

A3

ACQUIRE - ANALYZE - APPLY

“To Observe the Earth and Visualize the Future”

John D. Moore

2015 GLOBE Distinguished Educator Fellow

GLOBE Mission Earth

GLOBE International STEM Network



Office of Science and Technology Policy

Congress established the Office of Science and Technology Policy in 1976 with a broad mandate to advise the President and others within the Executive Office of the President on the effects of science and technology on domestic and international affairs. The 1976 Act also authorizes OSTP to lead interagency efforts to develop and implement sound science and technology policies and budgets, and to work with the private sector, state and local governments, the science and higher education communities, and other nations toward this end.

www.tvworldwide.com/events/pcast/110107



GLOBE MISSION EARTH

Our mission is to improve education and involvement in science, technology, engineering and mathematics (STEM) by increasing participation of students and citizens in the GLOBE Program (www.globe.gov).

Our specific goals for GLOBE Mission EARTH include:

- Develop vertically-integrated activities and materials to support GLOBE implementation;
- Provide K-12 professional development (PD) and year-long as well as multi-year support for teachers with scaling through Train-the-Trainer models;
- Enhance STEM Experience for Undergraduate Students;
- Engage the public by supporting and enhancing GLOBE, MY NASA DATA and citizen science initiatives;
- Disseminate the program widely through the National Science Teachers Association (NSTA) and the GLOBE Partner Network, the National Career Academy Coalition (for the high school component), and other relevant networks.

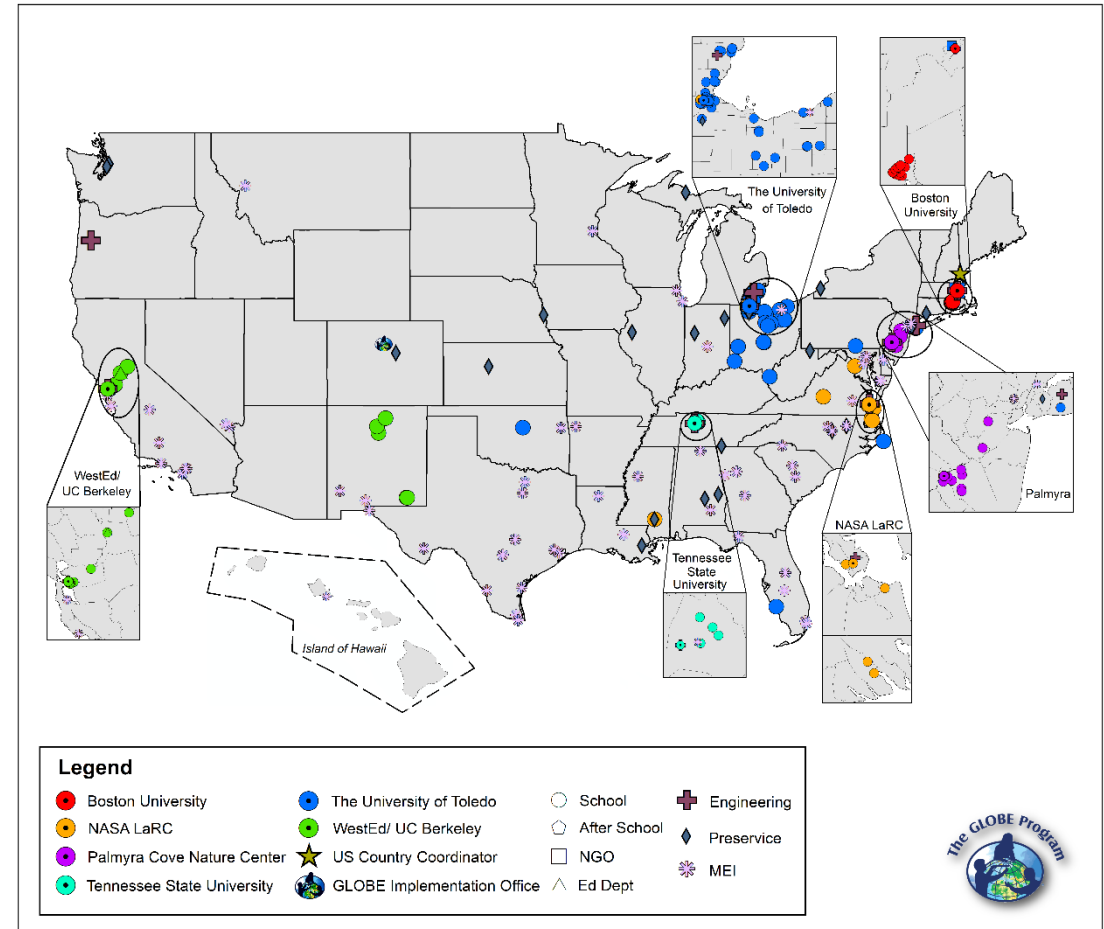
Website: <http://www.globe.gov/web/missin-earth>

Email: globe.mission.earth@gmail.com

Facebook: www.facebook.com/globemissionearth



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Engaging in STEM Education with Big Data Analytics and Technologies: A Rowan-Cove Initiative

NSF Awards: [1610911](#) *This material is based upon work supported by the National Science Foundation under Grant DUE-1610911. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.*

"Engaging in STEM Education with Big Data Analytics and Technologies: A Rowan-Cove Initiative" focuses on the large amounts of data have become available across fields in science, industry, government. Big data analytics and technologies hold tremendous promise to boost economic productivity, enhance national security and improve the quality of life.



**2019 STEM for All Video
Showcase
May 13-20, 2019**

<https://stemforall2019.videohall.com/presentations/1443>

2019 STEM FOR ALL VIDEO SHOWCASE

Innovations in STEM Education, May 13-20

(/)

[HOME \(/\)](#) [VIDEOS \(/PRESENTATIONS\)](#) [PRESENTERS \(/PRESENTERS\)](#) [FACILITATORS \(/JUDGES\)](#)

Activity for "ACQUIRE - ANALYZE - APPLY (A3)" (/presentations/1443)

[RETURN TO PRESENTATION \(/PRESENTATIONS/1443\)](#)

Map reflects approximately 269 visits and 198 visitors from 125 locations (shown as 125 markers). 

Color intensity indicates activity level, from: **Low** **High**



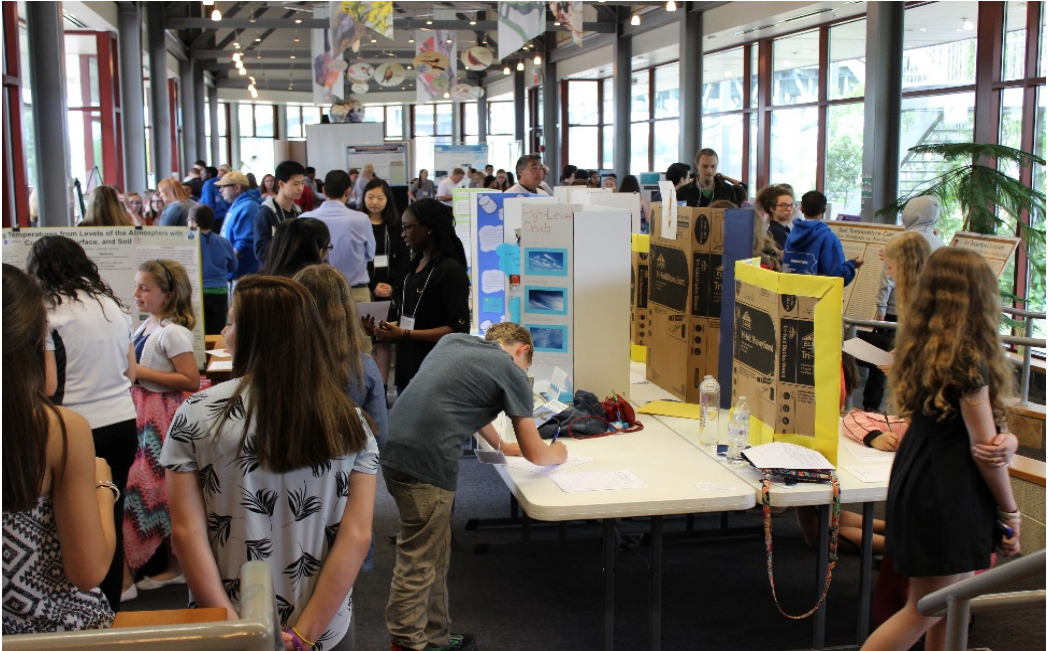
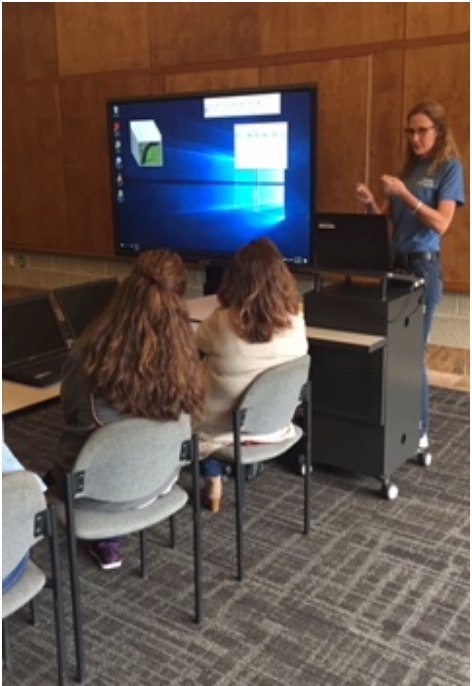
Display Activity For: City, USA (<https://stemforall2019.videohall.com/maps/1443?filter=region>), World (<https://stemforall2019.videohall.com/maps/1443?filter=country>)

ACQUIRE: Acquiring satellite imagery and remote sensing data sets to conduct investigations, or support field observations, are often difficult for teachers, students, and citizen scientists. Precollege investigators now have options to choose from field studies, AEROKATS, drones, sounding rockets, or CubeSats. *HoloGLOBE* was envisioned to be a “mixed reality” node where participants post and share their interpretations of satellite imagery along with their own field observations with other participants worldwide in the spirit of collaboration.

ANAYLZE: Traditional field experiences of making observations and measurements, following established science protocols, are used to create a database. These data points provide "ground-truth" data that can be compared to data/imagery gathered from space platforms as in the GLOBE Program's Satellite Collaborations. The use of ImageJ, MultiSpec, and the creation of Geographic Information Systems (GIS) has presented options for data to be viewed in a new way, and once again, developed transferable workforce readiness skills.

APPLY: STEM professionals are using satellite and remote sensing technologies to incorporate imagery, data, real-time observations, and modeling into daily decision making on a local to a global basis. GIS content is taught as a technical skill, and is used to develop "Geospatial Thinking" and the gathering of "Environmental Intelligence" to be used in problem-solving in multiple communities, and has become an integral component of data analysis and communication.

SPACE TO EARTH : EARTH TO SPACE (SEES) Model





Authentic Student Research

- GLOBE Student Research Symposium
- International Virtual Science Symposium

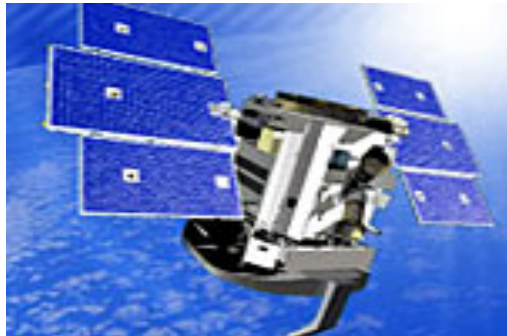
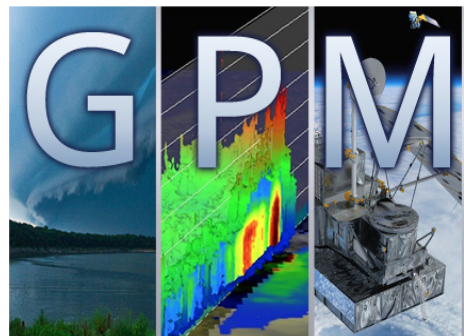


GLOBE Collaborating Satellite Missions:

www.globe.gov

Using the GLOBE Program Scientific Protocols (ground) and through the GLOBE Collaborating Satellite Missions (space) students engage in authentic science providing valuable ground validation for earth observing satellite missions. Currently the following missions* have student protocols.

- SMAP • GPM • CloudSat • CALIPSO • GOES-R (16) • ICESat2



GLOBE Observer
Choose your protocol:

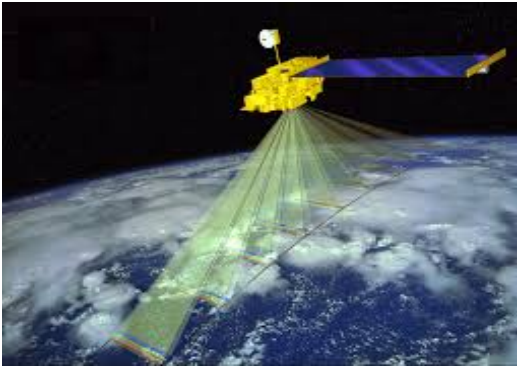
- clouds
- mosquito habitat mapper
- Land Cover
Adopt a Pixel
- Trees

f t YouTube

Visit the Observer Website

Visit the GLOBE Website

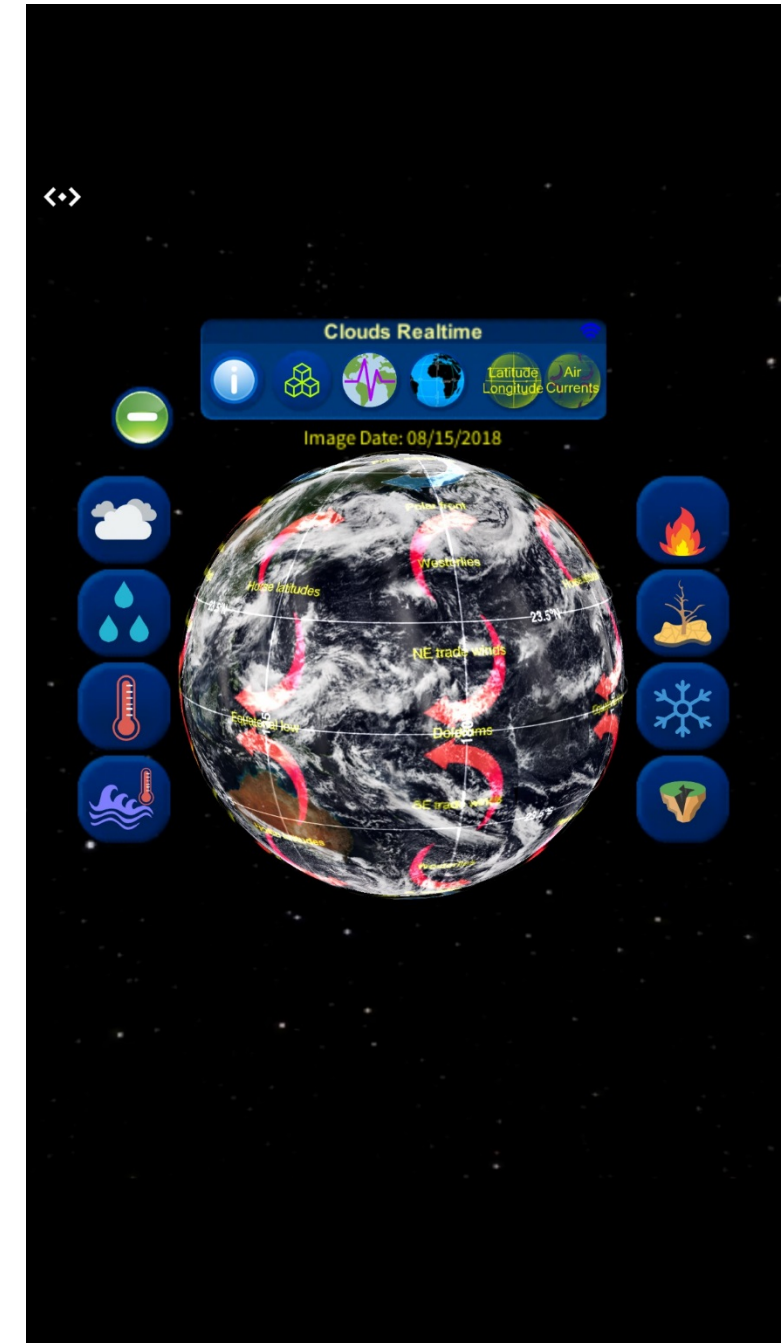
Home, List, Help icons



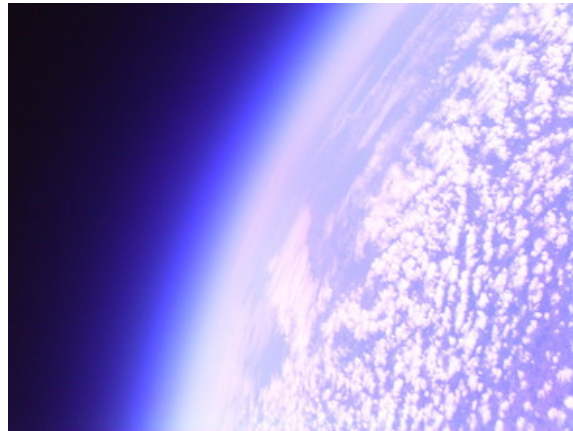
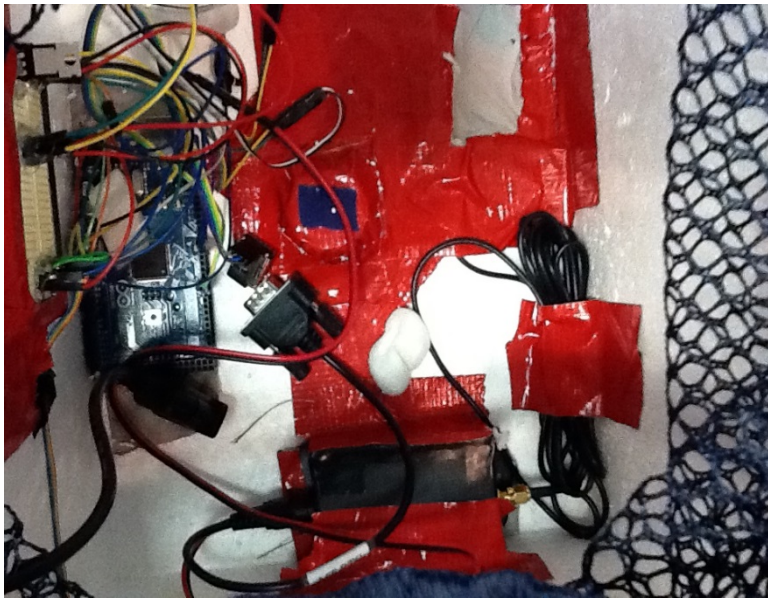
Satellites and Geovisualizations on HoloGLOBE



- IceSat2
- Suomi NPP
- Global Precipitation Measurement (GPM)
- Terra/Aqua –MODIS Instrument
- GLOBE Earth System – Geovisualizations
- NOAA Science on a Sphere (SOS)



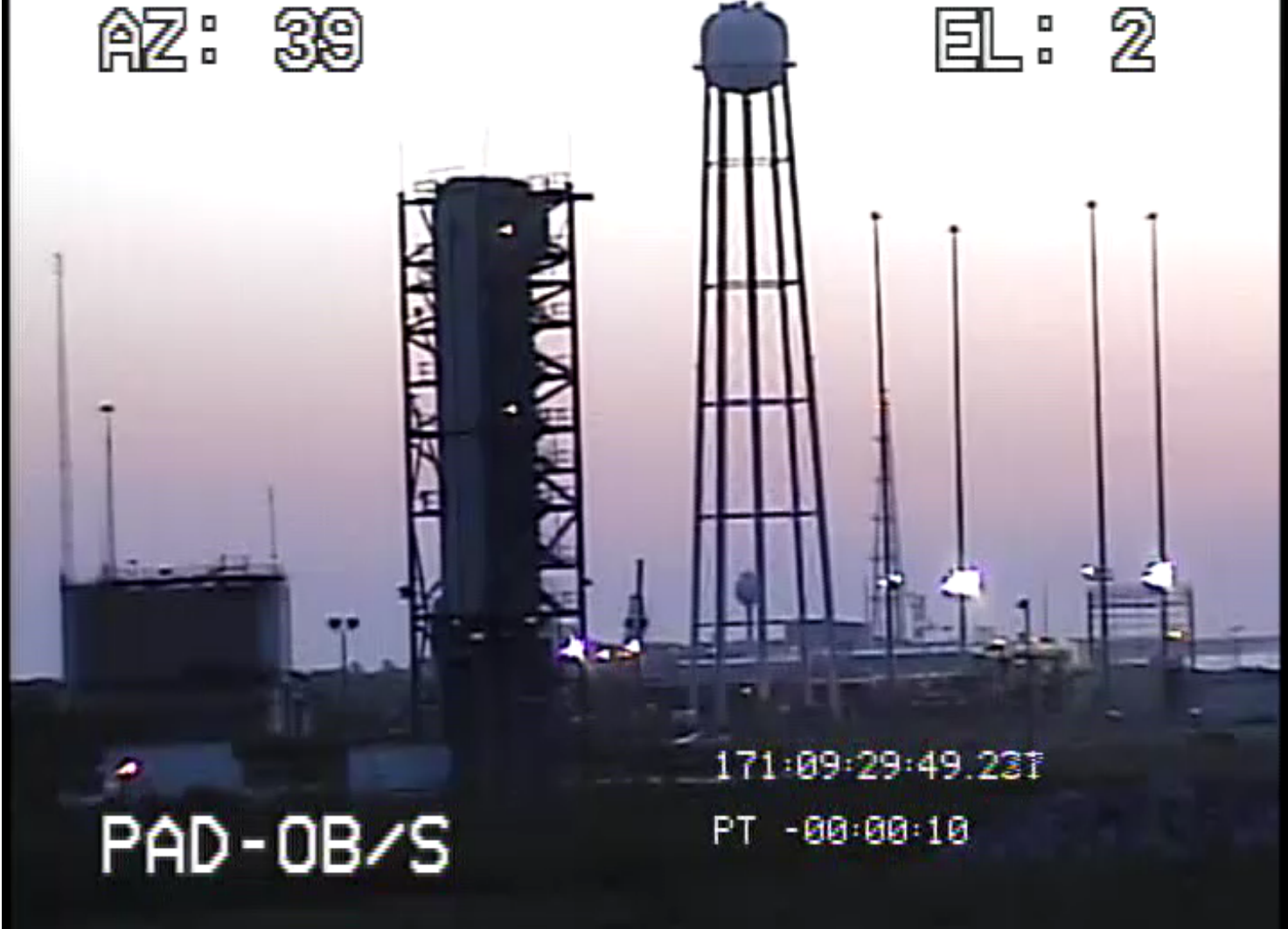






AZ: 39

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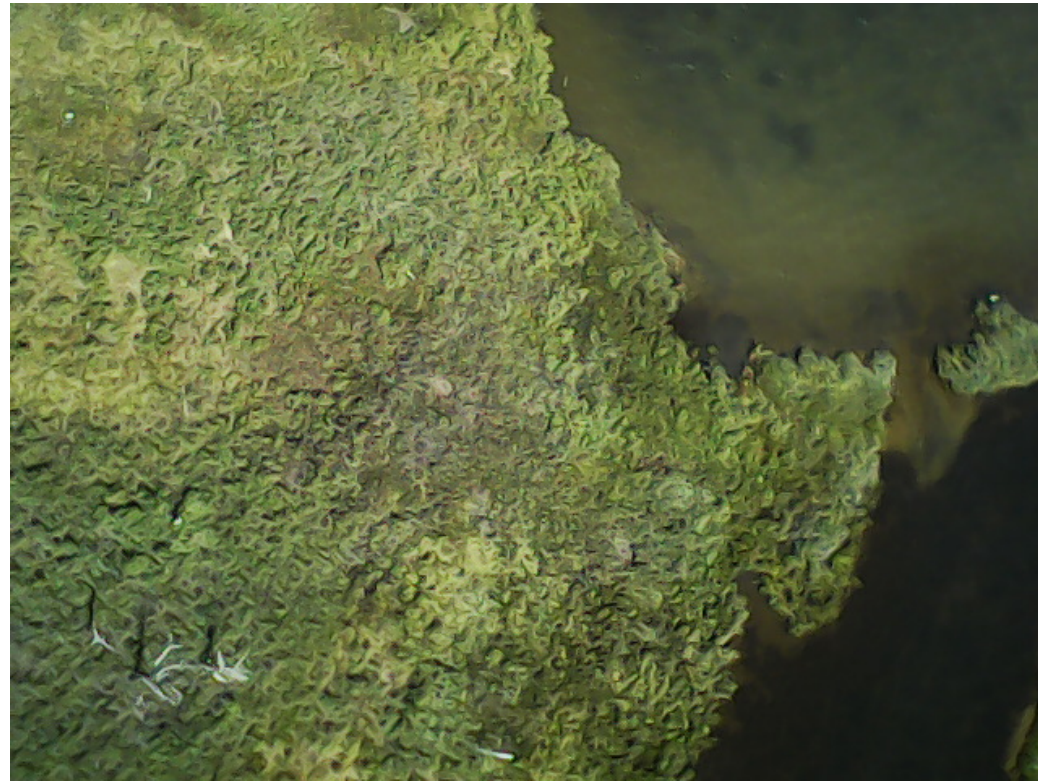


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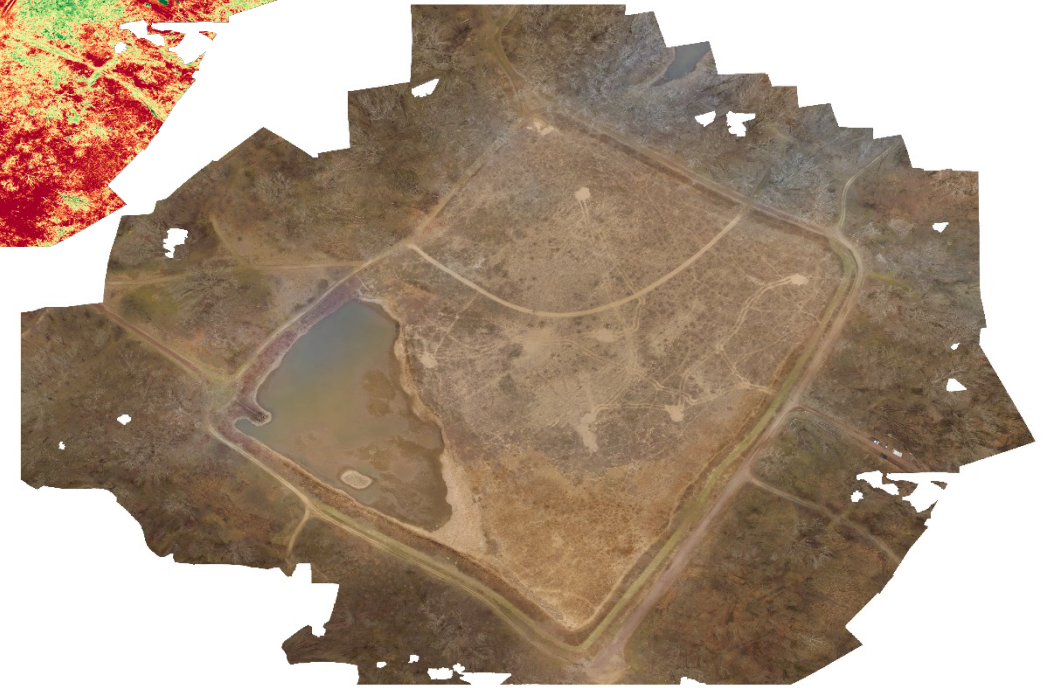
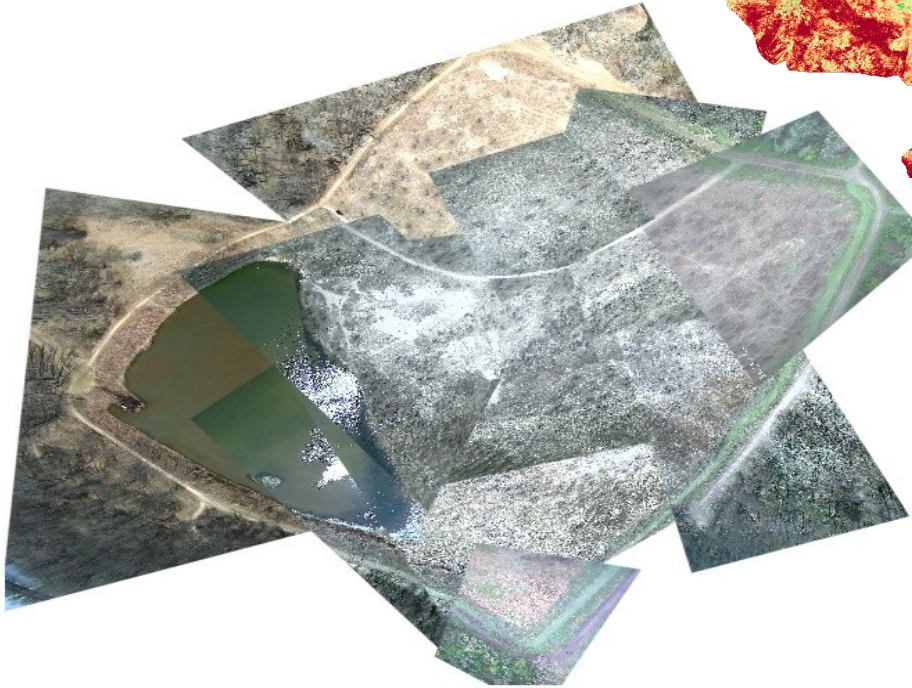
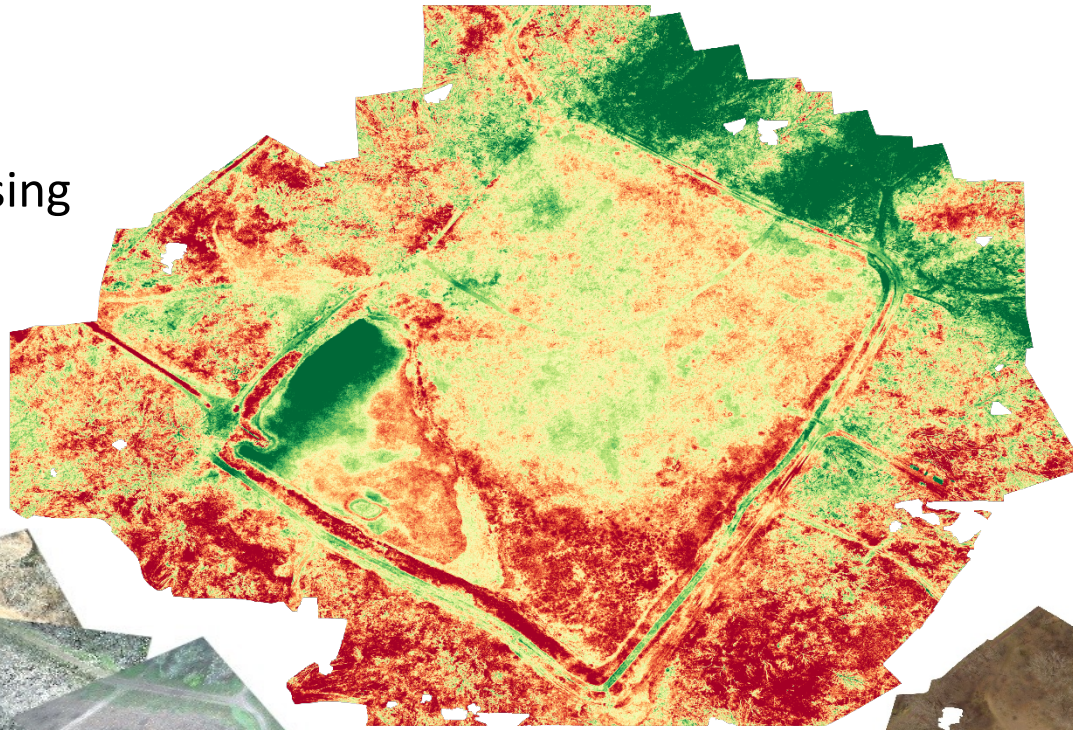




The **AEROKATS and ROVER Education Network (AREN)** introduces NASA technologies and practices in authentic, experiential learning environments. Low-cost instrumented systems for in-situ and remotely sensed Earth observations include kite-based “AEROKATS”, and remotely controlled aquatic and land-based “ROVERS”.

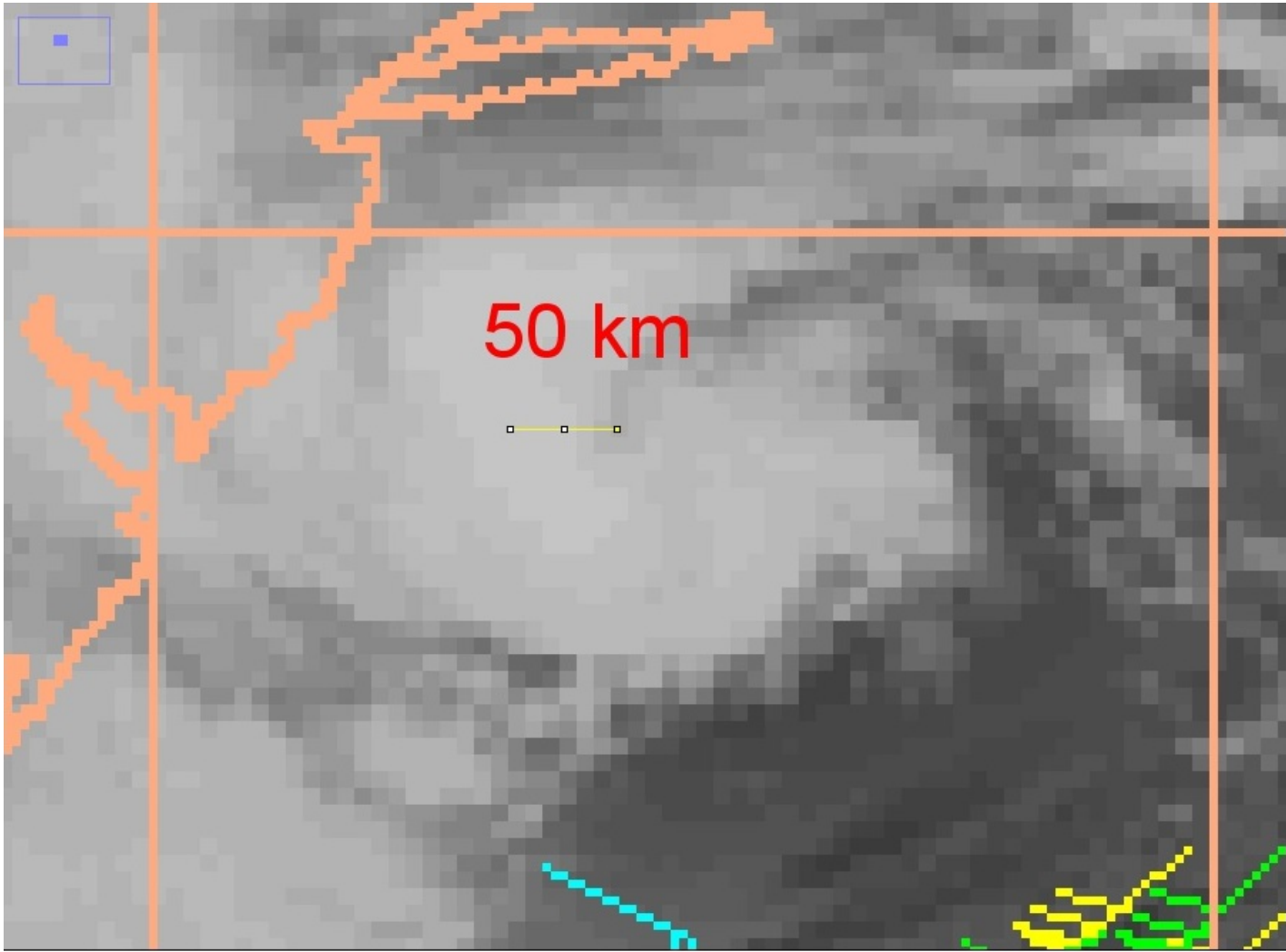


NDVI Product created using
Drone Deploy



Composite Aerial Image created using AEROKATS
and Geographic Information System (GIS)

Orthomosaic Image created using
Drones and Drone Deploy Software



Hurricane Sandy Analysis Using ImageJ

Why build toy cars
when you can learn
to build Satellites?

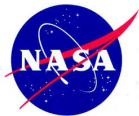
a³sat

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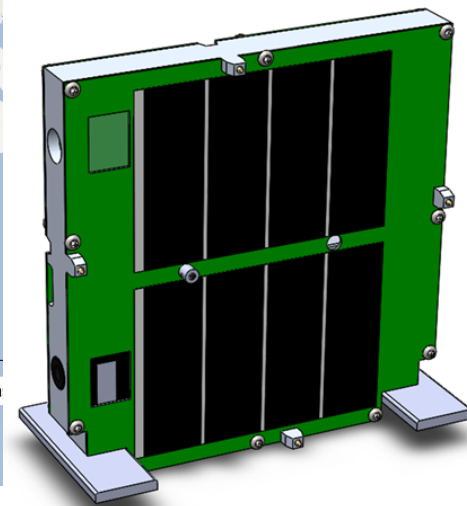
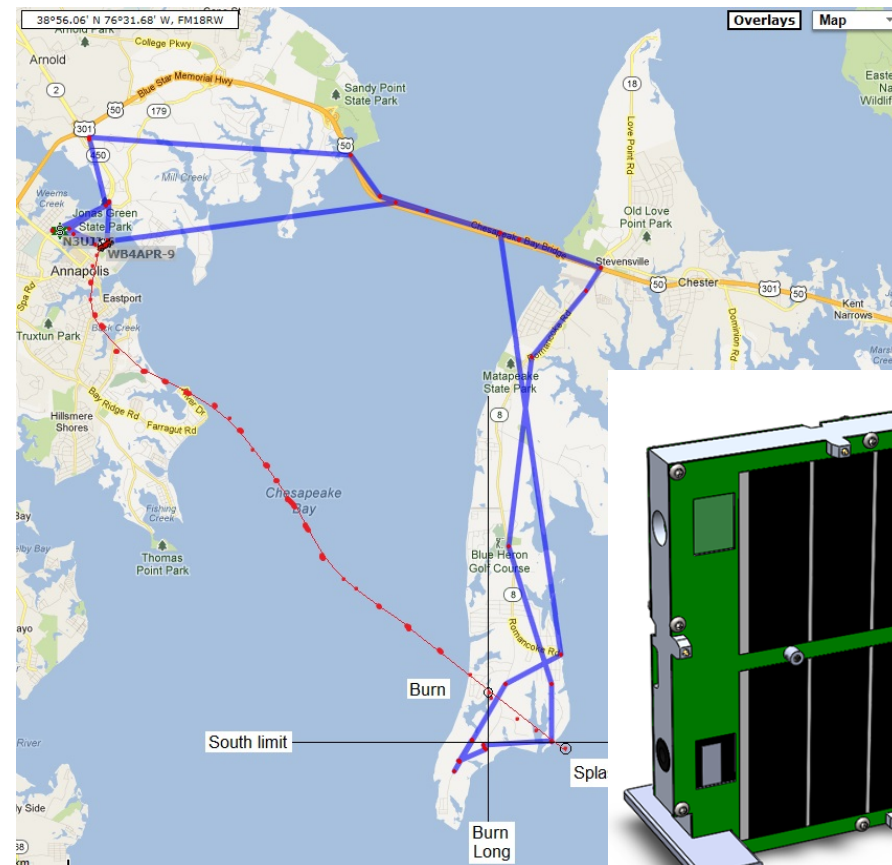
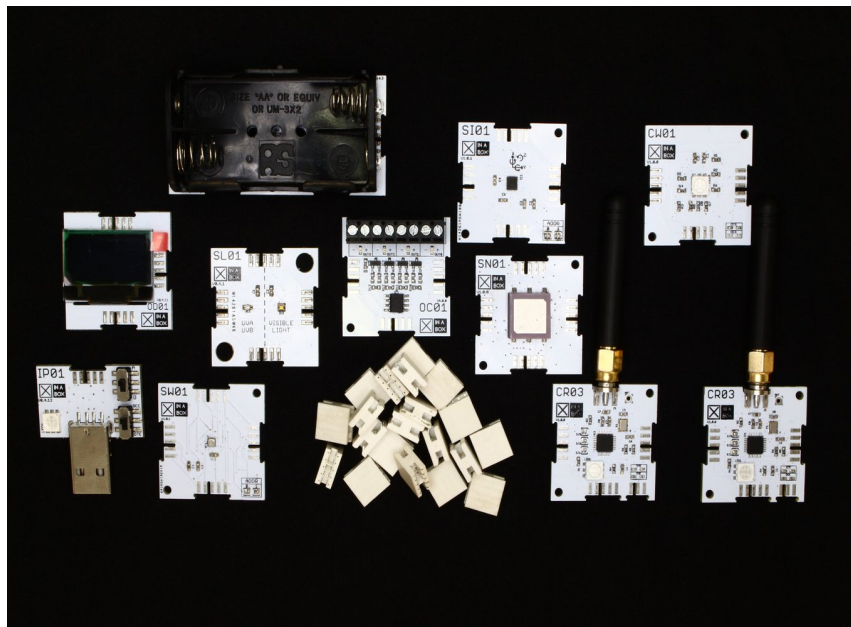
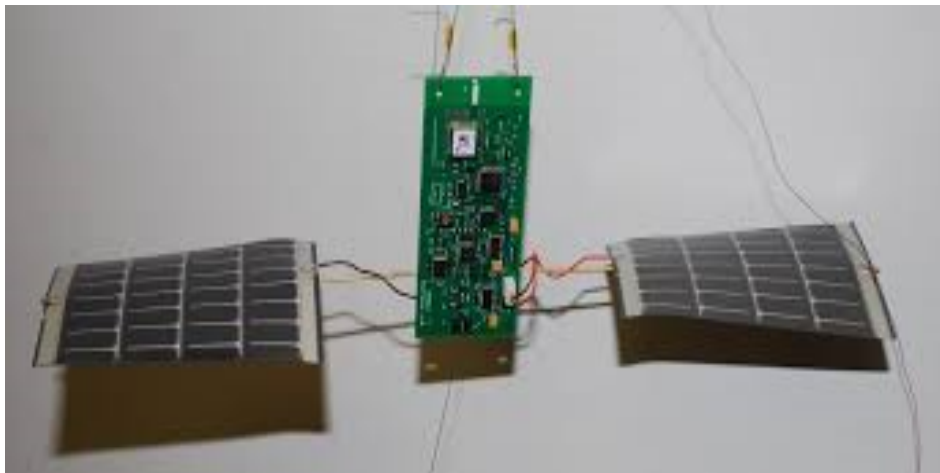
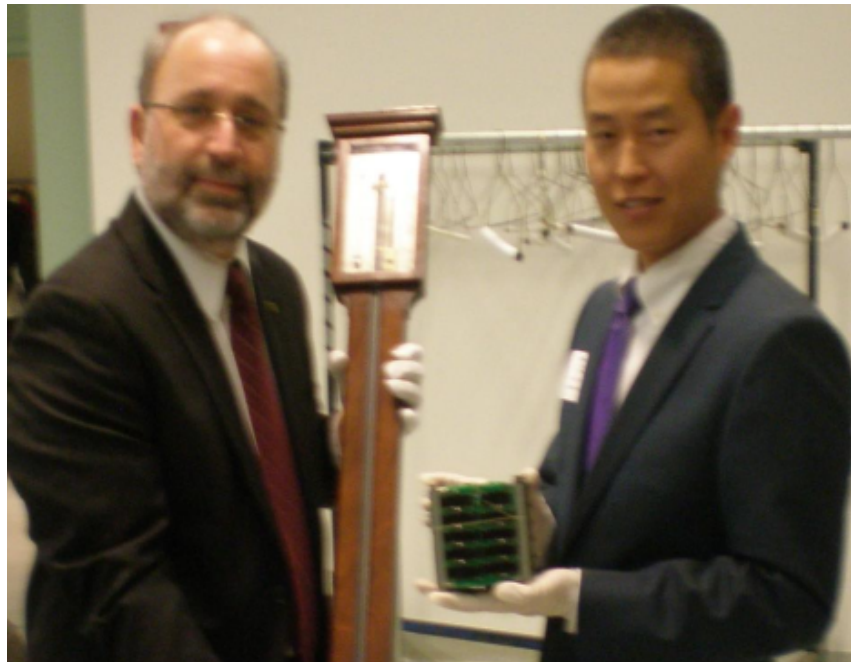
“To Observe the Earth and Visualize the Future”



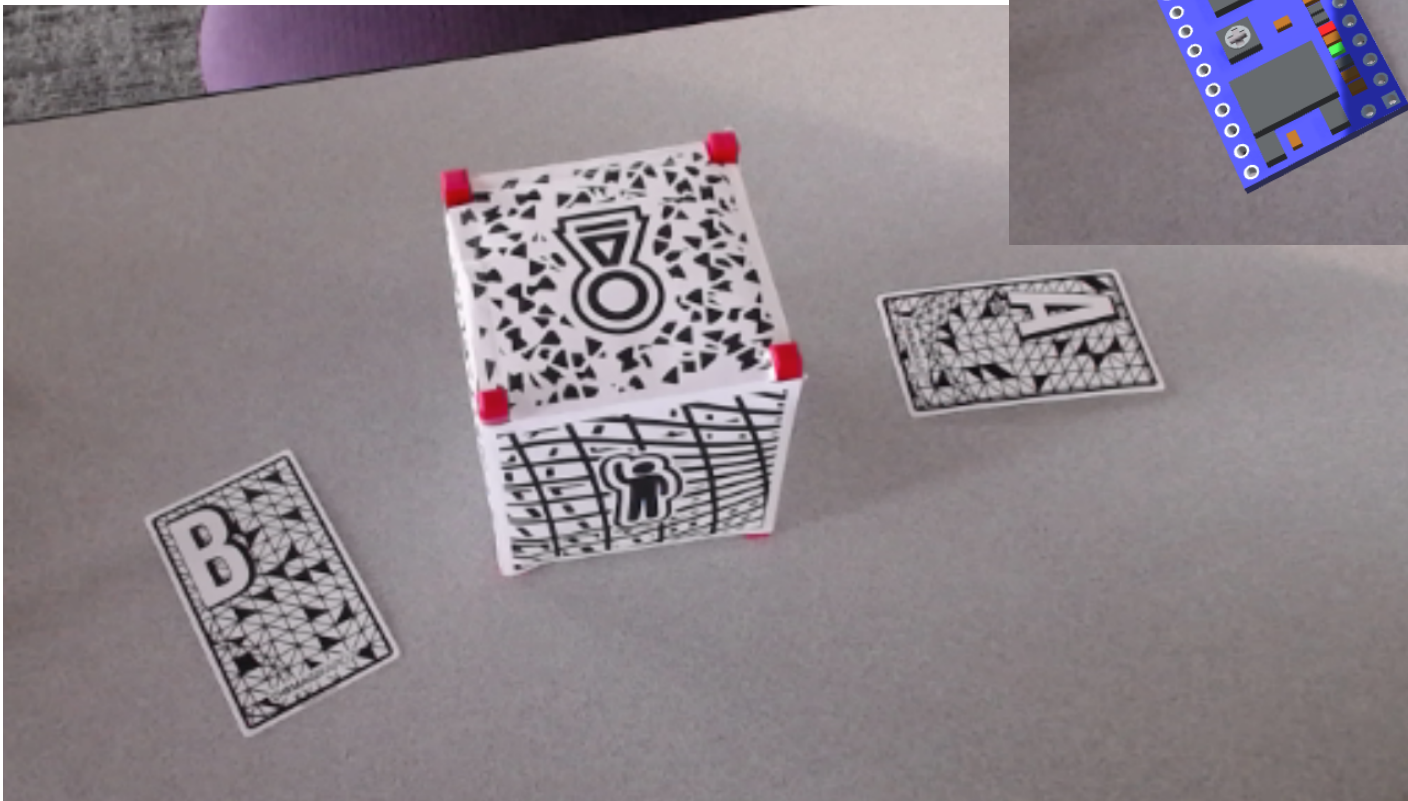
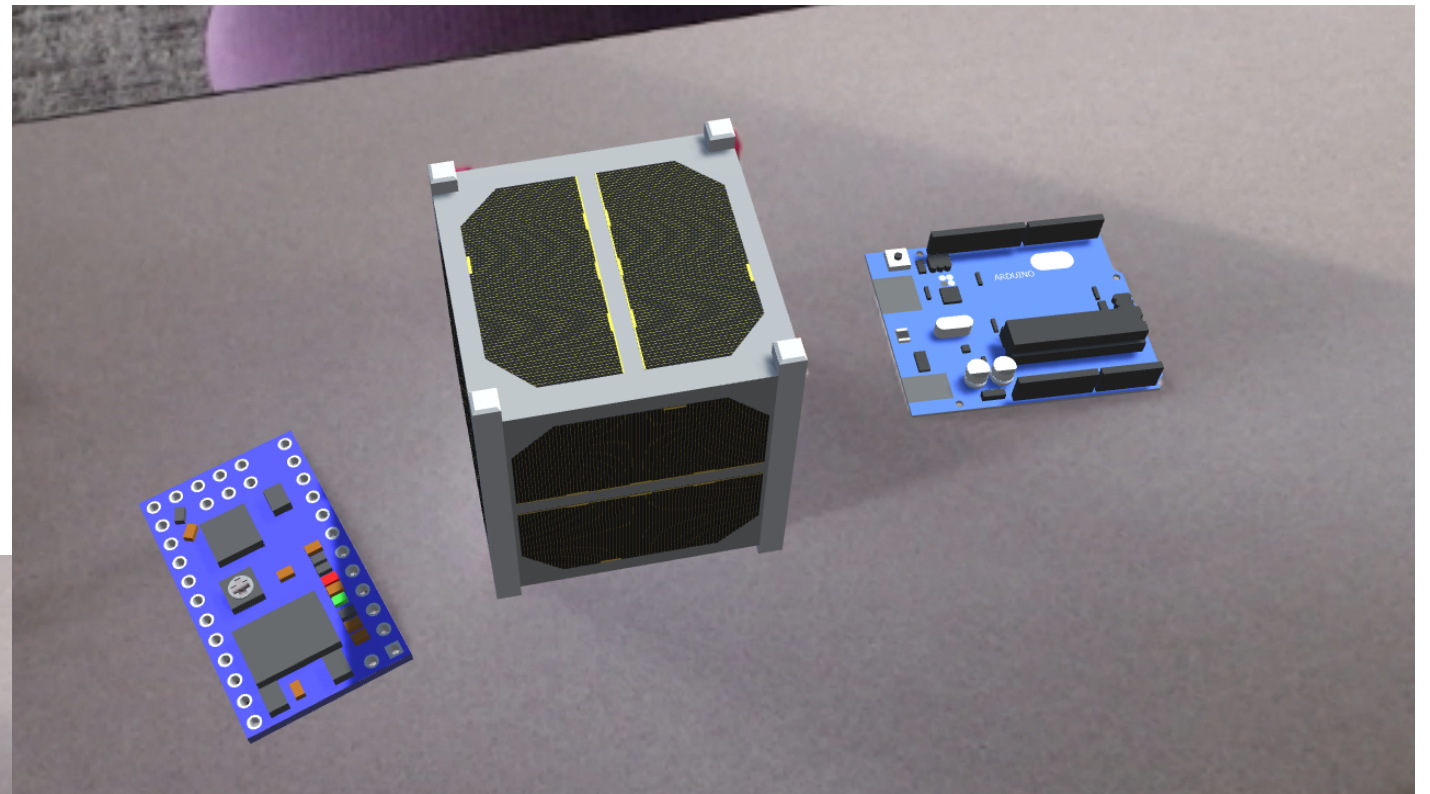
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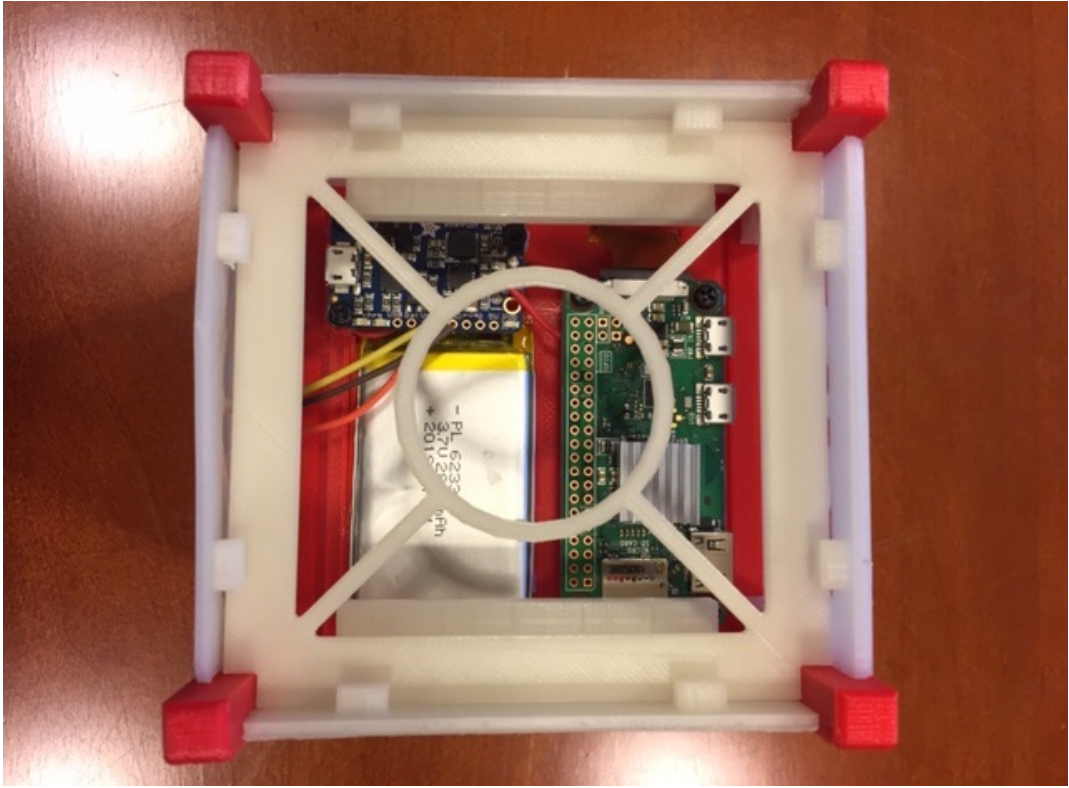
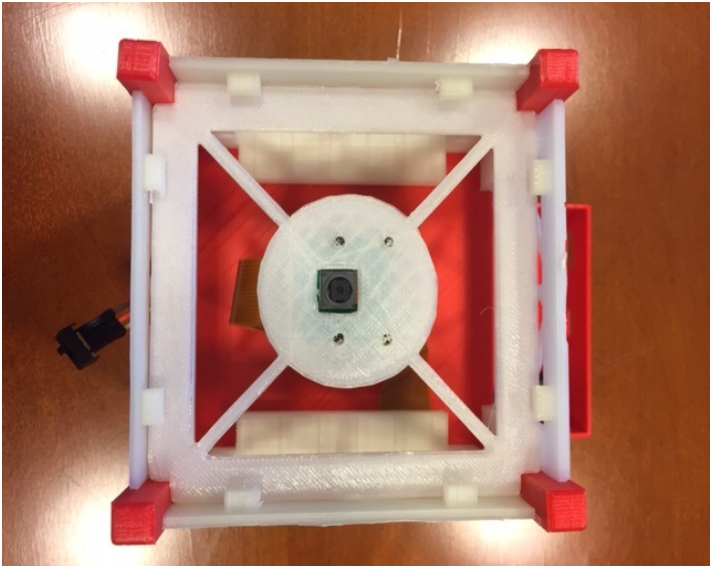
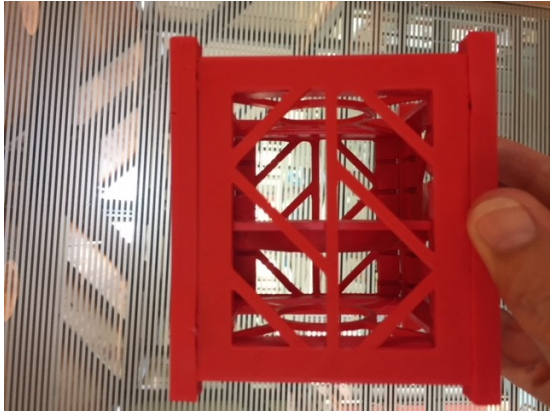
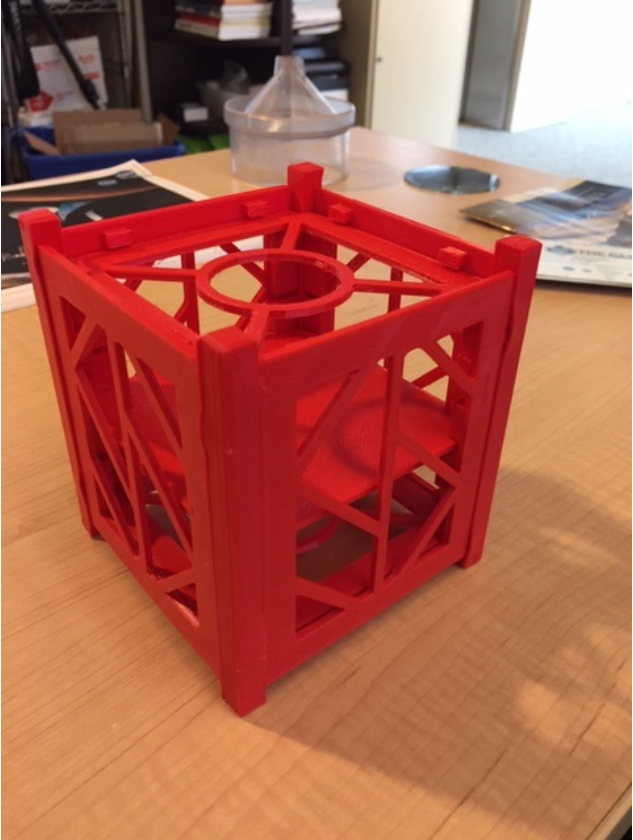


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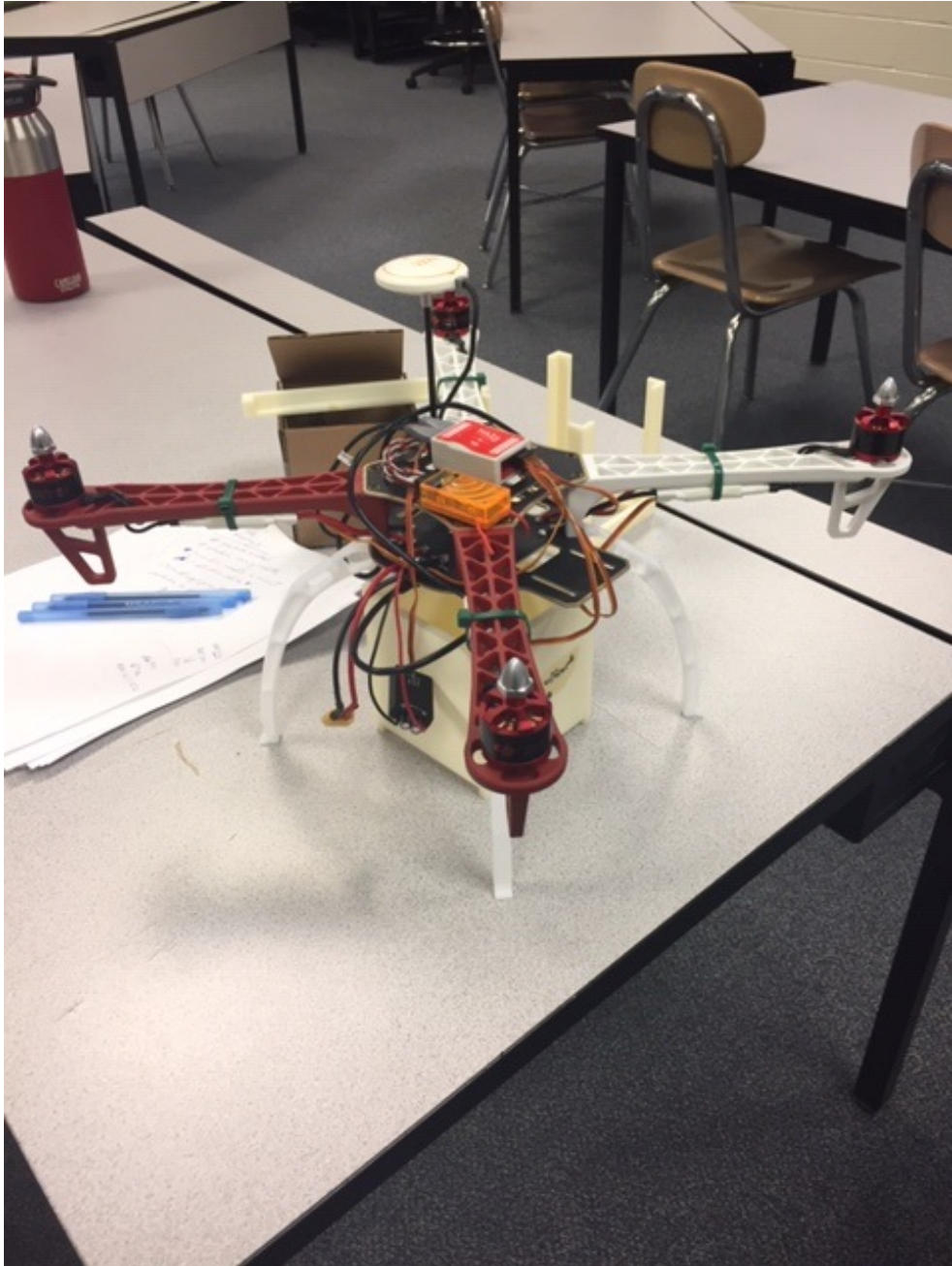
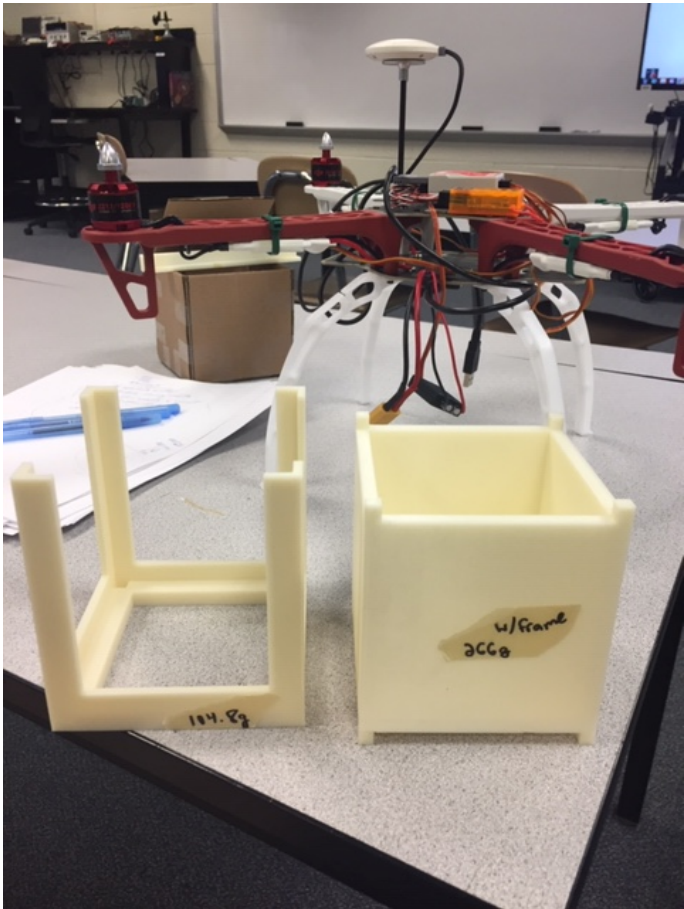
Engineering Design
using Augmented
Reality

a³sat



Engineering Design
Building Working
Models

a³sat



Engineering
Challenge

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