

Proposal for the development of PartsCrib Management System

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Computer Engineering Technology Students

<https://github.com/c3ko/SecondFactorKeypad>

Executive Summary

As a student in the Computer Engineering Technology program, I will be integrating the knowledge and skills I have learned from our program into this Internet of Things themed capstone project. This proposal requests the approval to build the hardware portion that will connect to a database as well as to a mobile device application. The internet connected hardware will include a custom PCB with the following sensors and actuators KeyPad, RFID reader, GPS sensor. The database will store key-Value Pairs consisting of student number and 5 pin number.. The mobile device functionality will include the ability for students to check which items are available and to make a request to borrow them. and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department Humber College Parts Crib. In the winter semester I plan to form a group with the following students, who are also building similar hardware this term and working on the mobile application with me Mohamed Kore, Gurkuran Padda, Ricky Ramnath. The hardware will be completed in CENG 317 Hardware Production Techniques independently and the application will be completed in CENG 319 Software Project. These will be integrated together in the subsequent term in CENG 355 Computer Systems Project as a member of a 2 or 3 student group.

Background

The problem solved by this project is Problem: The slow and tedious system in place for lending electronics from the parts crib to students. The process requires the use of large amounts of paper each day and it is difficult for the parts crib to track important trends such as which items are being requested the most at certain times.. A bit of background about this topic is It's not a rare occurrence for items to missing at the parts crib and the time required to track down which student didn't return an item is costly. The goal of this project is to implement a system that will allow the parts crib to keep an electronic catalogue of items loaned out to students. Students will be able to use a mobile android-based application to see what items are available and to request them using their student credentials..

Existing products on the market include [1]. I have searched for prior art via Humber's IEEE subscription selecting "My Subscribed Content"[2] and have found and read [3] which provides insight into similar efforts.

In the Computer Engineering Technology program we have learned about the following topics from the respective relevant courses:

- Java Docs from CENG 212 Programming Techniques In Java,
- Construction of circuits from CENG 215 Digital And Interfacing Systems,
- Rapid application development and Gantt charts from CENG 216 Intro to Software Engineering,
- Micro computing from CENG 252 Embedded Systems,
- SQL from CENG 254 Database With Java,
- Web access of databases from CENG 256 Internet Scripting; and,
- Wireless protocols such as 802.11 from TECH152 Telecom Networks.

This knowledge and skill set will enable me to build the subsystems and integrate them together as my capstone project.

Methodology

This proposal is assigned in the first week of class and is due at the beginning of class in the second week of the fall semester. My coursework will focus on the first two of the 3 phases of this project:

Phase 1 Hardware build.

Phase 2 System integration.

Phase 3 Demonstration to future employers.

Phase 1 Hardware build

The hardware build will be completed in the fall term. It will fit within the CENG Project maximum dimensions of 12 13/16" x 6" x 2 7/8" (32.5cm x 15.25cm x 7.25cm) which represents the space below the tray in the parts kit. The highest AC voltage that will be used is 16Vrms from a wall adaptor from which +/- 15V or as high as 45 VDC can be obtained. Maximum power consumption will be 20 Watts.

Phase 2 System integration

The system integration will be completed in the fall term.

Phase 3 Demonstration to future employers

This project will showcase the knowledge and skills that I have learned to potential employers.

The brief description below provides rough effort and non-labour estimates respectively for each phase. A Gantt chart will be added by week 3 to provide more project schedule details and a more complete budget will be added by week 4. It is important to start tasks as soon as possible to be able to meet deadlines.

COM-14662 12-Button KeyPad, RC522 RFID reader, stm32f103c8t6, GPS sensor, Raspberry Pi

Concluding remarks

This proposal presents a plan for providing an IoT solution for Students will use a RFID reader to scan a tag placed on their card along. They will then input a randomly-generated 4 digit number generated using a phone app. The app will only work when used on the Humber network. Thus, there is no requirement to verify student identity manually at the part crib as the code was generated on password-protected phone (mandated by my-wifi@humber).. This is an opportunity to integrate the knowledge and skills developed in our program to create a collaborative IoT capstone project demonstrating my ability to learn how to support projects such as the initiative described by [3]. I request approval of this project.

References

[1] (2018, November 16). Modis Lock. Retrieved from <https://modis.io/modis-lock/>

[2] Institute of Electrical and Electronics Engineers. (2015, August 28). IEEE Xplore Digital Library [Online]. Available: <https://ieeexplore.ieee.org/search/advsearch.jsp>

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