



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Shlok R. Shah	Project Number J0812
Project Title Autonomous Vehicle Crash Avoidance Algorithms	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals My objective is to figure out which method of crash avoidance, communication or sensing, will be better at avoiding crashes between autonomous vehicles. I hypothesized that communication will be better at avoiding crashes because it takes less time to detect communication signals than detecting events with sensors. If any other vehicle is turning or not can be determined with more certainty with communication.</p> <p>Methods/Materials First, two robots were constructed using a Raspberry Pi, ultrasonic sensors, and a gyro sensor. Then, three programs, a UDP communication, ultra sonic sensing, and control algorithm, were written in Python. The turns were decided from a randomly generated sequence based on a seed. Each algorithm was tested for ten different sets of seeds; every time the robots crashed, the time was recorded using a stopwatch.</p> <p>Results The results showed that the control consistently crashed on the first turn, sensing took longer to crash on average, and communication never crashed during the run time.</p> <p>Conclusions/Discussion Because control had no way of detecting turns, it would always crash on the first turn. Sensing successfully detected the first turn most of the time, but, in certain cases it could not detect next turns. For example, when one robot was a little bit ahead, this robot could not sense the other robot's turns, while communication could detect turns anywhere in the room. Therefore, my hypothesis was supported, because communication did the best out of all the algorithms.</p>	
Summary Statement My project is about figuring out which crash avoidance method, sensing or communication, is better at avoiding crashes in autonomous vehicles.	
Help Received I designed and implemented the algorithms myself. I built and conducted experiment myself. My teacher helped me review the results and display board.	