

Student Scientist Investigates Unmanned Aerial Vehicle Technology



Above: Demarius flying drone in the lab

The market for unmanned aerial vehicles (UAV) has exploded. The engineering behind the design of unmanned aerial vehicles provides several learning opportunities. Ecotek Lab student scientist, Demarius Clemons, 10th grader at Detroit Renaissance High School, has set his sights on building, testing and finding unique applications for unmanned aerial vehicles (UAVs).

A UAV is an aerodynamic mobile device that is controlled remotely. Flying in the air, over and under objects, UAVs are being used in surveillance, media/film, and military applications. Other common applications of UAVs include geophysical observations and emergency response management.

The first phase of research that Demarius performed involved building a drone quadrotor. He performed a forensic analysis of the drone's internal anatomy, which included examining its motors, light emitting diodes, motherboard, lithium ion power system, image sensors and foils.

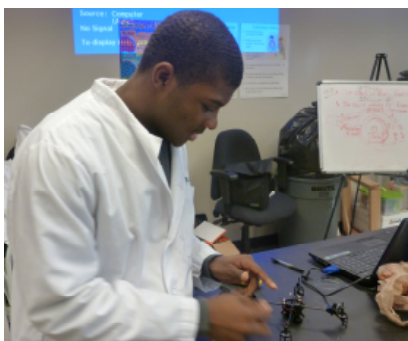
After getting a basic understanding of the anatomy of the drone quadrotor. Demarius investigated the laws of physics during flight. He validated that counter clockwise rotation of quadrotor foils and manipulation of engine torque can be used to demonstrate Newton's Third Law of Physics. For example, the counter rotation of the foils produces a downward draft that pushes against the ground causing lift.

The second phase of Demarius' research involved examining how the camera technology can increase the value of the drone quadrotor. He tested the camera in a number of ways, ranging from image capture, angle optimization to data storage and retrieval. Demarius validated the correlation between angle optimization and video recording. For example, when turning the drone quadrotor during flight, image clarity is degraded due to light defraction.

Learning about UAV technology has helped Demarius develop his analytical skills and better align his understanding of foundational physics with aerodynamics. As he continues his research work in the lab Demarius will examine how UAVs can be used to perform air quality monitoring and surface mapping.



Drone frame with foils and motors



Demarius building drone in lab



Demarius test flying drone

About the Ecotek Science Program

Ecotek is a science research lab program for young inventors and researchers in grades 4 thru 12. Student scientists work on projects aligned with the issues being addressed by world leaders at the United Nations. To learn more about Ecotek Lab go to <http://www.ecotek-us.com>