BME 484 Biomedical Engineering Capstone Design

Project Proposal

Project Title: Implementing a Pulse Oximeter using a PIC Microprocessor to Quantify Propagation Velocity

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Abstract: The problem faced is developing a pulse oximeter for measuring arterial oxygen saturation based on a PIC microcontroller system designed by Dr. Ying Sun of the Department of Electrical, Computer and Biomedical Engineering at the University of Rhode Island. This system consists of several digital filters, a waveform generator, an electrocardiogram (ECG), an ECG simulator, a Photoplethysmogram (PPG), and possesses the ability to receive input both manually, and digitally via a Bluetooth transmitter to an android device. Accompanying this device is an application designed and programed in-house to display signal output to the device via the breadboard. However, this system has never successfully integrated a pulse oximeter. The significance of this project is to integrate a piece of technology that will allow us to successfully integrate a pulse oximeter into the system, and use this instrumentation device to measure several physiological variables including heart rate, arterial oxygen saturation, propagation velocity and even BMI. This integration includes both hardware and software, as it will need to seamlessly operate alongside the rest of the existing system without interference with any other pre-existing components.

Innovation: The innovative approach is to successfully integrate a pulse oximeter into the existing system and use it to measure several physiological variables.

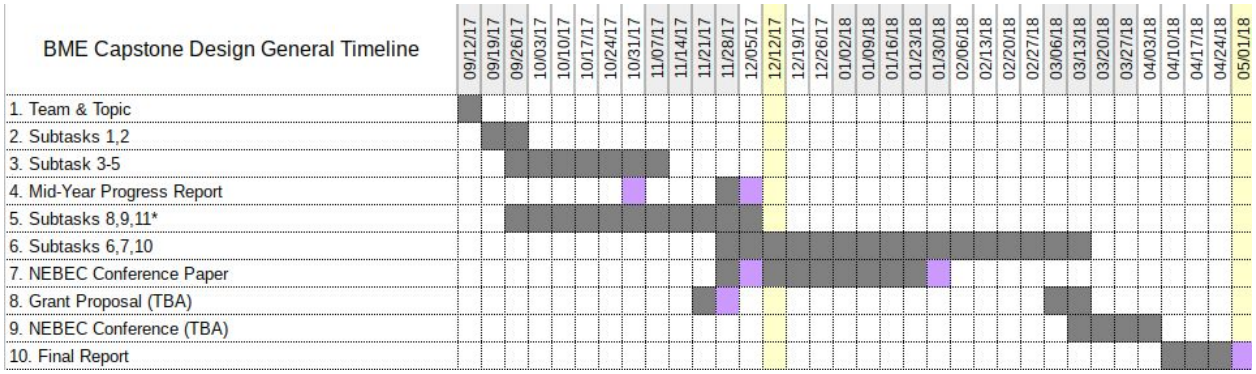
Materials: Solderless breadboard, solder, soldering iron, jumper wires, PIC Microprocessor, MAXREFDES Pulse Oximetry break board, digital to analog converter, 5V rechargeable battery, LED display screen, Android tablet, MP Lab X.

Subtasks:
1. Construct Dr. Sun's existing system, ensure no bugs present
2. Research MAXRefDes Pulse Oximeter Chip, develop data sheet
3. Integrate chip into hardware, ensure communication with PIC
4. Program communication via MPLabX and create case for PulseOx
5. Reprogram PPG case, ensure quality of signal

6. Test/Debug data communication from PulseOx to PIC
7. Test/Debug data output from PIC, ensure quality of signal
8. Create case for PulseOx on android application
9. Code data communication from PIC to tablet
10. Test/Debug android application to ensure quality
11. Construct schematic and PCB based on augmented system*

* Listed item has not been officially declared as a subtask

Timeline:



References:

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