WAYMO

CPUC Drivered Autonomous Vehicle Pilot

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1.35 million

deaths worldwide
due to vehicle crashes
in 2016

50%

of these people are pedestrians,
cyclists,
and motorcyclists

50 million

injuries worldwide
due to vehicle crashes
in 2018

94%

of crashes in the US involve
human choice or error

Speeding

Distraction

Drowsiness

Alcohol

Waymo is a self-driving technology company with a mission to make it safe and easy for people and things to move around.

Our experience

10 million+

miles on public roads

10 billion+

miles in simulation

25 cities

across the USA

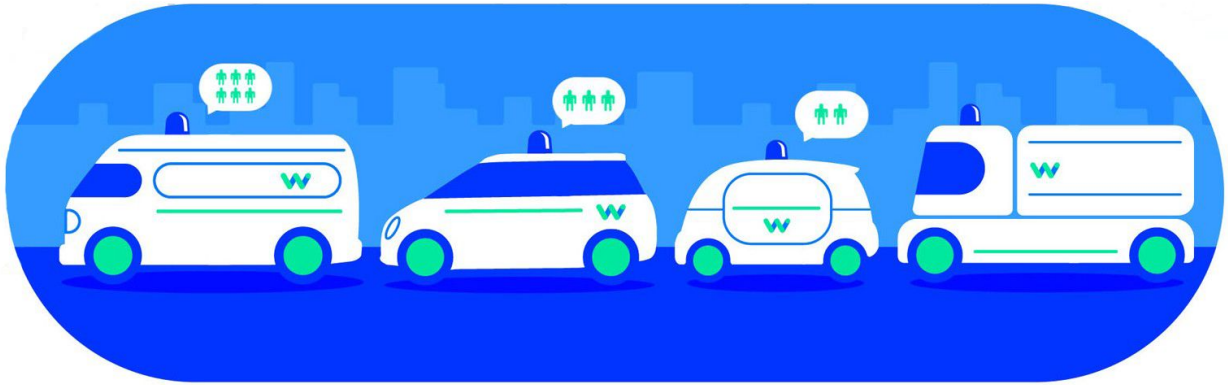
Google
self-driving car

Google
Self-Driving Car

Google

WAYMO

WAYMO
JAGUAR



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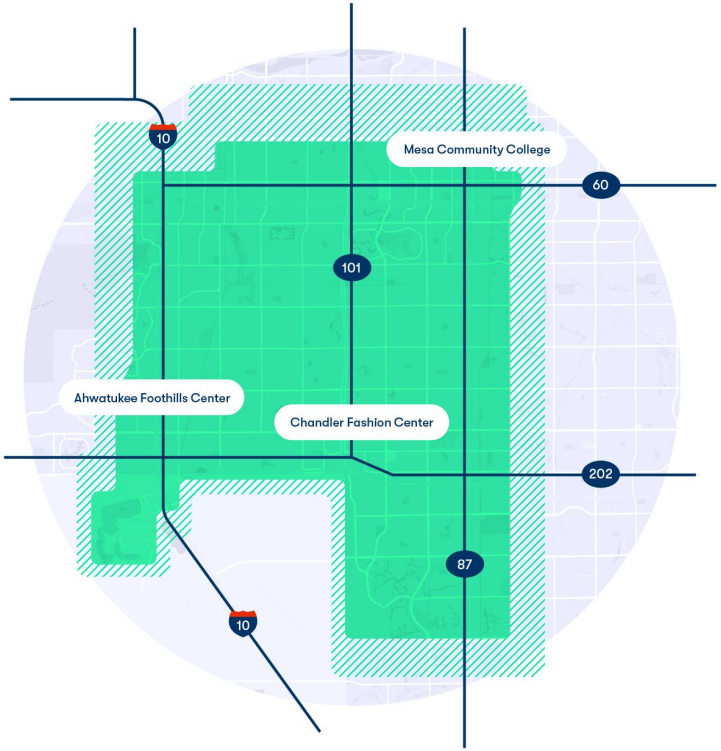
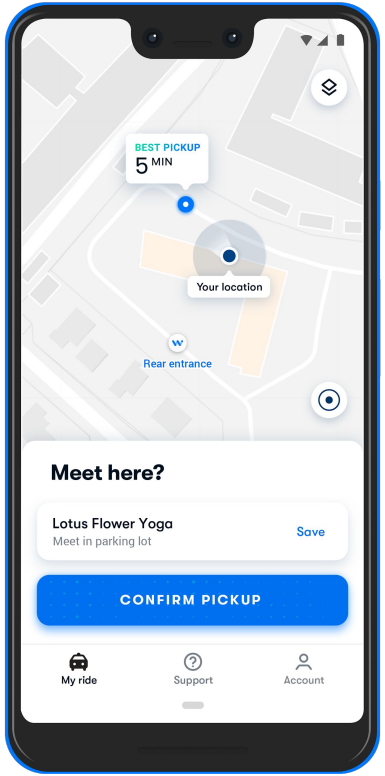
Waymo One - Today

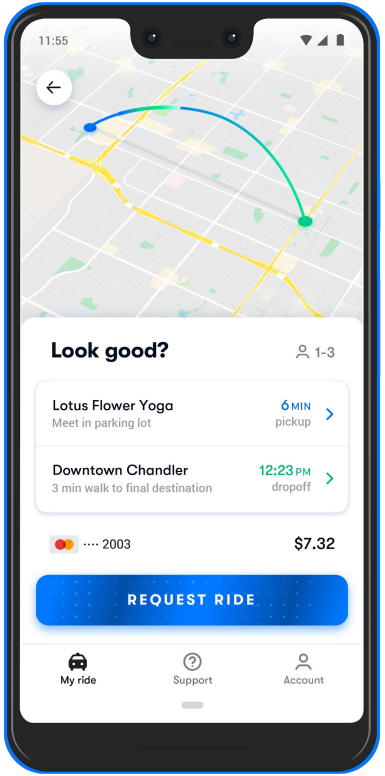


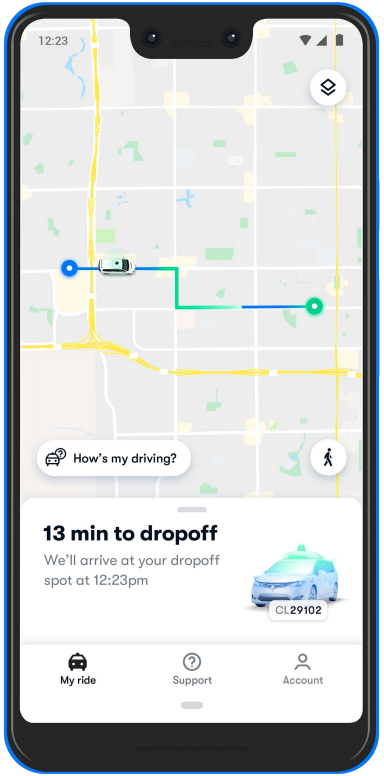
Facts and Figures

- 1,000+ riders
- 4 Arizona cities
  - Chandler
  - Mesa
  - Tempe
  - Gilbert

How does Waymo One work?







12:09 PM
W Chandler Blvd
35 MPH ZONE
Destination
Downtown Chandler
Dropoff
12:23 PM
Remaining
14 MIN
PULLOVER
SUPPORT

Driverless Autonomous Vehicle Testing in Arizona

Excerpts of Waymo One Passenger Experiences from Arizona

The Anthony Family (June 21, 2019):

Feedback on their first rides:

"We approached our first ride with a mixture of excitement and trepidation because we really didn't know what to expect. We were amazed by how 'normal' it felt. Once you get used to the idea that no one's driving, it's easy to relax and feels like you're in safe hands. We often find ourselves lost in conversation, oblivious to the fact that a robot is driving the car. The biggest surprise is how quickly riding with Waymo has gone from being a novelty to being a staple."

How they mainly use the service:

"We often use Waymo One when we're meeting friends for meals or drinks — situations where you might normally be looking for an alternative to driving your own car, search for parking, and so on."

Nicole and her Family of Five (September 17, 2019)

Feedback on first rides:

"While I was really excited for my first ride, I was a little nervous that some situations would be too complicated for the car to solve. I have since learned that the Waymo vehicle is extremely intelligent, computing data beyond my own sight line, and extremely cautious in situations where I may have been riskier."

How they mainly use the service:

"Taking a Waymo felt more normal when I started using it regularly for grocery shopping. Given how often I have to go to feed my tall boys, it is so great to have Waymo there to simplify the experience. Its door-to-door service is like calling a limo after a long day!"

Scope of Waymo's CA Drivered AV TCP Pilot Passenger Services

Passengers	The CPUC permit allows Waymo to participate in the pilot program, giving Waymo employees the ability to hail our vehicles and bring guests on rides within our South Bay territory.
Types of Rides	Waymo provided two types of rides to the members of the public: 1. Point-to point rides starting and ending within Waymo's operating territory in the South Bay, hailed through the Waymo app by employees of Waymo who had the option to include guest passengers on these rides. For these types of rides, during the reporting period, Waymo vehicles: ● Transported 6,266 passengers on 4,678 trips ● Traveled 59,886 miles 2. Educational demonstrations that start and end at the same location with the intention of demonstrating some of the technical capabilities of our vehicles. These rides are provided to pre-registered members of the public by Waymo and are not passenger-hailed. For these types of rides, during the reporting period, Waymo vehicles: ● Transported 33 passengers on 12 trips ● Traveled 31 miles

Scope of Waymo's CA Drivered AV TCP Pilot Passenger Services (cont'd)

Autonomous Test Vehicle	Each of Waymo's vehicles used for drivered testing is an "autonomous test vehicle" in accordance with the Department of Motor Vehicles' regulatory definition. These vehicles have human drivers seated in the driver's seat during drivered testing.
Roadway Type	During drivered testing, the operational design domain of Waymo's vehicles includes the following roadway types: Freeways, highways, city streets, rural roads, other roadways, and parking lots
Geographic Area	At present, Waymo's pilot program allows guests of Waymo employees to take rides within our geofenced South Bay territory, which currently includes Mountain View, Palo Alto, Sunnyvale, Cupertino, Los Altos, and Los Altos Hills
Speed Range	During drivered testing, the intended operational design domain of Waymo's vehicles includes roadways with posted speed limits up to 65 miles per hour.
Inclement Weather	During drivered testing, the intended operational design domain of Waymo's vehicles includes the following inclement weather situations: Rain and Fog
Time of Day	During drivered testing, the intended operational design domain of Waymo's vehicles includes all times of day and night.
Domain Constraints	Waymo's current operational design domain does not presently include testing under the following conditions: Snow/icy conditions, Flooded roadways, Offroad, One-way mountain roadways Controlling the operating domain of its drivered vehicles is a part of Waymo's dynamic testing program. For the purpose of drivered testing, Waymo may choose to change domain constraints to encompass less than the fullest operating domain for some or all of its vehicles at various times.

CPUC Pilot Data Report for the May 1 - July 31, 2019 Report Cycle

Waymo's pilot commenced on July 2, 2019, pursuant to the permit issued by the CPUC. The data is for July 2 through July 31.

REPORTING REQUIREMENT	QUARTERLY TOTAL
Total Waymo vehicle miles traveled during passenger service by all vehicles in Waymo's list of Autonomous Vehicle equipment	59,916.97
Total Waymo vehicle miles traveled during passenger service that were served by electric vehicles or other vehicles not using an internal combustion engine (All of the vehicles in Waymo's pilot for this reporting period were 2017 model year plug-in hybrid Chrysler Pacifica vehicles)	0
Total Waymo vehicle miles traveled during passenger service, from the vehicle's starting location when it first accepted a trip request to the pickup point for each requested trip	48,137.20
Amount of time (expressed in hours or fractions of hours) each Waymo vehicle waited between ending one passenger trip and initiating the next passenger trip (idling or dwell time)	4,083.39 hours
Total number of passengers transported by Waymo vehicles	6,299
Total number of accessible rides requested that are fulfilled (The 2017 model year plug-in hybrid Chrysler Pacifica vehicle is not wheelchair-accessible. For an overview of how "accessible rides" are included in the pilot, please see Section 3(F) of the Quarterly Data Reporting Methodology Overview.)	38
Total number of accessible Waymo rides requested that are unfulfilled because of a lack of accessible vehicles	0
Total number of accessible Waymo rides requested that are declined by the driver	0

Accessible Rides

Our app and service includes accessibility features, which we are continuing to grow and improve in consultation with the disability community. For example, earlier this year we conducted user testing in metro Phoenix with members of the Foundation for Blind Children, building on recent user studies we conducted in Phoenix and Mountain View late last year. Our current feature set is a product of, and basis for continued research and development. We look forward to continuing to partner with accessibility organizations as we expand and improve our offerings.

Waymo has developed a number of features that are available to riders. At this time, only Waymo and Alphabet employees, contractors, and agents may hail rides. To do so, they use an **accessible app designed for use with Android TalkBack and iOS VoiceOver**. The app also includes wayfinding features, including:

- In-app navigation to the vehicle through Google Maps and
- In-app button that enables the user to honk the vehicle's horn from nearby when the vehicle is ready for boarding.

Other accessibility features available to pilot participants include:

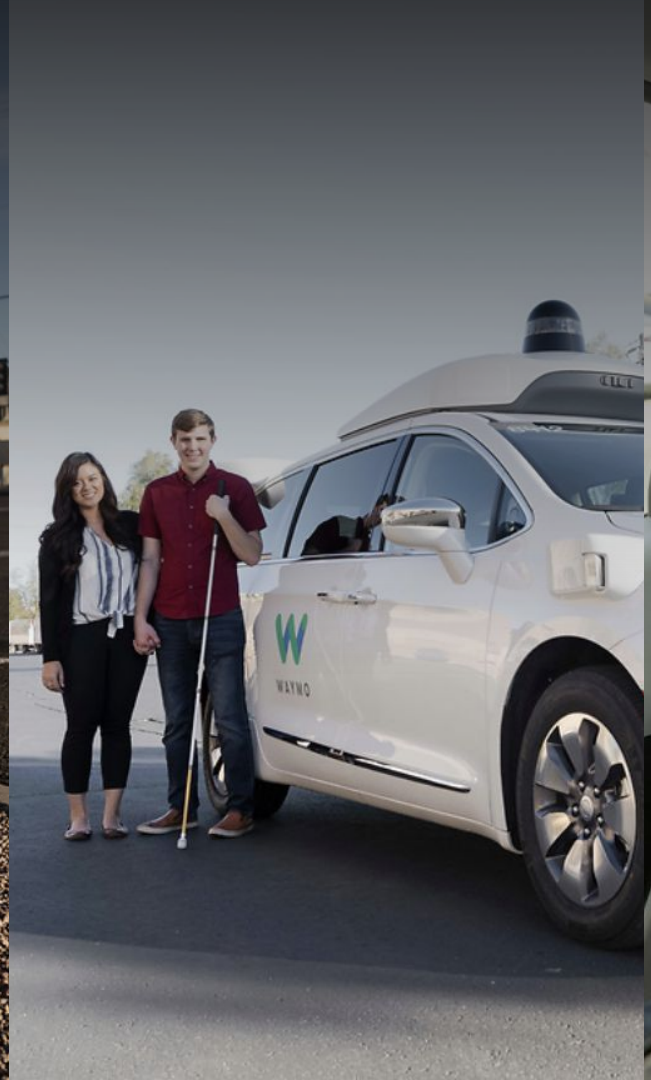
- **In-vehicle audio cues describing vehicle maneuvers** (e.g., “turning left onto Shoreline Boulevard”) to keep blind and low-vision riders informed on their journey. These audio cues supplement default audio cues provided in the vehicle and give blind and low-vision riders access to information that is also displayed on the second-row video screens. Riders may turn on these in-vehicle audio cues feature in the app.
- **A setting that, when activated, prevents the vehicle from considering a pick up or drop off point on the opposite side of the street from the rider’s selected location**.
- **The option to communicate with our Rider Support team through text in the app**, instead of, or in addition to, communicating through the in-vehicle audio system.
- **In-vehicle displays show text to accompany standard in-vehicle audio announcements** (e.g., the vehicle will announce when the vehicle is approaching the rider’s destination, and that message will also appear on the in-vehicle video displays).
- **The ride buttons in our self-driving vehicles have Braille labels**. These buttons allow riders to start the ride, pull over the vehicle, or call to speak to a member of our Rider Support team who can provide further assistance and information. These commands can also be made through the app.

Accessible Rides (Continued)

Pilot program riders with access to the Waymo app may activate these accessibility features, and we encourage all of our employees to test them and provide feedback. ***During the reporting period, for 929 rides, riders had activated the honk button, additional in-vehicle audio cues, or the setting that disallows pick-up or drop-off on the opposite side of the street.***

We're also testing the best ways to balance providing the data about accessible rides the Commission seeks with the privacy of our riders. At this time, Waymo does not require riders to indicate whether they have a disability or attest to having an accessibility need in order to use the features. Therefore, we cannot delineate precisely how many of these rides served an individual who needed accommodation for a disability. However, in the spirit of providing more information to the Commission, we did send a broad notice to employees, inviting them, if they choose, to voluntarily report the number of rides they took in the reporting period with an accessibility feature enabled that provided an accommodation for a disability. In response to this notice, ***we learned of 38 rides provided to riders who self-reported use of the accessibility feature to accommodate a disability. These rides were counted as "accessible rides" in Waymo's pilot data.*** *No "accessible rides" requested during the reporting period were "unfulfilled because of a lack of accessible vehicles" or "declined by the driver."*

MICHAEL
MICHAEL ALLANSON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Excerpt of CPUC Pilot Passenger Experiences During Reporting Period

- *"Great maneuvering around trash bins blocking the street in a roundabout"* (July 3, 2019)

- *"There was a lot of traffic and pedestrians in downtown today. The car handled very well."* (July 11, 2019)

- *"Smooth drive although route could have been better"* (July 30, 2019)

- *"Car had good reaction to the car trying to cut us in. The other car was not aggressive but it was great see SDC slow down in anticipation and proceeding as I imagine a safe driver would do."* (July 31, 2019)

Deployment of Autonomous Vehicles in California

Regulations Promulgated by the DMV

The DMV regulations for autonomous vehicle testing with a driver became effective on September 16, 2014. The final regulations were preceded by a regulatory process which commenced on April 9, 2013, included four public workshops, one public hearing, and one public comment period on the draft regulations.

- Google received an AVT permit from the DMV, on September 16, 2014.

The DMV regulations for driverless testing and deployment (public use) became effective on April 2, 2018, and were preceded by a regulatory process which commenced on December 16, 2015, included three public workshops, one public hearing, and four comment periods on versions of the draft regulations.

- Waymo became the first company to receive a driverless testing permit from the DMV, on October 30, 2018.

DMV Deployment Permit and TCP Framework

A DMV permit is a prerequisite to obtaining a TCP permit for transporting passengers in the CPUC pilot program. For any paid rides, AV TCP operations would be limited by the ODD defined in the DMV deployment permit (which defines the "geographic area, roadway type, speed range, environmental conditions (weather, daytime/nighttime, etc.), and other domain constraints" in which the AV can operate.

In addition, it is within the DMV's discretion to approve any changes to the ODD (that expand the geographic area, expand available roadway types, increase the level of automation, or increase the operating speed by more than 15 mph) and ensure that the company has completed testing and can safely operate within that area.

We believe the limitations of the DMV ODD requirements, which are significant, are sufficient to ensure that deployment will be gradual, phased, and incremental. This approach is consistent with the legislature's intent to expedite deployment of AVs, and will avoid a regulatory gap where an AV company is able to obtain a deployment permit from the DMV but would not be able to obtain a parallel TCP permit from the Commission.

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