

Human cop meet robocar

Waymo autonomous fleet developing emergency services interaction with Chandler Police and Fire Departments

When Waymo launched the first-ever public trials of self-driving cars, they chose the Phoenix metro area to implement it. This program is the first of its kind, designed so early adopters can use self-driving cars every day, for everything they would in a typical car, on their own, but riding and not driving. Over the course of the program, Waymo will work with hundreds of Arizonans who are interested in self-driving cars and can provide feedback on their experience.

Residents of Chandler were the first, and they report loving the experience, feeling safer, finding commuting less stressful and

having more time to spend with family.

The company's vision is of a future without tired, drunk or distracted driving that contributes to 1.2 million lives lost on roads every year. Google's parent company Alphabet has been working on self-driving cars for eight years, since 2009. On October 20, 2015, they completed the world's first fully self-driven car ride. Steve Mahan rode alone in one of their prototype vehicles, cruising through Austin's suburbs. Steve is legally blind, so sensors and software were his chauffeur. His route reflected the way millions of people could use a self-driving car in everyday life: riding from a park to a doctor's office and through typical neighborhoods.

The effort was spun off under its separate Waymo brand in late 2016. Over this time, prototypes have spent the equivalent of 300 years' driving: over 2 million miles of real-world driving, and last year alone completing a billion miles of testing in simulation.

Waymo is a key player in moving the industry

from seeming like science fiction to one where city planners all over the world are designing for a self-driven future. They see the technology being useful in personal vehicles, ridesharing, logistics, or solving "last mile" problems for goods transport. They expect self-driving technology to also become useful in ways the world has yet to imagine, creating new products, jobs, and services.

Development has necessarily been tackling the most difficult driving tasks: mastering multi-lane four-way stops, anticipating what unpredictable humans will do, and detecting and responding to emergency vehicles.

Whether it's the shrill siren of a fire truck or the flashing lights of a police cruiser, every human driver must recognize the signs of an emergency vehicle. Over the last few years, Waymo has been teaching its self-driving cars to detect and respond to everything from fire trucks and ambulances to police cars and police motorcycles. Their latest efforts to improve the way they detect emergency vehicles are now operating in the Valley, in collaboration with Chandler Police and Fire, using Waymo's new Chrysler Pacifica self-driving minivans. Day and night, their vehicles—equipped with a powerful suite of sensors—observe police cruisers and motorcycles, ambulances, fire trucks and

even a few undercover vehicles as they trail, pass and lead the Waymo self-drivers. As emergency vehicles make their moves, Waymo's sensors collect samples at different speeds, distances and angles, building up a library of sights and sounds to help teach their self-driving cars to respond safely to emergency vehicles on the road.

Waymo self-driving Pacificas are already capable of hearing twice as far as they could with the prior suite of sensors. And with a new generation of sensors, software is learning to discern the direction sirens are likely coming from. We often hear sirens first, so being able to gauge the direction of an oncoming fire truck or ambulance allows autonomous vehicles to make smarter and safer decisions: they may pull over if an emergency vehicle is coming from behind, but yield at an intersection if sirens are coming from up ahead. Or the vehicle may need to pause at an intersection to let an ambulance pass, even as the light turns green and even if other vehicles begin moving.

The custom-built self-driving sensor and audio detection systems are designed in-house. Not only has hearing improved, but they can now see emergency vehicles' flashing lights even farther away and more clearly, with a custom vision system plus radar and LiDAR. As the sensing system learns to reliably detect emergency vehicles in real-time, software is exponentially improved. The mission is to recognize an emergency vehicle even if it has never been encountered before, or if it appears different because of angle or lighting conditions.

Phoenix area residents in Chandler, Tempe, Mesa and Gilbert can check eligibility and apply for the early rider program at waymo.com/apply. ■

