# Development of Safe, Profitable, and Fair Robotaxi Deployment Strategy

### Data Collection

**What data will you collect or create?**

In this project, we aim to establish a simulation environment for Pittsburgh dedicated to simulating peer-to-peer ridesharing involving autonomous vehicles with different functionalities. We plan to reuse the existing real-world dataset (such as Argoverse dataset) that contains dynamic traffic information in Pittsburgh city such as lidar point cloud, vision information, GPS to help construct the simulation scenarios. The simulation platform will be used to deploy the strategy developed to help validate the performance. The team will finally provide a webpage for the synthesized dynamic map of traffic demands with the driving functionality map to develop a safe, efficient, and fair deployment strategy.

**How will the data be collected or created?**

For large scale simulation, we plan to collaborate with the Lawrence Berkeley National Lab (LBNL). LBNL is developing a multi-model simulation tool for city-scale transportation for autonomous vehicles. The simulation can give a good performance but needs to be run on the high-performance computing facility at LBNL. We will work with colleagues at LBNL to remotely access the computing resource and integrate the safety analysis into the simulation scheme. We plan to send one student to LBNL to be trained to operate the facility in the summer of 2020 and establish a simulation environment for Pittsburgh.

For small-scale simulation, we plan to establish a simulator based on Carla with Python API for simulating relatively small ranges such as several interactions or large range but low-resolution maps in Pittsburgh city. The platform is able to provide the position and type of each component at each timestamp and predefine the functionality of components which is helpful for validating the strategy.

### Documentation and Metadata

**What documentation and metadata will accompany the data?**

Each simulation instance will be accompanied with (1) the type, index and functionalities of each component appeared in the simulated scenario, (2) the sensing information of each component at each timestep, (3) the action of each component at each timestep.

### Ethics and Legal Compliance

**How will you manage any ethical issues?**

The ethic issues will be reported to the PI's university and subject to the university's Ethics policy.

### Storage and Backup

**How will the data be stored and backed up during the research?**

All collected data will reside on PCs and workstations belonging to the PIs’ university. A data server which is expected to have MySQL installed will be set up to store all the data and hold the web application. All data will be regularly backed up either onto multiple external hard drives, or a centralized backup cloud storage, to ensure full data recovery in the event of equipment failure. In the case of catastrophic failures, we will maintain both the data server and the web application indefinitely.

**How will you manage access and security?**

Data derived from this project shall be retained for at least one year. The selected research results will be open source and shared to the research community through technical reports or publications. The data in this project does not contain private or confidential information. The research results belong to PI’s university, selected result data and visualization can be obtained upon request by asking PI and research assistants.

### Data Sharing

**How will you share the data?**

Throughout the duration of the work, the PI will in a timely manner communicate any significant findings with the scientific community through journal publications, national and international conference presentations, and seminars. The reported results will be made available to the research community, where possible and permitted and upon request.