CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)

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Project Number

35199

Project Title

Night Guard: Building a Device to Help Care for Seniors with Alzheimer's and Dementia

Abstract

Objectives/Goals

I wanted to provide an alert system for the caregiver to help care for seniors with Alzheimer's and Dementia via an SMS to their phone when the patient gets out of bed. The device uses an Arduino microcontroller which takes input from and a piezoresistive step sensor mat and uses an algorithm to determine whether a senior stepped out of bed and sends an SMS via the GSM shield to the caregiver's phone.

1. Should effectively notify caregiver to wake them 2. Notification system should be portable to allow more freedom for caregiver 3. Device must cost less than $50 4. Should work on electricity and back-up batter 5. Activate for a senior over 100 lbs 6. Should sense with 90% accuracy the senior has left the bed 7. Should notify caregiver within 30secs of senior getting out of bed 8. Should work on different types of flooring (Tile, Carpet, Wood) 9. Should work with different types of footwear (bare feet, socks, slippers) 10. Should work regardless of lighting conditions 11. Should be able to notify caregiver in 1-5 mile radius

Methods/Materials

I had two designs, when the patient steps out of bed #1 sounded a buzzer, and #2 sent a SMS.
Arduino Uno, Computer, USB to USB-B Connector, 11#x11# Piezoresistive Fabric, GSM Shield, SIM Card, 30gauge galvanized wire, LED, 9V Battery
Method:
A sensor was built using a piezoresistive fabric and wire in a pre-tested configuration to accurately collect data on the pressure applied to the mat.
For design #1, based on the input values from the mat a buzzer would sound if the values met the algorithm criteria. For design #2, based on input values from the mat a SMS would be sent to the caregiver if the values met the algorithm criteria.

Results

The qualitative testing part of my data was based on eleven success criteria on a score of 0-5 range each. design #1 and design #2 achieved total scores of 45 and 53 respectively out of a maximum score of 55.

Conclusions/Discussion

Design #2 satisfied more of the goals. It was a costlier option but the benefits of portability and freedom it gave the caregiver far outweighed the cost difference. Therefore design#2 with the SMS capability was the winner.

Summary Statement

The purpose of this project is to build a device to help care for seniors with Alzheimer's and Dementia by providing an alert system that wakes up the caregiver via an SMS to their phone when the patient gets out of bed.

Help Received

I would really like to acknowledge my dad for helping me with setting up my Arduino and my science teacher, Mrs. Nguyen, has also inspired me to do this project.

Preliminary