NASAfacts

CSUNSat1: Low Mass, Extreme Low-Temperature Energy Storage

A California State University Northridge and Jet Propulsion Laboratory Collaboration

CSUNSat1 will test an innovative, low-temperature capable lithium-ion battery/super capacitor hybrid energy storage system in low Earth orbit. This new technology will reduce the mass and volume of power systems by eliminating battery heaters and provide increased performance at low temperature.

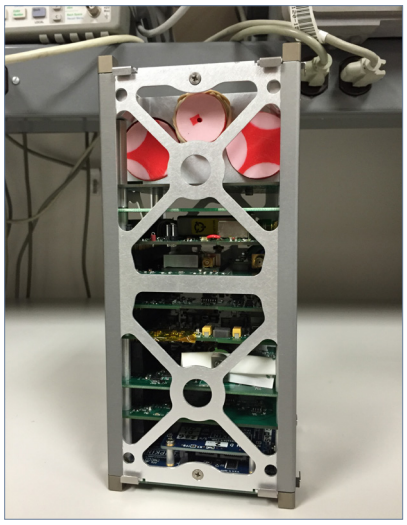
CSUNSat1 was selected to participate in NASA's CubeSat Launch Initiative and is tentatively scheduled for launch in Spring 2016.

The CSUNSat1 mission payload has the following goals:

- Deliver at least 90% of the energy of a conventional CubeSat power system at -35˚C
- Provide 90% of the initial capacity after 200 charge/discharge cycles at 50% depth of discharge
- Provide 90% of the initial capacity after 200 days of operation

During CSUNSat1's primary mission phase, a series of experiments will test the energy storage capabilities at low temperatures on orbit with full control and monitoring of the spacecraft being performed by the CSUN ground station. Extended mission operations will include operation of the satellite entirely from the experimental payload energy storage system. The CSUNSat1 spacecraft can be reprogrammed on orbit to carry out additional experiments if required.

The overall success of this energy storage system will enable future missions, especially those in deep space to do more science while requiring less energy, mass and volume.



Fit Test of CSUNSat1 with Payload Mock-up

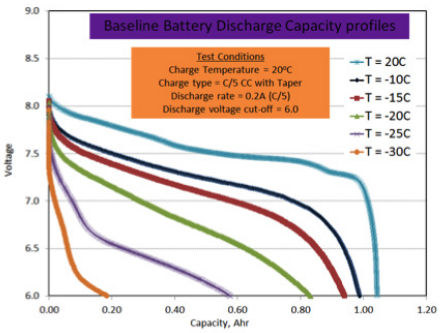
CSUNSat1, a two-unit (2U) CubeSat, is jointly developed by the California State University, Northridge (CSUN) and the Jet Propulsion Laboratory (JPL) in Pasadena, California. CSUN is responsible for providing the spacecraft while JPL provides the payload.

Another important aspect of this project focuses on the NASA strategic goal of advancing the nation's STEM education and workforce pipeline. This type of project attracts diverse students to NASA's workforce and provides them an opportunity to work with experienced aerospace engineers during development, design, testing and operations activities. The students gain valuable experiences and skills directly applicable to NASA's mission.

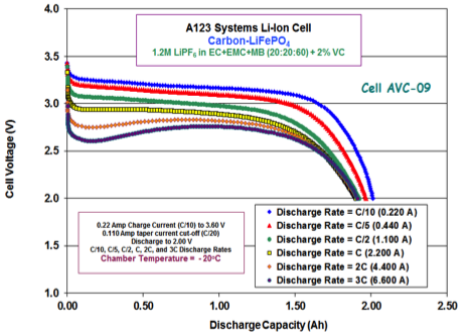
To this end, the CSUNSat1 spacecraft has been designed and tested entirely by CSUN students and faculty.

- Over 60 students have participated in the project to date
- This project has already pipelined several students into the aerospace industry
- A 100% deterministic spacecraft software system is being developed by CSUN
- Entire ground station mission control and tracking software created by CSUN students

This CSUNSat1 project is funded through the SmallSat Technology Partnerships, a program within the Small Spacecraft Technology Program (SSTP). The SSTP is chartered to develop and mature technologies to enhance and expand the capabilities of small spacecraft with a particular focus on communications, propulsion, pointing, power, and autonomous operations. The SSTP is one of nine programs within NASA's Space Technology Mission Directorate (STMD).



Standard CubeSat Battery



Low Temperature Battery

For more information about the SSTP, visit:
http://www.nasa.gov/smallsats

For more information about this project, please contact:

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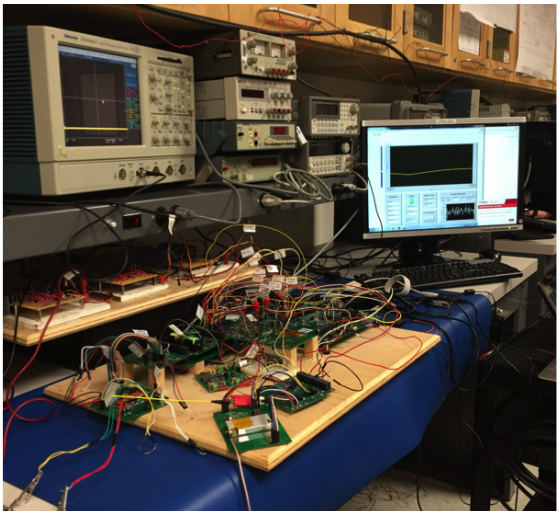

CSUNSat1 Flatsat with Solar Simulator

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