Grandma’s House

Team Go Getter

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Orientation Link: https://youtu.be/uyUtx-mzfNI

Microsoft Team:

Project Overview

- Six in 10 people living with dementia will wander at least once. The project aim to create a safe and stress-free environment for both dementia patients and their families by using a system of sensor to prevent wandering before it happens.
- The process: Using strain gauges and IR sensor to determine the patient whereabout → Transmission of all collected data to a microprocessor → Upload the information to a webpage/IoT cloud → When system indicates that the patient has left the room/house (or when the system cannot detect anyone for a period of time), the system will set an alarm to notify their caregivers.
- One of the key features that define our project is that the sensor system will operate **without any wearable tracker**, thus eliminating the risk of the patient removing the tracker.

Micro-controller

- Arduino Uno Rev 3.
  - Pros:
    - Wifi connection capability, doesn’t require an external part for wireless communication.
    - Fast processing speed
  - Cons:
    - Power consumption: with all the load, it will draw around 100mA. This can be fix by remove unnecessary components and install Low Power Mode library. After that, it will still draw around 22mA
- Twos Arduino board will work together to build a system. One will act as a server host and one will act as a client.

Sensors

- Motion Sensors:
  - IR motion sensor: a break-beam sensor able to read movement of someone enter the room. Allow directional detection for future plan.
  - PIR motion sensor: a motion sensor that can detect if someone is walking around close to the bed.
- Weight Sensors:
  - HX711 amplifier and 4 load-cell: Can read the weight of the patient on the bed.
  - 4 load configuration can measure across the mattress.
  - 3D printed load cell holder for better performance

Power Supply/ Enclosure

- Power Supply:
  - With the circuit taking around 120mA on full load and the quiescent current is about 40mA, no battery will last for long
  - It would likely be a AC powered device. Battery could also be use with a 8500mAh, 9V lithium battery estimated to last around 75 to 90 hours
- Enclosure:
  - 3D model and print
  - Able to withstand a 3-4 ft drop
  - Case enclosure should meet IP63 of International Protection ratings, meaning it offers total protection against dust and protection against water splashes from some directions.

Software

- Notifies User when:
  - Weight Sensor is zero
  - PIR Sensor is on
  - IR Sensor is on
- Notifies User by:
  - Indicating that the patient has gotten up by changing the webpage
  - (Sending SMS message through outside source)
- The code reads the input from the sensors on each of the two Arduinos (Client Arduino and Server Arduino) and notifies the server Arduino directly or over wifi from the client Arduino. Then the server Arduino changes the webpage to notify the user.

Progress

- Sensors:
    - Read data from environment
    - Calibrate
- System:
    - Connects to WIFI
    - Creates a webpage
    - Read data from sensors
    - Run off of power supply
    - Notify users from webpage

Future Plan

- Able to identify specific times
- Able to turn on and off
- Able to reconnect
- Able to send SMS messages
- Incorporate UI for web page
- Able to send messages to different
- Able to indicate if the patient is having trouble sleeping with strain gauge
- Battery saving mode
- Directional detection