

Progress Report - Phase A2 Completion

Summary

As discussed in the Application to Test Highly Automated Vehicles (HAVs) on Public Ways in Massachusetts that was approved on 05/31, Optimus Ride is committed to sharing key data publicly so as to ensure public transparency of the results of the testing that is occurring. During the period of 04/11/17 - 06/05/17, Optimus Ride collected over 100 miles of data on public roads. This data was collected to train our system on the environment we will be testing in and to ensure safe driving specific to our location. These datasets were collected with our two approved vehicles:

- 2016 Polaris GEM E6: VIN ****5158; 26.3 miles
- 2017 Polaris GEM E4: VIN ****5665; 75.2 miles

The public roads used for these data collections are the roads listed in our Application to Test Highly Automated Vehicles (HAVs) on Public Ways in Massachusetts, which are also listed below:

- 6th Street
- Ballard Way
- Black Falcon Ave
- Channel Street
- Design Center Pl
- Drydock Ave
- Fid Kennedy Ave
- Harbor Street
- Northern Ave
- Seafood Way
- Silver Line Way
- Tide St

All of the above roads are located in the Raymond Flynn Marine Park, Boston's designated autonomous vehicle testing zone. The data collections have been in a variety of environmental conditions including, but not limited to, the following:

- sunny, fair weather conditions
- overcast conditions
- light rain (<2.5 mm/hour) conditions
- high sun and low sun conditions
- light and heavy traffic conditions

There were no crashes involved in Phase A2 and, as all driving was done manually by a safety driver, there were no failures or disruptions of autonomous mode to report.



Research Achievements

Phase A2, the outdoor data collection phase, was necessary for two primary reasons: firstly, to identify any areas or scenarios unique to the Marine Park that would be more challenging for our system and, secondly, to gather training data for the neural networks used in our autonomous system. For the challenging areas, we found that there are certain sections in the Marine Park that pose challenges for global positioning and localization due to operating in an urban canyon. There are certain roads with reduced GPS accuracy as well as other roads with reduced useful features for reliable localization. These areas required additional data collection to ensure that our system would be robust to these challenges. These additional data collection allow us to test and validate our mapping and localization algorithms, ensuring that they are robust to different weather and traffic conditions.

For the training data, the data collection on public roads was vital for creating a reliable neural network that could address the unique obstacles found in the Marine Park. For example, the articulated buses used by the Silver Line are common to the Marine Park specifically. This data collection allowed us to gather data specifically on these buses in order to train our neural network to correctly identify these obstacles so that our system can react accordingly when in autonomous mode. The data collected in these 100+ miles allowed us to test and validate our obstacle detection and tracking algorithms both in simulation and on the vehicle.

Application Addendums

Since the submission of our Application to Test Highly Automated Vehicles (HAVs) on Public Ways in Massachusetts, Optimus Ride has added more vehicles and safety drivers to our testing program. Please find the appropriate registration and proof of insurance for the vehicles attached. The vehicles to be added are listed below:

- **2016 Polaris GEM E4: VIN *****3952**
- **2017 Polaris GEM E4: VIN *****6270**
- **2017 Polaris GEM E4: VIN *****6272**

Please find a set of photocopies of the drivers licenses of the newest safety drivers who will be operating Optimus Ride's vehicles, who are all listed below:

- Guillermo Bautista (out of state license, **30 day driving record attached**)
- Kevin Hong (out of state license, 30 day driving record ordered)
- Caelan Garrett (MA license)
- Sertac Karaman (MA license)
- Zhiyi Liang (MA license)
- **Jeremy Noel (MA license)**
- Charles Richter (MA license)
- Luke Shimanuki (out of state license, 30 day driving record ordered)

