PROJECT SUMMARY: 4Ride Scheduling Assistant
Optimizing Campus Transportation in Real Time while Migrating Existing Services under a Single Mobile Application

Project Overview

It's after midnight, its pouring, and 4Ride still has not shown up. Maybe that decision to live off campus is starting to feel like a bad idea. GW students are no strangers to this problem. In the heart of Washington DC, the university relies on a large network of services in an effort to solve complex transportation issues. GW supports intercampus transportation in the form of the VSTC and Vern Express, a number of student parking locations, and the campus 4Ride service. Every day thousands of students depend on these services as they commute to or within campus. In an effort to support the demands of its students, it is essential for GW to make transportation as streamlined as possible. This design proposal seeks to optimize a number of inefficiencies in the campus 4Ride system. For one, students report many incidents in which their requested 4Ride does not show up. Whether because the request was not serviced or the student does not wait long enough, this presents a major headache that results from inadequate scheduling and communication.

As an alternative to the existing web-based scheduling service, this design proposal seeks to create a mobile app with a more robust scheduling system and more effective communication between 4Ride drivers and their clients. The app will take two forms – a driver-facing interface and a client-facing interface. Capturing existing GPS feeds on 4Ride vehicles, the app will reduce arrival and travel times by optimally matching client pick-up requests to vehicles. All effected drivers and clients will receive real-time scheduling recalculations based on their requests and cancellations. The client will be able to view a map of all 4Ride vehicle locations as well as the location and driver name of their assigned vehicle. A real-time list of pick-up and drop-off locations will display on the driver's app in the order they are executed.

Frequent communication between GW's Student Association and transportation division will be key to meeting the needs of the clients and drivers. Additionally, understanding the existing organization of the system is pertinent to migrating its services to a mobile application. This will require collaboration with the transportation division and any other parties that maintain the service.

Intellectual Merit

In order to achieve these objectives, a server will need to gather vehicle GPS locations from an existing API. It will monitor requests and cancellations from clients as well as any pick-up/drop-off confirmations and overrides from drivers. With each client/driver "update" it receives, the server will run the scheduling algorithm and update effected drivers and clients. The server will push vehicle assignments to clients and updated itineraries to drivers with each recalculation.

Working to update the 4Ride service will lead transportation services, IT, and the Student Association to take a closer look at the technical implementation of university transportation services. The proposed project makes two intellectual contributions: (1) understanding algorithmic "bottlenecks" in existing transportation implementations that are resulting in suboptimal service, and (2) solving for an optimal scheduling algorithm.

Broader Impact

The two intellectual contributions discussed previously could lead to recommendations for other service improvements such as with VSTC and Vern express scheduling. This proposal's value is not limited to improving 4Ride services at GW since the university offers other transportation services with similar limitations. The impact of a prototype 4Ride application as proposed would lower the barriers to improving these other services.