AEROSPACE ENGINEERING
FACULTY OF ENGINEERING

Spacecraft Materials and Structures

مواد و هياكل المركبات الفضائيه

Code 494

Instructor: **Mohamed Abdou Mahran Kasem**
Aerospace Engineering Department
Cairo University, Egypt

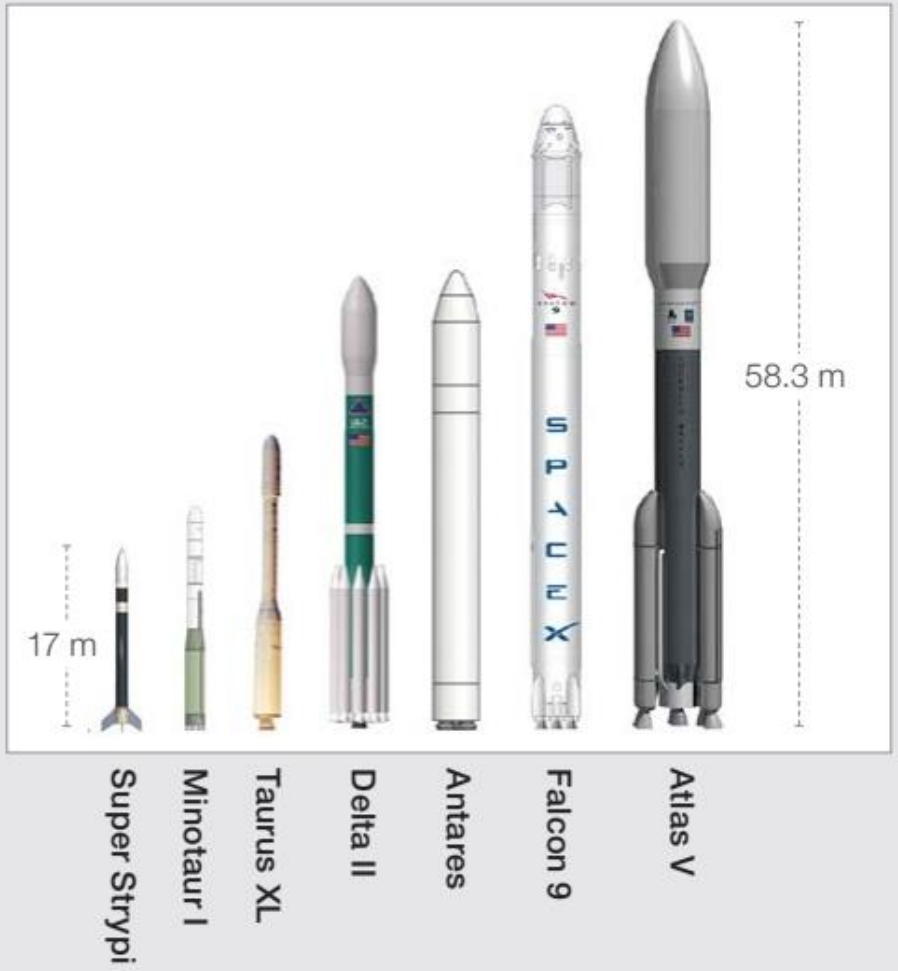
Cube satellite - Introduction

- CubeSat start as a collaborative effort between Jordi Puig-Suari, a professor at California Polytechnic State University (Cal Poly), and Bob Twiggs, a professor at Stanford University's Space Systems Development Laboratory (SSDL) in 1999 .
- The aimed to provide affordable access to space for the university science community.
- The basic standard CubeSat unit is 10 cm Cube, and weighs about 1 kg. This unit is called 1U.
- The CubeSats are usually factors of this unit such as 1.5U, 2U, 6U, and so on.

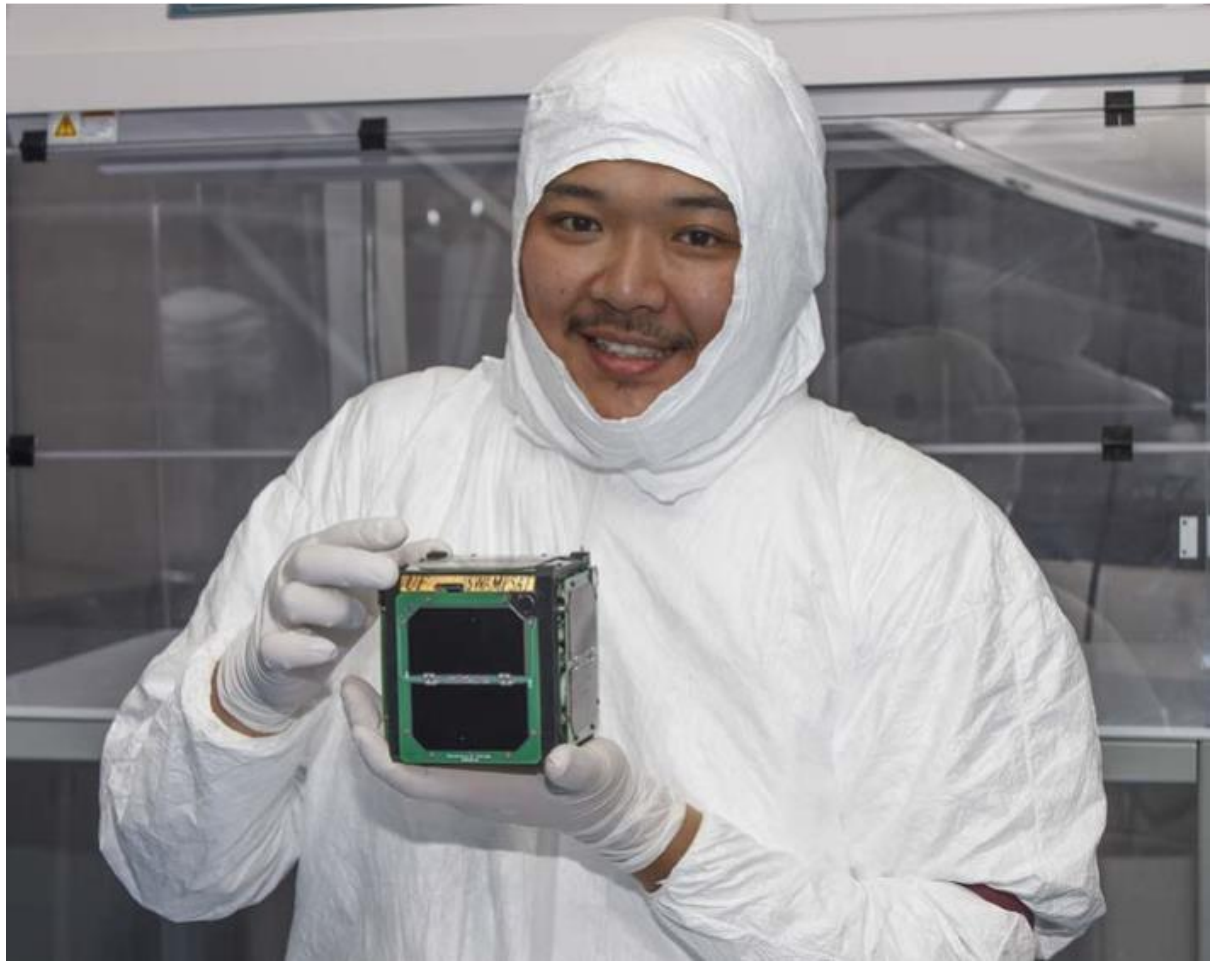
Cube satellite - Introduction

U.S. Launch Vehicles Used for CubeSat Launch
Super Strypi
Minotaur I
Minotaur IV
Taurus XL
Delta II
Antares
Falcon 9
Atlas V
Electron*
Falcon 9 Heavy*
LauncherOne*
Space Launch System (SLS)*

* These launch vehicles have not flown CubeSats as of the writing of this document in 2017, but have included CubeSats in the manifests of upcoming flights.



Cube satellite - Introduction

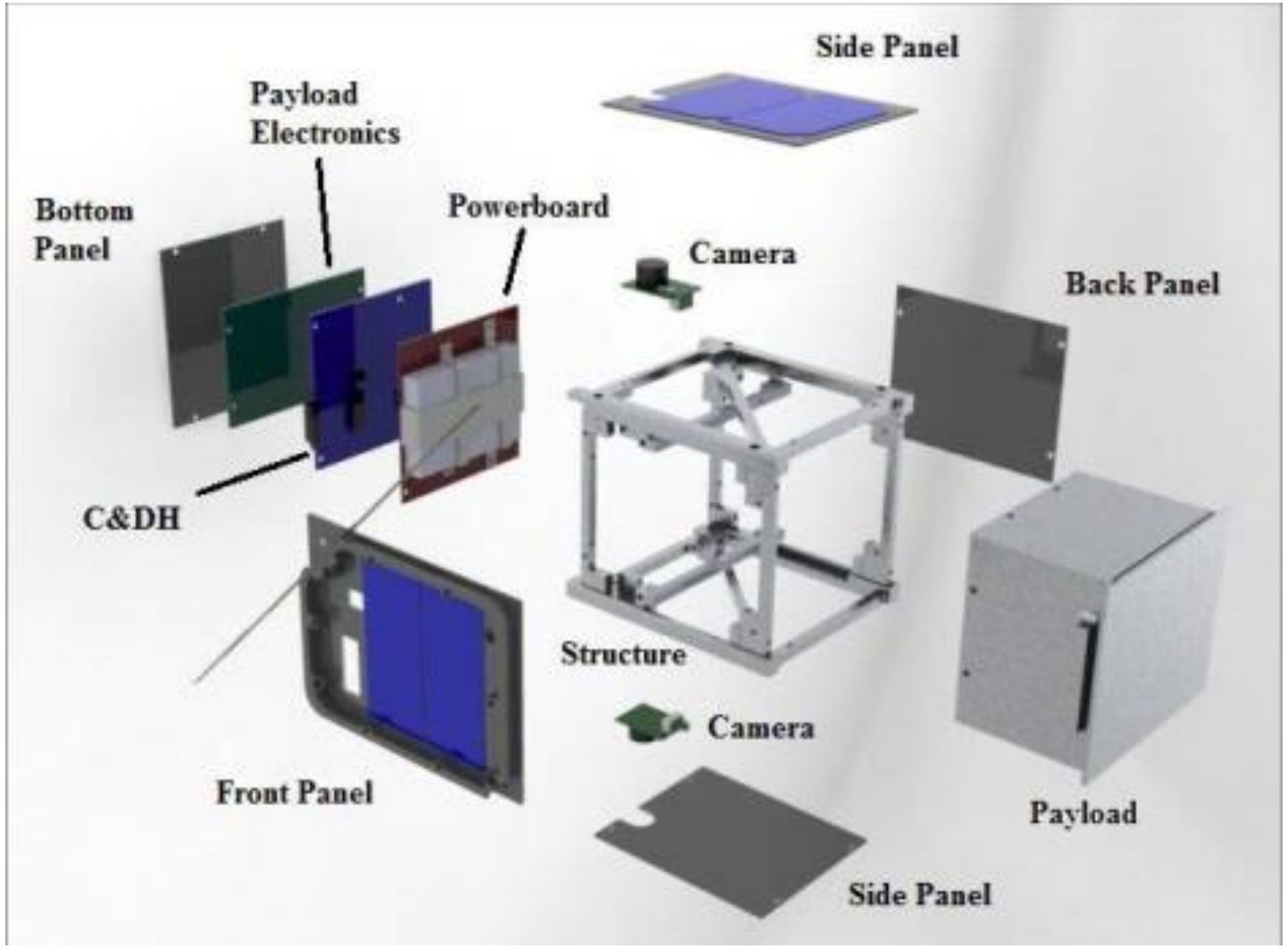


Student Bungo Shiotani from the University of Florida,

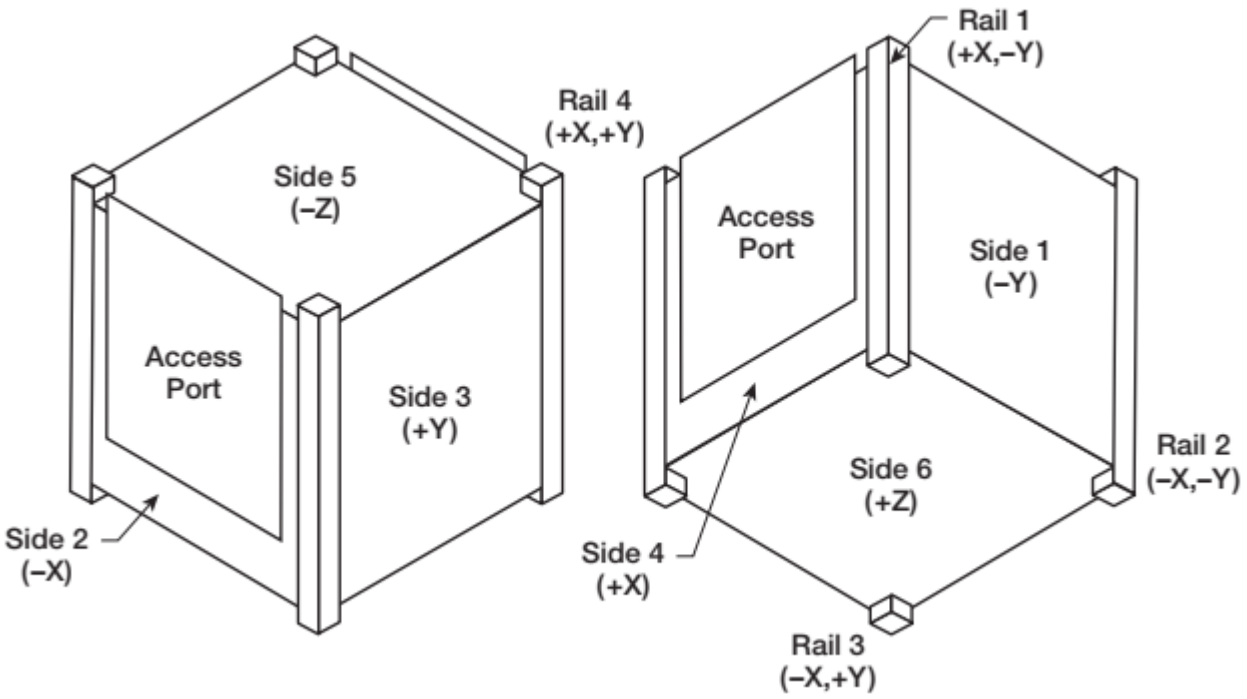
During an event Oct. 14, 2015, at the Agency's Kennedy Space Center in Florida

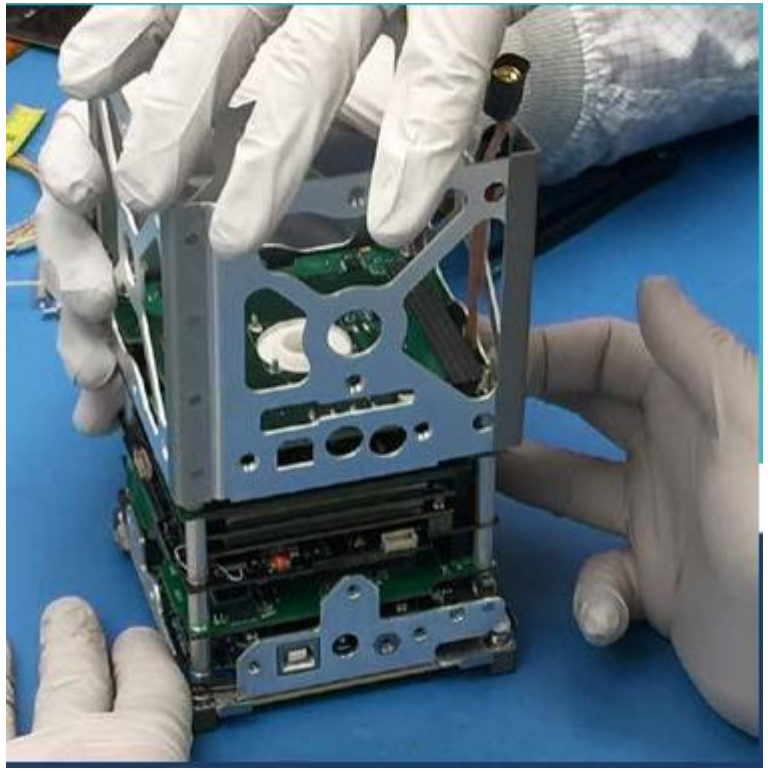
Cube satellite - Structure

CubeSats are usually made of aluminum



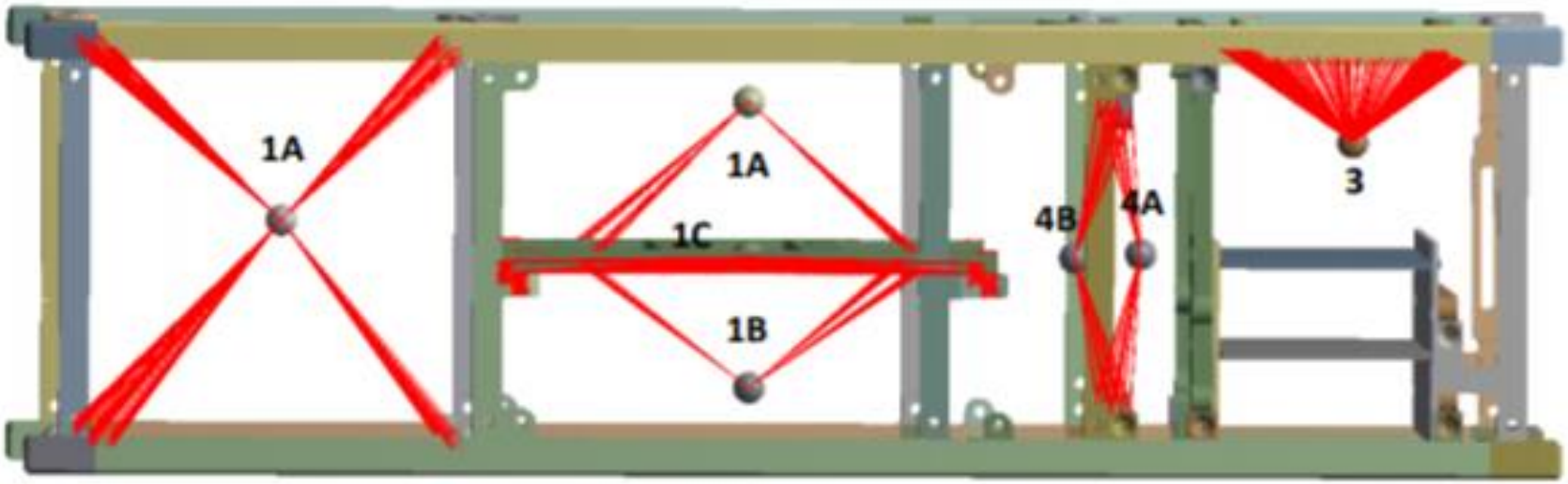
Cube satellite - Structure





Cube satellite - Structure

Load representation



Cube satellite - Structure

Required

- Design the structure of a CubeSat constructed from frames and plates.

- Assume the structure is made of aluminum
- Consider a hole for a camera. Assume a 1U total weight of 1.5 kg.

- Team members can be maximum of *three students*. They will submit a project report includes details for the design project in addition to a graphical process for the finite element analysis.

- In addition to a group presentation of maximum 5 minuets for the design process, members contribution, summary of the main results, and model validation.

- The best project will take a bonus mark according to : The report management and quality; the presentation management and quality; and the design accuracy, referencing, and validation.

Cube satellite - References

http://www.cubesat.org/resources