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Proposal for the development of JnJ's Clockwork

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<https://github.com/JuanRodriguez19/JnJ-s-Clockwork>

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: HTU21D-F Humidity/Temp Sensor (0x40), DRV2605 Haptic Motor Driver (0x5A), Display Screen. The database will store: Username, Password, Timestamp, Temperature Reading, Alarms Saved By Users. The mobile device functionality will include: Alarm Clock, Time Zones, Timers, Stopwatch, Temperature readings, User Information, Customization Features and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department: Humber Prototype Lab. 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. These are the following group members: Juan Rodriguez, Johnson Dinh, Jordan Pulido. 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: As a youth, it becomes increasingly difficult to manage and maintain a proper sleeping schedule. The snooze button is used to give the user 5 more minutes to relax and properly wake up, however this is often abused and the user ends up repeatedly hitting the snooze button, which often leads to time wasting. A bit of background about this topic is: This project will consist of an alarm clock application which will link up to a physical hardware element via bluetooth. The hardware being developed would contain a display where the current time, alarm settings, and local temperature readings would appear. The app is where the user would be able to customize and select what they want to appear on the display. Each sensor in the hardware portion of the project serve their own purpose in conjunction with one another. The Humidity/Temp sensor would give the current readings of the temperature and store them in the database, the Haptic sensor will vibrate the device with an alarm goes off as a time of notification. The display screen will be responsible for displaying the core information requested by the user.

Existing products on the market include Google Home. I have searched for prior art via Humber's IEEE subscription selecting Institute of Electrical and Electronics Engineers and have found and read A DIY approach to pervasive computing for the Internet of Things: a smart alarm clock 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.

Display screen for hardware element required. Materials for creation of the device. Casing for sensors and Raspberry Pi. Additional connectors to link up sensors to one another.

Concluding remarks

This proposal presents a plan for providing an IoT solution. The hardware device is a convenient option for those that want to maintain a solid time schedule all while being able to view current temperature readings of the area around them without having to open up external applications. 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]Google Home. (2016). Retrieved from https://store.google.com/ca/product/google_home

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

[3]Scott, G. and Chin, J. (2013). A DIY approach to pervasive computing for the Internet of Things: A smart alarm clock - IEEE Conference Publication. [online] Ieeexplore.ieee.org. Available at: <https://ieeexplore.ieee.org/document/6659445> [Accessed 15 Jan. 2019].