Final Project Proposal

Year: 2016 Semester: Fall Team: 7 Project: ANPR Parking System

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Team Members (#1 is Team Leader):

Member 1: Zhihao Liu Email: liu869@purdue.edu

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Member 4: Tian Qiu Email: qiu58@purdue.edu

1.0 Project Description:

There are a lot of cars but the management of them is still poor. Let’s take the parking garage as an example. For hourly or daily garages like those in an airport, drivers have to get their ticket when they start parking and pay at the ticket machine or at the exit when they leave. If you are in a hurry to catch your flight, this cumbersome process will definitely cause you a lot of trouble. Also, people can lose their tickets and that will probably take even more time for them to deal with. On the other hand, from the garage owner’s perspective, cheaters may try to tailgate another car so that they can park for free, which is a pain for many garage owners. If drivers are looking for a garage with parking permit, they still need to obtain their permits through mail or go to the office to get one, which means they need hire a custodian to maintain the service. The procedure of those activities can be reduced and thus the cost will be reduced.   
  
With the problem described above, we came to an idea that address the root of the problem from the beginning. For this particular design course, we will build a prototype that solves the problem happened in parking garages. Our design is to turn the manual work into a digital process. We decide to use camera to obtain a picture from the front or rear of the car, then send the picture to our process server. Our server will analyze the picture and figure out the corresponding plate number. If the driver does have a parking permit, then the system will open the barrier gate via the microcontroller. After that, assistant LEDs will lead the driver to an available parking spot according to the information gathered by the sensors.

2.0 Roles and Responsibilities:

1. Zhihao Liu
   1. Team leader - Provides direction and guidance among team members, integrates software and hardware, ensures team is progressing and assists team members in addressing issues.
   2. Hardware engineer - designs hardware, including the printed circuit board.
2. Tian Qiu - Responsible for high level functional overview of the system, component selection, and implementation of the plate image processing program.
3. Kaiwen Yu - Software engineer - Responsible for image capture and processing. Implements programs to recognize the plate number and manage user data. Also help on project packaging.
4. Zhuofan Li - Hardware engineer - Responsible for designing, developing and testing hardwares, including microcontroller, raspberry pi, sensors and PCB. Also in charge of board construction and packaging assembly.

2.1 Homework Assignment Responsibilities

|  |  |  |  |
| --- | --- | --- | --- |
| *Design Component Homework* | | *Professional Component Homework* | |
| 3-Software Overview | ZLiu | 9-Legal Analysis | TQ |
| 6-Electrical Overview | KY | 10-Reliability and Safety Analysis | ZLiu |
| 7-Mechanical Overview | Zli | 11-Ethical/Environmental Analysis | ZL |
| 8-Software Formalization | TQ | 12-User Manual | KY |

3.0 Estimated Budget

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Number | Name of Part | Unit Price(USD) | Quantity | Total Price(USD) |
| 1 | PCB | 100 | 1 | 100 |
| 2 | Microcontroller | 60 | 1 | 60 |
| 3 | Infrared Sensor | 1 | 10 | 10 |
| 4 | LEDs | 20 | 1 | 20 |
| 5 | Demo Car | 40 | 2 | 80 |
| 6 | Raspberry Pi | 100 | 1 | 100 |
| 7 | Wires | 5 | 1 | 5 |
| 8 | Board | 20 | 1 | 20 |
| 9 | Motor | 5 | 1 | 5 |
| 10 | Other Materials | 30 | 1 | 30 |
| 11 | Total Price |  |  | 430 |

4.0 Project Specific Success Criteria

1. PSSC #1: An ability to raise and lower a gate bar programmatically.
2. PSSC #2: An ability to detect the presence or absence of a vehicle from an embedded sensor node.
3. PSSC #3: An ability to use microcontroller to display parking lot occupancy status.
4. PSSC #4: An ability to capture image of plate using camera while the car is idle at the gate.
5. PSSC #5: An ability to track individual parking time according to the recognized plate number.

5.0 Sources Cited:

1. “Raspberry Pi Blog - News, Announcements, and Ideas,” *Raspberry Pi*. [Online]. Available: <https://www.raspberrypi.org/blog/>.