

Self-driving cars promise a 'revolution,' but not necessarily a positive one

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The finalized prototype of Google self-driving car. Credit: Google

With self-driving car technology rapidly advancing and such vehicles already driving on city streets, the time is ripe to start talking about how they might change more than just how we get around.

Self-driving cars won't just be cool technological gadgets. They are also likely to spur profound changes to the economy and society.

The move to [autonomous vehicles](#) "literally is a revolution," said Raj Rajkumar, a professor of electrical and computer engineering at Carnegie Mellon University who co-directs a lab there dedicated to [self-driving car](#) research.

How that revolution will play out will depend a lot on the public and policymakers thinking through the consequences of self-driving cars and putting in place rules that will steer them to the best outcomes.

"It's not going to be all positive," said Shannon Sanders McDonald, a professor of architecture at Southern Illinois University who has studied the potential impacts of self-driving cars. "If we understand (the drawbacks), we can design for them so their impact is not so negative."

Perhaps the most immediate effect of autonomous car technologies will likely be a dramatic reduction in accidents. More than 90 percent of all traffic accidents in the United States can be chalked up to driver error, according to the National Highway Traffic Safety Administration. Although manufacturers are still perfecting the technology, self-driving cars are expected to be much, much safer than human drivers. They aren't prone to distraction like their human counterparts. And they can use sophisticated sensors to get a much more complete real-time view of their surroundings.

Even so-called semiautonomous vehicle technologies, which are already showing up in cars today and only take over certain functions such as braking or lane keeping, have the potential to reduce accidents and save lives.

The savings that could be gained in terms of lives and money lost to accidents is "pretty tremendous, even with just some of these (automated) technologies on board," said Kara Kockelman, a professor of transportation engineering at the University of Texas at Austin.

Another near-term benefit of self-driving cars could be less congestion and smoother traffic flow. Thanks to their sensors and quick reaction times, automated cars will potentially be able to drive closer together than human-piloted cars, experts say. That would allow more of them on the road at one time. Because they would be less likely to get in accidents or to overreact to other cars changing lanes or slowing down, they'd be much less likely to cause traffic snarls.

The ability of self-driving cars to navigate traffic on their own could have ancillary benefits. Because they are less likely to get in accidents, they could be made lighter, making them more fuel efficient. Less congestion could lead to less pollution and greenhouse gas emissions. Handing the keys over to the robot driver could allow riders to work while stuck in traffic or simply relax.

Self-driving cars could "reduce the costs of congestion," said James Anderson a senior behavioral scientist at think tank RAND who has studied the potential impacts of autonomous vehicles.

Companies such as Uber are discussing the idea of putting together fleets of self-driving cars that would act like personalized [transit systems](#) for particular areas. Such systems could be huge boons for the millions of Americans who can't drive due to age or disabilities and to those who can't afford their own car. Those citizens tend to rely on transit systems that often don't do a good job of connecting poorer citizens with areas that have jobs or offering timely transportation to those in need.

That kind of personalized transit system could also persuade many consumers that it no longer makes sense to own a car. They could offer many of the benefits of car ownership - such as the ability to go directly from one point to another on a user's own schedule - without all of the burdensome costs, such as car payments, insurance, fuel, parking and maintenance.

Regardless of whether we each have our own self-driving car or we just hire them from Uber as needed, the vehicles could have a big effect on land use. Right now, we devote vast tracks of land to parking, much of it in highly valuable areas near where we work or shop. But if cars can park themselves, they don't necessarily need to be parked nearby. And if they're in constant use, because they're part of a fleet, they may need to be parked only rarely.

Those factors could allow cities to repurpose space now devoted to parking lots, residential garages and street spaces for more housing, bike lanes or even parks.

"You could suddenly free up incredibly valuable real estate in some of the densest cities in the world," said Anderson.

But the move to autonomous vehicles will also have drawbacks. The reduction in accidents alone - while a positive thing for society as a whole - will likely levy a huge blow to the industries and jobs that are tied to dealing with their consequences, whether car body shops or automobile insurance companies or even hospital emergency rooms. Self-driving cars are also likely to lead to widespread job losses among people who drive for a living, whether the vehicles they pilot are cabs, trucks or buses.

"The operators of these vehicles and those who repair them have to be on notice," said Kockelman.

Meanwhile there could be unintended consequences of self-driving cars that undermine some of their potential benefits. Because they're likely to make congestion less burdensome, self-driving cars may actually encourage more people to drive to work, paradoxically leading to more pollution and congestion. Similarly, they could encourage more people to take long driving trips for vacations figuring they can sleep or relax

while their RV or SUV worries about the road.

And should people continue to own their own cars, the move to self-driving ones could encourage owners, after they've been dropped off at work, to have their cars drive around in circles waiting for them or to send them home to park.

"You could end up with more congestion under reasonable assumptions," said Anderson.

These types of consequences are what makes it important to study how self-driving cars could affect society before they hit the street en masse.

"My god, we've got to understand what's happening," said McDonald. "Because there are many challenges and equally as many solutions."

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