Proposal for Marquette Senior Design Project

Internet of Things – Connected Clinical Devices

Sponsored by Direct Supply / Kent Newbury

The purpose of this project will be to build an interface between a clinical measurement device and a small data collector that will be used to save and store readings from the device. The data that is collected will be used to do basic analysis and trends of the readings.

* The connected clinical measurement device will be a Pulse Oximeter that has a Bluetooth connection. This device will be provided by Direct Supply for the duration of the project. A Pulse Oximeter records pulse rate and O2 levels of a test subject.
* The computer system for the data collection will be a Raspberry Pi, Arduino, or a similar small processor. This is being done to support future delivery of the solution as a small embedded controller.
* The design team will use the readings that are taken to analyze conditions that impact pulse rate and O2 levels. Direct Supply wants to understand if there is any correlation between age, time-of-day, mood, and stress levels and the readings taken with the Pulse Oximeter.

The business purpose of this project is two-fold. First, Direct Supply wants to understand the technical complexities involved in building a small embedded-computer product that collects data from an IoT connected clinical device. Second, Direct Supply wants to understand factors that influence clinical readings. This information will be used to develop further experiments that can lead to better living environments for elderly individuals.

There are several requirements for the project:

1. The budget for the project will be $500 to cover expenses for the computer system that the students select. Direct Supply will reimburse costs for equipment and software up to that amount.
2. The student team will be responsible for selecting the computer system to be used, configuring it with an operating system, and installing or writing any software needed for the project.
3. In order to fully understand the complexities of developing interfaces to connected clinical devices, the student team will be expected to write software that supports Bluetooth connections with the Pulse Oximeter, executes the necessary messaging between the computer system and the Pulse Oximeter to obtain readings, and stores the readings in a database.
4. The student team will need to design an experiment for analyzing the relationship between the readings that are taken and factors that could influence the readings.
5. The student team will need to take enough readings to support analysis in relation to factors that could influence the readings. Analysis of the readings can be done on the purchased computer system (Raspberry Pi, etc.) or on a laptop / desktop computer that the students provide.
6. The student team will need to provide the sponsor with regular updates on their progress. The sponsor will work with the students to help with any problems that they encounter during the project and to provide guidance as needed around project decisions.