

Immediate Alert System (Team 9)
18-500 Initial Project Proposal - 9/7/18
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GPS based bus tracking systems are not always that reliable. Most current apps require one to check in each time to see how far away a bus is - wasting one's precious time when running to catch a bus. The aim of our project is to explore if in real time, using cameras to detect when a desired bus goes by we can immediately alert a user (through text or push notifications) that it is time to head out to catch the bus in time, can be a better approach. We aim to start small by setting up just a camera or two along Forbes Avenue (locations/orientations to be determined) that will use computer vision to recognize when they see the different 61 busses (e.g. 61A).

To build this out we expect to need several components and technologies. We will need a couple cameras that can be connected to Raspberry Pi's loaded with Linux and proper drivers (and powered on-site), that will be programmable and also possibly connect wirelessly to one of the cluster-based computing machines available on campus for quick image processing, or possibly use AWS tools, such as Lambda, if our current machines are not fast enough. Initially we will take many videos and using the individual picture frames train our system to detect/recognize bus shapes and letters. After our model is trained we can do the quick real-time calculations on the pi's themselves. We're not sure yet how, but from the pi's we hope to connect them to a web application that will integrate with some established fast PubSub/SMS API to notify various relevant users when their buses are coming.

The web-app component will consist of several features. The app will allow users to upload their schedules, desired bus routes, and phone numbers, to tell our system during which time intervals to turn the cameras on to check if a bus is coming. The idea being that if I just woke up and have a class at 9 AM two stops away on the 61-bus line, I want to get a text at any point between 8:45 AM-8:52 AM that would tell me if the bus was seen a stop before me and will be here in just a few minutes so I should run over, otherwise I will forget it and just walk.

Even if we are not able to recognize buses and alert more reliably than the GPS-based approach, we believe our system is a valuable proof of concept that can be applied for anyone who wants to be alerted when something is caught on camera that might not currently have GPS tracking available to the public - maybe when your school bus goes by, or a police car, or UPS truck that you've been waiting on.

Scheduling out our project, we aim to have ordering of parts and setup of the cameras finished in the first two weeks, so that in the following week we can start building our dataset. While we are getting parts and data, we will work on writing the computer vision program for bus detection, as well as work on setting up the Raspberry Pis to get some basic interface between them and the cluster computers. Please see Gantt Chart below.

