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Proposal for the development of Resistor value recognizer

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https://github.com/BW25/Resistor-value-recognizer

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 Time-of-flight sensor , luminosity sensor, camera. The database will store User account information, History of recognized resistors, Resistor color code lookup table,. The mobile device functionality will include Viewing value of resistor, Viewing history, Color code table with values and will be further detailed in the mobile application proposal. I will be collaborating with the following company/department Humber parts crib. 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 Brendan Woo, Husnal Kaur. 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 Due to the large volume of students that use the parts crib, large amounts of unsorted components often accumulate. High traffic makes it difficult to sort these components, and it is often time consuming to figure out each and every value of the resistors. Also, it can be hard to identify resistor values correctly in a fast paced environment.. A bit of background about this topic is When a component is inserted into a processing area, image processing and machine learning will be used to recognize resistor values through object and colour recognition. Once the resistor's value has been found, this can be logged in a database to track usage. This information can be accessed by an Android app so the user’s ID can be used to look up their history. A time-of-flight sensor will be used to detect when an object is inserted. As image processing techniques are dependent on lighting, a luminosity sensor will be used to trigger a lighting system to ensure ideal lighting conditions are always present. The time-of-flight sensor will then trigger both the camera and the lighting system for greater energy efficiency..

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.
cast acrylic for component casings, time-of-flight sensor, luminosity sensor, Raspberry Pi camera module, assorted screws, standoffs, and bolts

Concluding remarks

This proposal presents a plan for providing an IoT solution for This system will make it easier for both students and professionals to recognize resistor values in a fast and efficient manner.. 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] Amazon. (2019, September 05). Amazon Go. Retrieved from Amazon.com: https://www.amazon.com/b?node=16008589011

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

[3] Cruz, J., Dimaala, M., Francisco, L., Franco, E., & Bandala, A. (2013). Object recognition and detection by shape and color pattern recognition utilizing Artificial Neural Networks. 2013 International Conference of Information and Communication Technology (ICoICT).