The Status of University Nanosatellites in China

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CONTENTS

Nanosatellite research in Chinese universities

Nano satellites development in China

- **HIT**
  - LilacSat-2 (2015,nanosate)
  - LilacSat-1(2017)

    Missions: INMS

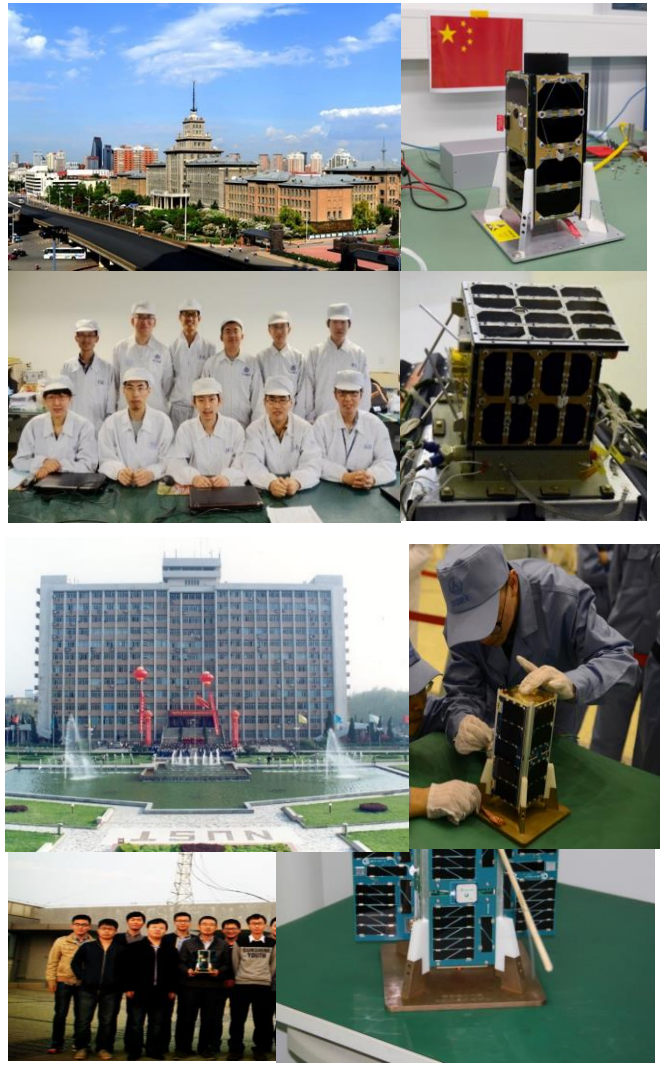
    New mode amateur repeater

    CMOS camera
- **NJUST**
  - NJUST-1(2015), NJUST-2(2017)
  - Young-1(2016), Canton-1(2017)

    Missions: AIS receiving

    Earth observation

    Aerospace education



Nano satellites development in China

- **Tsinghua**
  - NS-1 (2004,nanosat)
  - NS-2 (2015,nanosat)

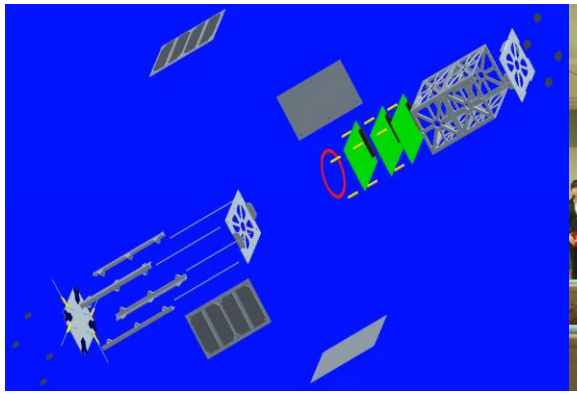
  Missions: CMOS camera
  MEMS
  Orbit maneuver
  Star tracker

- **ZJU**
  - ZDPS-1 (2007,nanosat)
  - ZDPS-1A (2010,nanosat)
  - ZDPS-2A(2015,nanosat)

  Missions: S-band comms
  MEMS test,
  GNSS

CubeSats development in NPU

- 2011, CubeSat structure design competition in NPU
- 2012, Aoxiang Cup CubeSat design competition in Shannxi Province
- China Graduate Student Future Flight Vehicle Innovation Competition
- Many presentations of CubeSat are given in the Chinese universities each year

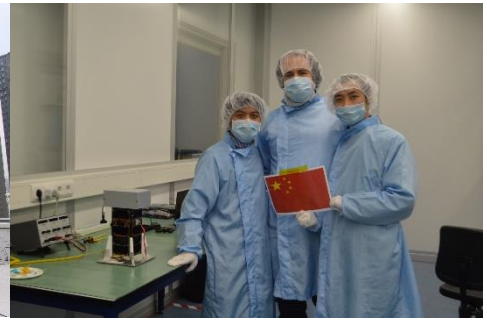


Brief introduction of NPU

Aeronautics

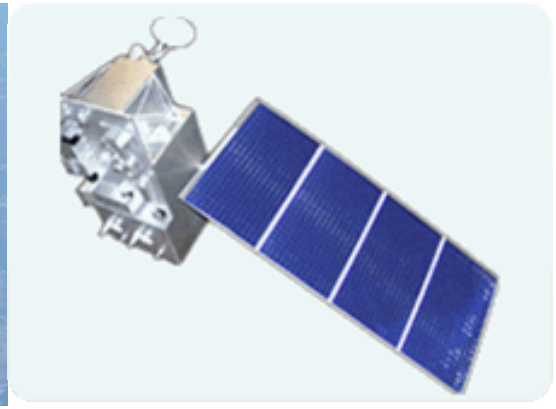
Astronautics

Marine



Spacecraft research team in NPU

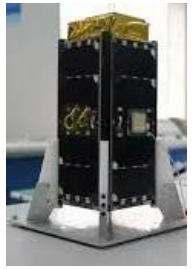
- 28 staffs , average age is about 34.
- Over 60 postgraduates
- Participated in SZ spaceship, Beidou navigation satellite system, Chang'E lunar orbiter, FY-2, FY-3 and etc.
- Comprehensive experiment conditions



Research history of CubeSats in NPU

Graduate project

SAOX，payload of CZ-7



Xingyun-1 launched

2010

2011 2012 2013 2014 2015 2016 2017

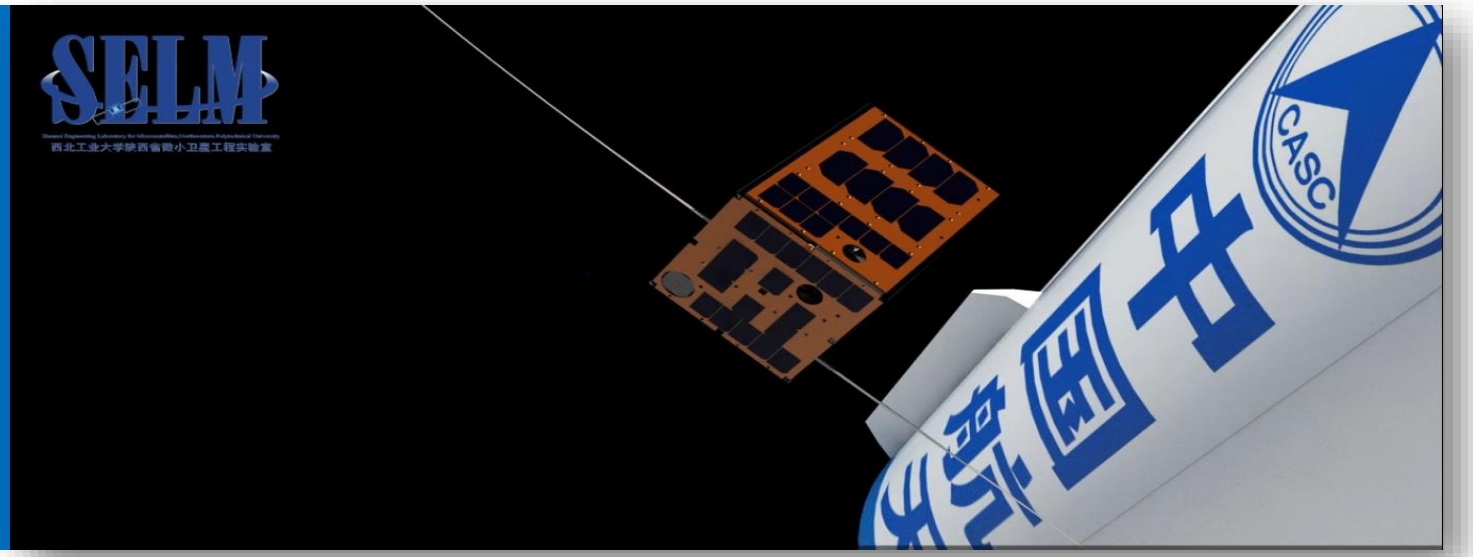
2U AX-1 joined QB50

AX-1 launched

The first 12U CubeSat in the world

Star of Aoxiang

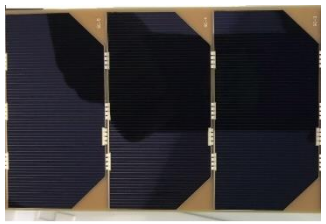
12U CubeSat



- Verification of 12U CubeSat Platform
- Polarized sunlight navigation and other experiments
- Education

Subsystems of 12U CubeSat

Power



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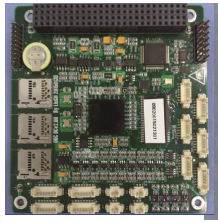
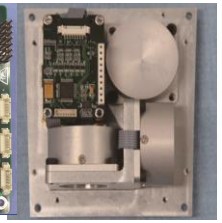
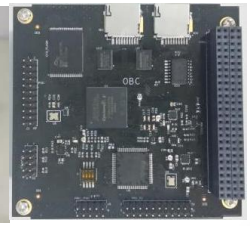




Structure

Payload



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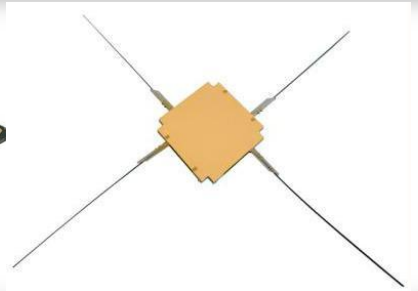
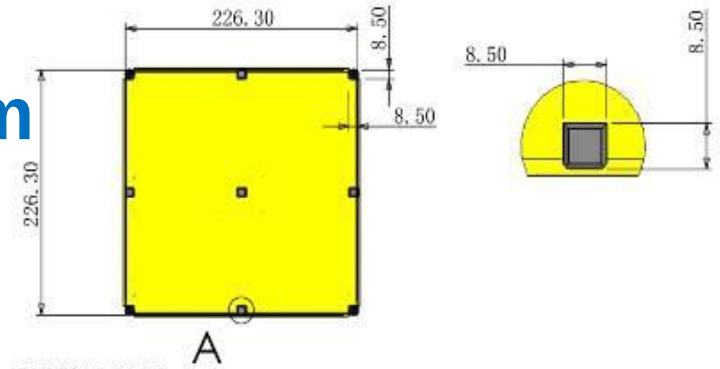
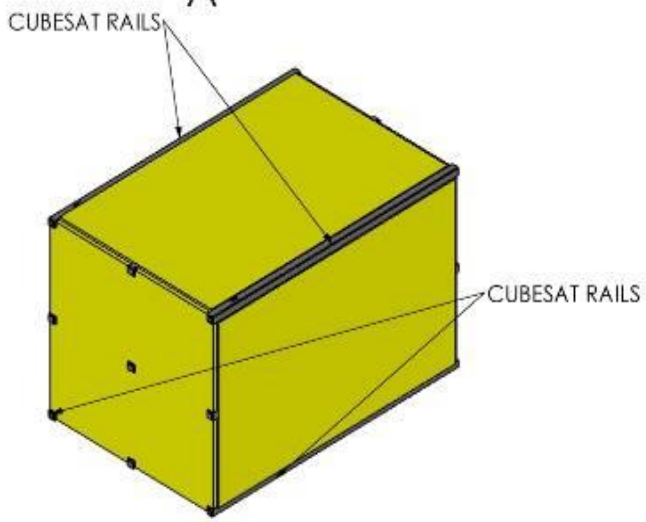
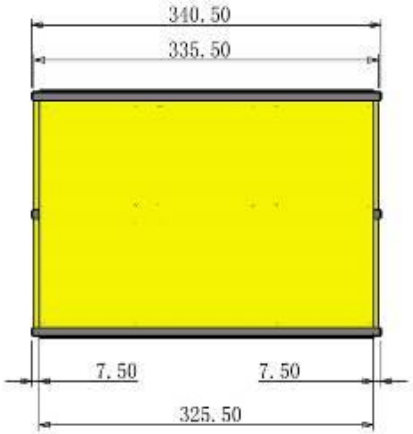


12U CubeSat structure

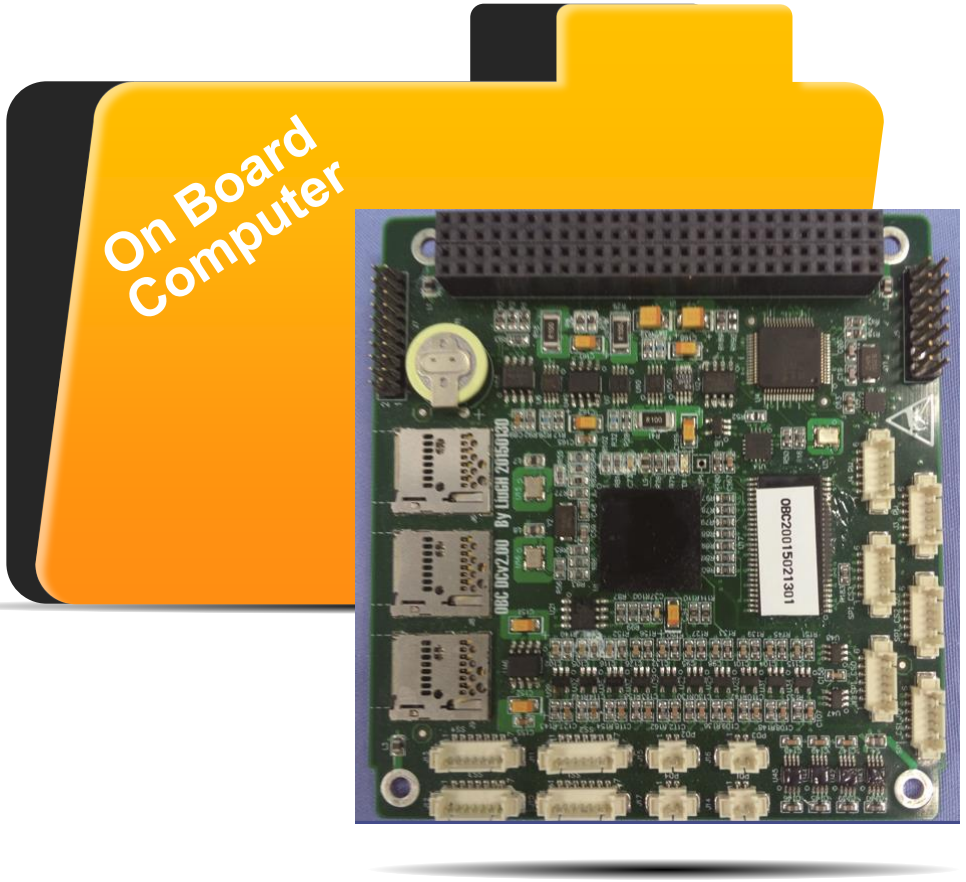
- 1.5kg(Including structure, rails and side panels)
- 226.3mm×226.3mm×340.5mm
- Al7075





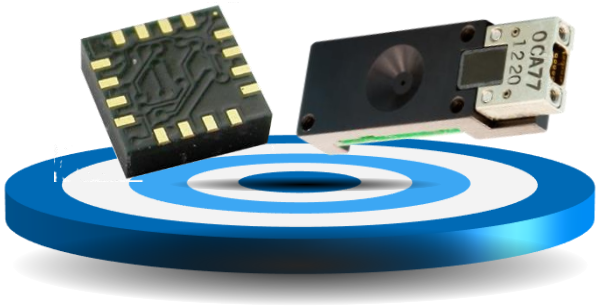


On board computer

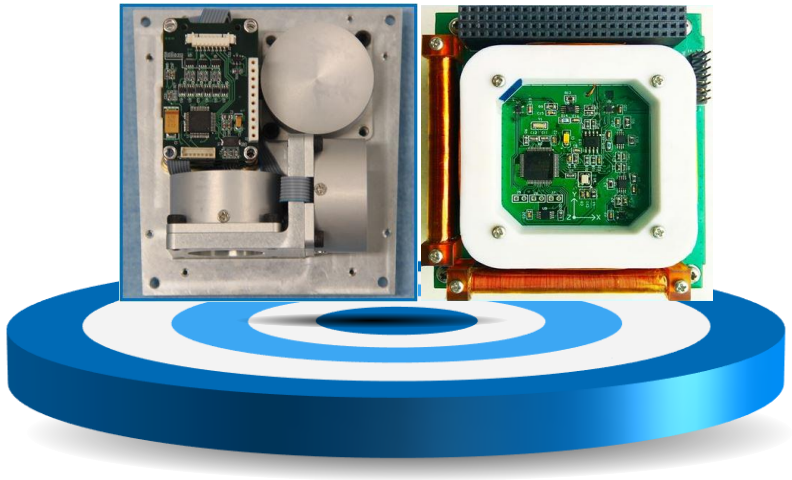


1. Monitor+host processor
2. Two host ARMs
3. Voting architecture
4. Rich interfaces

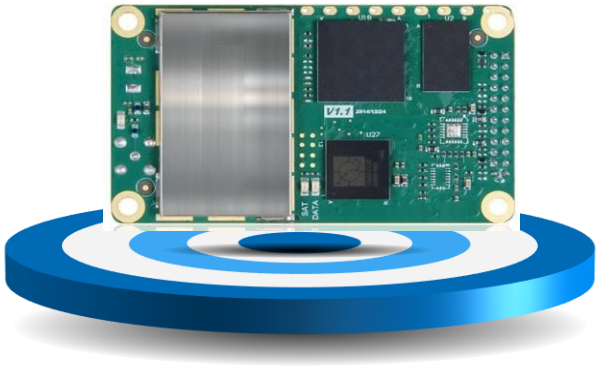
Attitude determination and control system



Attitude sensors

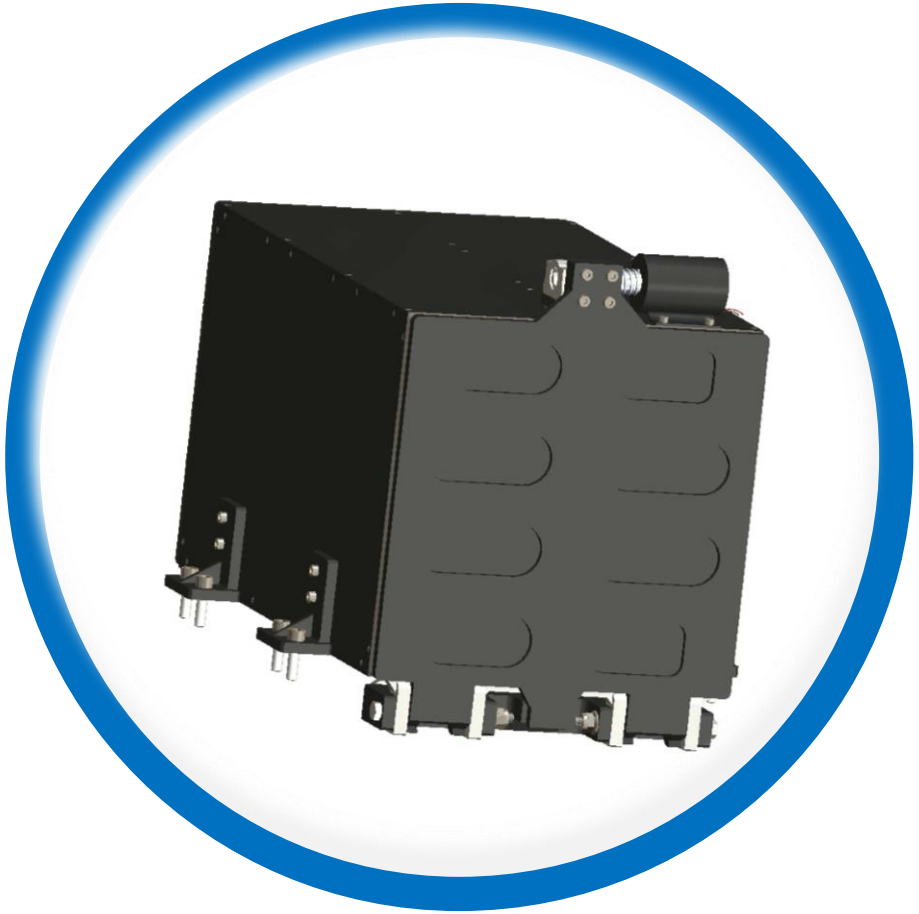


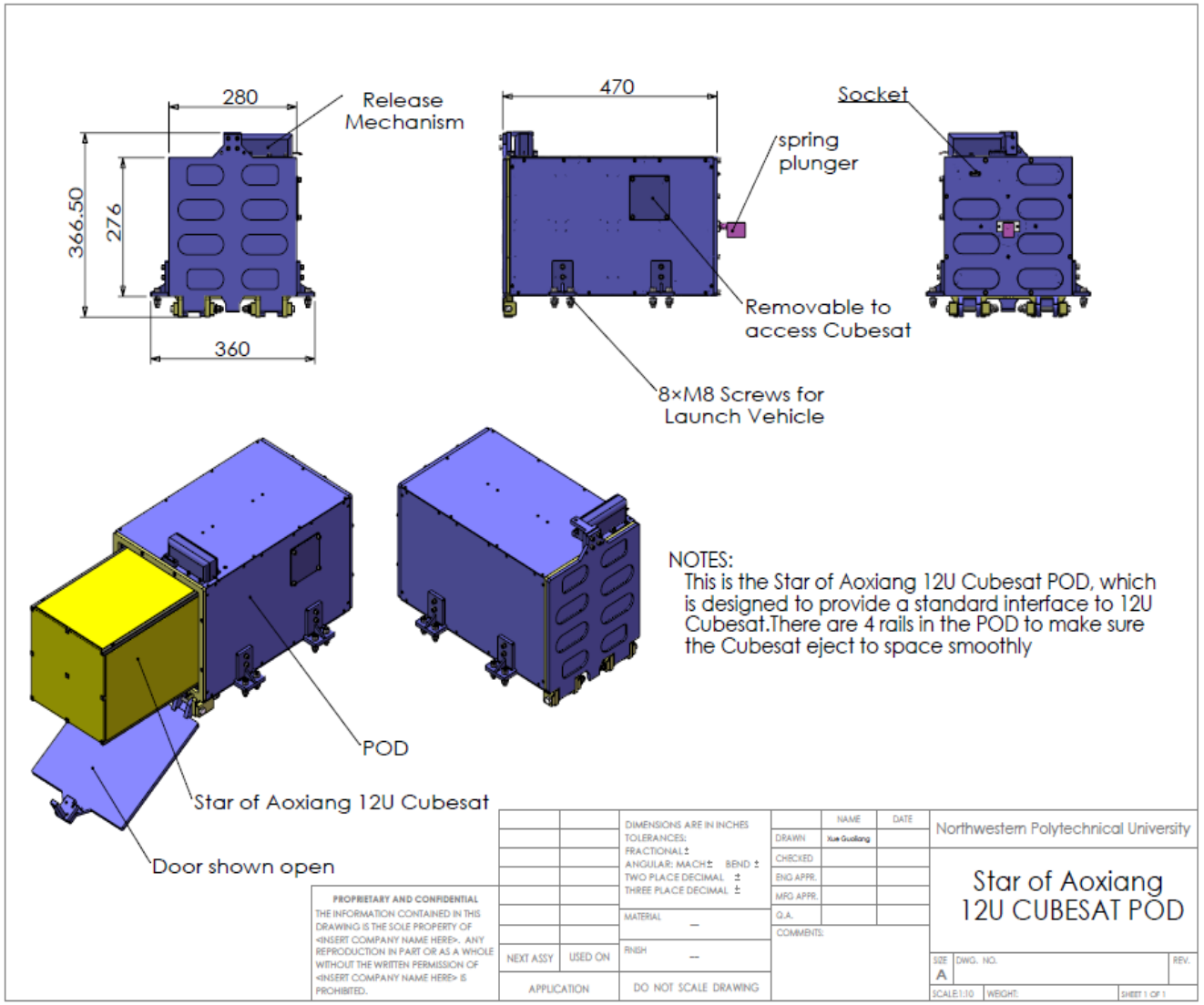
Actuators



GPS/BD receiver

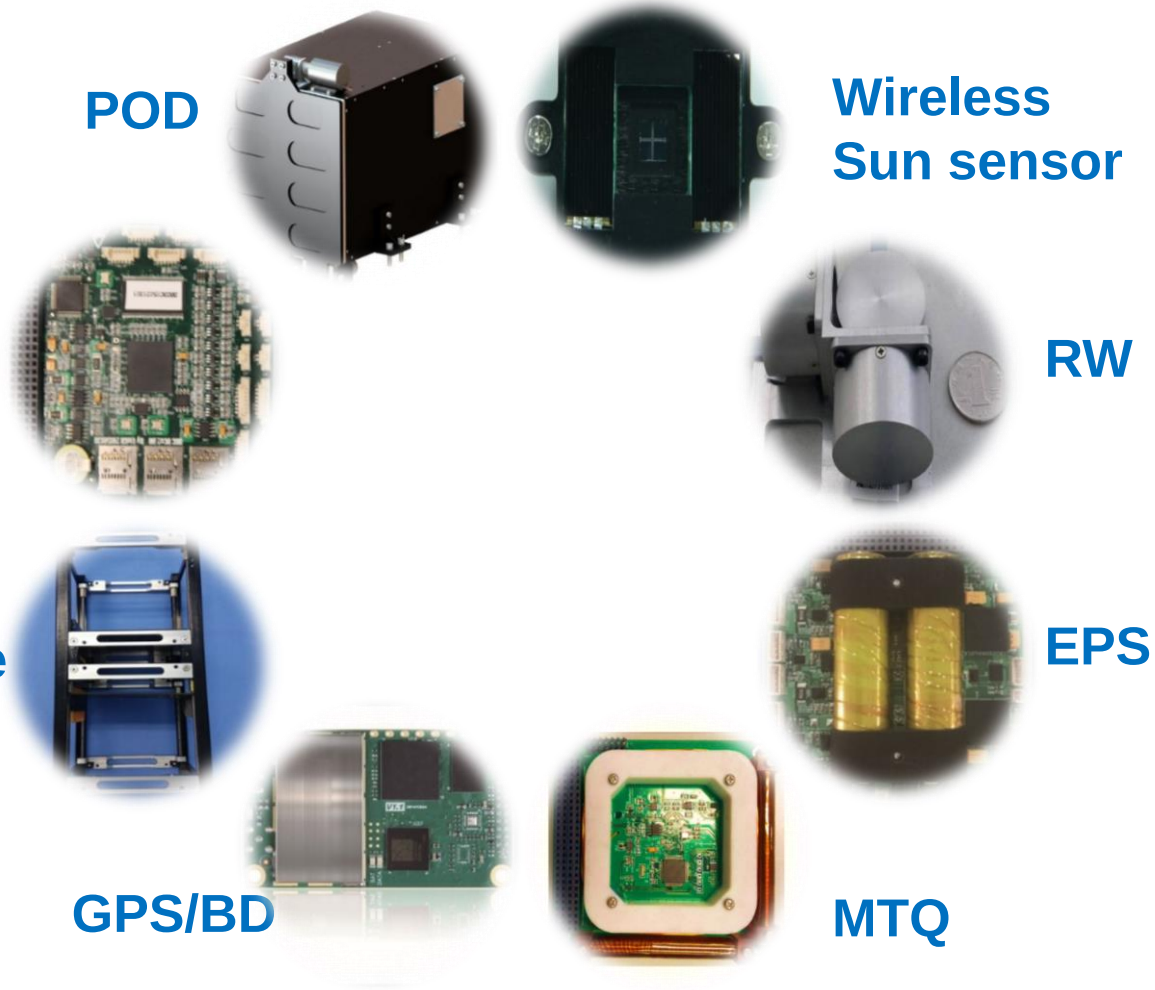
Electromagnetic unlocking POD



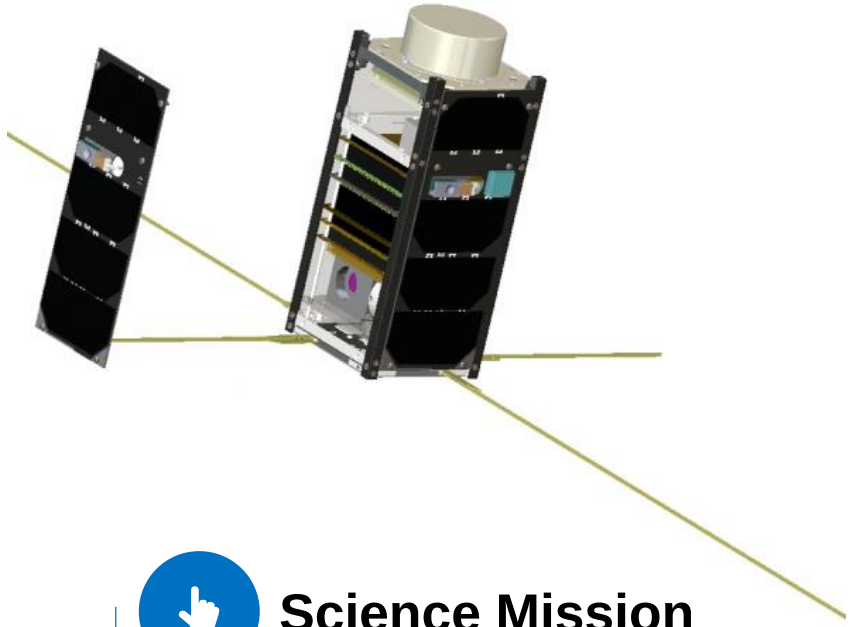


Developed subsystems

- Another 6U CubeSat has used the subsystems
- More CubeSats has decided to use the components



AoXiang-1— 2U CubeSat for QB50 project



Seventh Framework Agreement of EU

Project supported by EU FP7, launched in April, 2017

23 countries/regions have participated

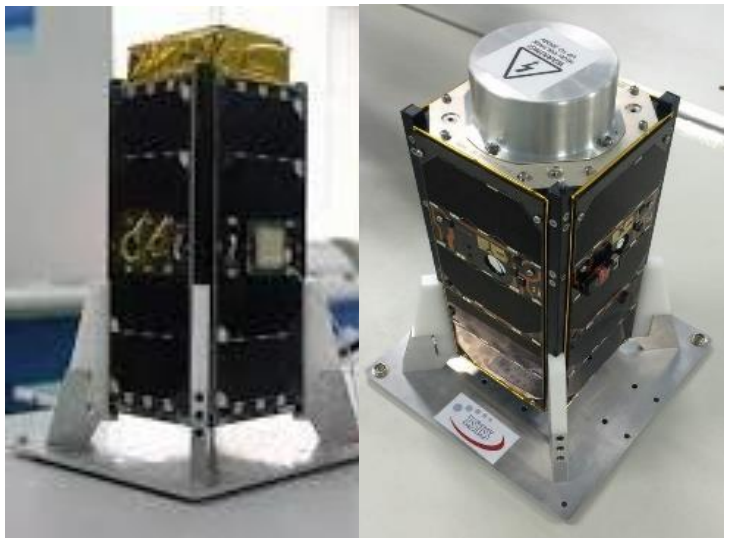
Initiator Members

Von Karman Institute for Fluid Dynamics, TU-Delft , Surrey Space Centre, Mullard Space Science Laboratory, NPU, Stanford University, etc.

Science Mission

Satellite network consisting of 23 satellites used for lower thermosphere measurement and reentry research

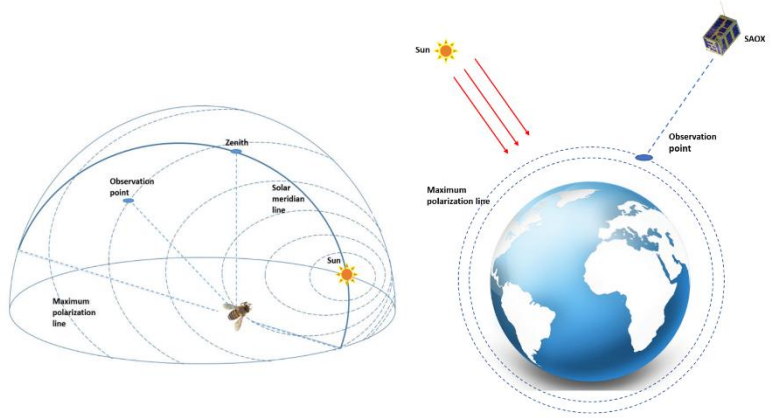
2U CubeSats : Xingyun-1 and Aoxiang-1

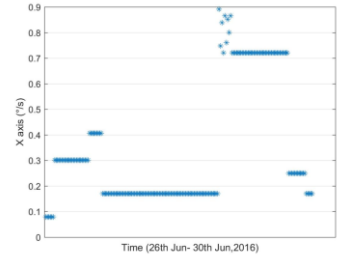


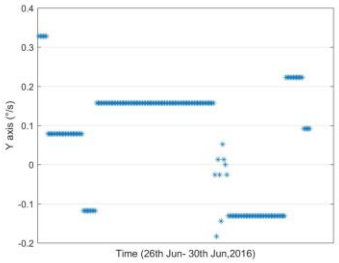
- Payload: INMS(QB50)/Com board(Xingyun)
- Power: Solar panels and EPS
- ADCS: Magnetometer, RW, MTQ, etc
- COMM : UHF/VHF
- Structure : 2U
- POD : 2U EMUPOD(Xingyun)

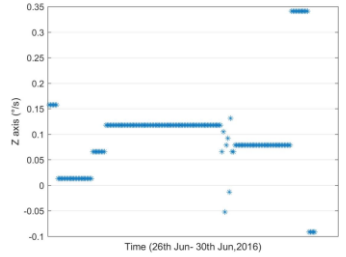
Flight result and lesson learned

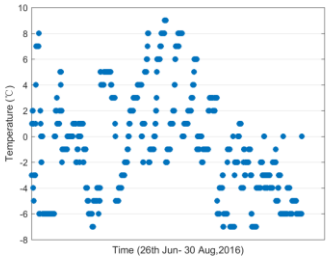
- All the mission of SAOX has accomplished.
- The attitude control system and payload worked very well, the data was successfully downloaded and got some interesting result .
- The data of Xingyun-1 has been received and the new POD is successful.









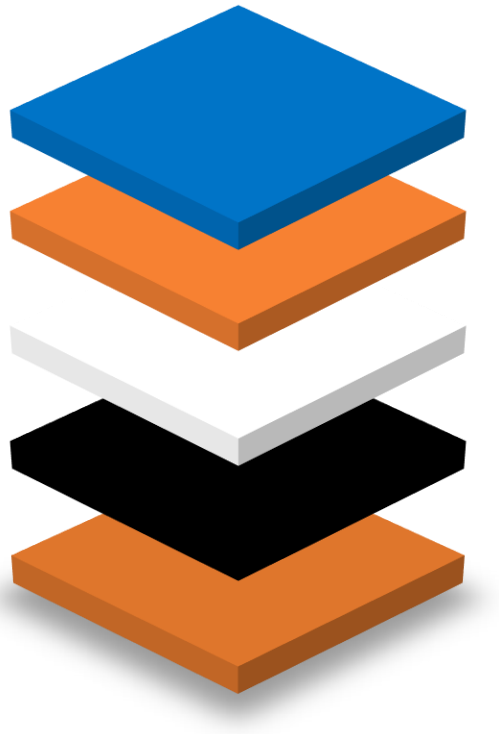


Flight result and lesson learned

EMC tests

Ground experiments

Chips selected



Radiation

Thermal analysis


SELM
Shaanxi Engineering Laboratory for Micro-satellites Northwestern Polytechnical University
西北工业大学陕西省微小卫星工程实验室

Thank you!