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Proposal for the development of GPS Sensor

Prepared by Ricky Ramnath
Computer Engineering Technology Students
https://rickyramnath97.github.io/gps/

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 Adafruit Ultimate GPS Breakout - 66 channel w/10 Hz updates - Version 3. The database will store Location of each parts crib. Student Names, ID's, E-Mail Adresses, and a randomly genrated pin for easy identification.. The mobile device functionality will include To enhance the user experience, having a GPS sensor is crucial to detect which parts crib the data belongs to aswell as allow students to find out where they are located and how far they are from the parts crib in the app. Will also show different parts cribs stations if the parts crib expands to different parts of campus in the future. and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department Prototype Lab, Raspberry Pi or Arduino.. 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 Mohammed Kore, Gurkaran Padda. 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 New students tend to get lost around campus. As a first-year engineering student, I found it difficult to navigate my way throughout campus. This can result in many students getting lost while trying to find the parts crib. Once they find the parts crib, the lab would have most likely have started and they would lose valuable time to complete their lab.. A bit of background about this topic is I would like to use this sensor with my project because I have always been fascinated with how you can hook up a GPS module to a microcontroller development platform (Raspberry Pi). I started to find interest in this from my Embedded Systems class when we made the solar panel tracking system. Throughout the summer I have been tinkering with many ways to use this at work and found that there can be so many ways to use such a little sensor. Since then, I have decided to incorporate this with my hardware production class and my final capstone project. I am very excited to work on this..

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 (Already Purchased), Adafruit Ultimate GPS to determine location of parts crib.

Concluding remarks

This proposal presents a plan for providing an IoT solution for The goal is to make the project scalable from one location to several. Students will no longer have trouble trying to find the parts crib. They can easily check the nearest parts crib around them and they will be able to grab their parts and be in class on time to complete their assignments.. 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] Adafruit Industries. (n.d.). Adafruit Ultimate GPS Breakout - 66 channel w/10 Hz updates. Retrieved from https://www.adafruit.com/product/746

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

[3] Liu, J., Priyantha, B., Hart, T., & Jin, Y. (2015, July 22). CO-GPS: Energy Efficient GPS Sensing with Cloud Offloading. Retrieved from https://ieeexplore.ieee.org/document/7164360