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Proposal for the development of Parts Crib DataBase

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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 sensors and actuators for **Parts Crib Database**. The database will **store information of students whom rent out items from the parts crib**. The mobile device functionality will include **list amount of each item in the parts crib and how many are left after being rented out and** will be further detailed in the mobile application proposal. I will be collaborating with the following company/department **Humber College Information Technology**. 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 are **Rafil Yashooa and Divesh Oree**. 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 project is it will improve the efficiency of students taking out items from the parts crib. This project will connect to a database and keep track of students with their full names, student numbers and items. There will be bar codes for each items in the parts crib that will be linked to the database that contains every item in the parts crib. When a student takes out items from the parts crib their card will be scanned with the items that are taken out. This will put the students in the list(database) of students who taken out items from the parts crib. This will intern keep track of all items taken out and help keep everything organized. The application (app) then will be used to list all the items available in the parts crib and will be available to all students in the campus. The app will be presented in a listed form that will have detailed information of the items in the parts crib and help students know which item to take out.

I have searched for prior art via Humber's IEEE subscription selecting "My Subscribed Content"[1] and have found and read [2] 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 tables below provide 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.

Labour Estimates	**Hrs**	**Notes**
Phase 1		
Writing proposal.	9	Tech identification quiz.
Creating project schedule. Initial project team meeting.	9	Proposal due.
Creating budget. Status Meeting.	9	Project Schedule due.
Acquiring components and writing progress report.	9	Budget due.
Mechanical assembly and writing progress report. Status Meeting.	9	Progress Report due (components acquired milestone).
PCB fabrication.	9	Progress Report due (Mechanical Assembly milestone).
Interface wiring, Placard design, Status Meeting.	9	PCB Due (power up milestone).
Preparing for demonstration.	9	Placard due.
Writing progress report and demonstrating project.	9	Progress Report due (Demonstrations at Open House Saturday, November 7, 2015 from 10 a.m. - 2 p.m.).
Editing build video.	9	Peer grading of demonstrations due.
Incorporation of feedback from demonstration and writing progress report. Status Meeting.	9	30 second build video due.
Practice presentations	9	Progress Report due.
1st round of Presentations, Collaborators present.	9	Presentation PowerPoint file due.
2nd round of Presentations	9	Build instructions up due.
Project videos, Status Meeting.	9	30 second script due.
Phase 1 Total	**135**	
Phase 2		
Meet with collaborators	9	Status Meeting
Initial integration.	9	Progress Report
Meet with collaborators	9	Status Meeting
Testing.	9	Progress Report
Meet with collaborators	9	Status Meeting
Meet with collaborators	9	Status Meeting

Incorporation of feedback.	9	Progress Report
Meet with collaborators	9	Status Meeting
Testing.	9	Progress Report
Meet with collaborators	9	Status Meeting
Prepare for demonstration.	9	Progress Report
Complete presentation.	9	Demonstration at Open House Saturday, April 9, 2016 10 a.m. to 2 p.m.
Complete final report. 1st round of Presentations.	9	Presentation PowerPoint file due.
Write video script. 2nd round of Presentations, delivery of project.	9	Final written report including final budget and record of expenditures, covering both this semester and the previous semester.
Project videos.	9	Video script due
Phase 2 Total	**135**	
Phase 3		
Interviews	TBD	
Phase 3 Total	**TBD**	
Material Estimates	**Cost**	**Notes**
Phase 1		
Raspberry pI 3.0(Kit), HDMI, Webcam, LED lights, PCB, Speaker	189	
Peripherals with cables		
Sensors		
Phase 1 Total	**>$200.00**	
Phase 2		
Materials to improve functionality, fit, and finish of project.		
Phase 2 Total	**TBD**	
Phase 3		
Off campus colocation	N/A	N/A
Shipping	*25*	
Tax	*18*	
Duty	*N/A*	
Phase 3 Total	**43**	

Concluding remarks

This proposal presents a plan for providing an IoT solution for Parts Crib. 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 our group, Humber parts crib. I request approval of this project.(Bulan & Sharma, 2011; Deng et al., 2015; Muniz, Junco, & Otero, 1999)

References

Table of Contents

Declaration of Sole Authorship

Approved Proposal

Abstract

Illustrations and Diagrams

1. Introduction
2. Software Requirements Specifications (SRS)

2.1.1 Purpose

2.1.2 Product Overview

2.1.3 Targeted Audience Group

2.2 Product Information

2.2.1 Main Functionality

2.2.2 Extra Requirements

2.2.3 Best Performance

2.3 Overall Description

2.3.1 Database

2.3.2 Hardware

2.3.3 Mobile Application

2.3.4 Web Application

2.4 Future Considerations

2.4.1 Operating Environment

2.4.2 Safety Considerations

2.4.3 Future Additions

2.4.4 Work Breakdown

3. Conclusions

4. Recommendations

5. Progress Reports

Declaration of Joint Authorship

The work that is specified in this report is a joint project by Masoud Rahguzar, Rafil Yashooa, and Divesh Oree. The work that has been done is our own and is expressed in our own words. We have clearly defined all work cited using the APA format expressing the authors/owners and their information. All work in this project is divide equally.

Approved Proposal

Abstract

The reason for this project is to develop a new parts crib system that is efficient and reliable, instead of the present way of using paper slips that are used to sign out items. The parts crib is an area that is used for technology students at Humber who can sign out hardware items that can be useful for labs and projects which is very useful. Our project will consist of three major hardware parts the Raspberry pi, webcam and barcodes. Raspberry pi is the brain of the operation computing and processing all the

active in the parts crib. The webcam is the eyes of the operation by scanning the barcodes. Lastly, the barcodes hold the information to identify each item in the parts crib and students who take out items. All information will be fetched to a database that will categorized using firebase. The database will be working along with our app and website, these applications will be used for showing the inventory status of the parts crib. In addition, the applications will also be used for the administrator (individual who works at the parts crib.) whom will have additional options to manipulate the inventory status and the students who took out items. This is brief description of our project.

1. Introduction/Overview

The main point of this project is to create a new parts crib system that is more efficient and more advanced than just using paper slips to sign out item from the crib. What I have in mind for the project is to create a barcode scanner using either a web cam or either a laser scanner (if we can afford one) to scan student numbers and items that will be checked out by the students.

So, when a student comes to the parts crib for an item, they will be assigned a barcode will their student number if it's their first time coming and then they'll be ready for item take out. All the administrator has to do then is to scan the student number and then start scanning then items that that user requested as they will each have a barcode. After the scanning is done, the user is ready to go and their student number will be stored in the local database on the raspberry pi.

The barcode scanned will be processed by the raspberry pI which will store it on the SQL database and then the application fetches from the database and displays the information. Note: only administrators will be able to view the student numbers, regular users will only be able to view the inventory count of items in the crib.

2. System Requirements Specifications

The goal of this project is to create a better system for the Humber part's crib system. It is a more organized way of signing in and out items. This application is going to receive data from a Raspberry Pi that will be used as our hardware device located in the parts crib. The user has to first scan the student id and that is recognized by the first 'n' character. And then scan the part number which will be identified by a 'p' character. Every item that the user will scan will go under the student's name for check out which will go to a database stored in the raspberry pI.

This application is designed for an android device. This project also cannot work offline due to the database being a huge part of the hardware aspect. However, internet availability in the college is very static and will no need to be offline at anytime

2.1.1 Purpose

2.1.2 Product Overview

2.1.3 Targeted Audience Group

2.2 Product Information

2.2.1 Main Functionality

2.2.2 Extra Requirements

2.2.3 Best Performance

2.3 Overall Description

2.3.1 Database

For our capstone project this term, we are building a PartCrib system which hopefully be successful enough to be used by the Humber's parts crib department. This project consists of 2 major parts, hardware and software. And in order to have the hardware interact with the software, we need them both to be connected to the same database so that one can send data and the other receive data, and vise versa.

The hardware part of this project is going to act as a scanner to scan barcode items and student id barcode. After it scan them successfully, the database would create a table for each student id it scans with a row of the exact time stamp and part number. Students would be able to sign out multiple items at once since the table can handle many rows under it.

The software part would be the project's android application and it would retrieve data from the database and display it live to the application. The data it retrieves would be based on the user's privilege, if it was an administrator using the app, it would display the full database with the student numbers and part numbers. But if it was only a guest browsing the app, it would only display the inventory with the items available in stock to sign out.

For the database, we are going to be using an SQL based service, the database we have up and running right now is firebase which doesn't allow full access to retrieve data to the application. We are either going to find a solution for this or use an SQL server running on another computer which is going to be port forwarded from home.

2.3.2 Hardware

The Humber parts crib is a project that will be able to keep track of students who take out and return items from the crib. This will occur because of three main hardware components; the raspberry pi, a camera, and barcodes. The raspberry pi is basically single-board computer which will be the brains of the project by computing and keeping track of all the student's activity in the parts crib by using the code/program implement by us the developers. Secondly, the camera, an important hardware component because it will be used to scan items in the parts crib which then will be sent to the raspberry pi. Lastly, the paper barcodes will be used to identify the items in the parts crib when scanned by the camera. In addition, the Humber parts crib project will have additional hardware components such as LED lights to notify when an item is scanned or when it is unable to be scanned and there will also be a sound bar implementing the LED characteristics but with sound.

identified by a 'p' character. Every item that the user will scan will go under the student's name for check out which will go to a database stored in the raspberry pi.

This application is designed for an android device. This project also cannot work offline due to the database being a huge part of the hardware aspect. However, internet availability in the college is very static and will no need to be offline at anytime

2.3.3 Application

The application for the Humber parts crib is an interactive, simple and user-friendly app (available only on android) that has the potential of being very useful for students at Humber. The app will consist of two types of users, the first being the student user and the second being the administrator. The student users in the app will only have access to the inventory status of the items in the parts crib. The administrator users will have a username and password that will give them access to everything in the app such as inventory status, database, add items and delete items. The way the app will continuously update the inventory status is by the use of a database program called firebase.

2.3.4 Database with Web Interface

For our Humber Part Crib project, our web interface will be designed using a two-tier architecture where the administrator will communicate and interact with a server. The web application will be based on a Java platform where it will communicate directly with a firebase database by using the appropriate Java Database Connectivity API. The latter will use his credentials that is his email address and password in order to log in. Inside the database, the administrator will have the privilege to check all the items available in the inventory, remove a student once the items have been returned, and also add a new student with the item parts which are being signed out from the crib.

As the database, will be connected on the Humber Server, we expect the wireless internet connection to be fast enough and is connected to the right access point so that the administrator can perform his daily task without any difficulty and hence making this whole project an effective one.

2.4 Future Considerations

2.4.1 Operating Environment

2.4.2 Safety Considerations

2.4.3 Future Additions

2.4.4 Workload Breakdown

The work break down will consist of three sections the first is the database, the second is the hardware and the last section is software. Rafil Yashooa will be responsible for the database which he will connect the app/website and the hardware together to work seamlessly together. Masoud Rahguzar will be responsible for the hardware, printing a PCB which will connect the speaker to the Raspberry Pi and many other additional hardware aspects. Lastly, Divesh Oree will be responsible for the software of the app and website by making user-friendly and functional.

3. Conclusions

4. Recommendations

5. Progress Reports

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