OPTIMUS RIDE

Q4 2019 PROGRESS REPORT

AUTONOMOUS VEHICLE TESTING
CITY OF BOSTON

OPTIMUS RIDE

Optimus Ride Inc. is a self-driving vehicle technology company. Emerging from Boston's vibrant robotics ecosystem, we bring together the promise of self-driving technologies with real-world considerations. We design our software to enable efficient, sustainable, and equitable mobility solutions.

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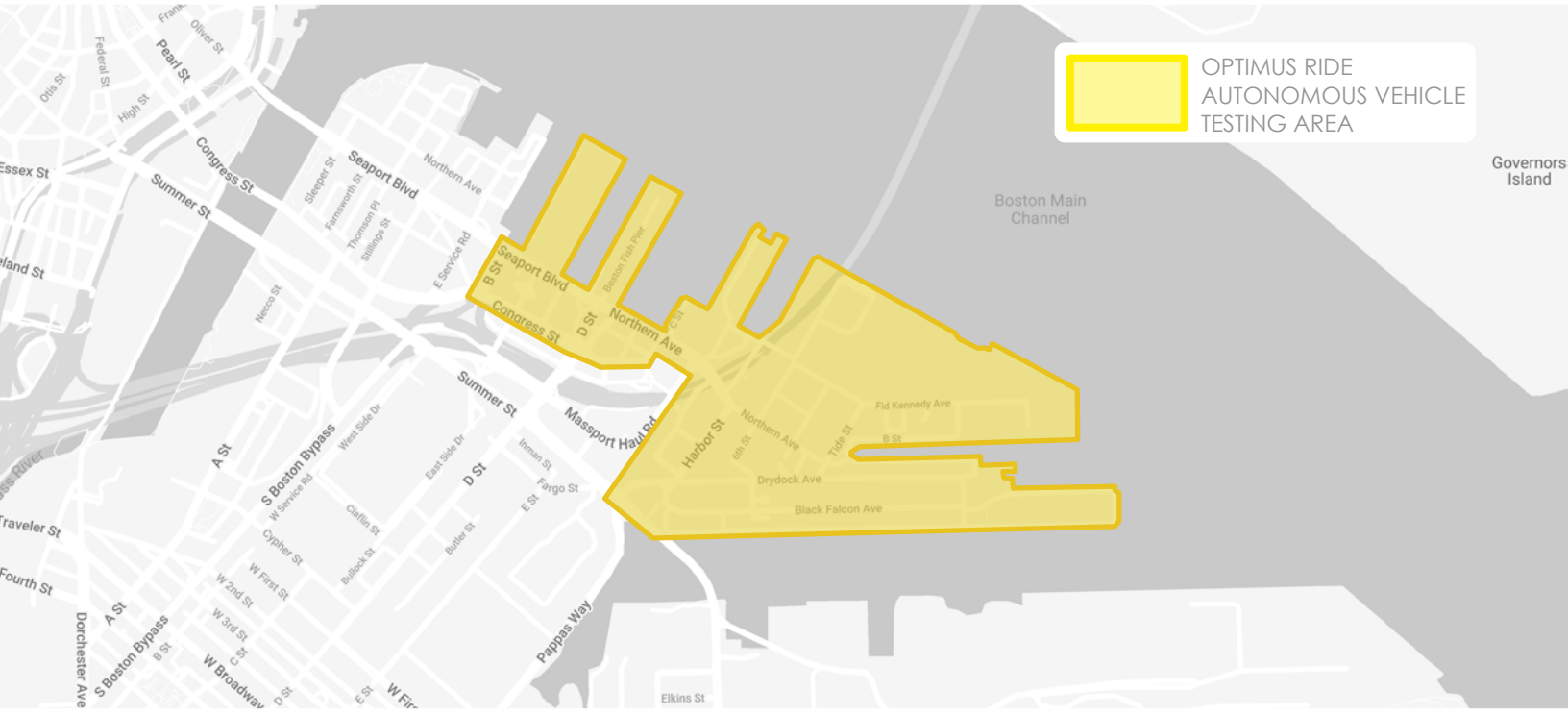
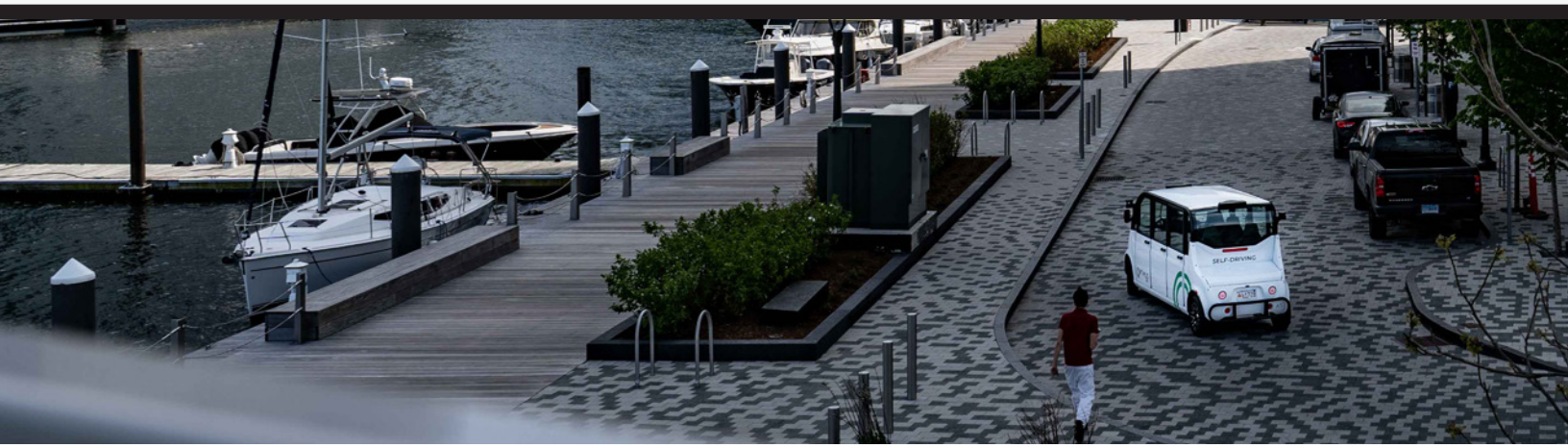
This document provides a quarterly update to the City of Boston and the general public on Optimus Ride's autonomous vehicle testing program.

OPTIMUS RIDE TESTING OPERATIONAL DOMAIN





INTRODUCTION

Participating in the Autonomous Vehicle Testing Program established by the City of Boston and MassDOT enables Optimus Ride to explore the promise of autonomous vehicles to improve road safety, expand access to public transit, enhance sustainability, and promote economic growth. To date, Optimus Ride has driven over 5,000 miles autonomously on public roads in Boston and logged many thousands more in the state of Massachusetts alone.

Optimus Ride began testing its autonomous driving system on public roads in the Seaport in the summer of 2017 and has been operating commercially since 2018. At the beginning of 2019, we announced the launch of additional commercial programs in three communities across the United States: Halley Rise by Brookfield Properties in Reston, VA, the Brooklyn Navy Yard in Brooklyn, NY, and Paradise Valley Estates in Fairfield, CA.

After extensive testing of our autonomous capabilities and overall service experience in the Raymond L. Flynn Marine Park and at the Brooklyn Navy Yard, Optimus Ride felt confident in the safety, reliability, and comfort of its service. As a result, during the fourth quarter of 2019, Optimus Ride officially launched operations at Halley Rise in Virginia and the Alpha Phase Pilot at Paradise Valley Estates in California. Below, Optimus Ride provides a description of activities over Q4 2019 as well as a year-in-review to frame our development more globally.

During this quarter, a core activity for the Optimus Ride team was engaging with relevant internal and external stakeholders to finalize our Application to Test Automated Driving Systems on Public Ways in Massachusetts. This is the second iteration of the application, which was developed in 2017 in response to Executive Order Number 572 "To Promote the Testing and Deployment of Highly Automated Driving Technologies" launched in 2016 by Governor Charles Baker. The final version of our application is expected to be signed and published by the Massachusetts Department of Transportation and the City of Boston, among others, by the end of Q1 2020.

We are continuously grateful to the State of Massachusetts and the City of Boston for enabling the development of the autonomous vehicle industry and for its support of Optimus Ride. Thank you.

Thank you,
The Optimus Ride Team

RESEARCH & DEVELOPMENT

Research Achievements

The safety and satisfaction of our passengers is our utmost priority. To this point, our engineering and operations teams focused their year-end efforts towards advancing the safe operation of our passenger service programs. As a result, we have reviewed and updated our incident management plan to ensure that we can handle incidents efficiently and effectively, under a wide range of scenarios. We have also continued to perform significant safety analyses of our entire vehicle system and algorithms, enhancing the robustness and fault detection capabilities as required. This includes a safety monitoring system within our software stack which monitors the functionality of various components within our system, putting our components through scenarios such as external shock, vibration, and temperature testing.

Driverless Testing

At the start of 2019, Optimus Ride launched an internal initiative to research, design, and build a fully driverless vehicle. In the last quarter of 2019, Optimus Ride was able to conduct significant, fully driverless, closed-course testing of this vehicle, enabling us to continue safe research and development. This initiative included performing significant testing on a vehicle with no steering wheel while the status of our vehicle was supervised by a remote monitor from afar. We are currently validating the system through repeated verification and validation testing and look forward to sharing more details at the appropriate time.

Takeovers

The driver takeover methods used in the Optimus Ride vehicles have been designed to ensure the Human Machine Interface (HMI) is clear, consistent, gives context, and provides the necessary feedback about the system.

The system is designed to disengage autonomous control and enable manual control by the safety driver when a takeover is initiated. The safety driver can immediately take control using the brakes, throttle, or steering wheel. Takeover events occur largely due to environmental factors, such as unclear or faded lane markings. An example of a common takeover during Q4 2019 was navigating around police officers who are manually directing traffic during construction around the industrial park.

Additionally, we have started reporting the percent (%) of each trip in autonomous mode in both time and distance, which we believe is a more meaningful metric than disengagements.

COMMUNITY ENGAGEMENT

To complement our commercialization efforts, Optimus Ride identified opportunities to engage the general public through education and stewardship efforts. In particular, we hosted a Meetup© regarding machine learning at our office where our Vice President of Engineering, Dr. Rujie He, discussed key considerations when developing and deploying machine learning algorithms for safety-critical applications such as self-driving vehicles. This included discussions surrounding how we collect, sample, and annotate the data required for training, testing, and validation of machine learning and neural network models for different autonomy components, as well as how these models are then tested and validated in both simulation and on-vehicle testing, across multiple deployment sites.

Our team also participated in for the 3rd year in a row at the Robot Block Party hosted by MassRobotics, where members of our operations and engineering teams were available to answer questions and take guests through a static demo. Finally, Optimus Ride participated in the MassDOT 10 Year Anniversary Seminar on Autonomous Vehicles alongside the City of Boston Mayor's Office of New Urban Mechanics and Aptiv. Here, we described the nature of the relationship between Optimus Ride, the Commonwealth of Massachusetts, and the City of Boston to establish a general understanding of what our AV testing program looks like.

YEAR IN REVIEW

For us at Optimus Ride, 2019 was the year we launched a thoughtful campaign to commercialize autonomous vehicles nationwide. We launched three sites in as many states - New York, Virginia, and California - and learned about what it takes to develop an autonomous mobility service. Each deployment provided distinct challenges: we designed a connector service to the Astoria Ferry open to the public at the Brooklyn Navy Yard, a circulator mobility system at Brookfield's Halley Rise complex in Virginia, and we began a small, closed-group pilot service to residents and staff at Paradise Valley Estates, a Continuing Care and Life Plan Community in Northern California. Below, we describe these service operations in greater detail.

COMMERCIALIZATION OF AUTONOMOUS VEHICLES

Optimus Ride develops electric-autonomous mobility systems focused on first/last mile connectivity and geo-fenced mobility solutions. The goal of first and last mile connectivity is to facilitate increased usage of commuter rail, bus, ferry, and subway systems by expanding their catchment areas, in turn reducing individual vehicle miles traveled to high frequency areas. The goal with geofenced mobility is to reduce the need for parking in communities to reclaim land for human scale needs, reduce the amount of vehicles driving in a community, and engage in traffic calming with the Optimus fleet through vision zero speeds (25 mph or less). With the reduction in number of vehicles, increased access to transit, and focused community support for all the citizens that inhabit it, we are able to deliver on creating streets that are safer, transit that is more accessible, and provide continuously reliable service. We expect to continue this work in our current areas of deployment and look forward to expanding to others to support the above stated goals. Optimus Ride has deployed self-driving systems in the following locations:

- **Boston Innovation District (Boston, MA)** – Optimus Ride has been operating a research and development program in Boston's Innovation District since 2016, and has been operating pilots on public roads since 2017 in various weather conditions including moderate rain and fog, as well as light snow. Optimus Ride conducts testing activities and operates an autonomous service for employees that exposes our system to real-world scenarios, including other mobile and static vehicles, pedestrians, double-articulated buses, industrial machinery, construction equipment, tractor trailers, and pets. In order for Optimus Ride to have full access to the public road network in this zone, it has had to engage with four different entities - Massachusetts Port Authority-Massport, the Economic Development Industrial Corporations, Massachusetts Department Of Transportation, and the City of Boston. During this time we have also worked closely with Massport to better understand the use cases for autonomous systems at the various ports they oversee. This area is active Monday-Sunday from 6am-12am EST.
- **Brooklyn Navy Yard (Brooklyn, NY)** – The Brooklyn Navy Yard (BNY) is the first and only commercial deployment of a self-driving vehicle system in the State of NY. We provide a fleet of self-driving vehicles that services the 300-acre site and provides inter-modal connectivity to the NYC Ferry's Astoria route that docks at the BNY. Our system allows ferry passengers from Manhattan and other parts of Brooklyn to connect seamlessly between modes and addresses the "Transit Dessert" issues given the long distance to existing transit lines from BNY. Since commencing operation in August 2019, we have provided thousands of passenger rides during a Monday-Sunday service from 7am-10:30pm EST where we transport public ferry riders to and from the ferry docking area to the entry/exit point at the Brooklyn Navy Yard.

- **Halley Rise (Reston, VA)** – Optimus Ride's deployment with Brookfield, the world's largest real-estate developer, provides autonomous mobility within their campus in Reston, Virginia, centered on servicing the new Reston Town Center Metro station on the outskirts of the Washington, D.C. area. We are operating a first and last mile mobility system to the tenants of Halley Rise, a mixed-use development. The introduction of autonomous vehicle systems can radically reduce the need for parking infrastructure, as every self-driving vehicle has the potential to replace 20 or more parking spaces depending on utilization. Additionally, the system's adoption at scale could provide hundreds of millions of dollars of potential savings to Brookfield's global portfolio while becoming a valuable asset for land optimization. Since commencing operation in July of 2019, we have provided tens of thousands of passenger rides during a Monday-Friday service from 9am-6pm EST where passengers are picked up and dropped off between their office and an offshoot, overflow parking lot through an active construction site.
- **Paradise Valley Estates (Fairfield, CA)** – Paradise Valley Estates is a 55+ independent living and continuing care community in Northern California. Optimus Ride's system will increase mobility access by providing safe and reliable transportation and logistics for community members as well as staff. At Paradise Valley, we offer a point-to-point internal mobility service within their gated, private community. This service is currently moving from Alpha to Beta Phase, where we provide service to a selected user group as we prepare to open up to the greater community. Our service operates from Monday-Saturday from 12pm-8pm PST, with modified and/or extended service hours during holidays and special events.

Advancing the Commercialization of Autonomous Mobility Systems

Optimus Ride's long term vision is to develop safe, sustainable, equitable, and accessible autonomous mobility systems globally. We are building systems that can be distributed widely across the world to enable efficient transportation, connectivity, and intra-community solutions, with the end goal of radically reducing personal-car ownership.

SAFETY RECORD

Optimus Ride continues to foster a Safety Culture by maintaining and continuously improving the safety of our daily activities and overall operations record. We maintain an excellent safety record and have no accidents, failures, or disruptions of our vehicles to report.