

Studying the Effect of Drones on STEM Education

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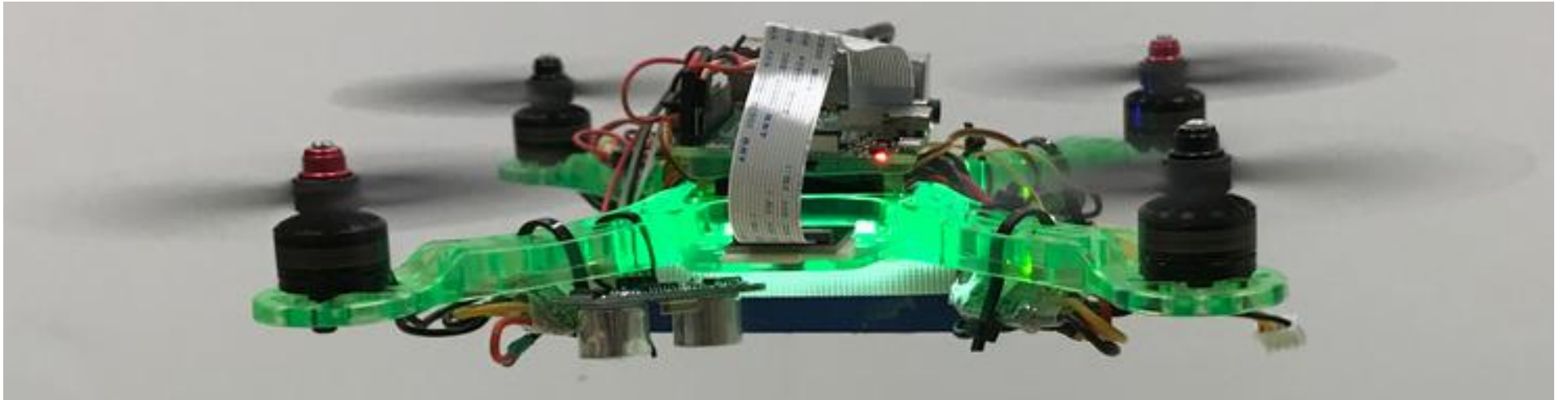
BROWN



Hypothesis

- Project-based learning through building, programming and using autonomous drones provides an engaging and exciting vehicle to increase interest in STEM, especially for students from underrepresented groups, by enhancing students self-efficacy, attitudes, content knowledge, and skills of science practices.

Duckietown Sky



- Raspberry Pi/Python/ROS Autonomous Drone
- \$225 in parts.
- All autonomy on-board in Python.





Course Outcomes

- Students build, program fly their own drone.
- Velocity and position estimation with optical flow and 2D features.
- PID control.
- UKF state estimation.
- Localization and SLAM.

Learning Materials

- Operations Manual
- Projects (on the robot) and assignments (off the robot).
- Online edX lectures and questions.

Education Initiative

- Now: recruiting teachers and schools to participate.
- Summer: Teacher training as standards aligned professional development.
- Fall: Distribute 300 drones to high school students and teachers.
- Spring: Measure learning outcomes with a pre- and post-test as well as interest in STEM and self-efficacy.