Automated Parking Management System

Overview
Our project goal was to design a parking management system that would enable the user to reserve and pay for a parking spot via an App for the Android phone. This was done by creating a sensor circuit at each parking space, and having both the App and the sensor communicate with a database we created. The sensor circuit also contained an LED array, which displayed the state of the parking space to viewers based on the color they turned. We validated that the car parking in a reserved space was the same one that reserved it by using Bluetooth to search for the phone.

Objectives
Our objective was to build a fully functioning prototype for the system described above.

Approach
- Did a patent search of similar products.
- Visited Harris Corporation to better understand what they wanted and determine design goals.
- Created a server to store all information about the parking spaces. This server served as the interface between the App and the micro-controller at the parking spaces. Server functions were coded in C++.
- Wrote an App in Java for the Android phone which provided a user interface and allowed the user to select and reserve a parking space. It communicated with our server.
- Installed Linux onto the micro-controller and wrote C code to control wireless communication with the server, the sonar sensor, the LED array and the android phone.
- Wired an interface circuit between the micro-controller and sonar sensor out of buffers and logic gates.
- Wired an LED circuit to display the state of a parking space based on the color it turned.
- 3D printed a case for the hardware located at the parking spaces. The entire case glowed different colors due to the LEDs inside.
- Tested and debugged our project until it operated successfully.

Outcomes
We successfully completed all of our project requirements. The system we created functions as intended. Our sponsors appeared to be impressed with our results.