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***Proposal for the development of Sunlight Sensor***

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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 sensors and actuators for use the sunlight sensor to monitor sunlight intensity, IR intensity and UV intensity. This will give data for UV-Light, visible light and infrared light.. The database will store the data of UV-light, visible light and infrared light when it get the data from detect sunlight. It will also record the time when it received the data. It will also store message and output the message on a screen.. The mobile device functionality will include displaying the total data of uv index, visible light (in Lumens) and infrared light (in Lumens). It will also show record on the past day and also display helpful message when it good to go outside and reporting helpful information like it is required to put sunscreen. and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department Humber College Institute of Technology & Advanced Learning North Campus Prototype Lab, Weather network, Raspberry Pi.. 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 Johnson Liang and Adrian Caprini.. 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 sunlight sensor will dectect UV-light, visible light and infrared light. With the data we can measure the total visible light (in Lumens), infared light (in Lumens) and UV (UV index). Without it, the people will not know how long they can stay outside till they get sun burn which damage your skin and can also cause skin cancer.. A bit of background about this topic is The sensor I'm going to use is Sunlight sensor. The sunlight sensor will monitor sunlight intensity, IR (Infrared light) intensity and UV (Ultraviolet light) intensity. I can use this sensor to detect and gathear data of UV-light (in uv index), visible light (in lumens) and infrared light (in Lemens). For example, if the uv light is 2, it means the uv light is low and if the uv light is 6, it mean the uv light is high. For data in lumens if you get the number 50, it means "cloudy day outdoor". With this I can output a helpful message to the user..

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 Pie 3: Use to connect the sunlight sensor to the main component. It will store the code to run the hardware and save data.

Pi2Grover - Grove Connector Interface for the Raspberry Pi: Provides the connection between Raspberry Pi pins and external Grove module.

Grove Sunlight / IR / UV I2C sensor: Detect UV-light, visible light and infrared light.

**Concluding remarks**

This proposal presents a plan for providing an IoT solution for With the information from the sunlight sensor we can get data like UV index. This will help people to know the information of the sunlight each day. When it detect the uv light it will output a helpful message to the user. For example, if the uv is low it the message would be "When doing outdoor activity minimal sun protection is required". If the uv is high the message would be "Sun protection required for outdoor activity".. 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] Simple IOT Sunlight Sensing Raspberry Pi Project - SunIOT Part 1. (2016, October 18). Retrieved September 17, 2017, from http://www.switchdoc.com/2016/10/simple-iot-sunlight-sensing-raspberry-pi-project-part-1/

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

[3] Mazzillo, M., Shukla, P., & Mallik, R. (2010, September 27). 4H-SiC Schottky Photodiode Based Demonstrator Board for UV-Index Monitoring. Retrieved September 17, 2017, from http://ieeexplore.ieee.org/document/5585671/