



Colorado Science and Engineering Fair

2024 Individual Project Abstract Form

Please print 2 copies of the completed form. Sign both copies, keep 1 for your notebook and submit 1 copy to your Regional Fair Director with your other paperwork.

Title of Project: Help! I Need Somebody: An Assistive Device That Notifies Emergency Services Once a Fall Has Been Detected

Finalist's Name: Maria Sears

School and City: Monte Vista Senior High School, Monte Vista

Sponsor's Name: Loree Harvey


Category: Mathematics & Computer Sciences (MACS)

Division: Senior (9th - 12th grades)

Abstract (250 words or less):

36 million falls are recorded every year among the elderly population. 35,000 of those falls result in death. There are fall detection devices already available, but they are expensive and only detect falls 85% of the time. Those fall detection devices use an accelerometer and gyroscope to measure if a fall has occurred, rather than using vitals. They also do not directly call emergency services or emergency contact. Instead, they notify a 24/7 monitoring center and they make the call. I developed a device that utilizes two modules, an accelerometer and pulse oximeter. With these modules I set constraints that when exceeded a timer would countdown from 20 seconds. The user would have 20 seconds to press a button that would tell the timer to shut off and reset the device. If the button is not pressed within 20 seconds, a pre-recorded message is sent to the attached bluetooth device through a bluetooth module. The pre-recorded message would include information that might affect patient care, like the user's location, list of pre-existing conditions and medicines, and any allergies that could put the user at risk. By using data from a pulse oximeter and accelerometer modules, the device was able to accurately detect if a fall had occurred. The device looked for an extreme increase in heart rate and zero movement to detect a fall. This device could be utilized by older adults that are at risk of falling and still want to live independently.

I hereby certify that the above statements are correct and the information provided in the Abstract is the result of one year's research. I also attest that the above properly reflects my own work.

Finalist's Signature: 

Date: 03/04/2024

In addition, all students must complete the ISEF Student Checklist (1A), Research Plan, Approval Form (1B), and Checklist for Adult Sponsor (1), and any other ISEF forms required for this type of project. See the International Rules and Guidelines for form requirements. Return COPIES of all of these forms to your Regional Fair Director with you Finalist Verification/Permission Form. A signed copy of this form must be included in your notebook.