



# CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

<b>Name(s)</b> Nathaniel G. Varghese	<b>Project Number</b> <b>S0920</b>
<b>Project Title</b> <b>A Robust Human Fall Detection Wireless System</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> One third of people over age 65 in USA fall every year; the average healthcare cost due to fall related injuries is ~\$20,000 per year per person. In many falls, timely help is more critical than the damage due to the fall itself. Automatic fall detection and alerts can improve responsiveness at lower costs and help avoid critical health conditions.</p> <p>My project is a system designed to automatically detect a human fall and wirelessly send an alert to a remote monitoring station. It improves existing solutions in this domain by the automatic nature of the fall detection and improving the robustness of the solution through a unique algorithm that reduces false alerts</p> <p><b>Methods/Materials</b> The system consists of two hardware modules - a detection system and remote monitoring system. Both use the Arduino platform for the code development. An accelerometer is used for sensing the fall and XBee radios are used for wireless communication. LEDs are used to visually indicate the occurrence of various alert conditions. The main algorithm for fall detection consists of four steps based on the physics of what actually happens when a person falls down.</p> <p>There were 3 stages in this project. The Stage 1 was the building the fall detection hardware and writing the basic software for fall detection. In Stage 2, I built the wireless radio setup using XBee radios, the radios configured using the X-CTU program on the PC and got basic wireless communication between two XBee radios working. In Stage 3, I put the fall detection system and the radio together. Then I tested various fall conditions and tuned the parameters to make it work robustly</p> <p><b>Results</b> The system was built successfully and tested under various fall conditions and results are demonstrated</p> <p><b>Conclusions/Discussion</b> I demonstrated that a Robust Human Fall Detection Wireless System could be built meeting the design goals set out. Key novelty in my system compared to prior approaches:</p> <ol style="list-style-type: none"><li>1) No human intervention to detect fall and generate alert</li><li>2) Robust algorithm that minimized false alerts</li><li>3) Wireless communication built in for immediate remote alert</li></ol>	
<b>Summary Statement</b> It is a system designed to automatically detect a human fall and wirelessly send an alert to a remote monitoring station	
<b>Help Received</b> My Dad ordered all the parts and helped with soldering the components.	