

## ***Proposal for the development of L-wing Solar Panel interactive Display***

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<https://github.com/junedacaya/L-wingSolarPanelInteractiveDisplay>

### **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 BME280, photodiodes, stepper motor. The database will store Energy collected by the solar panels, weather at that time, total energy collected every 30 minutes. The mobile device functionality will include Interactive display of power collection from the 4 solar panels. Choose from a single panel display or multi-screen panel display. Access to the database information through the internet. 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 Computer Engineering Technology Capstones. Specifically from Sustainable Energy and Building Technology program at Humber College.. 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 I am not sure if I can have the same group members during the winter semester because my team member at CENG319 right now doesn't have CENG317.. 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 problem is to create a mobile app and a hardware, to track the solar panel activity as well as improve solar power harvesting. Track its total energy collected every 30 minutes and save it in a database. This information is accessible from anywhere in the globe through the mobile app.. A bit of background about this topic is By creating the mobile app and the hardware, people from the Sustainable Energy and Building Technology program will have an interactive GUI that tracks the solar panel activity. The current weather, how bright the sun or is it cloudy, the total and current energy it is collecting will be stored in a database and will be available on the mobile app. I will try to create a hardware prototype that will be controlled by the app or view information from. The prototype will try to guide the panel to the best angle for maximizing solar power harvesting..

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.

Plan to purchase Raspberry Pi, voltage sensor, photodiodes and motors.

### **Concluding remarks**

This proposal presents a plan for providing an IoT solution for By using the app, users will have the ability to track the solar panels activity. Creating the hardware like photosensors, motors to move the solar panel prototype and temperature on the area will improve solar power harvesting.. 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] B. Steindl, R. Enne, S. Schidl and H. Zimmermann, "Linear Mode Avalanche Photodiode With High Responsivity Integrated in High-Voltage CMOS," in IEEE Electron Device Letters, vol. 35, no. 9, pp. 897-899, Sept. 2014. URL: <http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=6866114&isnumber=6881771>

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

[3] W. Hong-bin, Z. Zhe, C. Xu-hui and W. Yuan-bin, "Stepper motor SPWM subdivision control circuit design based on FPGA," 2017 IEEE/ACIS 16th International Conference on Computer and Information Science (ICIS), Wuhan, 2017, pp. 889-893. URL:  
<http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=7960118&isnumber=7959951>