Greater San Diego Science and Engineering Fair
2015 PROJECT SUMMARY

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Project Title: Designing and Implementing an Object Avoidance System for a Quadrotor Platform

Abstract

Objectives/Goals: The objective is to design and implement a reliable collision avoidance system for a quadrotor platform.

Hypothesis: A collision avoidance system could be successfully designed and implemented using AR Drone API functions and an Arduino at a distance of 18 inches.

Methods/Materials: The project used many materials that included an AR Drone 2.0, an Arduino Uno, male to male jumper wires, a Parallax BOE Shield, a Ping Ultrasonic Sensor, a Bluetooth module, a battery box and a 9V battery, an NXT Mindstorms 2.0 robot kit, and two personal computers were utilized in the experiment. Procedures that were utilized in the experiment included mounting the BOE shield on top of the Arduino and properly bread boarding the ultrasonic sensor and the Bluetooth module to the Arduino. The program for the Arduino 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. The separate PC was running the AR Drone control software for windows and when the back button is pressed, the drone moves backwards, away from the object. Using these materials and procedures, a proper collision avoidance system was designed and implemented.

Results: The drone was run through twenty presentations of obstacles. The drone successfully avoided seventeen out of twenty and failed to avoid three presentations of objects. The Arduino was correctly detecting and sending the "avoid" signal to the computer, but the color sensor seemed like it was having some trouble recognizing the alarm.

Conclusions/Discussion: The tests went relatively well but the three times that the drone didn't avoid the presented objects is partially to blame on the color sensor. The color sensor's light was reflecting off of the computer's screen and the reflection may have caused the failure of the object avoidance system three times. A more successful object avoidance system can be created that would utilize direct communication via radio signal. Even though a more successful system can be created, the existing system is just fine but as always, there is room for improvement.

Summary Statement: In the project, I designed, programmed, and tested a successful object avoidance system for a quadrotor platform using Arduino and NXT components.

Help Received: Dad provided materials and testing environment.