

Campus Parking Availability System



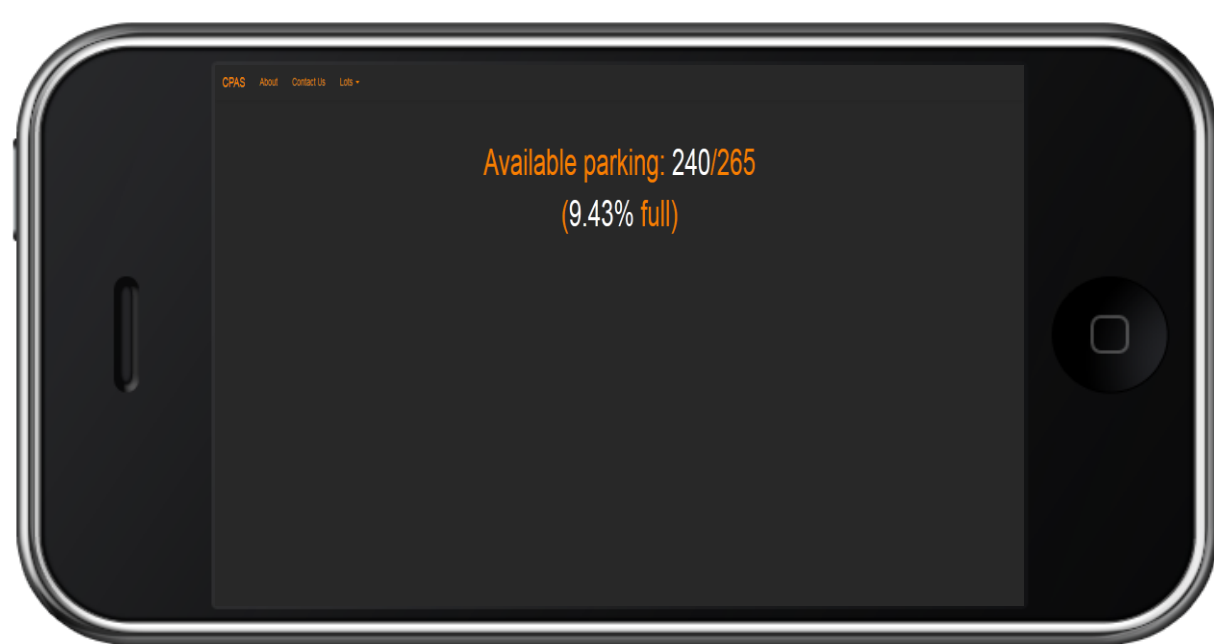
Team 27: Patrick Elam (Lead), Nathan Peck, David Lu, Benjamin Mills, Jacob Lambert, Andrew Stubbs
Customer: Dr. Mark Dean, UT College of Engineering

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Introduction

Why can't I find a place to park? Is there another place to park besides this packed parking garage? If you are a daily commuter to the University of Tennessee campus, these are questions that may or may not cross your mind at least once or twice a week as you scour campus seeking just one open parking space. Our project, The University of Tennessee Campus Parking Availability System (UT-CPAS), combats these issues by streamlining and de-stressing the commuter parking experience at UT. **The function of UT-CPAS is to provide campus commuters access to a mobile website designed to inform them of the available parking options on the UT campus in real time.**



Materials and Methods

Physical Components Per Lot:

- 2 MAXBOTIX MB-7060 Ultrasonic Sensors (Per Lot Entrance)
 - Sensor I/O => DB9/RS-232 cable => USB => Raspberry Pi
- 1 Raspberry Pi SBC w/:
 - Wi-Fi dongle attachment
 - 5V micro-USB Power Supply connected to USB AC/DC adapter.
- AC power taken from a 120 VAC mains outlet in P2/C5 garage infrastructure.

Back-End Components:

- OIT Linux Server

Software Packages:

- MySQL Database Manager
- Apache Server Software

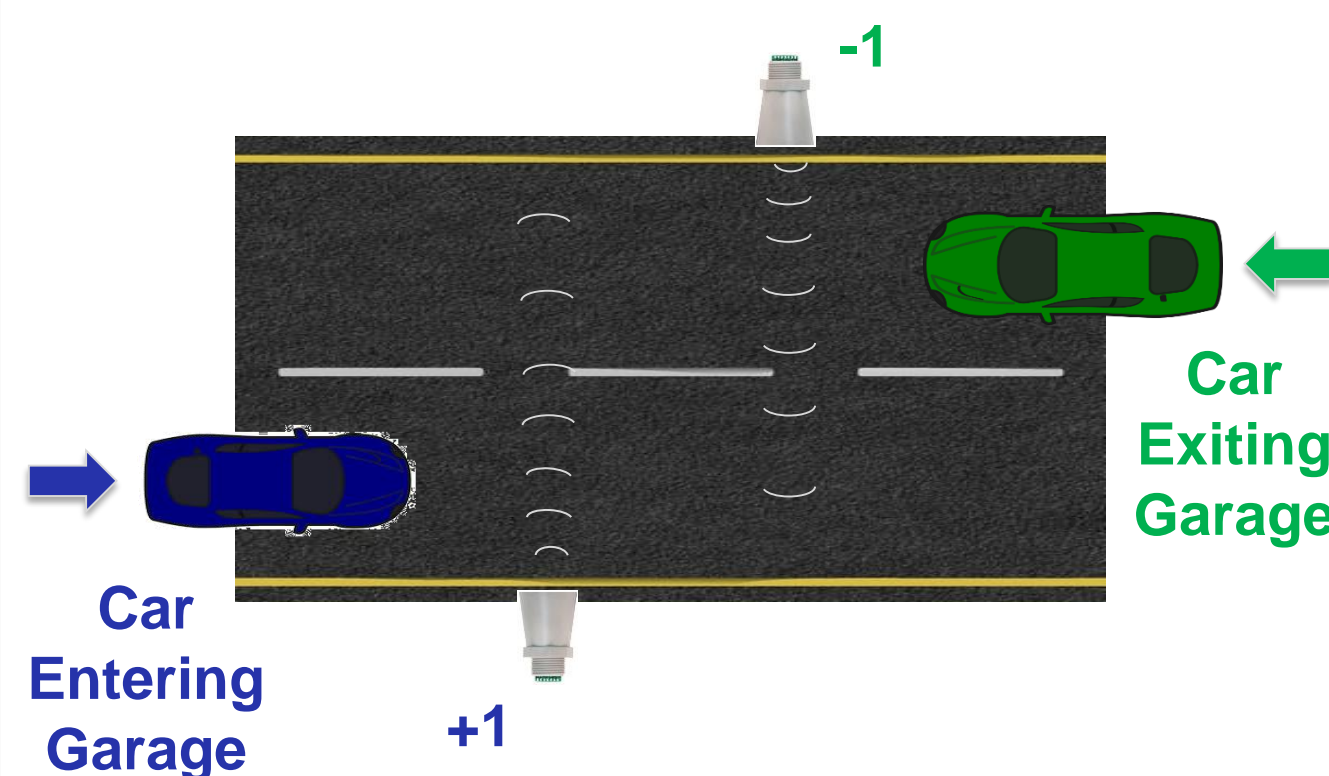
Other Software:

- Website (URL: cpas.eecs.utk.edu)

Results



Two ultrasonic sensors are placed at the entrance to Parking Garage P2/C5 on Lake Loudon Boulevard. As a vehicle passes the view field of either sensor, positive signals are transmitted to the Raspberry Pi for processing. Depending on which sensor detects the vehicle within its valid reading range, the Pi's algorithm will decide whether cars are entering or leaving a lot and apply a +1 or -1 count to a total. This total value is compared with the lot's maximum capacity in real time. Once every minute, this comparative data is communicated to a Linux server and stored in a MySQL database.



Additionally, we developed a website that can accommodate mobile devices. This website accesses the database and pulls data from it using a PHP script. The current number of available spots in P2/C5 can be found under the "lots" tab. As the semester ends, we aim to add an analytics tool that generates a PDF document after each day. This PDF would include graphs showing hourly occupancy statistics for each day.

Conclusions

Overall, the project was a success, and we were able to construct a system that accurately communicates parking spot availability information for a parking garage to a website. Development of the UT-CPAS system required several components, including physical ultrasonic sensors, communication hardware, and server hardware. These hardware components required software to relay the

data to a central database, handle data requests, and analyze the data. The system supports a website that analyzes the collected data and displays it to the user via a website. UT-CPAS has a lot of potential for additional modification and, for approximately \$250 in total, provides a service that would otherwise cost much more



Literature cited

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EECS Senior Design

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