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Google's Self-Driving Car Is Just the Beginning

By MARSHALL KIRKPATRICK of **ReadWriteWeb**

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Google announced this weekend that [it has developed a car that can drive itself](#). A small fleet of the vehicles has logged more than 1,000 miles of entirely automated driving and 140,000 miles of driving with only occasional human intervention.

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It's a development of historic significance: few events have changed the experience of life on earth as much as last century's proliferation of hundreds of millions of automobiles. The automobile was a revolution in personal autonomy, but it came with great costs. Now we've entered an era when that personal autonomy will become automated and some of the automobile's costs could be mitigated as a result. As a technologist, I find it helpful to understand the emergence of the fabled self-driving car as a convergence of three trends: the Internet of Things, Big Data and Real-Time Technology. Those trends are poised to go far beyond a

self-driving car.

The Internet of Things

The personal automobile was invented near the end of the 19th century and popularized throughout the 20th - approximately 600 million now traverse a world of roads. There is 1 car for every 11 people on earth, but sometimes it's hard to remember that - they can seem so ubiquitous.

As widespread and significant as they are, though, automobiles themselves have been to date relatively unconnected to each other. They are big, dumb, fast-moving hunks of metal. Essential, in fact, to keep apart from one another as they hurtle down the highway.

"Your car should drive itself," Google CEO Eric Schmidt foreshadowed in [a public statement last week](#), days before the Google self-driving car was unveiled. "It's amazing to me that we let humans drive cars. It's a bug that cars were invented before computers."

The instrumentation and networking of previously offline objects, like cars, buildings, roads and more, may represent the next big stage in the evolution of technology. A network-connected car in particular - primarily navigated by artificial intelligence able to leverage a world of data hosted in the cloud - promises big gains in safety, efficiency and quality of life for everyday drivers.

This product illustrates the potential for what's called the Internet of Things in a big way, but it should be understood in the context of the much larger trend. "Trying to determine the market size of the Internet of Things is like trying to calculate the market for plastics,

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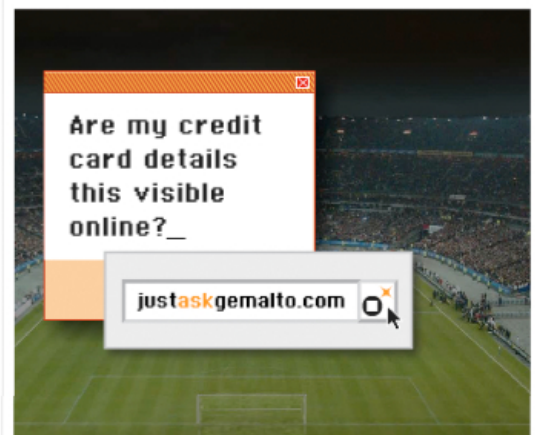
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circa 1940," says Georgetown University Communication, Culture & Technology professor Michael Nelson, the former director of Internet Technology at IBM, and the former director of Technology Policy with the Federal Communications Commission, in a February report by [The Hammersmith Group](#). "At that time, it was difficult to imagine that plastics could be in every-thing. If you look at information processing in the same way, you begin to see the vast range of objects into which logic, processors, or actuators could be embedded."

Big Data

How is Google able to drive a car? In part because its software has access to an incredible amount of very detailed data: maps of the world, speed limit information, live video of a car's surroundings, sharp computer vision analysis of what that live video contains and big-picture data about an emerging network of cars in motion on the road.

Multiply that by not just one car, but countless cars throughout our roads and you've got a whole lot of data being processed.

Where there are network-connected devices, there are waves of data made available. Where there is big data, there are opportunities for pattern analysis, rational decisions and recommendations based on that data.

It's hard to know whether Google's self-driving cars ought to be called recommendation technology based on big data, or whether this is going beyond recommendation and into directive commands.

Big data is, in large part, about decision making. A Google self-driving car will make it easier to make decisions about the important parts of driving by automating the parts that don't require human decision-making.

As Michael E. Driscoll [wrote this spring](#),

"...as information generating processes become more frictionless -- as humans have been excised from information read-write loops -- the velocity and volume of data in the world is increasing, and at an exponential rate..."

"As the Big Data stack matures, tools that help manage the workflow from data to analytics to visualizations, and ultimately to decisions, will be critical. Someday, creating and sharing a data analysis through a web dashboard should be as easy as writing a blog post. Until that day, there's plenty of work to keep us data scientists well-employed."

Or managing the data through automobile navigation, as the case may be. It's not hard to imagine new, self-driving automobiles competing in the market based on their navigation algorithms or the ways they enable human drivers to relate to all the rich data made available by sensors and cameras on cars.

Real-Time Data

The real-time Web has been mistakenly characterized as nothing but a stream of Tweets and Facebook updates.

Just as real-time automated trading has changed the stock market forever, real-time delivery of big video and sensor data to and from the cloud and the car on street will change driving forever.

Accident avoidance is the most-obvious example, but there are others. Google spokespeople have talked about car-sharing programs that drive cars to the location of a would-be user on command, avoiding the inefficient use of valuable parking spaces in every neighborhood. Presumably those vehicles could predict where they are most likely to be needed, based on real-time data about existing behavior.


Ultimately, though, real-time will be most evident when you're in the car and it makes decisions based on surrounding circumstances as they unfold.

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History

The point is, trends like the Internet of Things, big data and real-time data are poised to impact the human experience in many different ways. Their convergence in the sci-fi scenario of self-driving cars is the example that will be most evident to everyday people.

The consequences of such a technology on the psychology of autonomy, the ecology of transportation and urban planning and the million-plus lives lost every year due to human negligence behind the wheel, will be profound.

Even more profound, though, will be the spread of these same technology trends throughout our lives. Beyond our cars, automation and real-time analysis of data-rich environments could change the human experience in many, many ways in the relatively near future.

Tags: [big data](#), [google](#), [real-time](#), [recommendation](#)

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