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***Proposal for the development of EmergensUI - Vehicle Dashboard (GPS portion)***

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**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 BerryGPS-IMU V3 or Adafruit Ultimate GPS with gpsd. The database will store the locations that is captured through the GPS sensors in latitude and longitude.. The mobile device functionality will include the ability to allow the communication between the dispatcher with paramedics and/or doctors and nurses to allow for quick response times and reduced panic. In terms of digital dashboard functionality, the dashboard should be able to display the basic information car information when driving. (Speedometer, tachometer, odometer, temperature gauges, navigational system). and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department Industrial Design mentor, Professor Dennis Kappen. 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 Quyen Lu and Seung Min Song.. 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 In the current state, medical emergencies can be made more efficient. The communication between dispatchers, paramedics, and doctors are not in sync and can be improved to allow for quicker response and preparation times. If this can be solved, the chances for survival for patients can be increased if they can be attended to efficiently.. A bit of background about this topic is The project that we are currently working on is a concept that may be implemented into future ambulances to allow the paramedics to easier communicate between the dispatcher and doctors at the hospital. This can all be achieved through a more technological or digital dashboard within future ambulances. It would essentially still function normally as an ambulance with more up to date technology to decrease the time needed to transfer patient medical information in real time between dispatchers, paramedics, and doctors. This can either be done through the digital dashboard or through the mobile application..

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.

I plan to purchase: a raspberry pi 3 kit, either the BerryGPS-IMU V3 sensors or the Adafruit Ultimate GPS with gpsd sensors.

**Concluding remarks**

This proposal presents a plan for providing an IoT solution for The digital dashboard and mobile application within this project would allow for a more up to date approach to send and retrieve a patient's medical information. Although just a concept, if fully implemented it would declutter the outdated technology that is within current ambulances and allow for more space and functionality within future ambulances. All in all, becoming a "smart" ambulance.. 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] Formosa, B. (2019, February 13). Collaboration at Humber College creates augmented reality for emergency vehicles. Retrieved from https://www.gh360.ca/?p=7393

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

[3] Akin, B., Choi, S., & Toliyat, H. A. (2012). DSP Applications in Electric and Hybrid Electric Vehicles [In the Spotlight]. IEEE Signal Processing Magazine, 29(3), 133–136. doi: 10.1109/MSP.2012.2185863