secrecy. What have been the personal highlights?

"I think the first time I worked out how to predict where a certain surveillance satellite would be and then went out and looked and it showed up," he says - his ethereal photographs of the sky are traced with tell-tale dots and lines. He also recalls learning to see lethal Reaper drones in the Nevada desert air. They would watch him watching them. "It was one of those situations where you realise that if this was anywhere else in the world, that would probably be the last thing I would see," he says.

His pictures, often shot at distances of many miles, are snapshots of the known unknowns of our world. As he explains his practice to me over the course of an afternoon, he runs through a dizzying sequence of illustrative images on his desktop computer. It is a slideshow punctuated by my asking: "What's that?" and him patiently explaining what we can see: a speck of a drone on the face of the sun; the white domes of the largest NSA station outside the US - at Menwith Hill near Harrogate; the beach at Bude in Cornwall under which a cable carrying the world's data makes landfall.

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Bahamas Internet Cable System (BICS-1) NSA/GCHQ-Tapped Undersea Cable Atlantic Ocean, 2015. Paglen learned to scuba dive in order to trace the internet cables that carry vast amounts of data across the world's ocean floors. Photograph: Courtesy Trevor Paglen/Metro Pictures, New York

Paglen's most recent work is another departure into that digital landscape, this time into the terra incognita of artificial intelligence. He is developing a program that can take, say, the algorithm that controls a laser-guided missile or a self-driving car and recreate what it "sees" of the world. Or he has deconstructed the Facebook intelligence that seeks to scan our uploaded photos for evidence of what we wear and what we buy (to sell to advertisers) and repurposed it as an intelligence that only looks at photographs in terms of objects important to Freudian psychoanalysis or late-stage capitalism.

He sees this in some ways as a new way of looking, one entirely appropriate to the times. "We live in a political moment where it seems reason has gone out the door," he says. "And at the same time we have these incredibly predatory institutions being created, whether it is white supremacy on one hand or Facebook on the other. It is kind of a surrealist moment. Everything is like Magritte's *Ceci n'est pas une pipe*. Nothing is what it seems."

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In some ways, there is a kinship in Paglen's work to the paranoid surfaces of Adam Curtis's documentaries, or perhaps Don DeLillo's fiction, but he is also at pains to imagine how an alternative world might look.

Trevor Paglen: 'You might think you know what it is, but I am going to tell you something different.' Photograph: Courtesy of Trevor Paglen

A recent installation, *Autonomy Cube*, saw him demonstrate an internet with "the opposite business model", one that would still give you access to all the world's information, but would preserve anonymity and not collect your data. He is also looking at ways in which art might take that utopian principle into space.

In this sense, the forthcoming satellite project, what he calls the Orbital Reflector, is a kind of antidote to all he photographs. It will be followed in June by a major retrospective of Paglen's work at the Smithsonian Museum in Washington, DC. The plan, a decade in the making, is to launch the first ever satellite "that has no military value, no scientific value, no commercial value, only aesthetic value". A satellite that is the opposite of what we have come to expect. Not something that observes our every move, but something that we can gaze up at in old-fashioned wonder, a little diamond in the sky.

The project is being sponsored, fittingly, by the Nevada Museum of Art. The sculpture will piggyback off a Space X rocket before being ejected. Once in low orbit, a simple mechanism is designed to open up an inflatable Mylar structure, about 100ft long and 6ft high, with highly reflective planes, which he insists will be visible to the naked eye as a twinkle in the night sky.

And what does he want people to think when, in April, hopefully, they gaze up at it?

"I just hope people enjoy it," he says. "There is no message behind it. Apart from the idea that maybe there are sometimes different ways of thinking about the world."

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ARTFORUM

Trevor Paglen, "500 Words," with Andrianna Campbell, *Artforum*, July 20, 2017

Trevor Paglen

07.20.17

Trevor Paglen, *Sight Machine*, 2017. Performance view, Pier 70, San Francisco, January 14, 2017. Kronos Quartet. Photo: Joshua Brott, Obscura Digital.

Trevor Paglen is the first artist-in-residence at the Cantor Arts Center at Stanford University. The exhibition "The Eye and the Sky: Trevor Paglen in the Cantor Collection" places his photographic series of predator drones, "Time Study (Predator; Indian Springs, NV)," 2010, alongside photographs by artists such as Eadweard Muybridge, Edward Steichen, and Eve Sonneman from the Cantor's permanent collection. Earlier this year, the Cantor also commissioned Paglen's multimedia performance Sight Machine. *Below, he discusses issues of surveillance in the show, which is on view through July 31, 2017, as well as in the performance. On July 25, 2017, Paglen will participate in a panel discussion on civil liberties in the age of hacking at the Solomon R. Guggenheim Museum in New York. His exhibition "A Study of Invisible Images" opens at Metro Pictures in New York on September 8, 2017.*

MY TIME AT STANFORD has centered around a development in imagemaking that I think is more significant than the invention of photography. Over the last ten years or so, powerful algorithms and artificial intelligence networks have enabled computers to "see" autonomously. What does it mean that "seeing" no longer requires a human "seer" in the loop?

This past January, the Cantor commissioned *Sight Machine*, which I produced in collaboration with the Kronos Quartet. While the musicians performed selections by Bach, Raymond Scott, Laurie Anderson, and Terry Riley, among other composers, they were surrounded by cameras that all fed video into a rack of computers. The computers were programmed to run a large range of computer-vision algorithms, such as those used in self-driving cars, guided missiles, face detection and recognition software, and artificial intelligence networks used by Facebook, Google, and other companies to interpret images. While the Kronos Quartet played music, a projection behind them showed them as they looked to the array of algorithms watching them.

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At one time, to *surveil* implied "to watch over," and to *survey* was basically "to look." Between these two definitions we get a sense of how photographs can be manipulated for multiple aims. Eadweard Muybridge's *Sunset over Mount Tamalpais*, 1872, which gives you a vantage point to look at the Northern California landscape, is also a document of the move toward geopolitical dominance. That work is in "The Eye and the Sky," and Muybridge has been on my mind for some time. My photographic series in the show, "Time Study (Predator; Indian Springs, NV)," is made up of albumen prints of predator drones. They relate to Muybridge because they deal with conventions that we take for granted in landscape photography. During the residency, I worked with computer-vision and artificial intelligence students and researchers to further explore the largely invisible world of machine-to-machine seeing. We not only developed software that allowed us to see what various computer-vision algorithms see when they look at a landscape, but also were able to implement software that could be used in conjunction with artificial intelligence to "evolve" recognizable images from random noise—almost like a hallucination or the phenomenon of pareidolia, in which one sees faces in shapes such as clouds.

To "teach" AI software how to see various objects, you have to use enormous training sets of data. For example, if you want to build an AI program that can recognize pencils, keyboards, and cups, you need to give it thousands of pictures of each object. The AI technology teaches itself how to see the differences between these objects during a training phase of the software development. The libraries of the thousands of images you use to train an AI project are called training sets.

The implicit biases and values built into various training sets can have enormous consequences, and there are numerous examples of training sets creating AIs that reflect the unacknowledged forms of racism, patriarchy, and class division that characterize so much of society. A Google AI program described an African American couple as "a pair of gorillas," while other AIs technologies routinely assume that doctors are male and nurses are female. Indeed, in AI-based gender-recognition algorithms, subjects are invariably described as either "male" or "female"—the concept of nonbinary gender identities is utterly alien.

This brings me to what I am really fascinated by: a panoramic looking, or bird's-eye view, that you get with nineteenth-century landscape photography and that you begin to see manifested in the twentieth century as surveillance by machines. In the twenty-first century it involves total machine capture. At Stanford, we started developing training sets based on taxonomies from literature, psychoanalysis, political economy, and poetry. We built an AI program that can only see scenes from Freud's *The Interpretation of Dreams* and another that can only see monsters associated with metaphors of capital such as vampires and zombies. Another one is trained to see "American predators," from Venus flytraps to predator drones. With this body of work, I wanted to point to some of the potential dangers associated with the widespread deployment of AI and other optimization technologies.

In AI there are enforcement mechanisms that are even harder to discern. We are training machines in patriarchal histories or racist histories, etc. We know gender is fluid and race is a construct, but that is not the case with machine categorization. There is an assumption that the technology is unbiased, but it is not. These are not merely representational systems or optimization systems; they are set up as normative systems and therefore they become enforcement systems. The project to redefine the *normal* human is a political project. The contestation of those categories is essential before they become hard-coded into infrastructure. *Sight Machine* and my photographs included in "Time Study" address machine vision and the invisibility of these repressive visual regimes.

Read Trevor Paglen's 1000 Words in the March 2009 issue of Artforum here.

— As told to Andrianna Campbell

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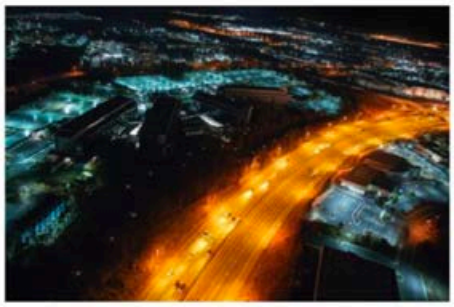
THE WALL STREET JOURNAL.

Wolfe, Alexandra "Photographer Trevor Paglen Turns Surveillance Into Art," *The Wall Street Journal*, June 10, 2016

From satellites to military infrastructure, the artist looks at the ubiquity of government surveillance in an exhibition called 'The Octopus.'

To get a picture of a U.S. military-communications satellite called PAN, photographer Trevor Paglen went to South Africa and set up his camera in the desert for a good view as the craft orbited above the Indian Ocean. The resulting photo, an abstract image of thin streams of white and blue, streaking through a black background, forms part of an exhibition about the ubiquity of government surveillance called "The Octopus.

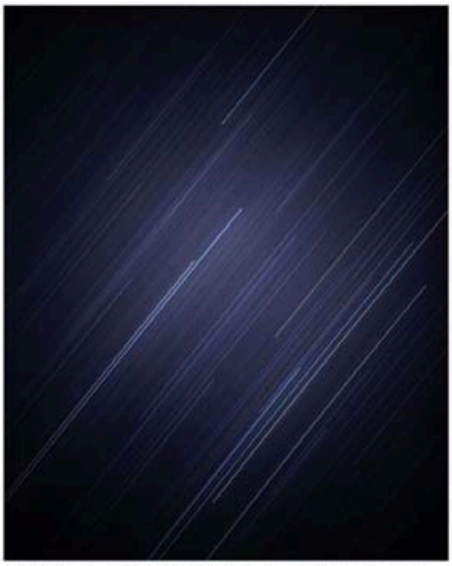


'National Reconnaissance Office, Chantilly, Virginia' (2014) | Mr. Paglen flew over this intelligence agency in a helicopter. The show 'Octopus' is named after its logo, in which an octopus's tentacles reach around the globe.

"I can't imagine anything more beautiful on this planet than looking up at the stars and seeing a kind of artificial star moving through the night sky. But at the same time, you know that that artificial star is secret, and you don't know what it is doing, and perhaps it is doing something you don't agree with," says Mr. Paglen, 41, whose works sell for between $10,000 and $50,000.

Earlier this month, he won the Deutsche Börse Photography Foundation Prize for the show. (The award is fully funded by a philanthropy of the German stock-exchange operator.) Selections from "The Octopus" will remain on view at the Photographers' Gallery in London through July 3.

The title refers to a logo of an octopus taking hold of a globe, made for a 2013 satellite launch by the U.S. National Reconnaissance Office. The logo went on the rocket that carried the satellites, with the words "Nothing is beyond our reach." Mr. Paglen says, "The exhibition is looking at this allegorical octopus that is consuming the world."



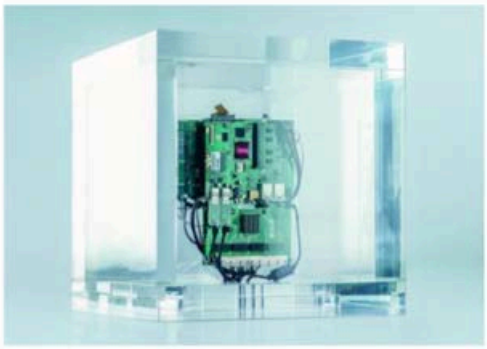
'PAN (Unknown; USA-207)' (2010) | To take this photograph of a mysterious satellite carrying classified information above the Indian Ocean off

the coast of Somalia, Mr. Paglen traveled to South Africa where he shot the image from a desert conservatory. PHOTO: TREVOR PAGLEN

Born on a military base in Maryland as the son of an Air Force ophthalmologist, Mr. Paglen has been photographing intelligence and military infrastructure—often set in sprawling natural landscapes—since the early 2000s. The facilities include places where large amounts of fiber-optic cable converge and sites he identifies as National Security Agency listening operations. Mr. Paglen says he hopes viewers will wonder, "How has the sky been transformed by drones? How has the ocean been transformed by the fact that over 90% of the world's information travels in underwater cables?"

'NSA-Tapped Fiber Optic Cable Landing Site, Marseille, France' (2015) | Mr. Paglen came across this landing site while working on the film 'Citizenfour,' a documentary about Edward Snowden. In Marseille, France, this landing site shows a 'choke point' where a huge amount of fiber optic cable converges in one place. PHOTO: TREVOR PAGLEN

Mr. Paglen's training is in art, but he also has a Ph.D. in experimental geography and often interviews historians and scientists to find and understand surveillance spots. "In today's world we have people with cameras everywhere…but [Mr. Paglen] is showing images we never see," says Art Collection Deutsche Börse managing director and curator Anne-Marie Beckmann, who was one of four jurors who awarded Mr. Paglen the prize.



Trevor Paglen/Jacob Appelbaum's 'Autonomy Cube' (2015) | Displayed at the Berlin Biennale, this sculpture allows museum visitors to connect to an internet network that makes internet usage anonymous. By tapping into this network, your IP address and search history can't be tracked. PHOTO: TREVOR PAGLEN/JACOB APPELBAUM/METRO PICTURES, NEW YORK/ALTMAN SIEGEL, SAN FRANCISCO

This month, Mr. Paglen's work is also on view at the Berlin Biennale. Through Sept. 18, his "Autonomy Cube" there lets visitors connect to an anonymous internet network that doesn't track browsing history or web addresses. He thinks it's in keeping with the rest of his work by taking on government-surveillance technology in an artistic way. "I think that a lot of us subconsciously would like to live in a world in which good things were beautiful and bad things were ugly," he says. "But that's not how the world works."

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THE NEW INQUIRY

Trevor Paglen, "Invisible Images (Your Pictures Are Looking At You," *The New Inquiry*, December 8, 2016

OUR eyes are fleshy things, and for most of human history our visual culture has also been made of fleshy things. The history of images is a history of pigments and dyes, oils, acrylics, silver nitrate and gelatin–materials that one could use to paint a cave, a church, or a canvas. One could use them to make a photograph, or to print pictures on the pages of a magazine. The advent of screen-based media in the latter half of the 20th century wasn't so different: cathode ray tubes and liquid crystal displays emitted light at frequencies our eyes perceive as color, and densities we perceive as shape. We've gotten pretty good at understanding the vagaries of human vision; the serpentine ways in which images infiltrate and influence culture, their tenuous relationships to everyday life and truth, the means by which they're harnessed to serve–and resist–power. The theoretical concepts we use to analyze classical visual culture are robust: representation, meaning, spectacle, semiosis, mimesis, and all the rest. For centuries these concepts have helped us to navigate the workings of classical visual culture.

But over the last decade or so, something dramatic has happened. Visual culture has changed form. It has become detached from human eyes and has largely become invisible. Human visual culture has become a special case of vision, an exception to the rule. The overwhelming majority of images are now made by machines for other machines, with humans rarely in the loop. The advent of machine-to-machine seeing has been barely noticed at large, and poorly understood by those of us who've begun to notice the tectonic shift invisibly taking place before our very eyes.

"Winona" Eigenface (Colorized), Labelled Faces in the Wild Dataset, 2016

The landscape of invisible images and machine vision is becoming evermore active. Its continued expansion is starting to have profound effects on human life, eclipsing even the rise of mass culture in the mid 20th century. Images have begun to intervene in everyday life, their functions changing from representation and mediation, to activations, operations, and enforcement. Invisible images are actively watching us, poking and prodding, guiding our movements, inflicting pain and inducing pleasure. But all of this is hard to see. Cultural theorists have long suspected there was something different about digital images than the visual media of yesteryear, but have

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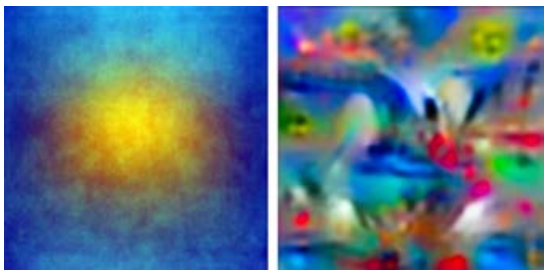
had trouble putting their finger on it. In the 1990s, for example, there was much to do about the fact that digital images lack an "original." More recently, the proliferation of images on social media and its implications for inter-subjectivity has been a topic of much discussion among cultural theorists and critics. But these concerns still fail to articulate exactly what's at stake.

Lake Tenaya, Maximally Stable External Regions; Hough Transform, 2016

One problem is that these concerns still assume that humans are looking at images, and that the relationship between human viewers and images is the most important moment to analyze–but it's exactly this assumption of a human subject that I want to question. What's truly revolutionary about the advent of digital images is the fact that they are fundamentally machine-readable: they can only be seen by humans in special circumstances and for short periods of time. A photograph shot on a phone creates a machine-readable file that does not reflect light in such a way as to be perceptible to a human eye. A secondary application, like a software-based photo viewer paired with a liquid crystal display and backlight may create something that a human can look at, but the image only appears to human eyes temporarily before reverting back to its immaterial machine form when the phone is put away or the display is turned off. However, the image doesn't need to be turned into human-readable form in order for a machine to do something with it. This is fundamentally different than a roll of undeveloped film. Although film, too, must be coaxed by a chemical process into a form visible by human eyes, the undeveloped film negative isn't readable by a human or machine.

The fact that digital images are fundamentally machine-readable regardless of a human subject has enormous implications. It allows for the automation of vision on an enormous scale and, along with it, the exercise of power on dramatically larger and smaller scales than have ever been possible.



"Goldfish," Linear Classifier, ImageNet Dataset, 2016; "Fire Boat"; Synthetic High Activation, ImageNet Dataset, 2016

II.

Our built environments are filled with examples of machine-to-machine seeing apparatuses: Automatic License Plate Readers (ALPR) mounted on police cars, buildings, bridges, highways, and fleets of private vehicles snap photos of every car entering their frames. ALPR operators like the company Vigilant Solutions collect the locations of every car their cameras see, use Optical Character Recognition (OCR) to store license plate numbers, and create databases used by police, insurance companies, and the like.[footnote: James Bridle's "How Britain Exported Next-Generation Surveillance" is an excellent introduction to APLR.] In the consumer

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sphere, outfits like Euclid Analytics and Real Eyes, among many others, install cameras in malls and department stores to track the motion of people through these spaces with software designed to identify who is looking at what for how long, and to track facial expressions to discern the mood and emotional state of the humans they're observing.

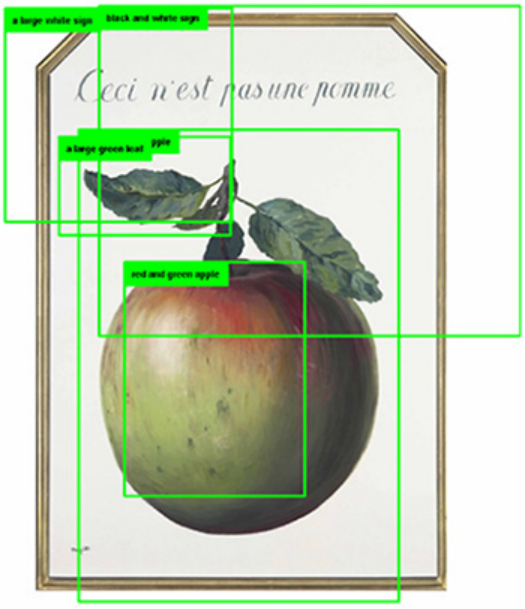
(Research Image), "Disgust," Custom Hito Steyerl Emotion Training Set

Advertisements, too, have begun to watch and record people. And in the industrial sector, companies like Microscan provide full-fledged imaging systems designed to flag defects in workmanship or materials, and to oversee packaging, shipping, logistics, and transportation for automotive, pharmaceutical, electronics, and packaging industries. All of these systems are only possible because digital images are machine-readable and do not require a human in the analytic loop.

This invisible visual culture isn't just confined to industrial operations, law enforcement, and "smart" cities, but extends far into what we'd otherwise–and somewhat naively–think of as human-to-human visual culture. I'm referring here to the trillions of images that humans share on digital platforms–ones that at first glance seem to be made by humans for other humans.

On its surface, a platform like Facebook seems analogous to the musty glue-bound photo albums of postwar America. We "share" pictures on the Internet and see how many people "like" them and redistribute them. In the old days, people carried around pictures of their children in wallets and purses, showed them to friends and acquaintances, and set up slideshows of family vacations. What could be more human than a desire to show off one's children? Interfaces designed for digital image-sharing largely parrot these forms, creating "albums" for selfies, baby pictures, cats, and travel photos.

But the analogy is deeply misleading, because something completely different happens when you share a picture on Facebook than when you bore your neighbors with projected slide shows. When you put an image on Facebook or other social media, you're feeding an array of immensely powerful artificial intelligence systems information about how to identify people and how to recognize places and objects, habits and preferences, race, class, and gender identifications, economic statuses, and much more.



(Research Images) Magritte

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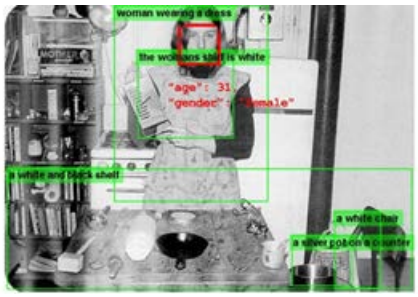
Regardless of whether a human subject actually sees any of the 2 billion photographs uploaded daily to Facebook-controlled platforms, the photographs on social media are scrutinized by neural networks with a degree of attention that would make even the most steadfast art historian blush. Facebook's "DeepFace" algorithm, developed in 2014 and deployed in 2015, produces three-dimensional abstractions of individuals' faces and uses a neural network that achieves over 97 percent accuracy at identifying individuals– a percentage comparable to what a human can achieve, ignoring for a second that no human can recall the faces of billions of people.



(Research Images) Rosler

There are many others: Facebook's "DeepMask" and Google's TensorFlow identify people, places, objects, locations, emotions, gestures, faces, genders, economic statuses, relationships, and much more.
In aggregate, AI systems have appropriated human visual culture and transformed it into a massive, flexible training set. The more images Facebook and Google's AI systems ingest, the more accurate they become, and the more influence they have on everyday life. The trillions of images we've been trained to treat as human-to-human culture are the foundation for increasingly autonomous ways of seeing that bear little resemblance to the visual culture of the past.

III.

If we take a peek into the internal workings of machine-vision systems, we find a menagerie of abstractions that seem completely alien to human perception. The machine-machine landscape is not one of representations so much as activations and operations. It's constituted by active, performative relations much more than classically representational ones. But that isn't to say that there isn't a formal underpinning to how computer vision systems work.

(Research Images) Opie; Dense Captioning, Age, Gender, Adult Content Detection

All computer vision systems produce mathematical abstractions from the images they're analyzing, and the qualities of those abstractions are guided by the kind of metadata the algorithm is trying to read. Facial recognition, for instance, typically involves any number of techniques, depending on the application, the desired efficiency, and the available training sets. The Eigenface technique, to take an older example, analyzes someone's face and subtracts from that the features it has in common with other faces,

leaving a unique facial "fingerprint" or facial "archetype." To recognize a particular person, the algorithm looks for the fingerprint of a given person's face.

Convolutional Neural Networks (CNN), popularly called "deep learning" networks, are built out of dozens or even hundreds of internal software layers that can pass information back and forth. The earliest layers of the software pick apart a given image into component shapes, gradients, luminosities, and corners. Those individual components are convolved into synthetic shapes. Deeper in the CNN, the synthetic images are compared to other images the network has been trained to recognize, activating software "neurons" when the network finds similarities.

We might think of these synthetic activations and other "hallucinated" structures inside convolutional neural networks as being analogous to the archetypes of some sort of Jungian collective unconscious of artificial intelligence–a tempting, although misleading, metaphor. Neural networks cannot invent their own classes; they're only able to relate images they ingest to images that they've been trained on. And their training sets reveal the historical, geographical, racial, and socio-economic positions of their trainers. Feed an image of Manet's "Olympia" painting to a CNN trained on the industry-standard "Imagenet" training set, and the CNN is quite sure that it's looking at a "burrito." It goes without saying that the "burrito" object class is fairly specific to a youngish person in the San Francisco Bay Area, where the modern "mission style" burrito was invented. Spend a little bit of time with neural networks, and you realize that anyone holding something in their hand is likely to be identified as someone "holding a cellphone," or "holding a Wii controller." On a more serious note, engineers at Google decided to deactivate the "gorilla" class after it became clear that its algorithms trained on predominantly white faces and tended to classify African Americans as apes.

The point here is that if we want to understand the invisible world of machine-machine visual culture, we need to unlearn how to see like humans. We need to learn how to see a parallel universe composed of activations, keypoints, eigenfaces, feature transforms, classifiers, training sets, and the like. But it's not just as simple as learning a different vocabulary. Formal concepts contain epistemological assumptions, which in turn have ethical consequences. The theoretical concepts we use to analyze visual culture are profoundly misleading when applied to the machinic landscape, producing distortions, vast blind spots, and wild misinterpretations.

IV.

There is a temptation to criticize algorithmic image operations on the basis that they're often "wrong"–that "Olympia" becomes a burrito, and that African Americans are labelled as non-humans. These critiques are easy, but misguided. They implicitly suggest that the problem is simply one of accuracy, to be solved by better training data. Eradicate bias from the training data, the logic goes, and algorithmic operations will be decidedly less racist than human-human interactions. Program the algorithms to see everyone equally and the humans they so lovingly oversee shall be equal. I am not convinced.

Ideology's ultimate trick has always been to present itself as objective truth, to present historical conditions as eternal, and to present political formations as natural. Because image operations function on an invisible plane and are not dependent on a human seeing-subject (and are therefore not as obviously ideological as giant paintings of Napoleon) they are harder to recognize for what they are: immensely

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powerful levers of social regulation that serve specific race and class interests while presenting themselves as objective.

The invisible world of images isn't simply an alternative taxonomy of visuality. It is an active, cunning, exercise of power, one ideally suited to molecular police and market operations–one designed to insert its tendrils into ever-smaller slices of everyday life.
Take the case of Vigilant Solutions. In January 2016, Vigilant Solutions, the company that boasts of having a database of billions of vehicle locations captured by ALPR systems, signed contracts with a handful of local Texas governments. According to documents obtained by the Electronic Frontier Foundation, the deal went like this: Vigilant Solutions provided police with a suite of ALPR systems for their police cars and access to Vigilant's larger database. In return, the local government provided Vigilant with records of outstanding arrest warrants and overdue court fees. A list of "flagged" license plates associated with outstanding fines are fed into mobile ALPR systems. When a mobile ALPR system on a police car spots a flagged license plate, the cop pulls the driver over and gives them two options: they can pay the outstanding fine on the spot with a credit card (plus at 25 percent "service fee" that goes directly to Vigilant), or they can be arrested. In addition to their 25 percent surcharge, Vigilant keeps a record of every license plate reading that the local police take, adding information to their massive databases in order to be capitalized in other ways. The political operations here are clear. Municipalities are incentivized to balance their budgets on the backs of their most vulnerable populations, to transform their police into tax-collectors, and to effectively sell police surveillance data to private companies. Despite the "objectivity" of the overall system, it unambiguously serves powerful government and corporate interests at the expense of vulnerable populations and civic life.

As governments seek out new sources of revenue in an era of downsizing, and as capital searches out new domains of everyday life to bring into its sphere, the ability to use automated imaging and sensing to extract wealth from smaller and smaller slices of everyday life is irresistible. It's easy to imagine, for example, an AI algorithm on Facebook noticing an underage woman drinking beer in a photograph from a party. That information is sent to the woman's auto insurance provider, who subscribes to a Facebook program designed to provide this kind of data to credit agencies, health insurers, advertisers, tax officials, and the police. Her auto insurance premium is adjusted accordingly. A second algorithm combs through her past looking for similar misbehavior that the parent company might profit from. In the classical world of human-human visual culture, the photograph responsible for so much trouble would have been consigned to a shoebox to collect dust and be forgotten. In the machine-machine visual landscape the photograph never goes away. It becomes an active participant in the modulations of her life, with long-term consequences.

Smaller and smaller moments of human life are being transformed into capital, whether it's the ability to automatically scan thousands of cars for outstanding court fees, or a moment of recklessness captured from a photograph uploaded to the Internet. Your health insurance will be modulated by the baby pictures your parents uploaded of you without your consent. The level of police scrutiny you receive will be guided by your "pattern of life" signature.

The relationship between images and power in the machine-machine landscape is different

than in the human visual landscape. The former comes from the enactment of two seemingly paradoxical operations. The first move is the individualization and differentiation of the people, places, and everyday lives of the landscapes under its purview–it creates a specific metadata signature of every single person based on race, class, the places they live, the products they consume, their habits, interests, "likes," friends, and so on. The second move is to reify those categories, removing any ambiguities in their interpretation so that individualized metadata profiles can be operationalized to collect municipal fees, adjust insurance rates, conduct targeted advertising, prioritize police surveillance, and so on. The overall effect is a society that amplifies diversity (or rather a diversity of metadata signatures) but does so precisely because the differentiations in metadata signatures create inroads for the capitalization and policing of everyday life. Machine-machine systems are extraordinary intimate instruments of power that operate through an aesthetics and ideology of objectivity, but the categories they employ are designed to reify the forms of power that those systems are set up to serve. As such, the machine-machine landscape forms a kind of hyper-ideology that is especially pernicious precisely because it makes claims to objectivity and equality.

V.

Cultural producers have developed very good tactics and strategies for making interventions into human-human visual culture in order to challenge inequality, racism, and injustice. Counter-hegemonic visual strategies and tactics employed by artists and cultural producers in the human-human sphere often capitalize on the ambiguity of human-human visual culture to produce forms of counter-culture–to make claims, to assert rights, and to expand the field of represented peoples and positions in visual culture. Martha Rosler's influential artwork "Semiotics of the Kitchen," for example, transformed the patriarchal image of the kitchen as a representation of masculinist order into a kind of prison; Emory Douglas's images of African American resistance and solidarity created a visual landscape of self-empowerment; Catherine Opie's images of queerness developed an alternate vocabulary of gender and power. All of these strategies, and many more, rely on the fact that the relationship between meaning and representation is elastic. But this idea of ambiguity, a cornerstone of semiotic theory from Saussure through Derrida, simply ceases to exist on the plane of quantified machine-machine seeing. There's no obvious way to intervene in machine-machine systems using visual strategies developed from human-human culture.

Faced with this impasse, some artists and cultural workers are attempting to challenge machine vision systems by creating forms of seeing that are legible to humans but illegible to machines. Artist Adam Harvey, in particular, has developed makeup schemes to thwart facial recognition algorithms, clothing to suppress heat signatures, and pockets designed to prevent cellphones from continually broadcasting their location to sensors in the surrounding landscape. Julian Oliver often takes the opposite tack, developing hyper-predatory machines intended to show the extent to which we are surrounded by sensing machines, and the kinds of intimate information they're collecting all the time. These are noteworthy projects that help humans learn about the existence of ubiquitous sensing. But these tactics cannot be generalized.

In the long run, developing visual strategies to defeat machine vision algorithms is a losing strategy. Entire branches of computer vision

research are dedicated to creating "adversarial" images designed to thwart automated recognition systems. These adversarial images simply get incorporated into training sets used to teach algorithms how to overcome them. What's more, in order to truly hide from machine vision systems, the tactics deployed today must be able to resist not only algorithms deployed at present, but algorithms that will be deployed in the future. To hide one's face from Facebook, one would not only have to develop a tactic to thwart the "DeepFace" algorithm of today, but also a facial recognition system from the future. An effective resistance to the totalizing police and market powers exercised through machine vision won't be mounted through ad hoc technology. In the long run, there's no technical "fix" for the exacerbation of the political and economic inequalities that invisible visual culture is primed to encourage. To mediate against the optimizations and predations of a machinic landscape, one must create deliberate inefficiencies and spheres of life removed from market and political predations–"safe houses" in the invisible digital sphere. It is in inefficiency, experimentation, self-expression, and often law-breaking that freedom and political self-representation can be found.

We no longer look at images–images look at us. They no longer simply represent things, but actively intervene in everyday life. We must begin to understand these changes if we are to challenge the exceptional forms of power flowing through the invisible visual culture that we find ourselves enmeshed within.