MAKING THE WORLD WORK
Intelligence
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Intelligence and Ethics and Behavior - Where Are We Headed?

TECHNOLOGY MOLTS AND RECONFIGURES BOTH ITS OPERATIONS AND OUR LIVES - WHAT TO DO?

MILKY WAY
A team of researchers with Keio University in Japan has found evidence of a mid-sized black hole near the center of the Milky Way galaxy. In their paper published in the journal *Nature Astronomy*, the group describes their study of a gas cloud cluster near the center of our galaxy and why they believe it offers evidence of a mid-sized black hole. CC0 Public Domain

In this, the penultimate issue of the **INTELLIGENCE** newsletter, I want to examine some the major ethical issues that confront humanity as we move through and into periods of unrelenting change and transformation. Technology, especially intelligent technology, has a huge role to play in future developments, but it is far from the most pressing ethical and moral issue facing humanity today. There are other developments that weigh more heavily on our collective futures.

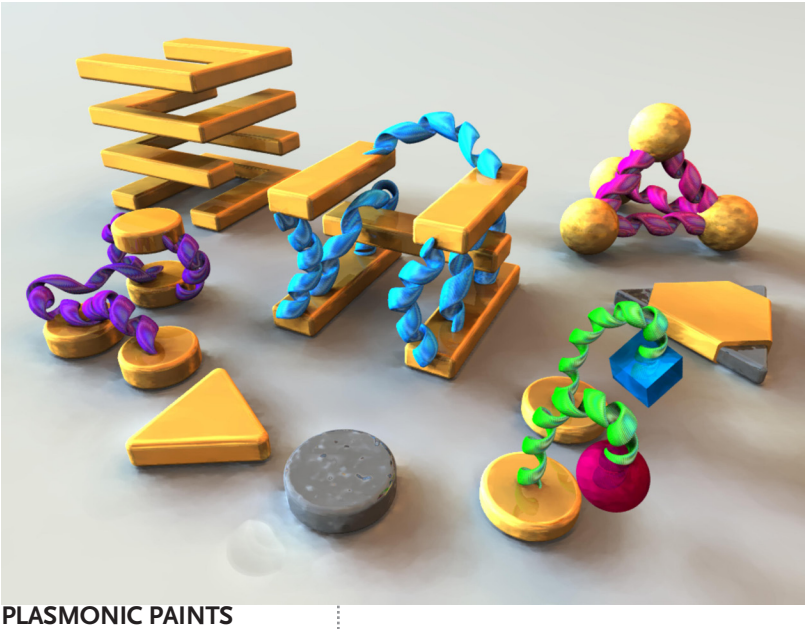
By far the most pressing ethical and moral concern is financial and social inequality. People need to take care of each other, not just accumulate more wealth "at any costs." The stupidity, rigidity and lack of adaptation by governments is close behind, especially in lieu of the moral and ethical lapses now being witnessed by the newer populist governmental regimes in both first- and third-world countries around the globe.

Technology, especially automation and machine intelligence as well as the inherent globalization now made possible by our interconnected social organization, all provide ethical issues of consequence that beg for proper due diligence and immediate solutions. But, technology and globalization do not pose the same levels of risk as the spectre of continuing and advancing inequality and the attendant government and corporate malfeasance.

If we continue to have 1% of the population control the wealth of 23% of the world's advanced economies and, even more, 39% of the wealth in the

United States, decisions, especially by government officials , will continue to treat more than half the global population poorly.

Next month, in the final issue of this newsletter, I will cover, report and comment more specifically on the issues of inequality and governmental turgidness, ignorance and criminality in the context of my future goal, as described in the subtitle of this publication: making the world work. Until then, I want to focus on some of the most important ethical and moral issues facing our technologically rich and fast moving culture today. In terms of the technology that is revolutionizing our world on a minute by minute basis, what do we mean when we discuss ethics, morals and responsibility?



PLASMONIC PAINTS
The image is on a canvas as wide as a human hair, its colors never fade, and they can be edited and erased on demand. Laura Na Liu at the U of Heidelberg in Germany has created it with magnesium blocks which shine because free electrons inside them perform a kind of Mexican wave known as a plasmon. 'Unlike the light emitting diodes in our phones, the metal blocks need no electricity to shine, and unlike pigments, they never fade. Plasmons could revolutionise how we display colour.' Laura Na Liu

Ethics = "moral principles that govern a person's behavior or the conducting of an activity." And: "Ethics or moral philosophy is a branch of philosophy that involves systematizing, defending, and recommending concepts of right and wrong conduct." The struggle now is to define right and wrong in technology and especially things related to automation and machine intelligence.

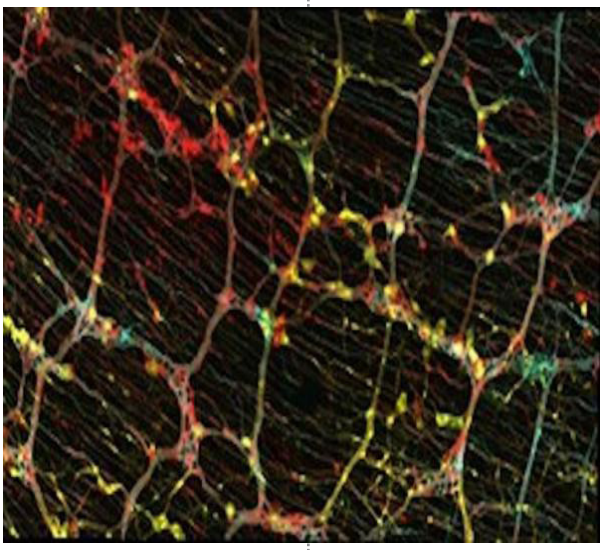
Fortunately, the discussions and debates about ethics in these domains is very much in the news, in industry and in academe, but not under as much consideration in the political realms of government. Certain corporate and other institutions have been making efforts to focus and define ehtical and moral issues with respect to technology development and disruption.

Late last month: "The Information Technology Industry Council — a [Washington,] DC-based group representing the likes of IBM, Microsoft, Google, Amazon, Facebook and Apple— [released] principles for developing ethical artificial intelligence systems." (*Axios*) (https://www.itic.org/resources/AI-Policy-Principles-FullReport2.pdf) This follows earlier efforts in the machine intelligence community, especially by UK-based Deep Mind, to develop ethics in relation to the further research and development of AI & MI.

And, ethical concerns are spreading to other important areas of technology. This month, a cover story on UK-based *Nature* noted "Four ethical issues for neurotechnology." and discussed the four areas with respect to the application of AI to brain computer interfaces: privacy and consent, agency and identity, augmentation, and bias. These new technologies "must respect and preserve people's privacy, identity, agency and equality." (https://www.nature.com/news/four-ethical-priorities-for-neurotechnologies-and-ai-1.22960)

MI (machine intelligence) systems depend on the ethical understanding of those who design such systems. Many of these designers, engineers, physicists, mathematicians, computer scientists, programmers, business executives, et al, have some ethical training, but most have none. Ethics is mostly considered within the confines of philosophy, usually, if at all, in academe, not for the most part in the high tech industries.

But there are efforts underway. "At OpenAI, Dario Amodei and his colleague Paul Christiano are developing algorithms that can not only learn tasks through hours of trial and error, but also receive regular guidance from human teachers along the way. With a few clicks here and there, the researchers now have a way of showing the autonomous system that it needs to [factor many simultaneous goals into its behavior.]. They believe that these kinds of algorithms — a blend of human and machine instruction — can help keep automated systems safe." (*The New York Times*)



ENTERIC NERVOUS SYSTEM
Scientists marked different progenitor cells with different colors so they could track the development of the enteric nervous system in mouse models. Photo by Reena Lasrado/ Francis Crick Institute

Many in the high tech and MI community have made proposals for proper machine operations. Oren Etzioni (Allen Institute for Artificial Intelligence) has proposed three AI rules, taking inspiration from Isaac Asimov's robotics laws, introduced in his 1942 short story "Runaround":

Asimov: "A robot may not injure a human being or, through inaction, allow a human being to come to harm. A robot must obey orders given it by human beings except where such orders would conflict with the First Law. A robot must protect its own existence as long as such protection does not conflict with the First or Second Law."

Etzioni: "These [Asimov] laws are elegant but ambiguous." His proposed AI laws: "First, an A.I. system must be subject to the full gamut of laws that apply to its human operator. My second rule is that an A.I. system must clearly disclose that it is not human. My third rule is that an A.I. system cannot retain or disclose confidential information without explicit approval from the source of that information." (*The New York Times*)

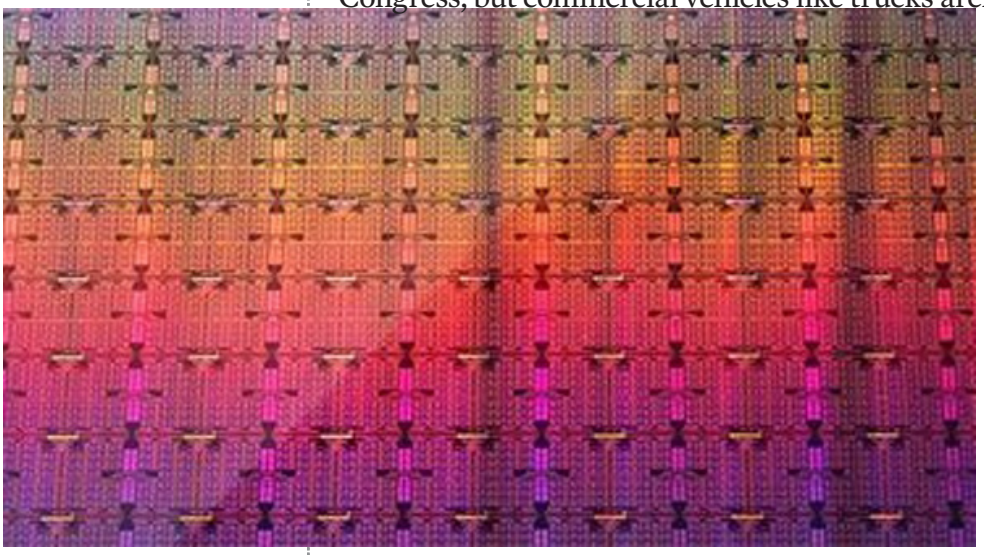
With so many areas in technology now being used in so many pernicious ways, I want to now focus on two specific domains for ethical concerns: jobs, with the prime example of self-driving vehicles, and privacy, with a prime example being the misuse of data and computing power.

A report, "Stick Shift: Autonomous Vehicles, Driving Jobs, and the Future of Work", from Demos (https://www.demos.co.uk) and two Washington think-tanks, the Center for Economic and Policy Research and Global Policy Solutions, notes, (according to an article in *Wired*:) "that states with high shares of trucking

industry employees, including North Dakota, Iowa, Wyoming, West Virginia, Mississippi, Arkansas, and Indiana, would be the most vulnerable. But not enough research is being done on the effects of automation on the trucking industry in the first place.

"Maya Rockeymoore, who directs Global Policy Solutions and helped write the trucking report (http://globalpolicysolutions.org/report/stick-shift-autonomous-vehicles-driving-jobs-and-the-future-of-work/) says she's been surprised by how little lawmakers, policymakers, and the automotive industry itself has thought about the repercussions of their technology.

"When she took the report to industry meetings and congressional offices, 'it wasn't clear that any of them had done any modeling or forecasting or research about the impact of their disruptive technologies on the labor market before developing their technology. It signals, perhaps, that disruption and the value of disruption itself as being a more important factor than the impact [on] society.' The first bill regulating self-driving technology is working it way through Congress, but commercial vehicles like trucks aren't likely to be included in the final legislation. That means states will continue to decide individually how to regulate self-driving trucks on their roads."



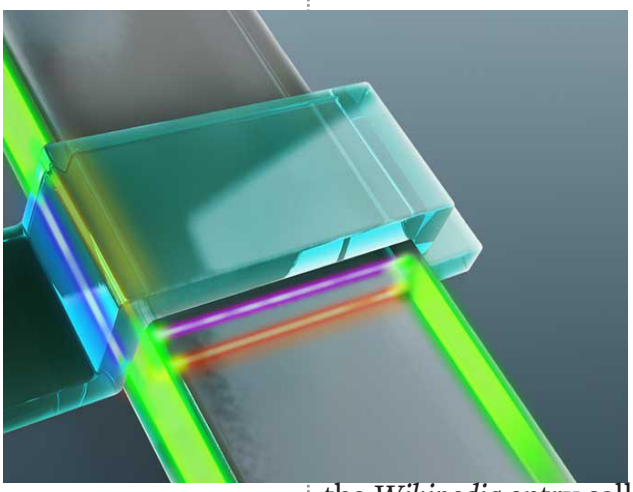
INTEL 10 NM CHIP "At the China version of its Technology and Manufacturing Day, Intel presented some interesting new information about its upcoming 10nm technology and, perhaps more interestingly, made clear a key aspect of its 10nm technology that seems to put it in a better light vis-à-vis the company's currently shipping 14nm++ technology." NASDAQ.com

The estimates for how many people will lose driving jobs, soon, varies from 2 million to more than 5 million, with soon being one to ten years from now. That would mean most human driving jobs will eventually be lost to autonomous vehicles. "When autonomous vehicle saturation peaks, U.S. drivers could see job losses at a rate of 25,000 a month, or 300,000 a year, according to a report from Goldman Sachs Economics Research. Truck drivers, more so than bus or taxi drivers, will see the bulk of that job loss, according to the report. That makes sense, given today's employment: In 2014, there were 4 million driver jobs in the U.S., 3.1 million of which were truck drivers, Goldman said. That represents 2 percent of total [US] employment." (*CNBC*)

The linkage between the loss of human jobs as a resuklt of autonomous vehicle development and deployment is only one enormous ethical issue. Where is the right and wrong when machines replace humans in any given activity? What are the responsibilities of society in coming to the aid of those drivers who are being displaced? How much aid and of what kind will work and will be enough? These are all questions begging for increased scrutiny and consideration. It is hopeful

that industry will take the lead, as government has been slow to respond.

Other ethical issues in the autonomous vehicle domain are many. An example is the ball problem. As cited by Jean Tirole in *Economics for the Common Good* "The most difficult tasks for computers involve unforeseen problems that do not match any programmed routine. Rare events cannot be analyzed inductively to generate an empirical law. Frank Levy and Richard Murnane offer the example of a driverless car that sees a little ball pass in front of it. This ball poses no danger to the car, which therefore has no reason to slam on the brakes. A human being, on the other hand, will probably foresee that the ball may be followed by a young child, and will therefore have a different reaction. The driverless car will not have enough experience to react appropriately. Although machine learning might be able to solve this problem, it illustrates the obstacles that computers still encounter."



MAJORANA PARTICLES Rendering of the eletronic device in which Majorana particles were observed. The device is made up of a superconductor (blue bar) and a magnetic topological insulator (gray strip). UCLA Engineering

The reference is to Levy and Murnane's 2015 book, *The New Division of Labor - How Computers Are Creating the Next Job Market*. And machine learning or other approaches can be used to teach an autonomous vehicle to recogzize balls and other play things that might cross its paths.

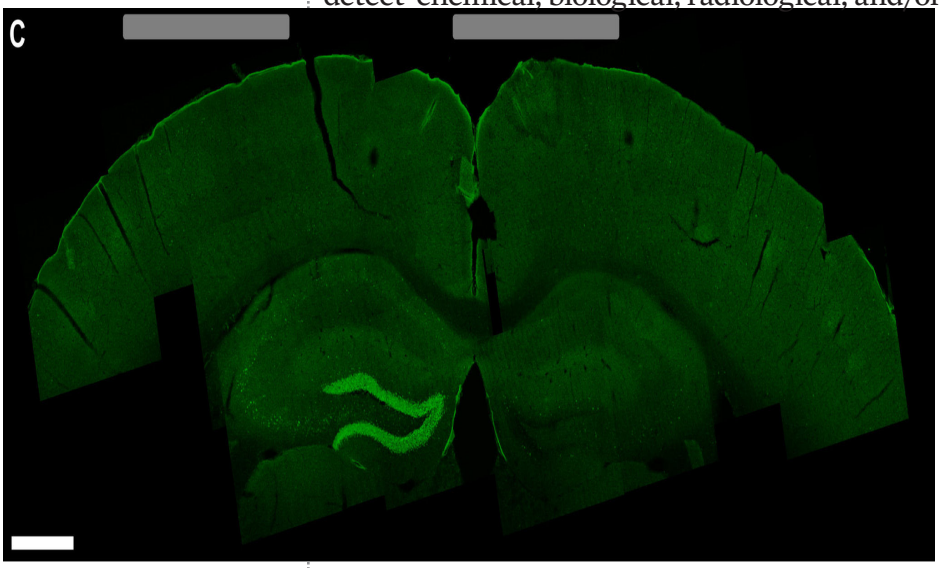
A more complex and bewildering problem, with less immediate indications as to right and wrong and no clear solutions in sight is the old trolley problem, which the *Wikipedia* entry calls a thought experiment in ethics: "There is a runaway trolley barreling down the railway tracks. Ahead, on the tracks, there are five people tied up and unable to move. The trolley is headed straight for them. You are standing some distance off in the train yard, next to a lever. If you pull this lever, the trolley will switch to a different set of tracks. However, you notice that there is one person tied up on the side track.

"You have two options: Do nothing, and the trolley kills the five people on the main track. Pull the lever, diverting the trolley onto the side track where it will kill one person. Which is the most ethical choice? What if the one person to be sacrificed on the track is the switchperson's child? Again: which is the most ethical choice? Whatever decisions an autonomous system makes are the result of the creation of that system which, necessarily include the biases of designers as well as all the built-in oversights in any complex system.

AI Now, a research institute spun out of NYU, is run by Kate Crawford and Meredith Whittaker, the former from Microsoft Research and the latter from Google Open Research. Their report (https://assets.contentful.com/8wprhhvnpfc0/1A9c3ZTCZa2KEYM64Wsc2a/8636557c5fb14f2b74b2be64c3ce0c78/_AI_Now_Institute_2017_Report_.pdf), according to *Wired*, states "Their conclusion doesn't waffle: Our efforts to hold AI to ethical standards to date, they say, have

been a flop. 'New ethical frameworks for AI need to move beyond individual responsibility to hold powerful industrial, governmental and military interests accountable as they design and employ AI,' they write. ...' Current framings of AI ethics are failing.'"

The issues concerned with the ethics and morality of privacy concerns are best conveyed by a headline that appeared as this issue was going to press (https://newatlas.com/darpa-advanced-plant-technology-sensor-research/52292/): "The latest [DARPA] program to be revealed is called Advanced Plant Technologies (APT) and it is currently seeking proposals from the science and technology community on the potential ways plant physiology could be appropriated to detect 'chemical, biological, radiological, and/or nuclear threats, as well as electromagnetic signals.'"



STIMULATING THE MOUSE HIPPOCAMPUS
A brain slice showing cells of a mouse hippocampus, in lighter green, that were activated by a new electrical stimulation technique. Edward S. Boyden et al., MIT

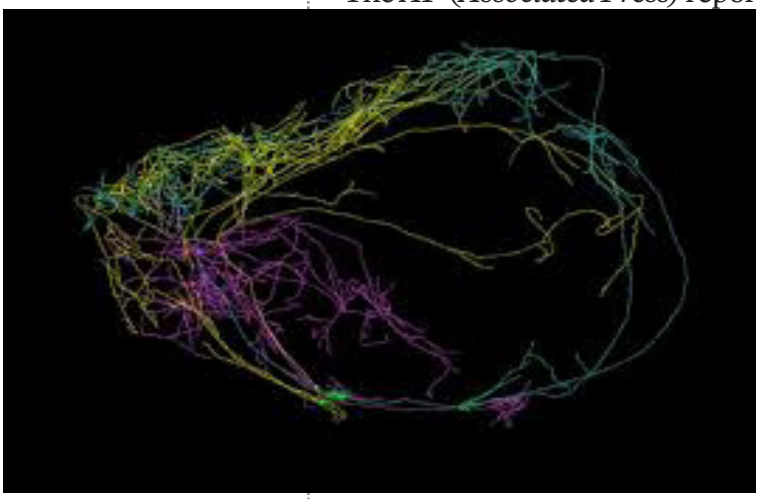
Or, the story last summer on smart contact lenses that can record anything you (or anyone wearing them) can see! (https://curiosity.com/topics/smart-contact-lenses-could-record-everything-you-see-curiosity?utm_source=androidapp) And, the more than 20 million street cameras being installed this fall in China. In addition to AI for facial recognition software, the cameras also collect data on age, gender and clothing worn for police databases.

Not to be outdone by the Chinese, Russia already has 170,000 cameras, now with facial recognition software, too. *Bloomberg* reported: "Moscow's facial-recognition technology was designed by Russian startup N-Tech.Lab Ltd. The system cross-references a digital fingerprint of images from the Interior Ministry's database against those captured by cameras at entrances to apartment buildings," And, last month, *The Guardian* (UK) reported on the difficulties of the Australian Prime Minister had with a government panel: "Turnbull denies new facial recognition amount to 'mass surveillance.'"

Here, "the United States Department of Homeland Security (DHS) has contracted one of the world's largest arms companies to manage a huge expansion of its biometric surveillance programme. According to a presentation seen by Privacy International, the new system, known as Homeland Advanced Recognition Technology (HART), will scoop up a whopping 180 million new biometric transactions per year by 2022." This will increase the size of the DHS database to biometrics on some 500 million people. Added will be face, iris and fingerprint recognition as well as a fingerprint matching system.

The EFF (Electronic Frontier Foundation has been trackijng the intentions of the role being played in this database collection effort by DHS's TSA: "TSA Plans to Use Face Recognition to Track Americans Through Airports: The 'PreCheck' program is billed as a convenient service to allow U.S. travelers to 'speed through security' at airports. However, the latest proposal released by the Transportation Security Administration (TSA) reveals the DHS's greater underlying plan to collect face images and iris scans on a nationwide scale. DHS's programs will become a massive violation of privacy that could serve as a gateway to the collection of biometric data to identify and track every traveler at every airport and border crossing in the country."

The *AP* (*Associated Press*) reported: "Leading researchers castigated a federal plan that would use [AI] methods to scrutinize immigrants and visa applicants, saying it is unworkable as written and likely to be 'inaccurate and biased' if deployed. The experts, a group of more than 50 computer and data scientists, mathematicians and other specialists in automated decision-making, urged the DHS to abandon the project, dubbed the 'Extreme Vetting Initiative.' That plan has its roots in US President Donald Trump's repeated pledge during the 2016 campaign [and after], to subject immigrants seeking admission to the United States to more intense ideological scrutiny — or, as he put it, 'extreme vetting .'"



A GIANT NEURON ENCIRCLING A MOUSE BRAIN
"A digital reconstruction of a neuron that encircles the mouse brain. Like ivy plants that send runners out searching for something to cling to, the brain's neurons send out shoots that connect with other neurons throughout the organ. A new digital reconstruction method shows three neurons that branch extensively throughout the brain, including one that wraps around its entire outer layer. The finding may help to explain how the brain creates consciousness."
Allen Institute for Brain Science/*Nature*.com

Speaking of surveillance, the new Big Brother stomping ground is in the home. Apple has delayed the launch of its Home Pod speaker until next year. This gives Amazon and its Echo as well as Google and its Home so many more months to collect every word uttered in their range, in addition to collecting every song played, phone number dialed, website visited, etc. Amazon's new model has a camera, too. Will you, the user of these home "speakers" (what a pun: they turn what you say, etc., into data) have access to this data? Not yet and maybe never.

The home front is not the final frontier. No, Big Brother wants to get inside, deep inside of us, inside our bodies. *The New York Times* reported this month: "First Digital Pill Approved to Worries About Biomedical 'Big Brother': For the first time, the Food and Drug Administration has approved a digital pill — a medication embedded with a sensor that can tell doctors whether, and when, patients take their medicine. ... Patients who agree to take the digital medication, a version of the antipsychotic Abilify, can sign consent forms allowing their doctors and up to four other people, including family members, to receive electronic data showing the date and time pills are ingested." What other data will be collected this way? Will follow-on versions of the digital pill scan the body for disease and more? Who else will get to see and use the data collected?

Intelligence

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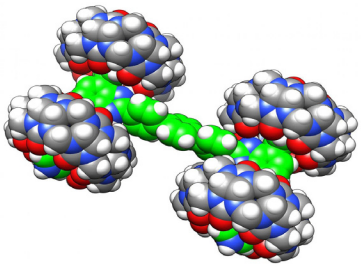
And, in keeping with this year's holiday spirit, *The Outline* (https://theoutline.com/post/2490/why-is-this-company-tracking-where-you-are-on-thanksgiving) published the story about how SafeGraph (another wonderful pun!) tracked and "collected 17 trillion location markers for 10 million smartphones during the holiday last year. ... The researchers also looked at where people were between 1 p.m. and 5 p.m. on Thanksgiving Day in order to see if they spent that time at home or traveled, presumably to be with friends or family. [quoting *The Washington Post*:] 'Even better, the cellphone data shows you exactly when those travelers arrived at a Thanksgiving location and when they left.'"



BOBCATNANOWAGON
The world's smallest monster truck.
Developed by Eric Masson, Ohio U

Last summer the ACLU's (American Civil Liberties Union) Ben Wizner gave a speech on "Rights & Liberties:" "It seems to me that this is an auspicious moment for a conversation about rights and liberties in an automated world, for at least two reasons. The first is that there's still time to get this right. We can still have a substantial impact on the legal and policy debates that will shape development and deployment of automated technologies in our everyday lives. The second reason is Donald Trump. The democratic stress test of the Trump presidency has gotten everyone's attention. It's now much harder to believe, as Eric Schmidt [of Alphabet/Google] once assured us, that 'technology will solve all the world's problems.' Technologists who have grown used to saying that they have no interest in politics have realized, I believe, that politics is very interested in them."

He then quoted another from the ACLU: "Jay Stanley has warned, that pervasive automated surveillance will: 'turn us into quivering, neurotic beings living in a psychologically oppressive world in which we're constantly aware that our every smallest move is being charted, measured, and evaluated against the like actions of millions of other people—and then used to judge us in unpredictable ways.'"

We have entered a new age, an age when most all privacy for individuals is either gone, eroded or up for grabs: by governments, companies and others. This is also the age when many jobs will be taken over by automation and machine intelligence; this has already begun and is coming soon. Which jobs will be endangered is hard to predict, quantify and fathom. In light of these megatrends, not very much is being done to ameliorate their negative effects.

Governments care more about security, and companies care more about profit, and both care little for the fate of individual human beings. In the jobs area, very little is being done to help, retrain and take other action on behalf of those threatened. These are but two ethical dilemmas now being faced as we race toward an uncertain future. Right and wrong are clear, here. What is certain is that more must be done, but, most likely, will not be done. Too bad.