

IRVINE CUBESAT

The New STEM
Education: Why
CubeSat technology
is the perfect vehicle
to get our students
ready for space
exploration.

Powered by
 PSF

Presented by

Kain A Sosa



Did you know....

60% of US companies find themselves **unable to find qualified hires** for newly vacant STEM positions.



Demand for bright minds with strong backgrounds in these fields often **exceeds** the # of qualified candidates

Courtesy of the stemworkscolumbus.org

-Stemedcoalition.org

Schools across America are designed to prepare students for the **past, not the future.**



Most aspects of today's public schools in America were designed in 1893.



Students lose more than 90% of their creative capacity during their school years.



65% of students will be employed in jobs that don't exist yet and for which schools are not preparing them.

Courtesy of the



IRVINE CUBESAT



Powered by
IPSF

Our shared vision is to
change the way
students **experience**
STEM Education

Dr. Brent Freeze and Kain A Sosa
Co-founders

IRVINE CUBESAT



Inspire the next generation of innovative thinkers, makers, programmers, and explorers.

Dr. Brent Freeze and Kain A Sosa
Co-founders

IRVINE CUBESAT STEM PROGRAM: Team Overview

Student
Teams



6
High Schools
in Irvine, CA

Key
Partners



BILINGUAL
INTERACTIVE



Industry &
University
Partners



IRVINE CUBESAT STEM PROGRAM: Sponsors

Sponsors




IRVINE CUBESAT STEM PROGRAM: Team Roles


Team: Beckman High School

IRVINE01 CubeSat - Interface Map

UHF Radio & Antenna




LED & IrDA Encoder



COMMUNICATIONS

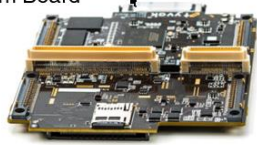
GPS, Magnetometer & Sun Sensors



UART, I2C & SPI 3.3V

3MM-0.5 BOLT

System Board

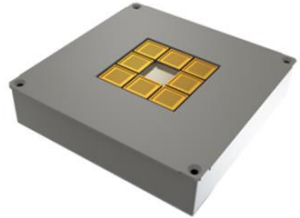


AVIONICS

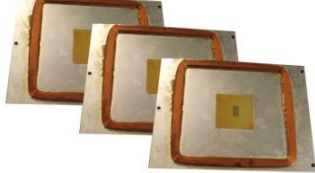
UART, I2C, SPI, USB 3.3V

2.5MM-0.4 TI BOLT

Electric Thruster




Magnetorquer Coils



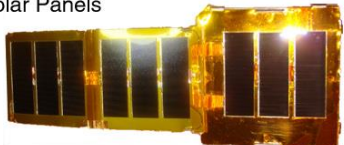
PROPULSION

10A POWER MOSFET 3.7V

Lithium Batteries




Solar Panels




POWER

Camera & Breakout Board



Frame

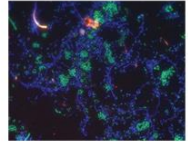


PRIME

2A DIODE 5.5V

2.5MM-0.4 TI BT

Organisms & Life Support System



BIOTECH

Team:
Woodbridge
High School

Team:
Northwood
High School

Team:
Irvine
High School

Team:
Portola
High School
(Irvine02)

Team: University High School

February 26, 2017

OVERALL GOALS

- **Assembly**
 - COTS Components & JIT Manufacturing Techniques
- **Programming**
- **Testing**
 - Vibration & Thermal Vacuum Certification
 - Software, EMI, Optics Bench & Other Tests
- **Launch**
 - Tentative launch of IRVINE01 CubeSat in July/Aug 2017 – Antrix PSLV Mission Sriharikota Launch Base, India to 500 km near SSO
- **Explore**
 - Radio Capture, then Orbital Operations until Re-Entry

SOFT SKILLS: STUDENT LEARNING OUTCOMES

- **Problem Solving**
 - Persistence and diligence, solving problems with no “solutions manual”
 - Trouble shooting and checking for reasonableness
- **Team Work**
 - Working as a team within each school and collaboration with other schools
- **Technology**
 - Using industry standard technology and programs
 - Finding methods for communication and project management
- **Communication and Documentation**
 - Oral and written communication for future programs and for design review
 - Digital methods to communicate with other teams and industry mentors

STUDENT OPPORTUNITIES AND EXPERIENCES

- **Interacting** with many industry professionals and networked with many experts – in person and many other methods including phone, email, Skype, and virtual meetings.
- Some have received **Ham radio licenses**.
- Some have attended a free **Linux C course** offered through Orange Coast Community College at Beckman High School.
- Learning how to **file paperwork** with **government agencies** such as the Department of Commerce, NOAA & FCC, among others.

STUDENT OPPORTUNITIES AND EXPERIENCES

- Learning how to handle **ITAR** (International Traffic in Arms Regulations) and proprietary hardware, software, and documentation
- Students from all schools participated in a logo design contest
- Students have worked on social media and blog updates
- Teams have worked hard to **promote and expose teen girls to STEM careers**

Visiting Speakers

Dr. Jordi Puig-Suari



**Co-created
CubeSat
standard**

**Dr. Natalya
Brikner**



**CEO of Accion
Systems
(Propulsion
systems
Manufacturer)**

**Dr. Pamela
Clark**



**Director, JPL
CubeSat
Development
Lab**

**Cdr. Ronnie
Nader**



**Ecuador's 1st
Astronaut
(Chief Engineer
on Pegasus and
Krysaor
CubeSats)**

**Dr. Michael
Minovitch**



**Retired, JPL
Gravity Assist
Technique for
Spacecraft
Trajectories**

Dr. Jordi Puig-Suari



Dr. Pamela Clark



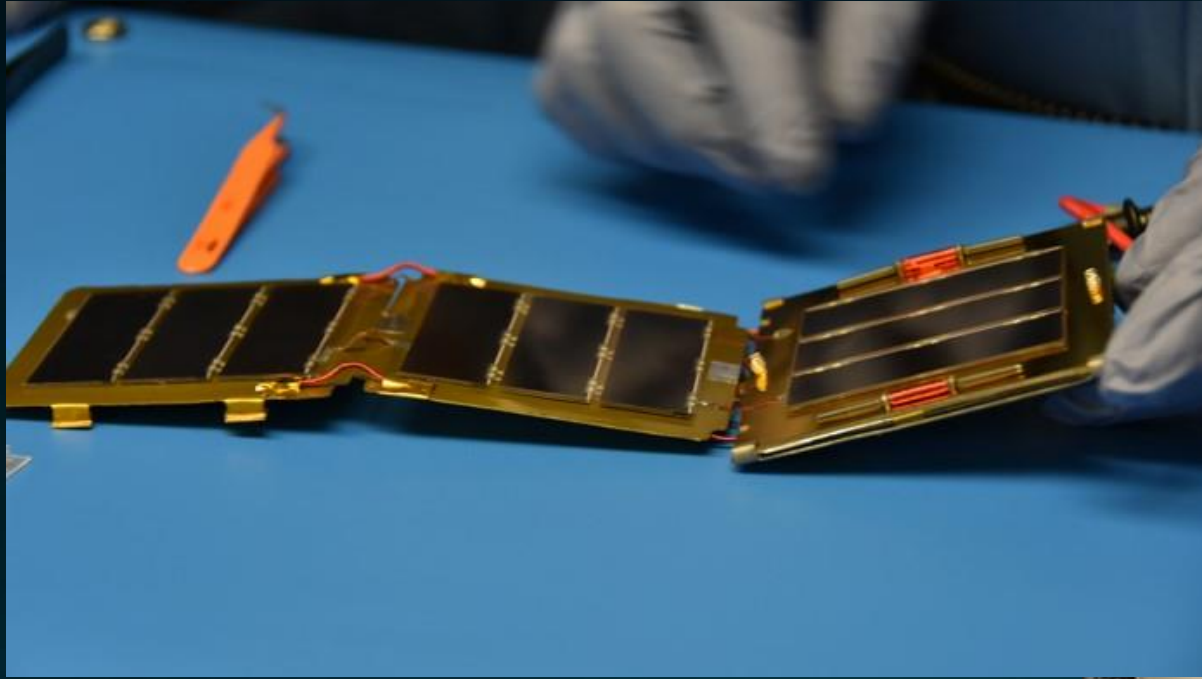
Commander Ronnie Nader



Design Review in Front of NASA Judges - Irvine Civic Center



Deployable Solar Array Testing and Training



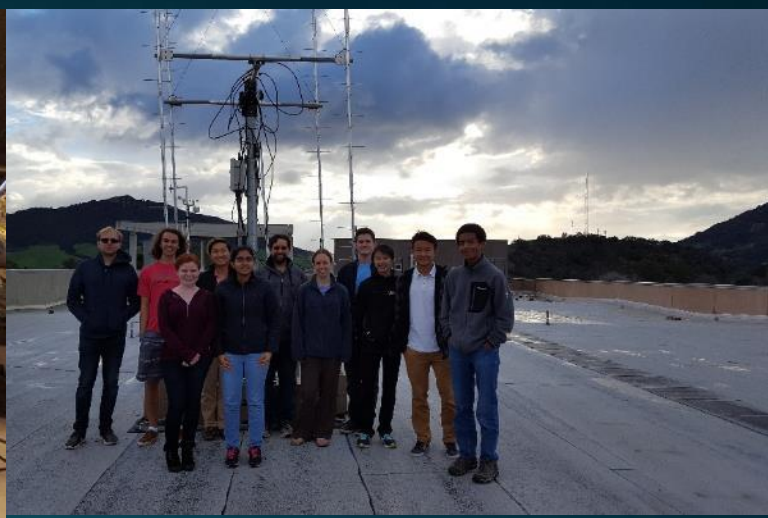
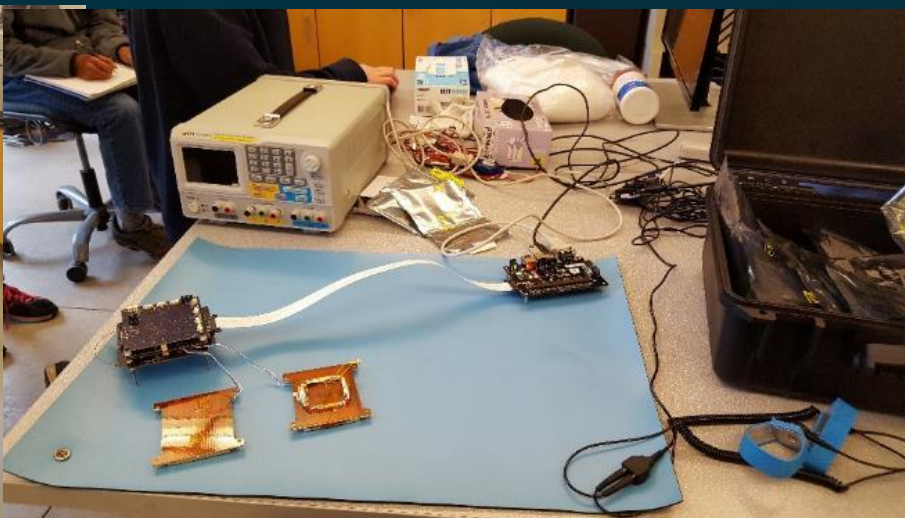
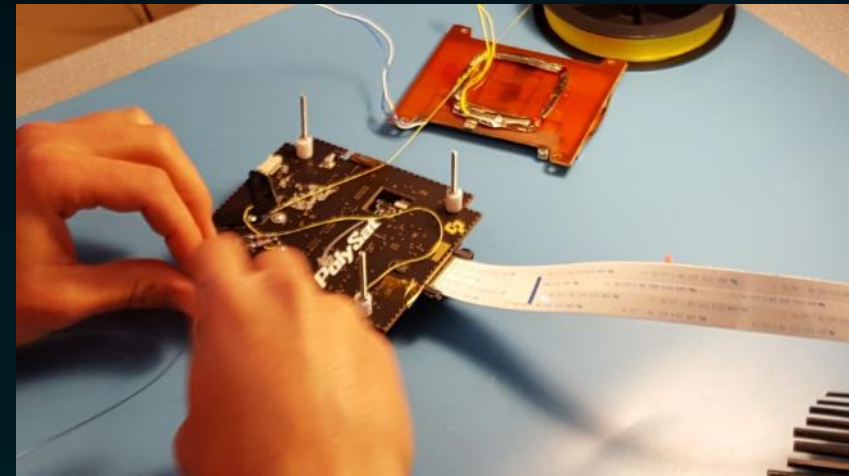
2016 Cal Poly SLO CubeSat Developer's Workshop



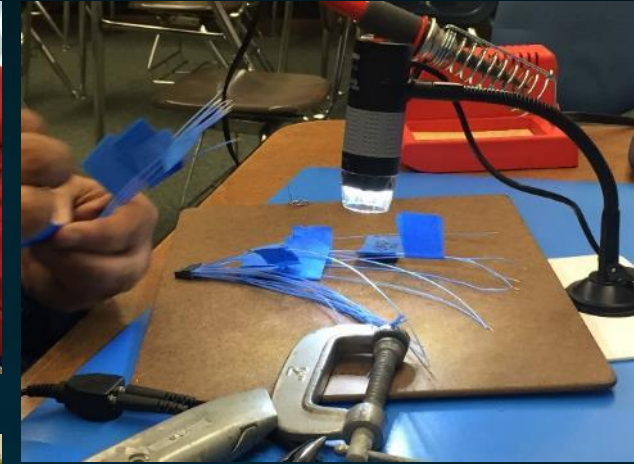
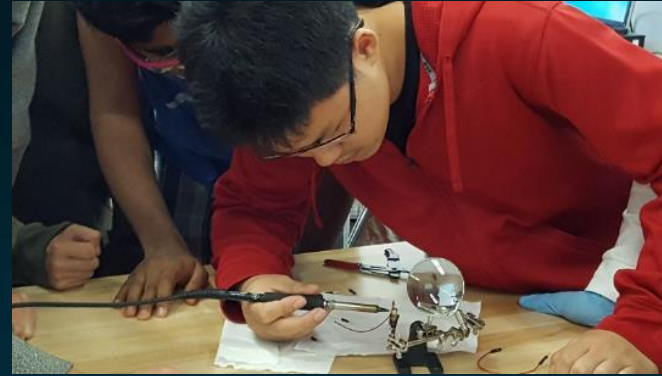
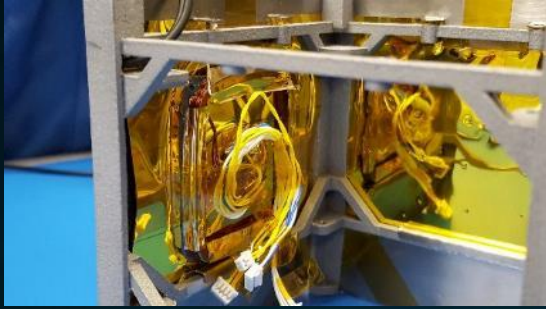
@ToryBruno CEO@ULA @IrvineCubeSat @CalPolyCubeSat @Tyvak @IPSF



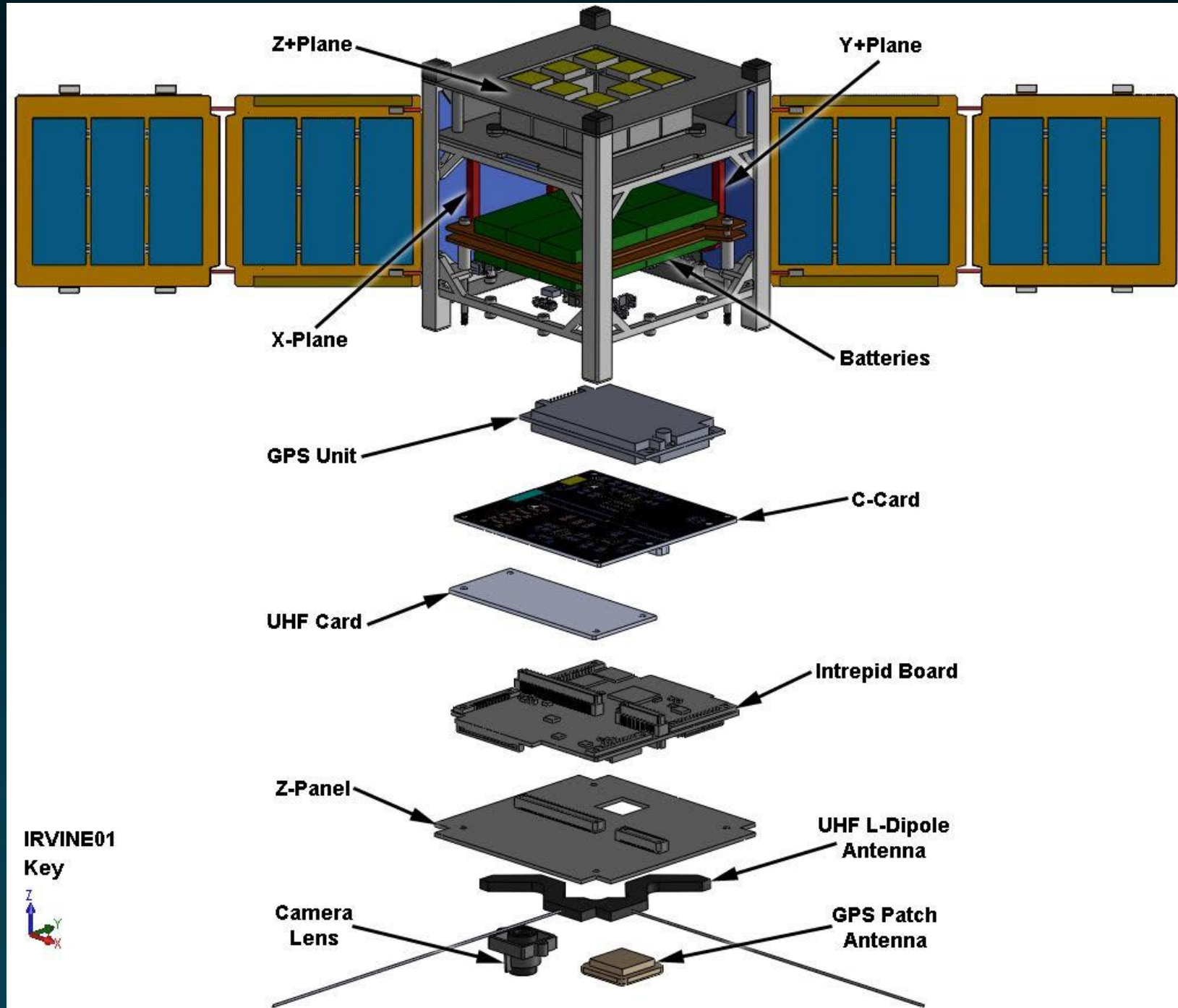
Communications Testing at Cal Poly SLO Feb. 2017



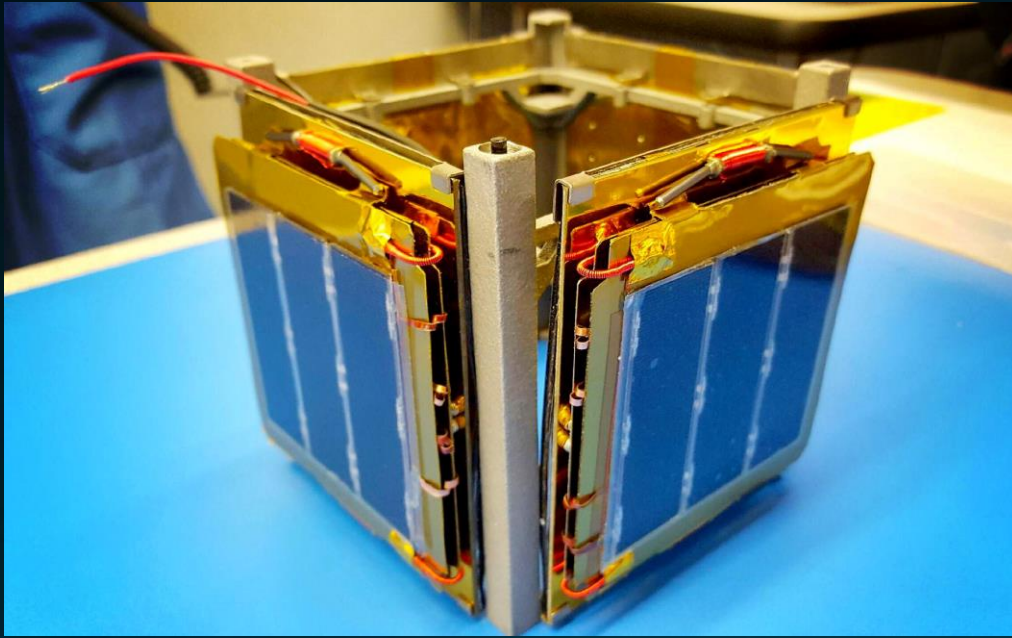
Students Working At School Sites



IRVINE01 Diagram

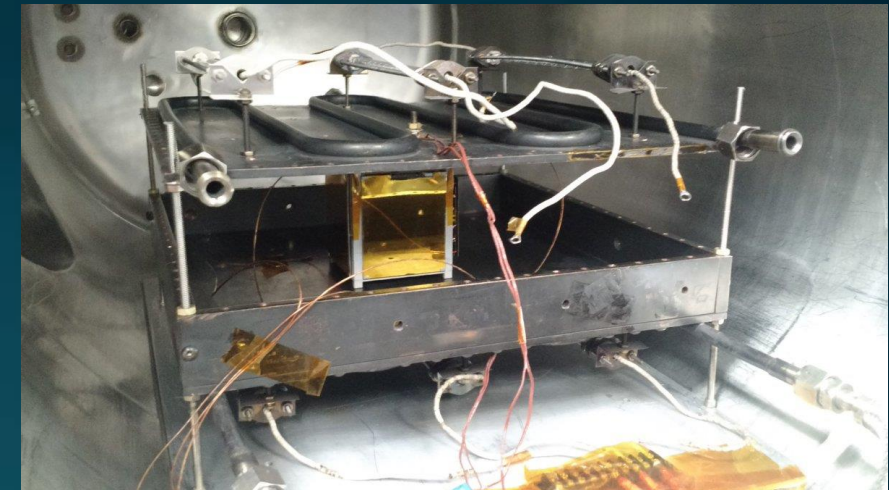
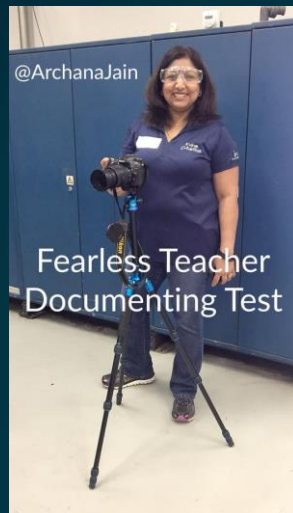
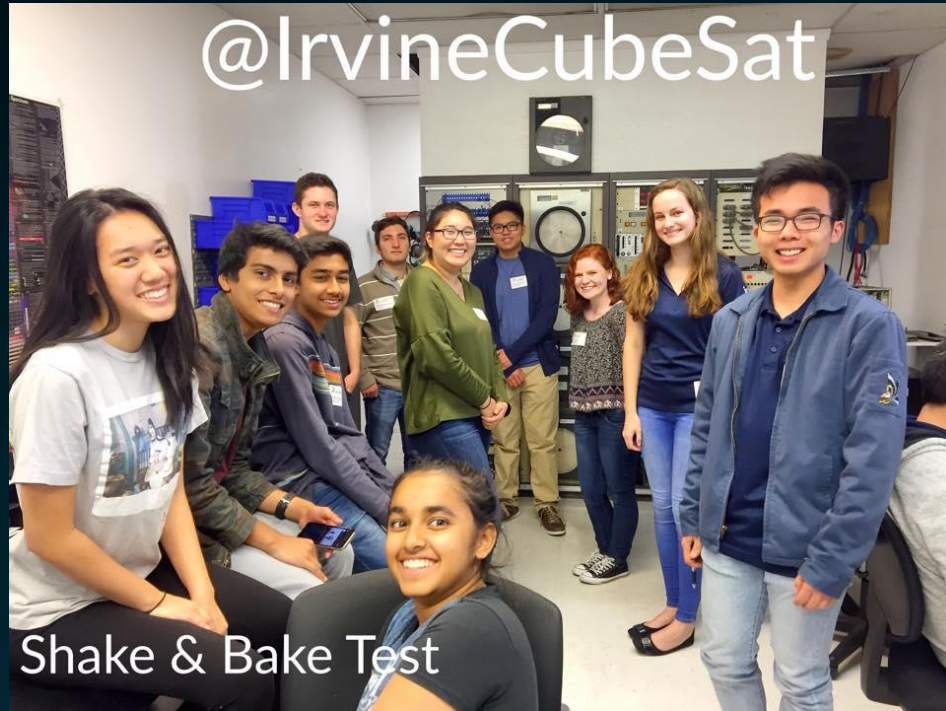


IRVINE01 CubeSat



@IrvineCubeSat

Vibration & Thermal Vacuum(VTV) Tests @ NTS





LAUNCH

Antrix PSLV Mission

Sriharikota Launch

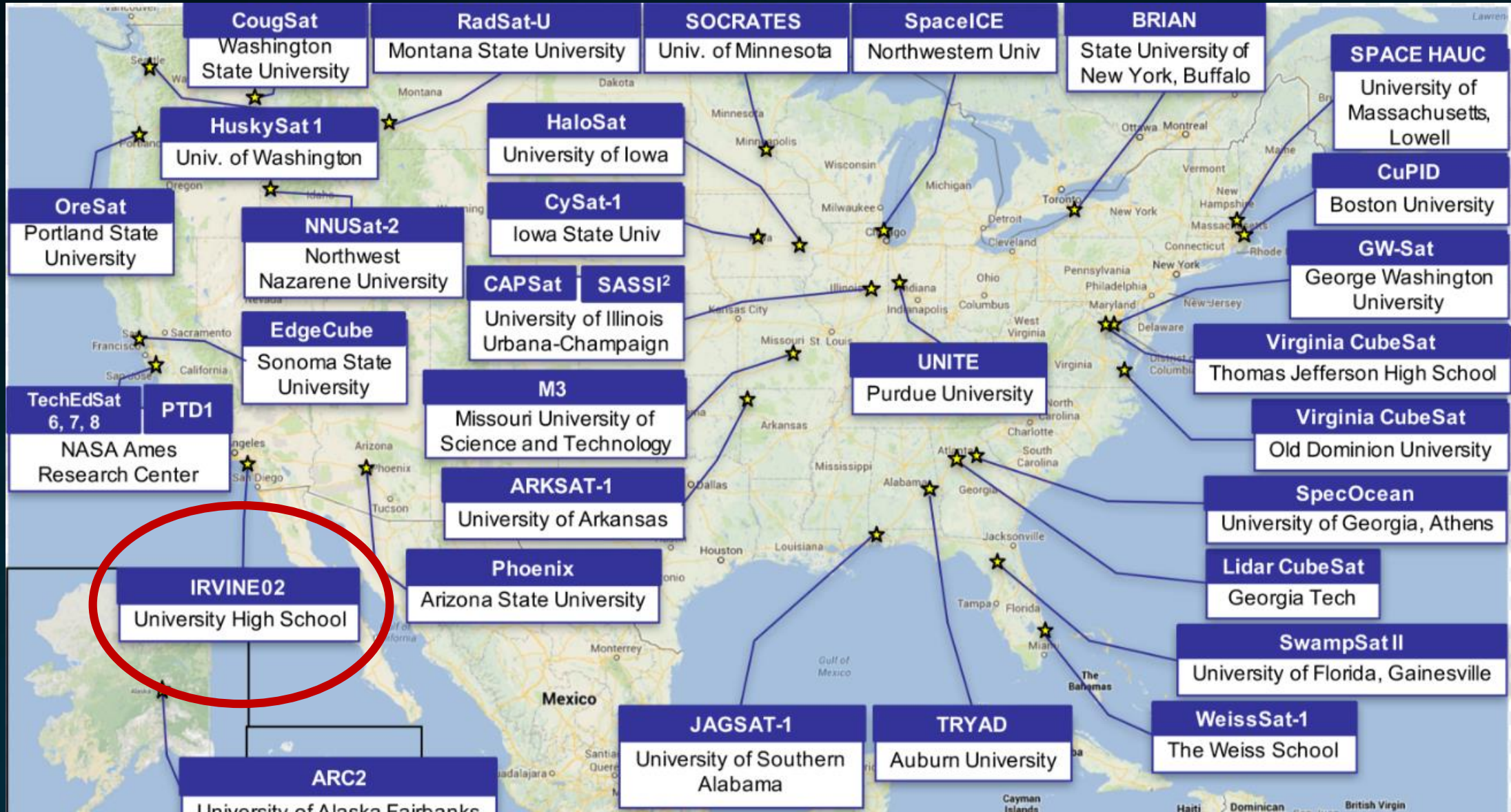
Base, India

Launch Period:

August 2017

500 km near SSO

IRVINE02 – ELaNa NASA Launch 2017 Selections



CubeSats & Partners - IRVINE01 to IRVINE05

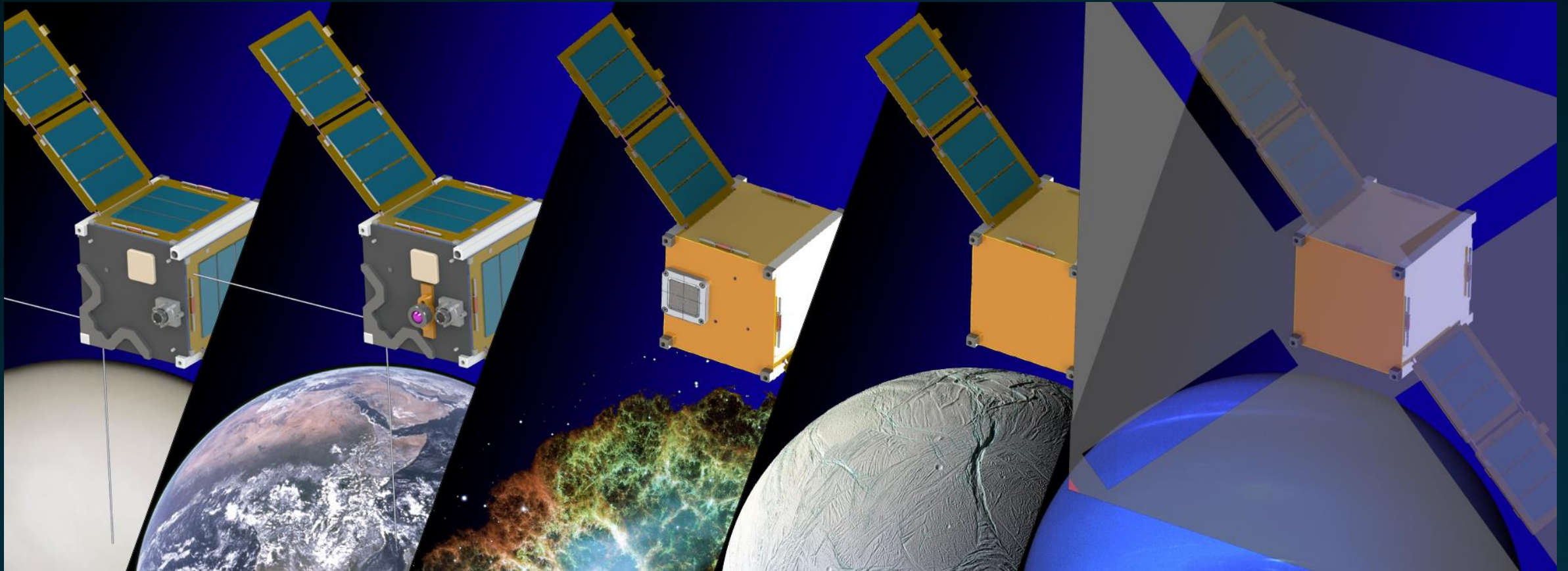
JPL Camera
Tyvak & CalPoly

Propulsion
Accion Systems

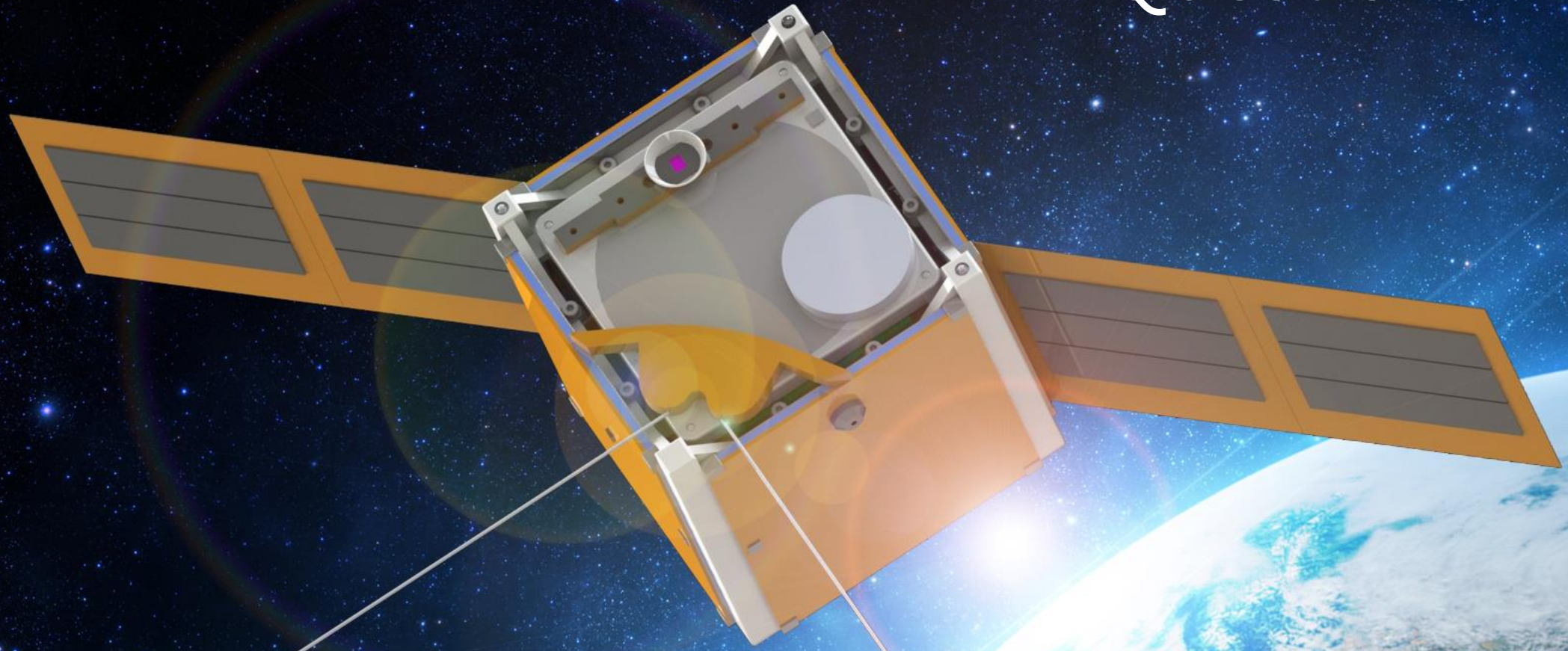
X-Ray Sensing
NASA Armstrong

Extreme Bacteria
NASA Ames

Aerocapture
MMA Design



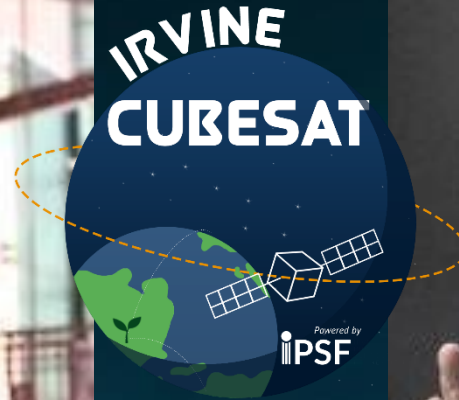
Questions?



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ksosa@bilingualintactive.com
Program Director

Archive

Explorers in Mars?



NASA
wants
you to
become
a
'telenaut'
who
explores
Mars
with
virtual
reality

