



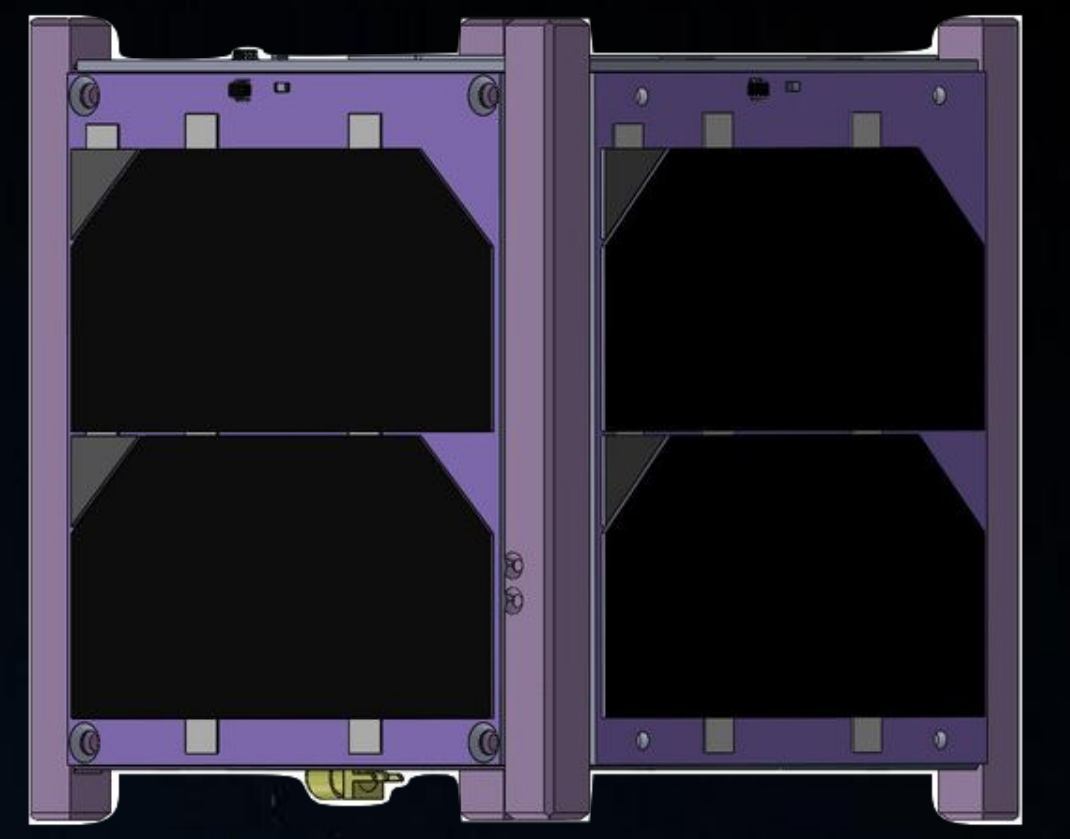
Low Earth Orbit NanoSatellite

HU-SAT

Burhan KAPLAN, Eşref DOĞAN , Yalçınay YALTIRIK

Supervisor: Dr. Dinçer GÖKCEN

Electrical and Electronics Engineering, Hacettepe University

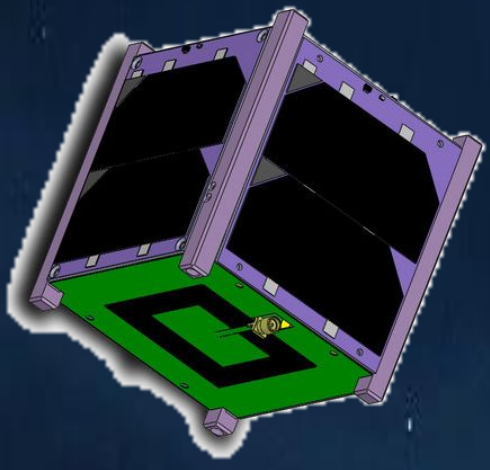


INTRODUCTION

Nanosatellite is usually applied to the name of an artificial satellite with a wet mass between 1-10kg. Cubesat is type of miniaturized satellite with dimensions 10x10x10cm³ cubic units. They can be used for a variety of Earth observation, remote sensing purposes, science, research and many other space applications such as low-power communications or maritime activity surveillance.

WHY CUBESAT ?

- Smaller
- Lighter
- Cheaper
- Easy to product
- Less risk-management



Main motivation of is to develop a space-qualified nano-satellite by using commercial of the shelf (COTS) products and catch up the other countries in that area.

On Board Computer will be the command and data handling part of the satellite. It also schedules and controls the payload operations on the satellite. It acts as the heart and brain of the satellite for its survival in space environment. **Electronic Power System** responsible for power management between subsystems and solar panels. It consists of two units. One is power generation and distribution unit, the other is battery unit. Battery unit supplies subsystems when the satellite is in the eclipse. **Communication Control System** and **Antenna** provides the communication between ground station and cubesat. S band system is generally used for high speed communication for small satellite, for example video or high quality image transfer. Payload varies from cubesat to cubesat and designed for a specific purpose such as radiation measurement, measuring quality of ionosphere or video transferring etc. **Radiation Sensor** is chosen as payload to measurement of space radiation.

DESIGN SPECIFICATIONS



LOW COST



HERITAGE & COTS



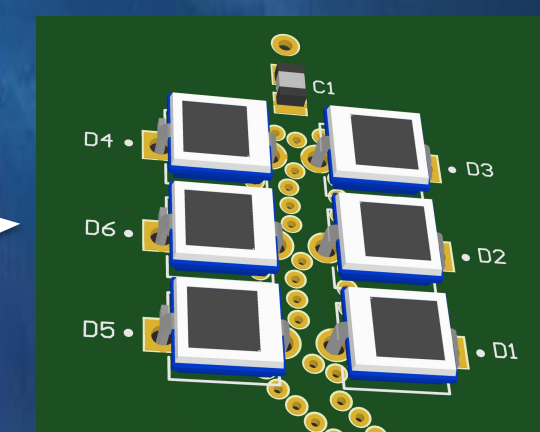
FULL REDUNDANCY

SATELLITE DESIGN

Radiation Sensor

- Capable of detecting gamma radiation(photons)

Based on PIN Diode Array

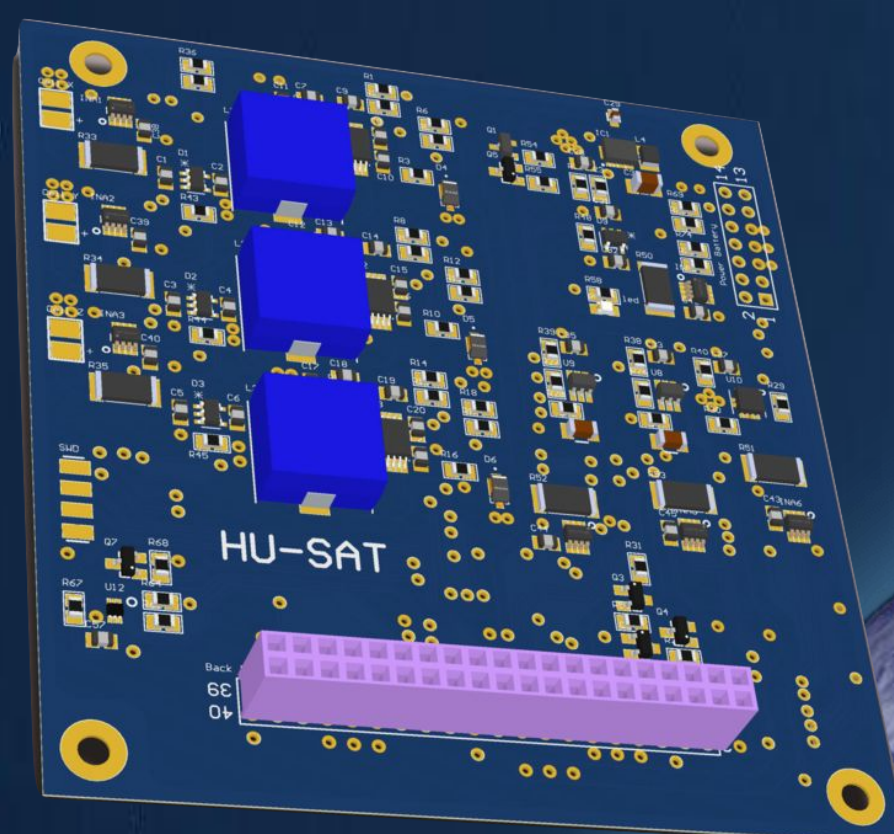


Radiation Sensor Prototype



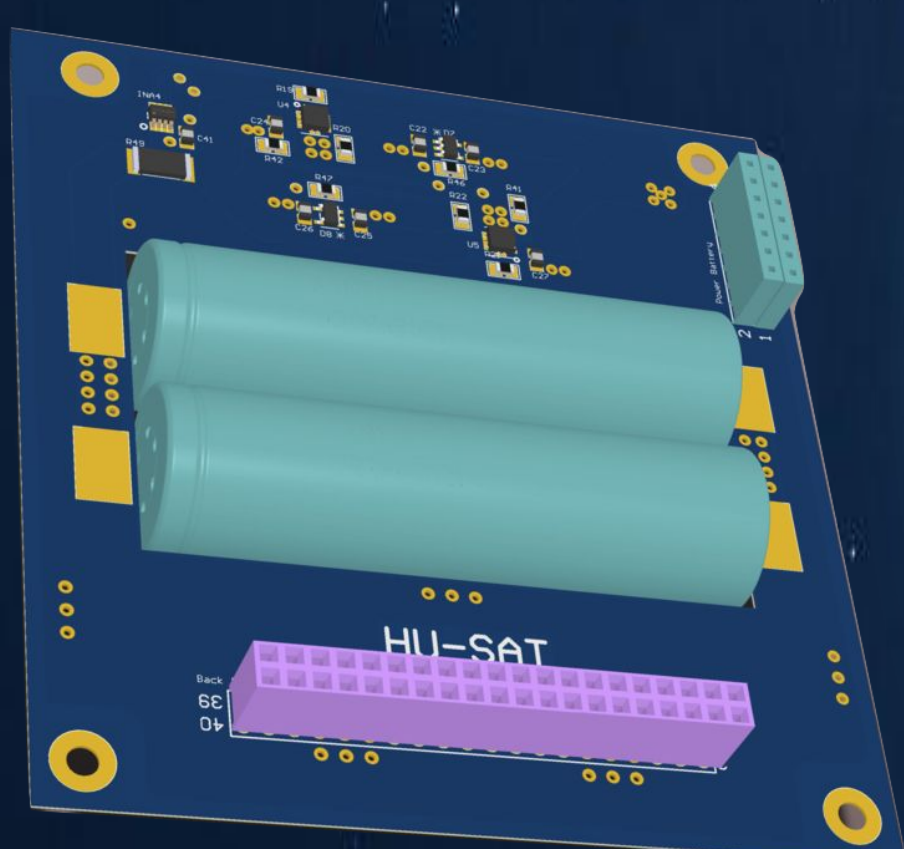
Power Generation and Distribution Unit

- Maximum Power Point Tracking to generating power



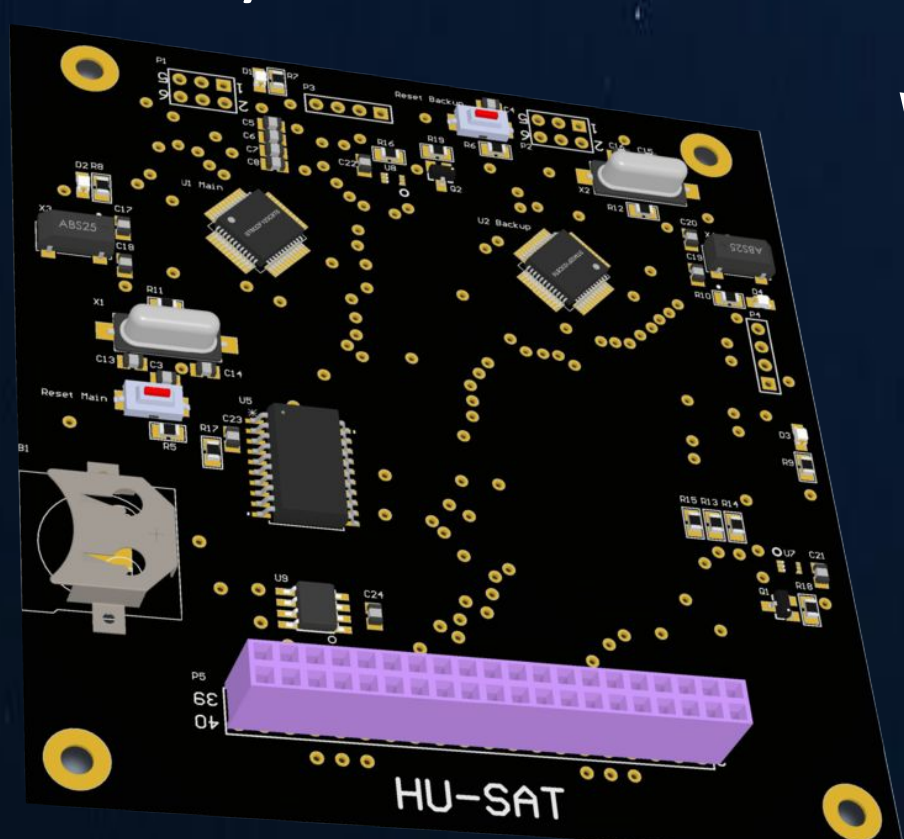
Battery Unit

- On-Board lithium-ion battery pack



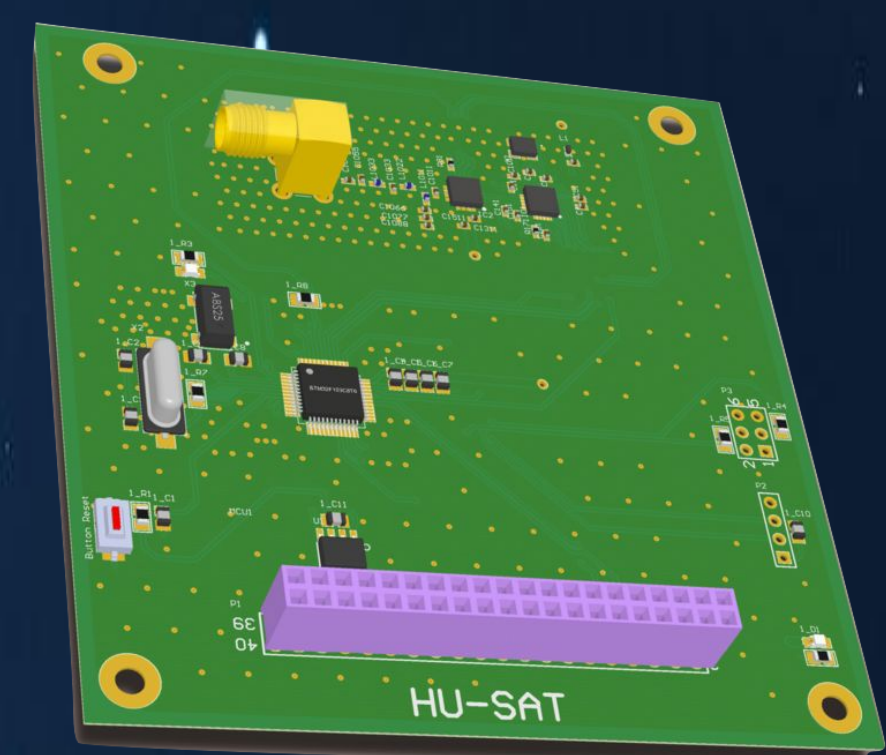
On Board Computer

- 72MHz 32-bit ARM processor
- 128 Kbytes of Flash memory



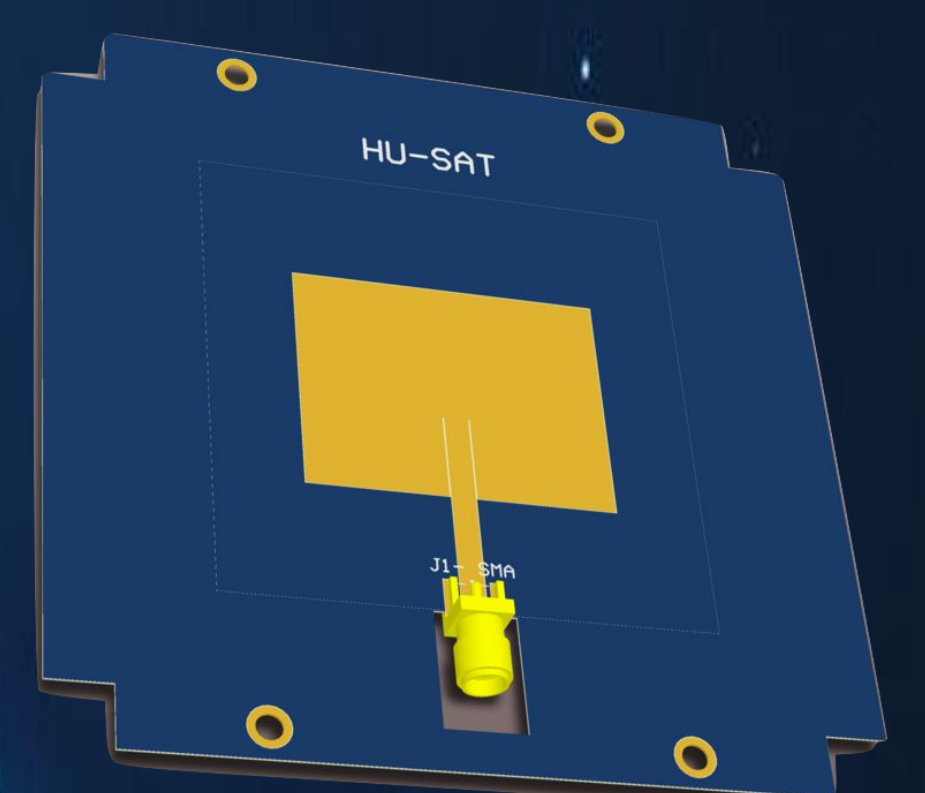
S Band Transceiver

- Providing up to 500kps user data rate



S Band Microstrip Antenna

- Allocated frequency 2.4GHz with 71 MHz bandwidth



Cubesat Prototype

