

The Line Wait Time Estimator

Overview

Inspired by the HOP Courtyard Café's tremendously long lines during the school year, we will construct a Line Wait Time device which will estimate the wait time for a line as a function of its length. Ultimately, readings taken by the device will be translated to wait time estimate in a web interface.

What We Have Done

Client: The client code interfaces with the HC-SR04 ultrasonic distance sensor, reads in data and sends it to the server. It takes the server response and prints it out. The client code is complete.

Server: The server code takes in the client message and converts it to a floating point number. Then, it communicates with both the client and the Parse back end. First, it sends the distance value back to the client with a maximum of two decimals and the unit of length (e.g. 23.90 cm). It also creates a custom Parse object and sets its distance value equal to the one it just received from the client. It saves a new Parse object to the database for each client message. The server code is complete.

Web Client: Using JavaScript, the website queries the database for the custom Parse objects. It currently takes in the 10 most recent objects (which translates into the past 30 seconds of data) and displays the floating point values as a list. The interface of the website is written in HTML and utilizes the Bootstrap CSS library. The basic skeleton of the website is complete but continued improvements on the UI will be made. The web client is still incomplete.

Real-World Testing: We've contacted KAF management and have received approval to conduct testing at KAF. We have a plan of how the testing will be done.. This part is still incomplete.

What We Still Have to Do

We are still working on a function relating distance (raw distance from the sensor) to tangible wait times for the line. We still have to better understand the JavaScript that configures our web page and queries distances from the database. The objects returned by the query will be given to a function that relates distance and wait times. Finally, this value must be displayed on the web page and refreshed at certain intervals.

Obstacles

Constructing a function that accurately converts raw distance measurements into wait times is a challenge. We need to understand how to calculate this distance, account for errors (such as momentary gatherings in front of the sensor), and, from the resources available, give a generally accurate reading. We plan on approaching this challenge by doing real-world measurements of line length compared to wait time and extrapolate a relationship from the data.

Changes In Direction

Our wait time calculation may rely on the past 30 seconds (10 distance measurement readings, taken every 3 seconds), but depending on how it is implemented, we may have to change this method. For example, we could take the average distance over these 10 readings or use some other method to get a consistent length reading. We originally also planned to test our device in the HOP since it has the most linear line, but we had to switch to testing at KAF since the HOP is closed during the summer. KAF is less desirable since the chances of people wandering in front of the sensor is higher but it is still the best option on campus.