

Proposal for the development of Parts Crib Database

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<https://github.com/IfeoluwaDavid/PartsCribDatabase>

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 USB Barcode Scanner, Magnetic Strip, PC2 Barcode Scanner.. The database will store Information on the various available parts crib tools and equipment in a categorized manner. It will also store student information like names, student IDs, email and tools they have in possession.. The mobile device functionality will include User Sign Up (i.e. student or admin), Ability to Search and Select Equipment Available at the Parts Crib, Display Record of Equipment already booked by the student, View all student holding a particular item, Edit and Approve Student Equipment Cart, Update Student Equipment Returns, Edit Item information, Display Inventory etc. and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department Humber College Applied Technology 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 Mohand Ferawana and Tosin Ajayi. 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 the frequent loss of materials to unidentified students and the cost of manpower used in the Parts Crib Services as well as cost of papers used on a daily basis as a result of students having to manually list and sign out the items needed before borrowing them.. A bit of background about this topic is Simply the collection of the necessary student data like student names and IDs, email addresses etc. and associating them with randomly generated and registered barcode pins for easy student identification. These barcode pins will be the main information required to figure out which student has what equipment in possession. It simply implements a database consisting of different tables holding valuable information on the various available tools and equipment in a categorized manner, as well as administrative user and student user information. This will surely help improve accountability for materials in the Parts Crib, in order to keep good record of them.

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.

Raspberry PI 3 Unit and USB Interfaced Barcode Scanner Module.

Concluding remarks

This proposal presents a plan for providing an IoT solution for From an Administrative perspective, this project will be highly beneficial to the Parts Crib Employees in the sense that, it will heavily improve accountability for tools and equipment in the crib, just like a library keeping record of the books coming in and going out, It will also speed up the process of borrowing out equipment to students during peak hours for lab sessions. From the user perspective, It can also help provide students with information on the kind of tools and equipment available at the parts crib before their lab sessions, as well as keep a digital record of the parts crib tools they have in possession.. 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] Iron Tread Mobile App. (n.d.). Retrieved from <https://play.google.com/store/apps/details?id=irontread.com.irontreadinspector&hl=en&rdid=irontread.com.irontreadinspector>
- [2] Institute of Electrical and Electronics Engineers. (2015, August 28). IEEE Xplore Digital Library [Online]. Available: <https://ieeexplore.ieee.org/search/advsearch.jsp>
- [3] X. Wang, J. Liu and H. Yi, "Design of Multifunctional Barcode System Based on MEGA128L," 2011 International Conference on Control, Automation and Systems Engineering (CASE), Singapore, 2011, pp. 1-4. doi: 10.1109/ICCASE.2011.5997548. URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5997548&isnumber=5997514>