2016 Small Satellites for Secondary Students

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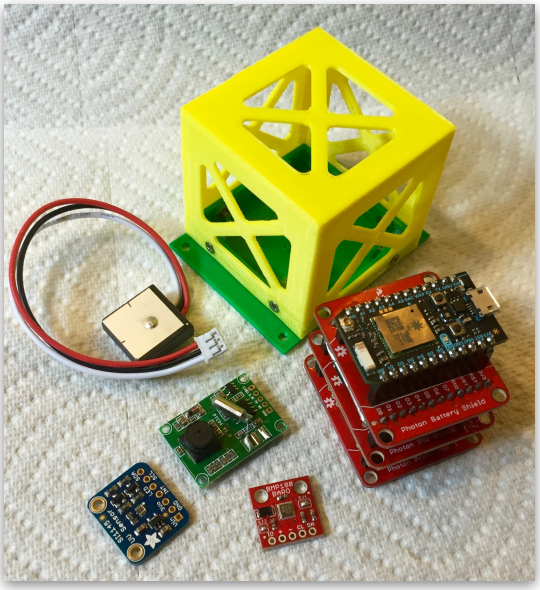
Opportunity



The S4 student satellite hardware is based on using the new standard 2p PocketQube[1] picosatellite format (5 x 5 x 10 cm). Each PocketQube contains an array of sensors and is programmed as an Arduino compatible computer. Each S4 uses cellular communications to communicate to the Internet cloud and each team uses a web page to monitor the status of their satellite and download telemetry from the flight. The system is extensible and new sensors can be added to each S4 for new and different missions. Students can make use of the default sensors and programming or can add new sensors or programming.

The standard sensors include: GPS, 3x accelerometer, 3x gyro, 3x magnetometer, external temperature, atmospheric pressure, battery status. Possible additional sensors might be gas (alcohol, LPG, methane, carbon monoxide) sensors, UV light intensity, or other

[1] PocketQubes are the successor to CubeSats designed by Professor Bob Twiggs, co-inventor of CubeSats. A number are now in orbit with more on the way. https://en.wikipedia.org/wiki/PocketQube

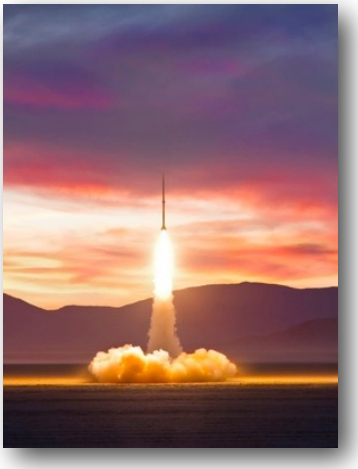
measurements. A microSD card provides for local recording of sensor data and a cellular data connection provides for data collection to the Internet cloud.

Program

The top 50 TARC teams would receive the opportunity to submit a proposal for a science or engineering experiment using the S4 - either with the standard sensors or customized sensors. A maximum of 25 teams will be selected based on the quality of their proposal and provided an S4 satellite kit.

Proposals must be submitted by June 1st, proposal selection will be completed by June 8th. Notification of selection will occur prior to June 10th and satellite kits delivered to the team lead before June 15th. The selected top 25 teams would then program their satellite to collect experimental data described in their proposal and fly it at a local launch site collecting data and relaying it to a ground station(smart phone or laptop)using the cellular data link. The teams would then analyze their data and submit a report of their results and findings for evaluation and award selection ***no later than August 15th.***

The top team selected by their results and documentation would be rewarded with a flight of their payload to over 100,000 ft. using an ARLISS Extreme[2] at Black Rock, Nevada. airframe at a cost of $1500 and a cash award of $500. The second place team would receive a flight of their payload to 10,000 ft and a $500 cash award, third place team would receive a flight to 10,000 ft. and a $250



[2] ARLISS Extreme is based on the Carmack Prize winning design to fly payloads to the edge of space economically. It flies standard CanSats or 2p PocketQubes to over 100k'. https://www.youtube.com/watch?v=hQDLykL45Xk

cash award , and the fourth place team would receive a flight to 10,000 ft. and a $100 cash award. All the award flights would have video and data streamed to the team's classroom from the Blackrock Playa during the ARLISS[3] launch in mid-September.

[3] A Rocket Launch for International Student Satellites is an international 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