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Proposal for the development of Greenhouse System Scale Model

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<https://github.com/McAdieCENG/CENGProject>

Executive Summary

The database will store Temperature, Humidity, Soil Moisture Levels. The mobile device functionality will include The mobile application will display temp, humidity and soil moisture levels when the user logs in. They will also be given the option to access a camera to take a picture to post on social media. I will be collaborating with the following company/department I will be collaborating with Humber Arboretum. 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 Myself (Ryan McAdie), Daniel Bujold. 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 real life problem being solved by this project is that Humber arboretum and several other nurseries don't have a proper system to measure temperature, humidity and soil moisture levels. This monitoring system will help them to keep track of everything related to the health of the habitat.. A bit of background about this topic is Humber Arboretum needs a system to measure and display, in real-time, the appearance, temperature, humidity, and soil moisture of the plants in its nursery. Through an app, employees can view these measurements online. It will be connected to the firebase database through the internet. Firebase server will hold all the levels measured by the sensors and will send it to the mobile application. The mobile application will display those levels on the screen when the user's login. There is an additional camera option in the app which will allow users to click the picture and share it on social media..

Existing products on the market include "Sensaphone Remote Monitoring Solutions Greenhouse Remote Monitoring Systems", "Climate Control Systems Greenhouse Sensor Systems" and "Monnit Remote Monitoring Systems for Greenhouse Monitoring".

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-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.

A Raspberry Pi, a BME280 sensor, an EK1940 sensor and possibly a camera that we can hook up to the RPi to take remote photos

Concluding remarks

This proposal presents a plan for providing an IoT solution for To build a device capable of reading temperature, humidity and soil moisture to be used in plant nurseries. Along with a constructed mobile application that can be used to access a database to show users real-time information regarding temp, humidity and soil moisture. 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 Humber Arboretum. I request approval of this project.

References

- [1] (n.d.). Monnit Remote Monitoring Systems for Greenhouse Monitoring. Retrieved from <https://www.monnit.com/solutions/greenhouse-monitoring> Labbate, E. (2018, March 19). Greenhouse Sensor Systems for Real Time Monitoring and Control Greenhouse Automation Systems. Retrieved from <https://www.climatecontrol.com/blog/greenhouse-sensor-systems/>
- [2] Institute of Electrical and Electronics Engineers. (2015, August 28). IEEE Xplore Digital Library [Online]. Available: <https://ieeexplore.ieee.org/search/advsearch.jsp>
- [3] An IoT-Based Traceability System for Greenhouse Seedling Crops G. Ramirez-González (2018). . IEEE Access, 6, 67528-67535. <https://ieeexplore.ieee.org/document/8502066>