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Proposal for the development of Humber Campus Navigator

Prepared by Bettin Jacob, Ishan Khuttan, and Anoopjot Kaur Dhallu
Computer Engineering Technology Students
https://github.com/HumberCampusNavigator/Capstone

Executive Summary

As students in the Computer Engineering Technology program, we will be integrating the knowledge and skills we have learned from our program into this Humber Campus Navigation 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

1. LSM9DS0 9-axis accelerometer, Gyroscope, Magnetometer and Temperature sensor.
2. 1.8 TFT Color Display ST7735
3. Tmp-36 Temperature sensor

The database will store the temperature readings from LSM9DS0. The mobile device functionality will include 1. Showing the path from a current location to a destination and 2. Displaying the temperature of the room selected and will be further detailed in the mobile application proposal. We will be collaborating with the Sustainability department of Humber College. In the winter semester we formed a group of three,

1. Bettin Jacob 2. Ishan Khuttan 3. Anoopjot Kaur Dhallu,

who are working together on the mobile application. The hardware was completed in CENG 317 Hardware Production Techniques independently and the application was completed in CENG 319 Software Project. These will be integrated together in this term in CENG 355 Computer Systems Project as a group.

Background

The problem solved by this project is 'Humber College Incampus Navigation'. A bit of background about this topic is given below,

All the existing in-campus navigation is using GPS signals[2]. There is no existing product for an incampus navigation at Humber College. When we were new to college, we used to roam inside the campus to find anything within the campus. It was really tiresome. Even in last semesters students face difficulty to explore new places in Campus. For students it is really hard to navigate within the campus. We are designing an application which helps students to navigate within the campus from any point to any point in short time and the app will display the temperature of the rooms they visit. We use QR codes to identify the current location of a user.

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 us to build the subsystems and integrate them together as our 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 was 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 this Winter-2019 term. We need to design a PCB board which can stack all the sensors on a single board, so that the integration is complete. So the temperature readings from the LSM9DS0 sensor will be displayed on '1.8 TFT Color Display ST7735' screen and the temperature readings from LSM9DS0 will be verified by the temperature readings from Tmp-36 Temperature sensor, which also will be displayed on the '1.8 TFT Color Display ST7735' screen.

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-labor 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.

Concluding remarks

This proposal presents a plan for providing an In-campus Navigation for Humber College Students and visitors. This is an opportunity to integrate the knowledge and skills developed in our program to create a collaborative capstone project demonstrating our ability to find solutions for real world problems. I request an approval for this project please.

References

[1] Dionido, R.S., & Ramos, M. C.(2017). Autonomous seed-planting vehicle. Retrieved from https://ieeexplore.ieee.org/document/8284391/

[2] Jana S., & Chattopadhyay M.(2015). An event-driven university campus navigation system on android platform.Retrieved from https://ieeexplore.ieee.org/document/7083850/