THE PERCEPTRON

The latest news and innovations in technology

IN THIS ISSUE

AI SURVEILLANCE TECHNOLOGY: DOES IT DO MORE HARM THAN GOOD?

SOCIAL RESPONSIBILITY OR FREE SPEECH?

ELECTRIC VEHICLES' ROLE IN GREEN TRANSPORTATION

IS NIGHT SHIFT REALLY SAVING YOUR SLEEP?

AI Surveillance Technology: Does It Do More Harm Than Good?

by Kathryn Le

With ongoing protests in the midst of the Black Lives Matter movement, the debate on police behavior and the protection of local communities has intensified. The question of how deeply law enforcement officials can investigate people's personal lives is also widely controversial. Both of these topics were considered in the discussion to sell face recognition and other surveillance technology to government institutions such as police departments.

Big tech companies such as Amazon, Microsoft, and IBM have been researching and selling facial recognition technology to law enforcement. The American Civil Liberties Union (ACLU) sent a petition with 150,000 signatures to Amazon demanding that the company stop selling facial recognition and surveillance technology to the government. Amazon,

followed by IBM and Microsoft, announced that it will discontinue its selling of facial recognition technology to law enforcement for the next year. It might seem like the debate has ended there but there are concerns that Amazon will return to its previous deal with the government after the one-year termination comes to an end.

In order to completely understand the situation, we have to go back to 2018, when the debate initially erupted. Two researchers Joy Buolamwini from the Massachusetts Institute of Technology and Timnit Gebru from Microsoft researched the accuracy of face recognition technology. The research showed surprising results: IBM's system was 34.4% worse at identifying a darker female than a lighter male.

Gender Shades audit, 2018

Accuracy in gender classification

	Darker Male	Darker Female	Lighter Male	Lighter Female	Largest Gap	
IBM	88.0%	65.3%	99.7%	92.9%		34.4%
Megvii	99.3%	65.5%	99.2%	94.0%		33.8%
Microsoft	94.0%	79.2%	100.0%	98.3%		20.8%

Chart: MIT Technology Review • Source: Joy Buolamwini & Timnit Gebru • Created with Datawrapper

They concluded that this technology could harm people of color through misidentification. Deborah Raji, who worked with Buolamwini and Gebru on this research, said "having higher error rates for people of color, it puts them at greater risk…it's easily weaponized against communities to harass them," (MIT Technology Review, 2020). The high level of error could misidentify innocent people, particularly dark-skinned people, as criminals. This puts already marginalized minorities at a greater risk for misunderstandings.

In another study of the same kind, the ACLU tested the technology on mugshots. Results showed a similar outcome to the previous study: 28 members were falsely matched and out of those members, a disproportionately high number was people of color. Although facial recognition technology has great potential in accurately identifying criminals, it can also be easily abused to target specific minority communities.

Although these studies were conducted two years ago, it is especially significant now when the demand for police reform and protections for Black people is so heated. Amazon was only willing to take the first step forward when it was approached with a petition. The government should not have waited for the death of an innocent Black man to make reforms on the police department that included the regulation of facial recognition technology and body cameras. On

the more positive note, although the new bill cannot make the tech giants responsible for their part in facial recognition technology, it can act as a basis for future legislation to regulate the use of facial recognition and other technologies.

The debate not only deals with racial and civil concerns but also with privacy concerns. This technology can be invasive and some say that it even violates basic human rights to privacy. The questions as to whether this technology should be used in the government and how it should be regulated are still up in the air.

The benefits of Artificial Intelligence (AI) and technology on society are massive but the consequences are just as severe. Like people say "With great power comes great responsibility." AI is a powerful tool that can benefit society but it can also be easily abused without proper regulation. AI is rapidly developing and it is hard to say the potential impacts it could have on society but it certainly plays a significant part in developing better systems of protection for all people.

Social Responsibility or Free Speech?

by Caroline Wang

It is undeniable that social media plays a crucial role in how people perceive and receive information. Under Section 230 of the Communications Decency Act, social media companies are protected from liabilities relating to posts on their platforms. In the midst of the COVID-19 pandemic, the Black Lives Matter movement, and the presidential election, two companies are in deep water with the public over their refusal to censor President Trump, the common denominator in all of those issues.

Facebook, run by company founder Mark Zuckerberg, decided to allow Trump's comments on racial protests to remain on the website. Based on Zuckerberg's call with his employees, the comments were ruled appropriate to keep on the site — they fall under "state use of force" which doesn't violate company policy. Zuckerberg also said that he stands for free speech and that world leaders' posts are newsworthy. Many employees were against this decision.

As a result, many Facebook employees resigned and protests broke out in front of Zuckerberg's home. Employees also participated in a virtual "walkout" by refusing to work. Vanita Gupta, head of the Leadership Conference on Civil and Human Rights, had a meeting with Facebook officials and later compared their refusal to censor Trump's posts to their inaction in Myanmar and the Philippines where they allowed military leaders to spread false information. Zuckerberg attempted to quell the controversy by meeting with employees to further discuss his decision. However, he still refuses to take action against Trump's inflammatory posts. One of the engineers that resigned named Timothy Aveni has posted, "I'm watching my company do nothing to challenge the increasingly dangerous status quo".

Twitter, on the contrary, has hidden one of Trump's controversial comments, which read "when the looting starts, the shooting starts," behind a warning statement that it glorifies violence. This is the first time that Twitter has applied a policy of censorship to one of President Trump's tweets. In response to the censorship, Trump issued an executive order limiting tech companies' legal protections. Twitter continued to label hundreds of tweets related to the murder of George Floyd. Trump continued to tweet, and said in a newer post on looting that he does not promote violence. This post was not flagged by Twitter. Professionals have stated that it is important for Twitter to approach censorship with caution because this is one of the first instances of big tech companies standing up against world leaders. Twitter's actions might initiate a wave of responses from tech companies that prioritize social responsibility over the hands-off free speech policy.

Electric Vehicles' Role in Green Transportation

by Anna Ye

Transportation is one of the largest producers of greenhouse gases in the world. If we want to make a real dent in stopping climate change, we need to make a shift to cleaner transit systems and vehicles, fast.

Electric vehicles are one way to do this. Over the course of an electric vehicle's lifetime, much fewer greenhouse gases are emitted than in their diesel-powered counterparts. Even as companies have been trying to reduce emissions by gas-powered vehicles, electric vehicles have an advantage because, while they are running, they produce little to no running emissions. Almost all of their pollution comes from battery production, which some critics say

defeats the image of electric cars as greener transport options.

The manufacturing process behind batteries used to power electric cars indeed produces carbon emissions. Batteries are made up of rare metals. In order to extract these metals from deep inside the Earth and make them usable, greenhouse gases must be emitted. The machines used in the extraction process and the factories the batteries are produced in send a lot of carbon dioxide and other greenhouse gases into the atmosphere. In order to solve this problem, we need to make our infrastructure and manufacturing techniques more efficient.

For instance, the country in which the battery is produced plays a big role. If we were to produce the same battery in China versus in the United States, we would find that Chinese battery manufacturers produce up to 60% more carbon dioxide than American manufacturers. So if we were to produce the batteries in the United States, the pollution would not be much worse than when producing diesel engines. However, the lifetime emission difference between gas and electric-powered cars shows that electric cars are much cleaner.

Also, batteries can be recycled. The same cannot be said for fossil fuels. As we do more research and electric vehicles become more common, recycled batteries will become easier to find and more accessible. This can save a lot of greenhouse gas emissions from destroying our planet in the long run.

The biggest issue right now is that electric cars are much more expensive than their gas powered counterparts. Because electric cars are newer, and gas engines are much more widespread, the cheaper price of gas vehicles is difficult to compete with on the market. This is where public policy can play a part and help cut transportation emissions.

In the meantime, there are other transportation methods that are still cleaner than driving gas engines around. Public transportation is a great example, and although we all groan at the thought of dirty New York City subway platforms, at least we will be helping to make sure our children have clean air to breathe. If public transportation is not an option, try planning a carpool. Five people in one car saves more carbon emissions than five people in separate cars. Rideshare companies such as Uber and Via also have options of sharing a car with others who are using their services, and this option can actually save you money since it's cheaper than not sharing a ride. CitiBike is also a super cheap and green option for

New Yorkers, as well as tourists wanting to explore the city.

If we all do our part to fight for clean energy in transportation, electric vehicles might become a widespread solution in the decades to come. Who knows, maybe a better alternative transportation technology will come along.

Is Night Shift Really Saving Your Sleep?

by Aliya Fisher
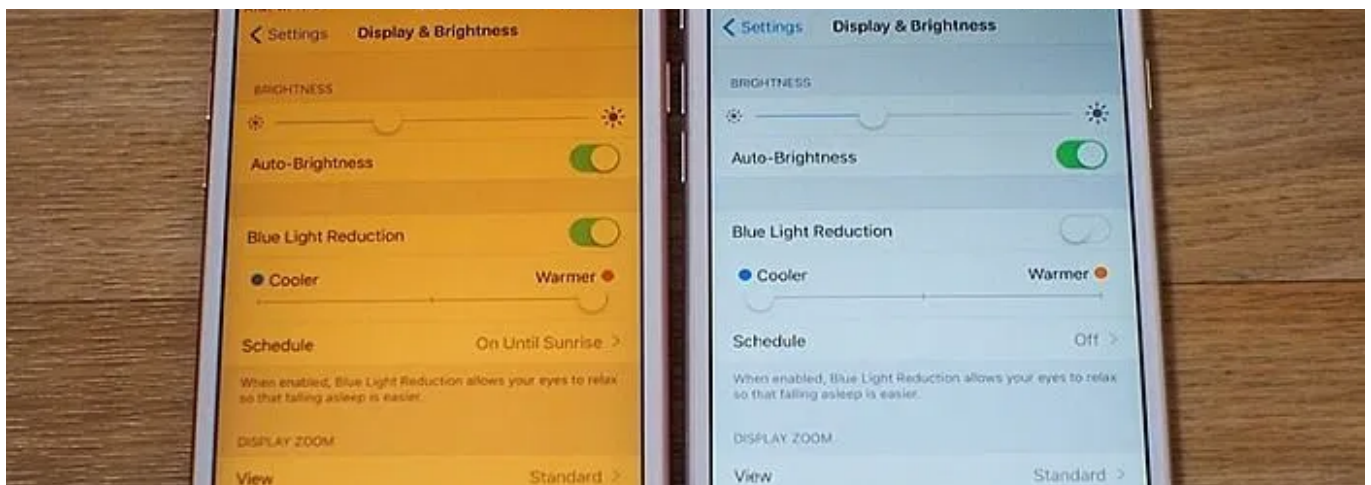
You may have discovered the night shift feature on your smartphone, laptop, or tablet. This popular feature alters your device screen so that it emits warm, yellow tones rather than harsh, blue tones before you go to sleep. The scientific basis for this feature is that blue light suppresses melatonin, a hormone that tells your brain and your body to go to sleep, and yellow light is not as stimulating. However, a study from 2019 provides evidence to suggest that the yellow light could be worse than blue light.

First of all, the study clarifies that light color is less significant than overall light intensity when it comes to disrupting sleep. This means that if you're really worried about disrupting your sleep at all, it's probably better to completely skip that "one last episode!" of your favorite binge-worthy Netflix show.

The study refers to sleep disruptions in terms of our built-in, biological clocks that regulate our activity, sleep, and many other factors in sync with 24-hour days. These regulations, called circadian rhythms, are very perceptive to light, and slight changes in light patterns can throw the entire system

off. Researchers at the University of Manchester conducted a study in diurnal mice to find the effect of light color on circadian rhythms. They found that yellow light was perceived more intensely than blue light, and that it was more effective at triggering the daytime settings of the circadian clock, characterized by a high activity level.

The next test involved disrupting the mice's circadian rhythms in a way that is analogous to jet lag. The researchers delayed the periods of light by 6 hours, meaning the mice were in darkness for a total of 18 hours, a significant change from the usual 12 hours, which decreased their activity level during the day. The next day, while the rhythms were still abnormal, researchers exposed some mice to blue light and some to yellow light following the normal rhythm. They recorded the speed at which the mice returned to their normal activity level. The results showed that the yellow light did a better job than blue light at re-establishing the normal cycle, which indicates that yellow light has a stronger effect on circadian rhythms than blue light.

This phenomenon can also be explained ecologically. During the early day, the light in the environment is mostly yellow. Closer to evening, the light shifts to blue. Therefore, yellow light should trigger longer, more intense activity periods than blue light.

So then why did Apple, along with many other tech companies, jump onto the night shift bandwagon? The creators of night shift seemed to latch onto the idea that since melatonin suppression was caused most intensely by blue light, blue light must have the most drastic effect on the rest of the circadian system. However, another study, done at the University of Surrey, showed that circadian disruptions and melatonin suppression are not proportional, although they are positively correlated. In this study, human participants were exposed to different light conditions, including short, intermittent periods of light exposure during the night. They compared melatonin levels with circadian phase shift, which is the number of hours the circadian period is delayed or advanced due to arrhythmic exposure to light or darkness. They found that certain conditions affected phase shift disproportionately more than melatonin suppression. This indicates that night shift theory is probably based on a misconception that melatonin suppression can be used as a proxy for circadian disruption.

There could also be a molecular basis for this misconception. The suprachiasmatic nucleus (SCN), located in the hypothalamus of the brain, is the control center of the biological clock. It integrates light signals to synthesize molecules that trigger downstream pathways in order to cue different stages in the circadian period. One of these pathways is the production and secretion of melatonin, which occurs in the pineal gland in the brain. However, this is only one of many mechanisms and molecular pathways that the SCN controls, so melatonin levels are not an accurate portrayal of the entire circadian system. Since each pathway is uniquely

triggered, scientists researching circadian rhythms should look at a multitude of indicators in order to determine how certain environments affect circadian clocks.

Circadian disruptions have been linked to many health problems including obesity, mental health disorders, and neurologic disorders such as Alzheimer's and Parkinson's, which is why there is so much concern over our devices causing these disruptions. Many people have fallen into the night shift trap as a way to sneak in more screen time without fear. The truth is that these solutions are probably ineffective and could cause more damage. The best way to avoid circadian disruption is to use your judgment, maybe skip that last episode, and go to sleep instead.

Science & Technology Crossword Puzzle

by Kathryn Le
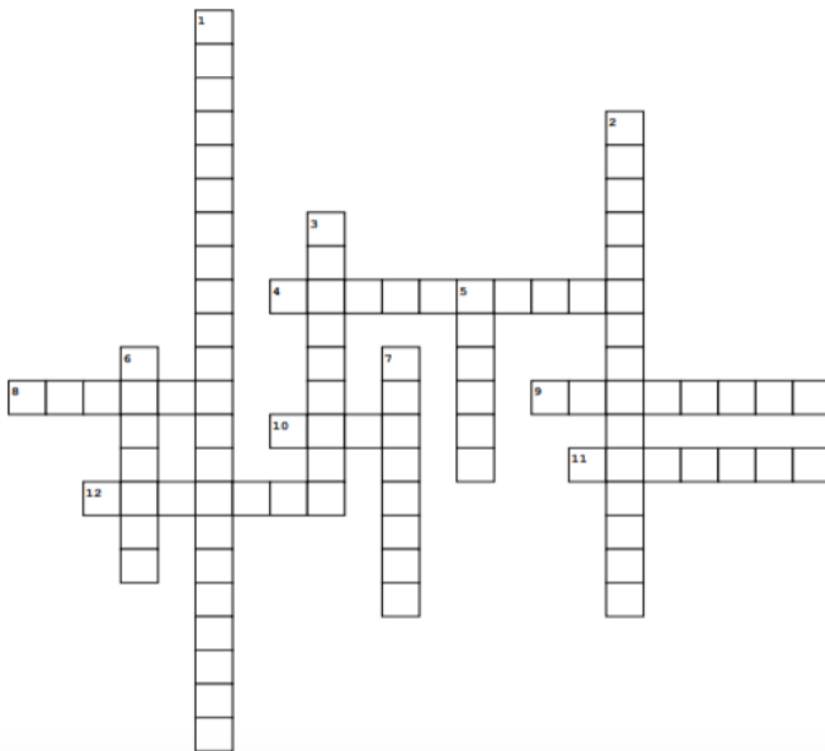
See solution in our next newsletter!

ACROSS

4. a machine learning algorithm for supervised learning (name of the blog)
8. a programming language that is commonly used in
data analysis and web applications
9. a subatomic particle with a negative charge that is
found in an atom
10. the basic building block of matter
11. a set of instructions for a computer to execute
12. the natural science that studies living organisms

DOWN

1. the ability for a computer to learn and predict
2. the study of algorithms to access, learn from and predict based on data
3. the study of the composition, structure, and properties of matter
5. a subatomic particle with a positive charge that is found in the nucleus of an atom
6. the study of matter and its motion and behavior in space
7. an electronic device used to compute and store data