CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY

Name(s)
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Project Number
J0813

Project Title
Microcontroller Based, Elderly Activity Monitoring System with Intelligent Data Analytics for Early Emergency Detection

Abstract

Objectives/Goals
There is a need for a microcontroller-based, proactive, intelligent healthcare activity monitoring system for seniors and other people that monitors healthcare activities, reporting and alerting any irregularities for preventive care. This system can be deployed for seniors and other people at home or assisted living by caregivers.

Methods/Materials
First, finding cost-effective, open-source, microcontroller-based sensors that can passively monitor daily routine activities, e.g. sleep, medicine dose, bathroom visits, etc. Next, designing, calibrating, and connecting the different sensors to the Arduino microcontrollers. Then, using a Raspberry Pi to connect to the microcontrollers, getting minute data from the sensors, that is aggregated to hourly data, and, once a day, daily data is created with intelligent analytics for the activities, then posting the daily data to the caregiver, for monitoring and detecting any irregularities for preventive care.

Results
The bed monitoring with the FSR sensor is tested for 17 days, and the daily data collected, i.e. the daily hours in bed and the number of wake and sleep hours in the wake and sleep zones, is validated. The pill monitoring with the Hall Effect sensor is tested for 10 days, and daily pill reporting is validated to determine if the pill was taken at correct time. The bathroom visit monitoring with the break beam sensor is tested for 10 days, and the reported data for bathroom visit frequency and time are validated in the sleep and wake zones.

Conclusions/Discussion
My project provides very meaningful information about the healthcare activities of seniors to the end users, making it useable for preventive care.

Summary Statement
My project is a microcontroller-based, elderly activity monitoring system that can be deployed for seniors at home or assisted care livings in order to take care of them.

Help Received
My dad helped me solder some of the parts to my Arduino Pro Minis, and he also bought an Udemy course for me to learn the basics of iOS programming.