ResQ: A Low Cost, Wearable, Automatic Fall Detection Device for Senior Citizens

Goutam, Arya

I designed a fall detection device called “ResQ” that automatically detects if a Senior Citizen were to fall down and become unconscious. Upon detection of a fall, the device sends an alert message via Bluetooth to a companion mobile app which I also developed. This mobile app then immediately places a phone call to designated family members, configured within the app. Based on feedback received from several Senior Care facilities, I significantly reduced the size of the device from 3x3x2 inches to about the size of a quarter, so that it can easily fit inside a shirt pocket, be placed on a belt, or be part of a chain around the neck. To miniaturize the device I learned to use Eagle CAD software and design a custom Printed Circuit Board (PCB). The cost of fabricating the PCB was only $3 but I received quotes of over $1,000 per PCB to Surface Mount the tiny electronic components like microcontrollers onto the PCB. After some research and help from my mentor, I found that I could surface mount these components myself by using a modified toaster oven as a Reflow Oven. I achieved this by adding a new heating element, microcontrollers and relays. Using this Reflow Oven, it took me only 30 minutes to Surface Mount components onto my custom PCB. This enhancement to my production process helped me develop multiple copies of ResQ very quickly in my own garage. Instead of using a simple threshold based fall-detection algorithm, that I found to be unreliable, the device now uses a neural network to distinguish between falls and daily activities. The neural network was trained using some university research databases containing accelerometer and gyroscope data for various activities of daily living as well as human falling data to achieve higher reliability in fall detection.

Awards Won:
Third Award of $1,000