

# GREAT DECISIONS

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HIGH SCHOOL

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# ARTIFICIAL INTELLIGENCE

## THINKING MACHINES

Teaching Computers to Think Like Humans

## LOOK OUT! THE DANGERS OF AI

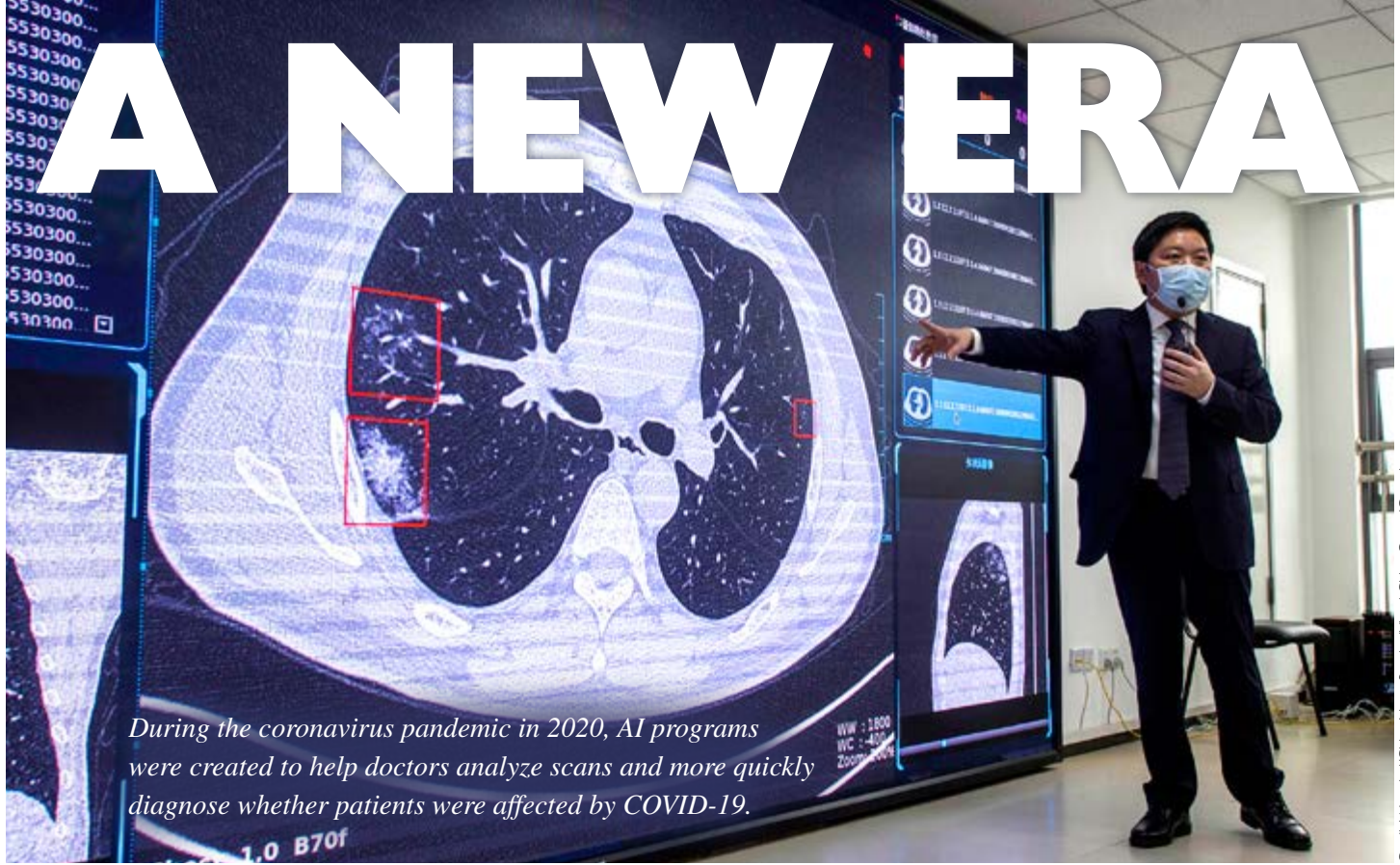
## STEPS YOU CAN TAKE

## TEEN ACTIVISTS ON THE FRONT LINES

AI and other smart technologies are becoming more common every day. Will they change our lives for the better or the worse?

BY SANDY ONG





*During the coronavirus pandemic in 2020, AI programs were created to help doctors analyze scans and more quickly diagnose whether patients were affected by COVID-19.*

Credit Wang Lei/China News Service/Visual China Group/Getty Images

**W**hen you think of **artificial intelligence** (AI), you might conjure up images of a fantastical future involving cyborgs, space travel, and flying cars. But far from being science fiction, AI is already part of our everyday lives.

Netflix uses AI to help you pick out a new movie, and Spotify uses it to suggest new songs for your playlists. It's what enables Facebook to tag your friends in the photos you upload, and how Google Maps figures out the fastest route to your destination. It's how Siri can listen to your questions and

**Humankind must figure out how to reap the benefits of AI while learning how to manage the risks it brings.**

promptly find you an answer. In short, AI is nearly everywhere you look these days. The technology that enables these applications has been advancing rapidly in recent years, and some experts claim we are now in the midst of a new **industrial revolution**. Similar to how coal and steam power transformed the lives of those in the 18th century, and electricity brought about immense changes in the 19th century, AI, robots, and other smart technologies will revolutionize the way people work, live, and play.

AI holds the immense potential to change our lives for the better—from helping individuals work more efficiently to tackling climate change and other big issues. However, it also has some potential drawbacks. For example, many worry that AI will perpetuate discrimination and bias, while others fear for their privacy.

With AI's role in our lives continuing to expand, humankind must figure out how to reap the technology's benefits while learning how to manage the risks it brings.

## **THINKING LIKE HUMANS**

What exactly is artificial intelligence, and how does it work? Broadly speaking, the term is used to describe computer systems that can absorb information, process it, and respond in ways similar to humans. For example, you have probably played video games where you compete against computer-controlled opponents. These opponents pay attention to your actions and react differently depending on the situation. This is the result of programmers creating detailed instructions for the game to follow. But what if a computer

Autonomous vehicles rely on external sensors to detect the location and movement of potential obstacles. AI programs use this information to decide whether the vehicle needs to speed up, slow down, or turn.




Credit: Sundry Photography/Shutterstock

Some modern cars are already equipped with self-driving features that take over navigation, acceleration, and other tasks from human drivers.



Credit: Scharfsm/Shutterstock

could learn and improve instead of just obeying a set of rules?

In recent years, researchers and inventors have focused heavily on an area of AI called **machine learning**. First, programmers create **algorithms** designed to identify patterns in data. [Then they start feeding data into the algorithms](#) . The more data the program analyzes, the more it learns and the better it gets at completing a task. For example, the speech-recognition technology that powers Siri, Alexa, and other AI helpers was built using machine learning. At first, these systems struggled to understand people who had accents or used unfamiliar words. But as they have spent years listening to millions of people talk, they have improved greatly.

AI systems can be fed many different types of information, including numbers, text, or images. This enables AIs to carry out many different functions—from identifying the faces of

people in video footage to figuring out which products different people will want to buy.

## GREAT POTENTIAL

One useful application of AI has been to help climate change scientists make better predictions of the future. Scientists gather large amounts of data from the atmosphere, oceans, land, and

even ice. They use this information to construct models so they can estimate how much sea levels will rise or which places will be most vulnerable to hurricanes, heat waves, and other extreme weather events. Machine learning algorithms can help make these predictions more accurate.

Additionally, AI is helping expand our range of transport options. Already, companies such as Waymo and Tesla are experimenting with **autonomous vehicles**, which rely on sensors, radar, machine learning, and other sophisticated technology to detect their surroundings. Cars that drive themselves offer many potential benefits: they free up people's time, cut down on traffic by figuring out the clearest routes, provide greater fuel efficiency, and possibly even make driving safer. Autonomous trucks could one day be particularly useful. Long-haul trucking is an exhausting and dangerous occupation—in 2018, [nearly 5,000 people](#) in the U.S. died in accidents involving

## THE DEBATE

### SHOULD FULLY AUTONOMOUS CARS BE ALLOWED ON THE ROAD?

#### YES

- ✓ They can travel at consistent speeds and distances from one another, making driving more eco-friendly.
- ✓ They could reduce accidents caused by human error, fatigue, and drunk driving.
- ✓ Commuters will be free to do other things while traveling.

#### NO

- ✗ Self-driving cars are potentially vulnerable to hackers and cyberattacks.
- ✗ Taxi drivers, long-haul truckers, and others may lose their jobs.
- ✗ AI might struggle to make decisions such as whether to hit a pedestrian or avoid them by swerving into a concrete barrier instead.



Credit: Digital Genetics/Shutterstock



commercial trucks. More than 90% of the cases were caused by human error. By contrast, self-driving trucks will be able to operate around the clock without getting fatigued like people do.

Another useful application of AI is in the medical field. Analyzing chest X-rays for pneumonia, mammograms for breast tumors, or CT scans for brain bleeds is a tedious and time-consuming task. Instead, machines can be trained to do a first pass of such scans and flag cases for doctors to take a closer look at, saving precious time when it comes to diagnosing disease.

AI can also help researchers discover new treatments more quickly. For a drug to be effective, it has to bind to the bacteria or virus that has infected someone. Think of it as two puzzle pieces fitting together—to ensure a good fit, scientists have to first understand the shape of the target protein. But a protein can assume


countless different shapes, and calculating its most likely structure can take a very long time. AI helps accelerate that process. This proved especially useful during the Covid-19 outbreak, when time was of the essence. Google’s AI system [DeepMind](#) helped predict the protein structure of the SARS-Cov-2 virus within a few short months. With that knowledge, scientists could then rapidly develop vaccines.

AI is also being used to help fight crime and make cities safer. Law enforcement agencies apply machine learning algorithms to the images they obtain from surveillance cameras, using the technology to search for similar faces in databases of mugshots, social media pictures, and other images. Recently, the FBI relied on facial-recognition technology to identify rioters who stormed the U.S. Capitol in January. And pop star Taylor Swift is said to have used facial recognition to identify stalkers at concerts.

**“... black and brown people are more likely to be inaccurately identified, and thus unfairly targeted.”**

## USE WITH CAUTION

AI has led to some extremely positive developments. But as with many other technologies, its misuse can pose serious risks. One major concern is how AI can encourage discrimination and racial bias. There have been calls to ban facial recognition tools because [studies](#) have shown they perform badly when it comes to identifying women and people from ethnic and racial minorities, as compared to how well they can classify white, male faces. “This means that black and brown people are more likely to be inaccurately identified, and thus unfairly targeted,” says Michal Strahilevitz, a professor of marketing at St. Mary’s College of California. “This may not be intentional, but it ends up having a racial bias that is dangerous and unethical.” Bias has also been identified in systems that use AI to screen applicants for jobs or bank loans. The reason this happens is because such AI-powered systems are fed data that isn’t diverse enough, and so they tend to “pick” only certain types of candidates—the ones they are familiar with.

[Others voice concern that AI violates basic privacy rights](#)  . Closed-circuit television cameras are everywhere these days. But in public spaces such as super-



Credit Kent Nishimura/Los Angeles Times/Getty Images

*After the January 6, 2021, riot at the U.S. Capitol, law enforcement used AI-driven facial recognition programs to identify suspects in photos and videos of the event.*



Credit: AP Images

*To create a convincing deepfake, AIs must analyze hours of footage and map every point of a person's face.*

markets and airports, people can't explicitly consent to having their every step monitored.

There has also been outcry over social media companies violating their users' privacy. One way these platforms make money is by allowing third-party companies to post ads on their sites. For example, you have probably seen promotions for clothes, shoes, and other products when using social media. These ads are usually targeted at specific users after the platforms use AI to analyze their posts and tweets, likes and shares, professional and educational history, demographic information, and other details. Some social media platforms have harvested this personal information—without users' consent—to sell to other companies. Facebook, for example, was fined \$5 billion in 2019 for mishandling its users' personal data. The social media giant sold data to a British consulting firm called Cambridge

Analytica, which then used it to influence voters during the 2016 U.S. elections.

The elections also thrust **fake news** into the spotlight. AI algorithms can be designed to create fake news—content that is believable but simply untrue. Analysts believe that Russian hackers used hundreds of thousands of AI-controlled Twitter

accounts, called **bots**, to spread **propaganda** and disinformation during the 2016 U.S. elections and Britain's Brexit vote.

AI can also be used to generate **deepfakes**. These are photos or videos that have been artificially doctored to superimpose the face of one person onto another, or to alter their speech. They are sometimes so realistic that it's hard for people to distinguish if they are real or not, even when paying close attention. Paired with fake news, deepfakes create nearly limitless opportunities to spread misinformation. For example, people have used deepfake technology to place the faces of celebrities in pornographic videos. Such activity could be used to ruin the reputation of almost anyone.

The use of AI also raises many ethical issues. For example, what if it falls into the wrong hands and is used for dangerous purposes like creating heat-seeking missiles? And as machines become more intelligent, how should they

## THE DEBATE

### SHOULD TECH COMPANIES BE ALLOWED TO COLLECT AND SHARE YOUR DATA?

#### YES

- ✓ It's what helps them earn profits so they can provide their services to users for free.
- ✓ Companies can use the data to better understand customers' needs and wants, and offer products accordingly.
- ✓ If customers don't want to share data, they shouldn't use a company's products or services.

#### NO

- ✗ People own their data and should have a say in how it's used.
- ✗ Companies are often unclear about which kinds of data they are collecting or how they are using it.
- ✗ Leaked information, such as bank details, can have serious repercussions.



Credit: Alexey Boldin/Shutterstock






Credit: Monkey Business Images/Shutterstock

Any time you go online, you exchange data with servers around the world. The data stored on these servers can be used to train AIs in all kinds of ways.

be treated? Can a robot or an autonomous vehicle be held to blame if it causes an accident—as a self-driving Uber car did in March 2018 when it struck and killed a pedestrian? Or should the people who programmed them take the rap? And is it possible that we are creating AI and robots that will one day outthink human beings? As renowned physicist Stephen Hawking pessimistically predicted about AI: “It would take off on its own and re-design itself at an ever increasing rate. The development of full artificial intelligence could spell the end of the human race.” Could this really happen? All these are questions that society must collectively consider as we move forward into a future with increasingly powerful AI technology.

## KEEPING AI IN CHECK

To ensure we don’t end up in a dystopian future, [policymakers](#)

[around the world are starting to introduce laws](#)  to control how AI systems are developed and put to use. For instance, the European Union passed a law in 2018 stating that tech giants must be able to explain how the machines they design make decisions. And in 2019, the U.S. government introduced the Algorithmic Accountability Act, which requires

companies to assess their machine learning systems for security and privacy risks. In addition, firms need to regularly examine their algorithms and take corrective actions if discrimination is detected. Some cities have gone one step further. In May 2019, San Francisco became the first city in the world to ban facial recognition. Several other California cities soon followed suit.

Private companies, too, are doing their part to develop AI in a responsible manner. For example, Google unveiled a tool in 2019 that helps news organizations tag stories with potentially misleading information. It also partnered with fact-checking networks and changed its AI to stop promoting fake news and hoax videos on YouTube.

To develop AI systems with fewer biases, computer programmers are now looking to use more diverse datasets in machine learning. They are also more mindful of how the systems are trained. For example,

## THE DEBATE

### SHOULD AI-POWERED ROBOTS BE ALLOWED TO REPLACE HUMAN WORKERS?

#### YES

- ✓ Computers don’t get tired and can work more efficiently than humans.
- ✓ Robots can do repetitive or dangerous tasks, freeing up people to do more meaningful work.
- ✓ Robots are cheaper than humans in the long run, helping companies reduce costs.

#### NO

- ✗ Face-to-face human interaction is an important part of customer service, medical treatment, and many other jobs.
- ✗ Many people will lose their jobs.
- ✗ AIs cannot handle situations they haven’t been trained for.



Credit: Martin Stawicky/Shutterstock

# TEENS MAKING A DIFFERENCE

some companies use a software platform called GapJumpers to “blindly audition” potential job candidates based on their skill sets, instead of using personal data such as where they grew up or studied.

## WHAT YOU CAN DO

Tackling fake news, privacy issues, and other AI-related challenges isn't just limited to the realm of governments and big tech firms. You can play a role too, by taking these simple steps:

- Don't believe everything you read on social media or messaging apps. Instead, get your information directly from trustworthy news outlets.
- Think twice before reposting or retweeting. Verify that the information you're about to share is real by double-checking it with reliable news sources.
- Learn to spot deepfakes. [Tell-tale signs](#) include unnatural eye movements or facial expressions, awkward posture, abnormal skin tone, blurred edges, and inconsistent audio.
- Regularly review your privacy settings on social media.
- When you've downloaded a new app, be careful about giving it access to your contacts, photos, location, and other personal information.
- [Let your elected officials](#) know how important this issue is.
- [And as soon as you're old enough, VOTE!](#) With few exceptions, you can't vote until you're 18, but in many states you can register at 16 or 17, and you'll be all set when 18 rolls around.



Jerry Di

Credit: Susie Koderscheidt/Yorkregion.com

### Jerry Di

When 15-year-old Jerry Di was diagnosed with Tourette syndrome a few years ago, he was disappointed to find that treatment options were limited, expensive, or “downright ineffective.” To make matters worse, no one was looking to improve treatment for the neurological disorder, which causes repetitive, uncontrollable movements called tics. In response, Di decided to do something about the problem himself. The teen from Ontario, Canada, founded a biotech startup called [Unitic](#). The aim: to use machine learning to diagnose Tourette patients and come up with treatment plans tailored specifically for them.

### Gregory Tarr

As a young boy growing up in Ireland, Gregory Tarr taught himself how to code using online tutorials. He soon became interested in AI, and after more than five years of research, he created a computer program to

detect deepfakes. [Tarr's program](#) can analyze a video and detect if it contains faces that have been swapped or voices that have been dubbed. It's up to 10 times quicker than other state-of-the-art detection systems, and more accurate. For his work, the 17-year-old won this year's BT Young Scientist & Technology Exhibition.

### Sophie Zhu

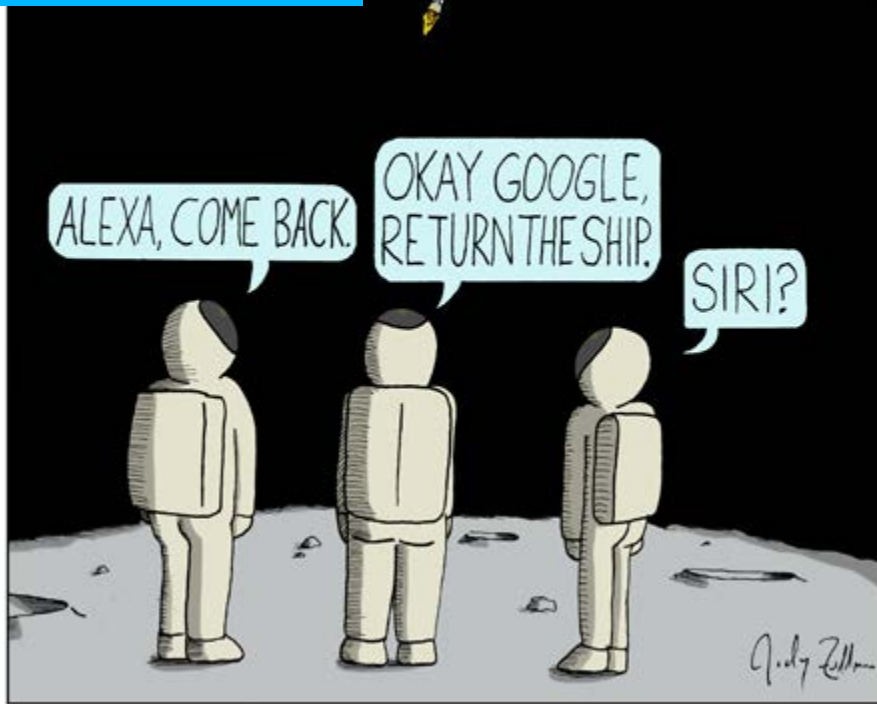
In 2019, 16-year-old Sophie Zhu launched a project to find out how AI might one day reshape our world. The California teenager emailed 130 of the world's leading AI experts, academics, and journalists, asking questions such as: “Do you believe that androids and human-level AI, once available, will be weaponized?” and “What is the most likely reason why they could harm humanity or threaten the survival of the human race?” Zhu, now a freshman at Duke University in North Carolina, collated and analyzed the replies she gathered, and wrote an illuminating [research paper](#) on the topic.



Gregory Tarr

Credit: Chris Bellew/Fennell Photography





Credit: Judy Zellman/Cartoon Collections

THE TECHNOLOGY REVOLUTION

## CAN YOU COUNT ON AI?

1. What is this cartoon trying to say about our increasing use of AI? Do you agree with the message?
2. Why is it important for people to learn how to do things themselves, even if they can be done more easily by AI?
3. How much do you rely on AI helpers like Alexa and Siri? Have they ever answered your questions incorrectly or messed up a command you gave? Which resources do you turn to when AI services let you down?

## NOW IT'S YOUR TURN TO MAKE GREAT DECISIONS

1. Do the benefits of AI outweigh the potential drawbacks? Why or why not? Are government regulations needed to keep it in check? If so, what kinds?
2. Are you excited for the future of AI? Why or why not? What ways do you think it will change the way people live?
3. **YOUR STORY:** Have you ever been fooled by a deepfake or similar misinformation online? How did you find out? How did you feel when you realized what had happened?

### KEY WORDS & TERMS

algorithms  
 artificial intelligence  
 autonomous vehicles  
 bots  
 deepfakes  
 fake news  
 industrial revolution  
 machine learning  
 propaganda

### GREAT DECISIONS ARTIFICIAL INTELLIGENCE

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Dear Students & Teachers,

Welcome back to Great Decisions High School! While this month's subject is certainly more approachable than the [last](#), it is no less crucial to our understanding of modern society. Artificial intelligence already occupies a central role in many of the most contentious debates of our time, and its import only continues to grow.

As always, we'd love to hear your thoughts. Teachers can write to us at [teachers@fpa.org](mailto:teachers@fpa.org), while students can submit comments and questions to [students@fpa.org](mailto:students@fpa.org). We'll feature student responses to the discussion questions at left on our blog, so let us know what you think!

Want to make sure you're up to date with the latest from Great Decisions High School? [Click here](#). Our next topics include immigration and the COVID-19 pandemic, so stay tuned! And if you missed our earlier issues, check them out [here](#). You can also sign up for our upcoming teacher module on human trafficking and modern slavery.

Debate becomes livelier and more interesting as more people participate. In that spirit, please feel free to share this issue with other teachers and students. You can also watch free episodes of the Great Decisions TV series on [artificial intelligence](#) and [other topics](#).

In a school year that has been unlike any other, we appreciate you turning to Great Decisions High School as a resource, whether you're learning from home or in the classroom.

Eliza Edel McClelland  
 Education Director