



An Introduction to Cruise: Presentation to NCHRP

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Rachelle Celebrezze | Email: Rachelle.Celebrezze@getcruise.com | Phone: (206) 488-6160

Agenda

- Cruise Approach to AV Development
 - Cruise Sensor Suite Overview
 - Cruise Approach to Testing
- Future Vision: The Cruise Origin
- Partnering with Community
- Cruise Guiding AV Regulatory Framework Principles



Cruise Approach to AV Development

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What is Cruise?

Self-driving.

Our mission is to build the world's most advanced self-driving vehicles to **safely** connect people with the places, things, and experiences they care about.

Zero-emission.

Cruise AVs are all-electric, powered by 100% renewable energy.

Shared.

Cruise will own and operate a fleet of all-electric AVs, providing shared transportation services.



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Strong Partnerships

Today, Cruise is the only autonomous vehicle company with the ability to produce fully integrated self-driving vehicles at global manufacturing scale.

Partners at GM and Honda bring vehicle design, engineering, manufacturing, and safety expertise. In turn, Cruise designs AV software and hardware that is unique to vehicles that drive themselves.

On the assembly line, electrical, computer, and AV systems are deeply integrated to make Cruise AVs fully redundant.

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Zero Emissions, 100% Renewable

Dedication to the Environment:

- Every gasoline-powered car emits more than 3x its own weight of CO₂ into the air each year, and pollutes our air 6x more than an electric vehicle.
- 29% of all emissions are from the transportation industry.
- Cruise will always use a 100% electric vehicle fleet.
- Cruise is the first self-driving company to power our all-electric fleet with 100% renewable energy.

Cruise Commits To
Delivering The Holy Grail:
Self-Driving EVs Powered
Entirely By Renewable
Energy

Forbes



Read more: [Cruise Becomes First Self-Driving Company to Power Vehicles With 100% Renewable Energy](#)

Safely Navigating Communities

A Cruise AV uses **multiple sensors** to:

- See everything around it with 360-degree vision
- Identify vulnerable road users to anticipate movement and respond safely
- Know where it is down to the centimeter
- Make decisions 10 times a second to help it safely navigate the city



How does the Cruise AV work?

1. How does the Cruise AV see the world?

40+ state-of-the-art sensors throughout

The Cruise AV uses multiple sensors, including cameras, LiDAR, and radar to see the world and help determine free, drivable space around the vehicle.

2. How does the Cruise AV know where it is?

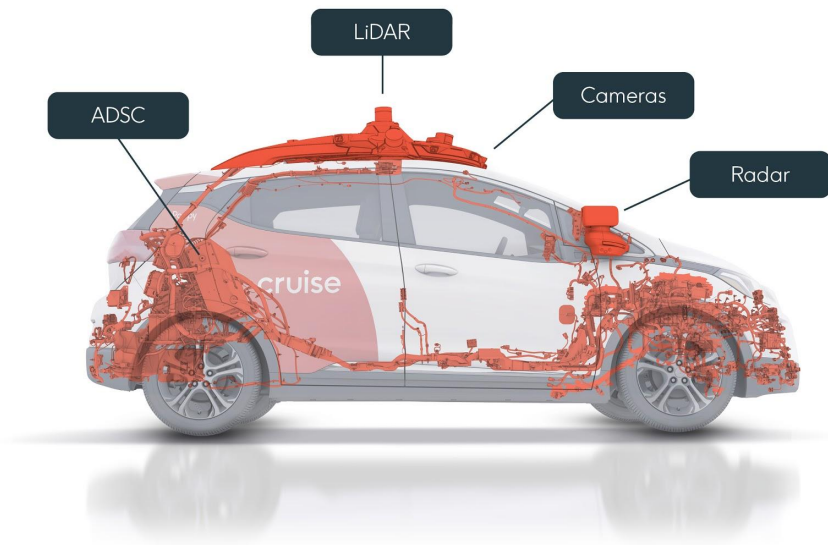
Rich 3D maps

The Cruise AV takes a live snapshot of what it sees in the world and matches it against a rich 3D map so it knows precisely where it is in the city, down to the centimeter.

3. How does the Cruise AV make decisions?

Autonomous Driving System Computer (ADSC)

The ADSC is the brain of the vehicle. It takes in data from multiple sensors and converts it into decisions so the Cruise AV can safely navigate the city. The Cruise AV detects, predicts, and responds to the movement of people and objects around it 10 times per second.



Sensor Technology

Sensor diversity provides confidence that the self-driving system can detect, track, and classify objects around it in various driving conditions.

Cameras

Cameras help classify and track objects so the Cruise AV can make confident real-time decisions.

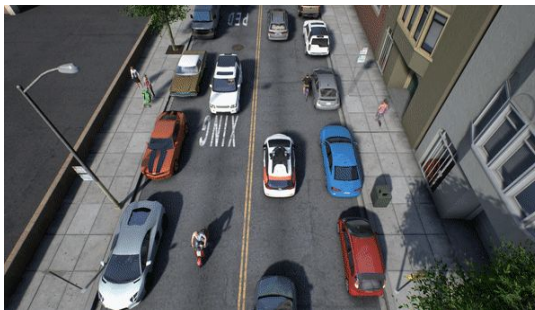
Cruise AVs use multiple cameras to create a 360° field of view with no blind spots. Cameras help the Cruise AV identify pedestrians, vehicle types, construction zones, and traffic light states.



LiDAR sensors

LiDAR sensors use an array of lasers to measure the distance between objects, down to the centimeter, and create a 3D visualization of the world.

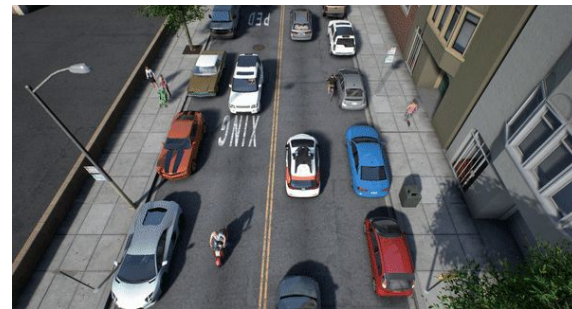
LiDAR helps the Cruise AV determine where it is in the world and reliably know where all nearby pedestrians, vehicles, and other objects are located.



Radar sensors

Radar sensors use radio waves to quickly measure the speed and trajectory of moving objects.

Each Cruise AV is equipped with multiple radar sensors, which measure the direction of travel and speed of moving objects like cars on the road.



Cruise AV: Seamless Integration

Safety Designed from
the Ground Up

3 Layers of Testing:

- Real world
- Simulations
- Closed course



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Real-World Testing:

Navigating Double Parked Vehicles



A link to the video can be found [here](#).

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Real-World Testing:

Sharing the Road with Cyclists and Scooters



A link to the video can be found [here](#).

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Simulation:

**Driving More
than 200,000
Miles in
Simulation
Every Day**



A link to the video can be found [here](#).

Simulation:

Testing Sensors in a Simulated World



The Cruise Origin

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Moving beyond the car



Read more: [The Cruise Origin Story](#)

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The Cruise Origin Seats up to Six People in Campfire Seating



Partnering with Community

Partnering With **People** to Drive Life in Cities Forward

We're guided by the question "will this solution help us partner with people to drive life in cities forward?"

By working with our communities to build a product and experience that people love, we believe we can make a major positive impact by:

- Helping to **save millions of lives** by reducing car crashes
- **Reshaping cities** around people, not cars
- Giving people **time** to do things other than drive
- Making transportation more **accessible**



Read more: [Driving Life in Cities Forward, One Self-Driving Cruise at a Time](#)

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Working with First Responders:

Detecting Emergency Vehicles



A link to the video can be found [here](#).

COVID-19 Crisis Response: **Stand With SF**

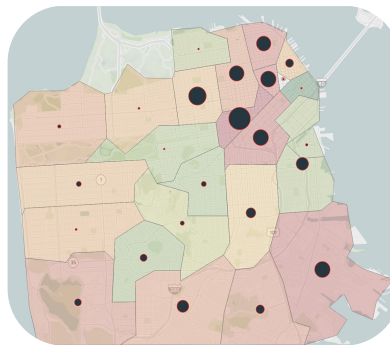
- Since April, Cruise has been working with SF-Marin Food Bank and SF New Deal to deliver meals and groceries to people in need.
- To date, we have completed more than **50,000 contactless deliveries of groceries and meals** using our fleet of all-electric, self-driving vehicles.



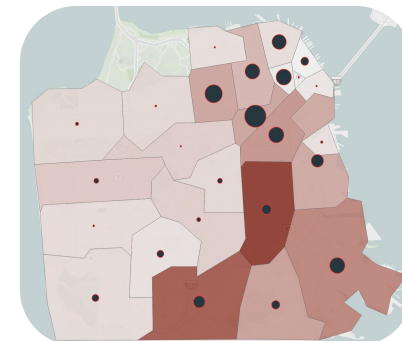
Read more [here](#).



SF-MARIN
FOOD BANK



Median household income



Rate of COVID-19 cases

Reshaping Our Future: An Opportunity to Transform Cities

State and local governments have decades of transportation planning experience.

What could our cities look like if we re-imagined:

- Curb Management
- Parking & EV Infrastructure
- Shared Street Designs
- Sidewalk Usage



Cruise Guiding AV Regulatory Principles

Cruise Guiding AV Regulatory Framework Principles

- **Clear Path to Deployment:** Laws and regulations should explicitly authorize deployment of fully self-driving vehicles and remove existing roadblocks that assume a human driver behind the wheel.
- **Testing in Real-World Environment:** Ensure that testing is permitted in domains that match where deployments will ultimately occur.
- **Statewide Applicability:** One unified, statewide framework to avoid a patchwork of regulations which create conflict, complicate compliance, and delay testing and deployment.
- **Service neutral:** Ensure that framework allows for both the transport of persons and the delivery of goods in autonomous vehicles.
- **Technology-Neutral Approach:** Governments are encouraged to allow new technology to mature and avoid overly prescriptive approaches that could inadvertently constrain progress, innovation and impact.
- **Insurance:** Insurance requirements should mirror the state's requirements for other vehicles of the same type (for example, personal vehicles, TNCs, etc.)



Thank you

For more information, contact:

Rachelle.Celebrezze@getcruise.com