



# CALIFORNIA STATE SCIENCE FAIR 2015 PROJECT SUMMARY

<b>Name(s)</b> Anshul Singh	<b>Project Number</b>  35084
<b>Project Title</b> <b>Collision Avoidance on Drones: Creating a Frontal Collision Avoidance System for Applications on Drones</b>	
<b>Objectives/Goals</b> The objective was to design and implement a reliable collision avoidance system for a quadrotor platform. <b>Methods/Materials</b> The project used many materials that included an AR Drone, Arduino Uno, BOE Shield, Distance Sensor, Bluetooth module, NXT Mindstorms, two PCs, Arduino Micro and Leonardo, RF modules, DC Barrel Jack, and Aluminum foil. Procedures that were utilized in the experiment involved properly wiring the Arduino Uno. The program for the Arduino Uno was properly designed and uploaded using a computer. The program set a threshold for a distance that an object could be from the drone before the Arduino sends an "alarm" message via serial feed to the computer. The NXT was built into a color sensor and clicker module. When the color sensor saw the alarm signal on the computer screen, it triggered the clicker module to press the "back" button on a separate PC's keyboard, eventually moving the drone backwards. The Arduino Micro and Leonardo system had different procedures involving wiring each system. Once the systems were properly wired, a program that was uploaded to them. The program had the Arduino micro constantly ping the distance of objects that were presented to the drone. When an object got too close, the Micro system would send an alarm message using its RF transmitter to the Leonardo system. The Leonardo would decode the message, and eventually keystroke for the computer to move the drone back. <b>Results</b> The drone presented with a total of 130 obstacles. The drone successfully avoided 55/65 objects with the Uno and Mindstorm and 62/65 objects with the Micro and Leonardo setup. The Arduino Uno was functioning ideally and sending the alarm ping to the computer, but the color sensor seemed like it was having some issues seeing the alarm. On the other hand, the Leonardo and Micro system was working ideally. <b>Conclusions/Discussion</b> The tests went relatively well but the ten times that the drone didn't avoid the presented objects was mostly due to the color sensor in the Mindstorm system. The sensor's light was reflecting off of the computer's screen and it caused the 10 failures of the setup. The Leonardo and Micro system had a more exact RF communication system that didn't fail, making the system steady. Replacing the unreliable color sensor with an RF module system improved the system and created a successful collision avoidance system for the AR Drone that can be applied in many areas.	
<b>Summary Statement</b> The project is about creating a fully functional frontal collision avoidance system for applications on drones.	
<b>Help Received</b> Parents provided materials; Mrs. Gillum assisted in the development of the notebook.	