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Proposal for the development of Digital Dashboard

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https://github.com/KaranRajKanwar/DigitalDashboard-Final

Student 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 FT6x06 Capacitive Touch Driver, FXOS8700 Accelerometer/Magnetometer, and TEA5767 Digital FM Radio Receiver. The database will store Timestamp, touch location, current speed, source of transportation, favorite radio station, location. The mobile device functionality will include a clean UI for viewing the speed, viewing all saved data logs, grabbing the real time location using the mobile sensors, grabbing the real time speed using mobile sensors, audio control for the radio. We will not be collaborating with any groups and companies. 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, Zhill Patel and Darren Prong. 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 that a lot of older/modified vehicles don't have a speedometer which is a hazard when on the road, it is also illegal in some countries to not have a working speedometer in a motor vehicle. Also not being able to track where you have traveled in an older vehicle is hard due to the lack of technology. A bit of background about this topic is this scholarly article talks about how we use measurement in our daily life, and where & why we use these measurements. How we use a dashboard cluster to utilize and grab information and how it's logged. It defines instrumentation and measurement and reviews basic principles. Case studies detail car, LOX tank, submarine data acquisition system, and medical device examples. It reviews sensor types, sizes and systems and covers basic instrumentation with a look at general configurations focused on areas such as inputs, conditioning and transformation, analog pre-processing, analog-to-digital converters (ADCs), outputs and basic processing.
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.
Our purchases include Raspberry Pi 3 B, case, power supply, heatsink, micro SD card, HDMI cable, wireless keyboard, wireless mouse, a 2.8 in capacitive touch screen, screen faceplate, speakers, and antenna.

Concluding remarks

This proposal presents a plan for providing an IoT solution for the solution we came up with for this problem is creating a portable mini dashboard that can be mounted onto the surface of the source

of transportation. When the dashboard is mounted the user is required to select the type of vehicle, such as go-kart, bike, scooter and anything with a handle to support the device. Once the dashboard is installed, your current statistics will be saved as data logs on your dashboard. Radio controls will also work off the touchscreen for an interactive experience. The functionality can be replicated on the mobile device through connectivity. 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] Auto Meter® - User Configurable LCD Dash Display. (n.d.). Retrieved January 17, 2019, from https://www.carid.com/auto-meter/user-configurable-lcd-dash-display-mpn-6021.html?singleid=172937519

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

[3] Fowler, K. R., & Schmalzel, J. (2005, April 10). Introduction to Instrumentation. Retrieved January 16, 2019, from https://ieeexplore.ieee.org/servlet/opac?mdnumber=EW1016

[4]Madhuram Mishra, A. P. (2016, November 9). *IEEE.org.* Retrieved from https://ieeexplore.ieee.org/document/8360580/authors#authors

[5]Prong, D. (2018, September 10). *www.github.com.* Retrieved from https://github.com/DarrenProng/Hardware-Production/