CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY

Name(s)
Arthur K. Jakobsson

Project Number
J0916

Project Title
Saving Grandpa

Abstract

Objectives/Goals
One big worry for elderly and for their loved ones is falling. One third of the population above 65 is injured by falling, and falling can cause serious injuries and even death. I built a fall detector using an Arduino Uno and a 9-axis sensor, and programmed the Arduino to detect falls.

Methods/Materials
I built a fall detector using an Arduino Uno, a device that receives sensor data, computes and sends signals. In order to detect falls, I sensed orientation, movement, and acceleration. I used the sensor to determine the angle of the person wearing the device as it changes over time. If the angle change is larger than a set threshold, the device will convey an alarm, since this corresponds to a fall.

Results
I tested my fall detector on seven subjects who performed everyday activities and falls, and found that my device consistently detected all falls and did not send any false alarms.

Conclusions/Discussion
Commercial fall detectors have large error rates. I have studied how to reduce these. This will improve protection for elderly. I experimented on seven subjects, four of which were 60 to 80 years old, and found no false negatives or false positives.

Summary Statement
I have studied how to create a fall detector that has very low error rates, to address a problem commercial fall detectors have.

Help Received
My dad taught me how to program C. My parents and neighbors helped me by being my test subjects.