# CALIFORNIA STATE SCIENCE FAIR
# 2016 PROJECT SUMMARY

**Name(s)**
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**Project Number**
36136

**Project Title**
## Constructing a Noise Generator to Interrupt Multicopter Flight

**Abstract**

**Objectives/Goals**
For my project, I built a noise generator in order to prevent multicopters (drones) from flying in areas where they could cause danger. I had heard that multicopters had blocked fire crews from extinguishing a recent fire, so I wanted to attempt to create a solution for these fire crews to ground multicopters. I hypothesized that I would be able to build this device, and that adding a Yagi-Uda antenna to this device could send signals in the direction of the multicopter.

**Methods/Materials**
I put together materials for my anti-multicopter device, including an Arduino, a 2.4GHz RF module, the Arduino IDE, an AirView 2 spectrum analyzer, and paperclips, which were used to create the Yagi-Uda antenna. I put my device through a variety of tests, including using it to emit a frequency on a specific channel, and using it to emit radio waves on the most heavily used frequencies of a specific multicopter remote, with and without the Yagi antenna attached. During these tests, I used the AirView 2 spectrum analyzer to determine if radio waves were being transmitted.

**Results**
When I programmed the RF emitter to emit radio waves of one specific frequency without the Yagi antenna, it performed as expected; it emitted radio waves of that frequency, and significantly weaker waves of surrounding frequencies. When I tested the circuit with a program that cycled between four different frequencies, similar results were produced, on all four frequencies. These emissions were very similar to those of the multicopter remote. When I tested the circuit with the program running and the Yagi antenna attached, the results varied greatly from the expected outcome. The emissions were no more powerful than those with the default whip antenna, but they were more strongly focused on the four dominant frequencies.

**Conclusions/Discussion**
In my project, I found reasonable evidence that supported my hypothesis that I would be able to build an RF emitter circuit. However, the emissions of the circuit with the Yagi antenna, contrary to my hypothesis, did not strengthen the radio waves in the direction it was pointing. This may have been due to imprecisions in the construction process, since the antenna was homemade from consumer grade materials. My findings could be used to create a device that could interfere with multicopter signals for government use; however, this would require a significantly more powerful RF module.

**Summary Statement**
In my project, I created a proof-of-concept electrical noise generator to interrupt the flight of multicopters, more commonly known as drones.

**Help Received**
My science teacher provided guidance throughout the project, and my father provided guidance with soldering the circuit.