

Google Self-Driving Car Project

Monthly Report

June 2015

This month we kicked off the next big phase of the project: [testing our prototype vehicles on public streets](#). We're still all about learning; now we want to know how the community perceives and interacts with these vehicles, and what operational challenges are unique to a fully self-driving vehicle. We're continuing to test with our Lexus vehicles and we'll gradually introduce more prototypes to the streets over the coming months.

Activity Summary (all metrics are as of June 30, 2015)

Vehicles

- 23 Lexus RX450h SUVs – currently self-driving on public streets, mainly Mountain View, CA
- 25 prototypes - 2 are currently self-driving on public streets, mainly Mountain View, CA

Miles driven since start of project in 2009

“Autonomous mode” means the software is driving the vehicle, and safety drivers are not touching the manual controls. “Manual mode” means the safety drivers are driving the car.

- Autonomous mode: 1,057,962 miles
 - Manual mode: 816,380 miles
 - We're currently averaging ~10,000 autonomous miles per week on public streets
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Recommended Viewing

Earlier this year, project director Chris Urmson spoke at the TED Conference; the video, “[How a driverless car sees the road](#),” is now online. If you've ever wondered why we decided to build a fully self-driving vehicle that can take anyone from point A to point B at the push of a button...the answers are in this talk.

Scenes from the Street - *each month we'll give examples of everyday situations we encounter*

Tune in from [7:43 of the TED talk](#). You'll see how we handle both the expected and the rare, from people changing their minds, blowing through red lights, and making up their own rules of the road...to some close encounters of the *bird* kind.

The bottom line is that we need to be ready and able to deal with all of it -- even if we've never seen that exact situation before. We use the same basic principles to guide us in all situations. If we're not sure what something is or how it will behave, we'll slow down to give ourselves time to gather more information about the situation. If it's a moving object, we'll categorize it as a vehicle, cyclist or pedestrian so we can make reasonable predictions about its behavior -- and be prepared for odd behavior. When in doubt, our cars will stop. Over time, we're getting better at modeling and responding smoothly to the unexpected, from cyclists riding the wrong way in a bike lane, to the new fad of lane-splitting electric skateboards.



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Traffic Accidents Reported to CA DMV

Given the time we're spending on busy streets, we'll inevitably be involved in collisions; sometimes it's impossible to overcome the realities of speed and distance. Thousands of minor accidents happen every day on typical American streets, 94% of them involving human error, and [as many as 55% of them go unreported](#). (And we think this number is low; for more, see [here](#).) In the six years of our project, we've been involved in 14 minor accidents during more than 1.8 million miles of autonomous and manual driving combined. Not once was the self-driving car the cause of the accident.

(CA regulations require us to submit CA DMV form OL316 Report of Traffic Accident Involving an Autonomous Vehicle for all collisions involving our cars. The following summaries are what we submitted in the "Accident Details" section of that form.)

June 4, 2015: A Google Lexus model autonomous vehicle ("Google AV") was travelling westbound on California St. in Mountain View in autonomous mode and was stopped behind traffic at a red light at the intersection of California St. and Rengstorff Ave. A vehicle approaching from behind collided with the rear bumper of the Google AV. The Google AV was stopped for approximately 17 seconds prior to the collision. The approximate speed of the other vehicle at the time of impact was <1 mph. There were no injuries reported at the scene by either party. The Google AV sustained no damage and there was no visible damage to the other vehicle.

June 18, 2015: A Google Lexus model autonomous vehicle ("Google AV") was traveling northbound on California St. in Mountain View in autonomous mode and was stopped at a red light in the straight-only lane at the intersection of California St. and Bryant St. The lane to the left of the Google AV was a left-turn-only lane. The vehicle waiting immediately behind the Google AV in the straight-only lane began to move forward when the green arrow left turn signal appeared (despite the signal for the straight-only lane remaining red) and collided with the rear bumper of the Google AV. The Google AV had been stopped for about 11 seconds at the time of impact. The other vehicle was traveling about 5 mph at the time of impact. There were no injuries reported at the scene by either party. The Google AV sustained minor damage (scrapes) to its rear bumper. The other vehicle sustained minor damage (scrapes) to its front bumper.

What we've been reading

- Mountain View Voice, "[The Robo-Car Revolution Hits Mountain View Streets](#)," June 2015
- Vox, "[A CA Resident Says Google's Autonomous Cars 'Drive Like Your Grandma'](#)," June 2015
- The Telegraph (UK), "[How Driverless Cars Could Revolutionize Old Age](#)," June 2015
- The New York Times, "[Look Ma, No Hands](#)," June 2015
- The Boston Globe, "[Where's My Driverless Car?](#)" June 2015
- Jalopnik, "[No, The Robocar Road Wars Haven't Begun](#)," June 2015

