ParkingEaze

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INTRODUCTION

In Today's world traffic flow, distribution, and accessibility of parking space, have been a major concern to every person in daily routine which makes it an important issue. There is a lot of consummation of time and resources for drivers who spend their precious time driving along the streets in search of parking space and then also going through the long process to pay the parking fees.

To solve this necessity of vehicle parking, we introduce a parking project called ParkingEaze. The ParkingEaze Project enables customers/drivers to online reserve a parking space using the mobile application.

The purpose of this project is to provide the user the convenience to park their vehicle as per their requirement using the app.

AIM

Parking is a worldwide problem, especially when people are unaware of spaces, costs, and policies that result in a waste of time, crowding and frustration. Our project aims to solve these problems by using such sensors and effectors which in coordination with our mobile application makes it easier for our users to park and pay in a fast and efficient manner. With the help of our technical skills and professor's guidance, we used the features and key points of different sensors and effectors. The list of Required resources used are

•Infrared sensor

•Ultrasonic sensor

•Bipolar stepper motor

•LCD module

•Raspberry pi

Moreover, the customizable development of the mobile application is being developed to deliver a trustworthy finished product under a low-cost budget.

Bill of materials

Besides parts kit which each of our group members was having other materials budget is given below

Total = $175.67

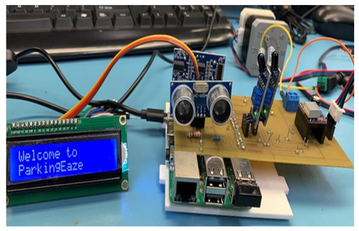
Budget summary

Category	Total
HC-SR04 ultrasonic sensor	$16.09
LCD Display	$9.73
Bipolar Stepper Motor	$43.00
DRV8825 Stepper Motor Driver Module	$14.88
Raspberry Pi 3	$79.99
EK1254 IR Infrared sensor	$11.98

Budget for the components used for the hardware production

METHOD

The hardware of this project is created by adjoining essential sensors such as HCSR04 ultrasonic sensor, Ek1254 infrared sensor along with effectors like LCD Module and Bipolar stepper motor. Raspberry Pi 3B+ is used as the Broadcom for this project. To connect all the elements, a PCB was created using Fritzing software and Humber Prototype Lab. Functioning of the PCB was tested using the multimeter and connecting it with the VCC and the Ground of it.



PCB with all the elements connected to it.

The firmware of this project was written in python script. It had two major python codes, one for connecting the infrared sensor with the bipolar stepper motor which scan the car before the barrier and give the information to the motor to raise or lower the Barrier. The second code connects the ultrasonic sensor with the LCD which evaluates if there is any car in the parking lot and continuously updates the LCD with the number of parking slots available. Both the codes were able to run by using "&" with it to make it as foreground and background code to keep the track of it.

The firmware code is modified to integrate the hardware with the python code to make the hardware interact with one other. In the previous semester, the hardware components were developed on an individual basis. But now all the sensors and effectors are combined to accomplish an integrated project.

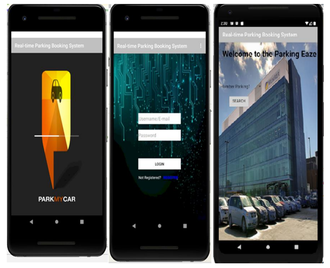
First of all, all the components are tested on the breadboard using the jumper wires after researching how to connect parts along with examining the firmware code too. After knowing that it successfully works on the breadboard, a design for PCB is created. Then, the sensors and effectors are integrated using the PCB which shows the same results as the integration was operative and giving the right results that we have planned to do for the integration.

To sum up, when the vehicle will be to approach the parking space, the barrier will be triggered through the infrared sensor after which the car goes into one of the parking lots. The number on the LCD will be changed immediately for the number of parking lots available with the help of the ultrasonic sensor. It will be changing every time any vehicle enters or exit the parking lot

RESULTS

The ParkingEaze mobile application provides a reliable user interface and easy to navigate functionality in it. The app. first opens up with a splash screen with a time delay of 3sec to load and then provides the user to:

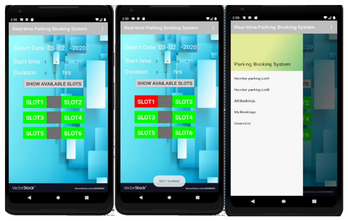
1. Register as a new user.
2. Login access with the same credentials.
3. Navigate between 2 different parking lots.



Preliminary interface of the ParkingEaze app.

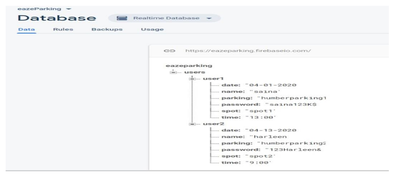
Once the user is logged in and selected the parking lot, it gives the user access to:
1. Select the date- The date user wants to park the car.
2. Start time – At what time the user wants to park the car in the parking slot.
3.Duration – For how long the user wants to park its car for.

After filling all the necessary details, on clicking the "Show available slots" 6 specific slots will be shown in green color meaning that the slots have not been booked. Once the user selects the slot, it turns the color to red and generated the toast message saying "Slot # booked! ". For more functionality, this app also provides navigation drawer with information such as "My bookings " where the user can see all the prior booked slots.



Choosing time and Booking of Parking slot

All the information and the selections made by the user are sent to the server-side database connected with the firebase. Here the admin can see the details of the user such as the name of the user, time and date the slot is booked, slot number.



Database showing the information added by the user.

PRINTING

The case is built using the laser-cut technique and the application used to design the case was the MakerCase. Some necessary changes were made using Corel draw software like adding some holes and slits in the design to give a pathway to the sensors, effector, jumper wires and the motor. The motor covers are made of 3D printing on the top and bottom but it is also covered with acrylic so it gets enclosed completely and properly. Two barriers were also designed one, with the 3D printing technique and the other with the acrylic material. Two acrylic rectangular stands are also included in the design, one is kept at one of the corners of the base just for a better look of the parking lot and the other is designed and placed in the center to hold the LCD which displays the available parking spots.

The final enclosure with dimensions of our tool box.

CONCLUSIONS

The project for the parking is accomplished to an extent of showcasing it as a finished one. Further improvements can be done in the android application to make it more effective and user-friendly. Moreover, new features can be included in the design and functionality such as providing more options for the user. The experience of making the android application and hardware production provides the necessary skills which make us being capable of moving to advance steps for the project development. We are moving forward to fix the errors and troubleshooting the software application along with working on the database. Although hardware components are integrated and work accordingly yet further changes and modifications can be considered to grow the parking space for additional plans in the future. Overall, the project has allowed us to solve a real-world problem through this course as we learn vital technical skills and knowledge using both hardware and software.

ACKNOWLEDGEMENTS

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