CALIFORNIA SCIENCE & ENGINEERING FAIR
2019 PROJECT SUMMARY

Name(s)

Ryan Beam

Project Number

S0302

Project Title

Developing a UAV Free Fall Device for Microgravity Experiments

Abstract

Objectives

The objective of the project was initially to design and build a "submarine free fall vessel," this proved unfeasible. The objective then became to use the data collected from this failed project to create a completely self-contained vessel which could ascend to approx. 100m, and sustain free fall through the atmosphere for 3-4 seconds.

Methods

Laptop computer with Solidworks Student Edition CAD program, 3D Slicer, 3D printer, PLA filament, Arduino, Stepper Motors and Drivers, assorted quadcopter components.

Designed streamlined body, designed fittings for individual components, printed, built device. Tested, repeated.

Results

By way of an iterative design process, I was able to successfully build a device capable of ascending to a height of about 75 meters, then freely fall through the atmosphere for a period of just over 1.5 seconds, creating an environment suitable for microgravity experiments. I am still in the process of optimizing the device.

Conclusions

I built an inexpensive, accessible device capable of sustaining free fall conditions for several seconds. By using CAD and 3D Printing, I was able to create an ideal environment for carrying out microgravity experiments.

Summary Statement

I created a drone-like device which can be used to carry out microgravity experiments in conditions rivaling those of a traditional drop tower.

Help Received

None. I designed and built the device by myself.