***Proposal for the development of Robot Arm***

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*Computer Engineering Technology Students*https://github.com/voltAG3D/CENG-317--Daniel

**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 Analog feedback mirco servo. The database will store postions of the arm that it is currently in and presets that the user can save.. The mobile device functionality will include The mobile app will include controlling the arm, allowing the user to save postions to a preset that the user can later use. and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department Electrical Mchanical Engineering Technologist. 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 Daniel Shelepinsky, Ali Khaliq, and Matthew Glafand. 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 main issue for this part will most likely be getting the phone application to work with the arm and control it the way we want it too. But besides that all we have to do is get the arm reprinted and remove one motor so that it is only 4 and than change the code from python to C.. A bit of background about this topic is The analog feedback mirco servo is used like a regular servo but has a feedback wire which is white and that wire reports back through analog on postions that it is currently in. Like a normal servo it can rotate 180 ° but it is not big like the regular servos as it is a mirco servo. The Robot arm which uses servos to move can be used for a number of applications while it be in assembly lines or replacing limbs it will app depend on the arm build and code for the arm..

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.

We have for the most part everything already bought. There may be changes in the future.

**Concluding remarks**

This proposal presents a plan for providing an IoT solution for The arm once perfected can be used in a few applications, like the assembly line or handling dangerous metals/chemicals. Can even replace an arm once modified correctly.. 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] Svec, R. (2013, December 11). Trainable Robotic Arm. Retrieved September 15, 2017, from https://learn.adafruit.com/trainable-robotic-arm/overview - Industries, A. (n.d.). Analog Feedback Servo. Retrieved September 15, 2017, from https://www.adafruit.com/product/1404

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

[3] Wu, J., Law, M. K., Mak, P. I., & Martins, R. P. (2016). A 2- µW 45-nV/ #x221A;Hz readout front end with multiple-chopping active-high-pass ripple reduction loop and pseudofeedback dC servo loop