2017 S4: Small Satellites for Secondary Students Earth Science with Smart Eggs

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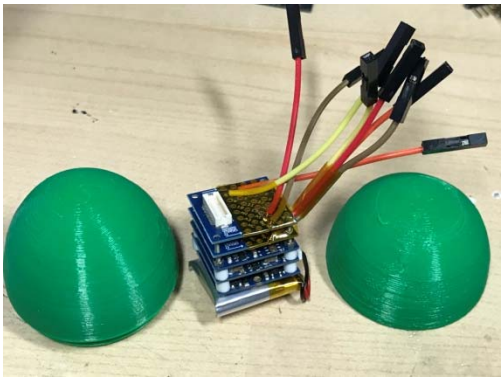
Congratulations 2017 TARC National Finalists!

Let's do some earth science together

The S4 (Small Satellites for Secondary Students) student satellite system is an opportunity to do payload science. It is based on the 17+ year ARLISS[1] program of university student payloads that invented CanSats. Each **S4Egg** payload is a hen's egg based science payload - a smaller sibling of larger S4 payloads based on the new standard 1.5p PocketQube[2] picosatellite format (5 x 5 x 7.5 cm). Each S4Egg contains an array of sensors and is programmed as an advanced Arduino compatible computer.

The National Association of Rocketry, in cooperation with the ARLISS program, is sponsoring an experiment in crowd sourced student rocketry earth science using S4Eggs and your TARC rockets.S4Egg satellites are designed to be flown on TARC rockets (or larger!) to do a common earth science experiment collecting data on atmospheric pressure, temperature, humidity, carbon dioxide level, and TVOC (Total Volatile Organic Compound - including formaldehyde) during your flight(s). Send the information back to us and we will post that information for all the teams to look at and analyze. Send us your analysis and we will publish that as well.



In addition to the common crowd sourced experiment, your S4Egg can be adapted with additional software and sensors to do additional, customized science experiments. Baseline S4Egg sensors include: temperature, atmospheric pressure, humidity, CO2 and TVOC measurements. Additional available S4Egg sensors include GPS, and light (IR, visible, UV) sensors, Standard interfaces are available to add even more sensors. And the S4Egg's electronics can be moved to the larger S4Arduino package for even more sensors (dust, gamma radiation, IR imaging, video) and capability. S4Arduino samples data from the baseline sensors at about 50 Hz, stores data locally at about 10 Hz. A microSD card provides for local recording of sensor data.

2017 S4Egg Program

All 2017 TARC National Finalist teams have the opportunity to participate and it's a simple process.

1. Send us (kenbiba@icloud.com) a request to participate (by June 1, 2017).
2. 30 participating teams will be selected by the date of their application and geographic location. Selected teams will have their S4Egg shipped to them by mid-summer along with user documentation.
3. Fly the S4Egg as many times as you like over the summer and fall, then submit your flight data and analysis by November 1st 2017.
4. We will publish all the data and analysis we receive by December 1, 2017 and make the report available to all.
5. We then encourage all teams to look at this much larger dataset (hopefully with hundreds of flights across the United States) - and see if we can find patterns in atmospheric CO2 and volatile organic compounds.

Teams can contact Ken Biba (kenbiba@icloud.com) at AeroPac for more information.

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[1] A Rocket Launch for International Student Satellites is an international high school and university competition for autonomous robotic student satellites held for the last 17 years by the AeroPac rocketry club at Black Rock Nevada. www.arliss.org

[2] PocketQubes are the successor to CubeSats designed by Professor Bob Twiggs, co-inventor of CubeSats and CanSats. CubeSats are now the standard for small satellites - educational, commercial and government. PocketQubes are the successor - recognizing the increase in electronics capability at small size. A number are now in orbit with more on the way. https://en.wikipedia.org/wiki/PocketQube