



**CALIFORNIA STATE SCIENCE FAIR
2014 PROJECT SUMMARY**

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Project Title A Comparison of Accuracy between Ultrasonic and Infrared Proximity Detectors	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals To determine which proximity detector - ultrasonic or infrared - yields a more comprehensive range of distances and angles. It was hypothesized that the ultrasonic would yield the greater range.</p> <p>Methods/Materials The manipulated variable was the type of proximity detector used, with reference to wave type. The responding variable was the range at which these detectors could accurately detect an object's distance. First, a board that represented the entire of field of detection was constructed - 5 cm marks were labeled along the horizontal of the board and 5 degree marks were labeled along the vertical of a board. Then, the UNO software was programmed to read these voltages from the sensors and convert these voltages into a distance. The sensors were then hooked up to the specific software on a laptop through a USB cable. The sensors were then placed at the top middle of the simulation board. An object was moved about this board at various location and the measured distances were compared with the distances being reported by the sensors that appeared on the laptop. The area in which the sensors could accurately detect the object was recorded. 5 trials were taken for each sensor. This experiment was conducted in a setting away from direct sunlight and any substantial noise levels. Materials: Infrared sensor (Sharp-GP2Y0A21YK0F), ultrasonic sensor (Sainsmart HC-SR04), Arduino UNO software, laptop, ruler, notebook, pencil, protractor, large board, small cardboard box. /</p> <p>Results The ultrasonic detector yielded a large range of 3-115 cm and 20 degrees to either side. The infrared yielded a range of 7-25 centimeters with 6 degrees to either side. The ultrasonic also proved to be more precise.</p> <p>Conclusions/Discussion The data proves the hypothesis to be supported. The ultrasonic sensor yields a more accurate and more comprehensive range than the infrared sensor.</p>	
Summary Statement The comparison of the comprehensive ranges of two proximity detectors - ultrasonic and infrared.	
Help Received Mother helped set up board; Dad helped program sensors.	