The Status of University Nanosatellites in China

Dr. Yu Xiaozhou

Northwestern Polytechnical University
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Nano satellites development in China

- **HIT**
  - LilacSat-2 (2015, nanosate)
  - LilacSat-1 (2017)
  Missions: INMS
    - New mode amateur repeater
    - CMOS camera

- **NJUST**
  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

2010

SAOX, payload of CZ-7

2011

Xingyun-1 launched

2012

2U AX-1 joined QB50

2013

2014

2015

2016

AX-1 launched

2017
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
- OBC&ADCS
- Structure
- Payload
- COMM
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

NOTES:
This is the Star of Aoxiang 12U Cubesat POD, which is designed to provide a standard interface to 12U Cubesat. There are 4 rolls in the POD to make sure the Cubesat ejects to space smoothly.
Developed subsystems

- Another 6U CubeSat has used the subsystems
- More CubeSats have decided to use the components
AoXiang-1— 2U CubeSat for QB50 project

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
Thank you!