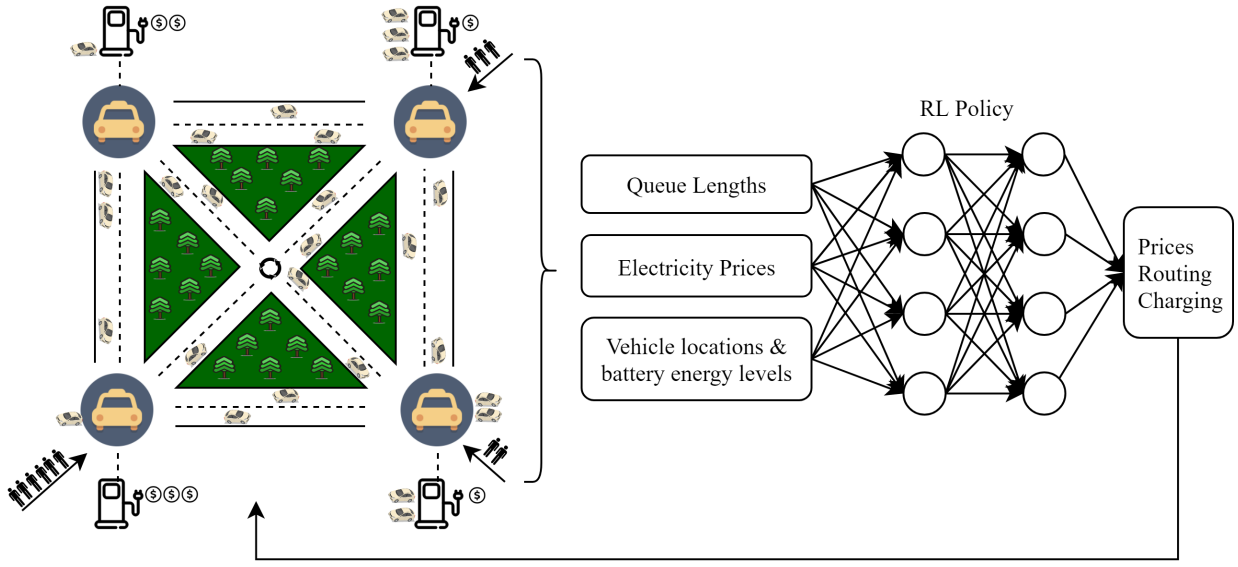
**Autonomous Mobility on Demand – Smart Pricing and Routing**




## Project Statement

The proliferation of ride hailing systems is a major drive in the advancement of autonomous and electric vehicle technologies. This project is focused on the joint routing, battery charging, and ride pricing problem faced by a profit-maximizing transportation services provider that operates a fleet of autonomous electric vehicles. To accommodate for the stochastic nature of trip demands, renewable energy availability, and electricity prices, a real-time dynamic policy is required. The optimal real-time policy that executes actions based on full state information of the system is the solution of a complex dynamic program and is intractable to exactly solve for due to the curse of dimensionality. Therefore, we apply deep reinforcement learning (RL) to develop a near-optimal control policy.

## Project Objective

A fundamental challenge of our problem is that the state-action space grows exponentially in the number of vehicles, rendering the problem intractable for large networks. We plan to train and numerically test several RL policies that exploits the transportation network structure to control the complexity of training. Numerical case studies will be conducted on various transportation networks representing different cities (e.g., Manhattan and San Francisco) to test and demonstrate the efficacy of our real-time policy in terms of network size, ride queue length and stability (representing customer wait times for rides) and platform profits.

**Project Tasks**

- Algorithm design to exploit network structure
- Training and testing new algorithms under various network conditions and sizes

**The tasks described above are very challenging so a big portion of the effort need to be devoted to learning the state of the art in vehicle dispatch and developing new algorithms.**

**Classes in optimization and machine learning will be very helpful.**

Questions? Contact alizadeh@ucsb.edu