

UNISEC-MEXT human resource development project (November 2015-March 2018)

# Development of International Space Human Resources for Sustainable Development and Utilization of Nano-satellite

Yasuyuki Miyazaki (Nihon University)

12<sup>th</sup> January 2016, 16:30-18:30  
Sanjo Conference Hall, The University of Tokyo

1. Schedule
2. Summary of the UNISEC-MEXT project
3. Objectives of the forum for review procedures for nano-satellite

\* MEXT: Ministry of Education, Culture, Sports, Science and Technology



# 1. Schedule

		AM	Lunch	PM	Evening
12-Jan	Tuesday	N/A	N/A	4:30pm-6:30pm briefing for Reviewers: Venue Room 002 (B1F), Sanjo-Kaikan at University of Tokyo	free
13-Jan	Wednesday	9:30am-12:00pm Presentation on review for nano-satellite (25minutes x 5 persons)	restaurant in Sanjo-Kaikan (B1)	2:00pm-5:00pm Review for Origami-sat presented by Prof. Sakamoto and Prof. Nakanishi, Tokyo Institute of Technology	5:30pm-7:30pm Reception (same room)
14-Jan	Thursday	10:00 am- 12:00 Reviewer's meeting	restaurant in Sanjo-Kaikan (1F)	1:30pm-4:30pm Pre - program committee for Deorbit Device Competition (committee members only)	free
15-Jan	Friday	10:00am-12:00 Lab tour at Nihon University, Chiba prefecture (Meet at lobby in the morning and go together)	Okonomiyaki lunch (optional)	Go back to Tokyo	free
16-Jan	Saturday	Leave Japan (check out: 11:00am)			

# Background

## Explosive increase of CubeSats since 2013 and low success rate

- Developed by unskilled people (students)



**Increase of space debris  
Exhaust of radio frequency**



**CubeSat is serious threat?  
Launch will be restricted?**

### On the other hand

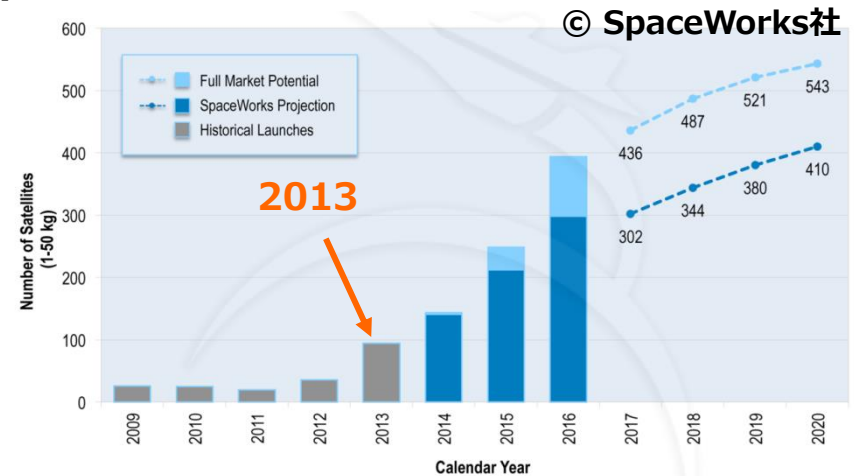
- Nano-sat is highly effective education tool
- Scientific research/ practically useful results have been achieved

### What can we do?

- ✓ To encourage the students to make and use satellite properly
- ✓ To spread basic knowledge and technology necessary for "success"



**Sustainable utilization of nano-sats**



**Increase of nano-sats less than 50kg**

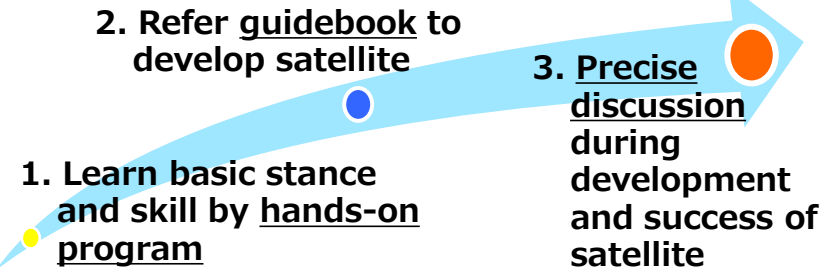


**Most are less than 10kg**

# Project overview

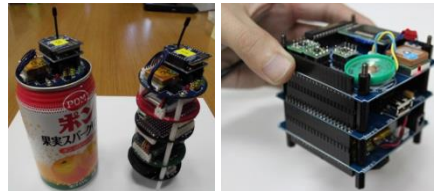
## Development of education program and place for discussion on student satellite

- Development and spread of education tools and text
- To provide the place for discussion (communication) on nano-satellites
- To produce young engineers and researchers for sustainable space utilization



### 1) Hands-on training program for basic skill of nano-sat development

- Education tools and textbook
- Hands-on program
- Broadcast of the program by internet



i-CanSat

Hepta

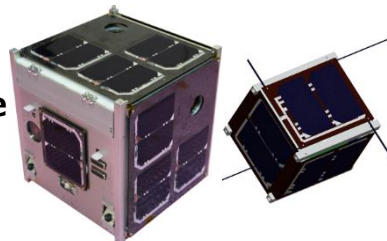
### 3) Review (discussion forum) for nano-sat

- Voluntary review committee
- Review (discussion forum)
- Improvement of review (discussion) and guidebook



### 2) Guidebook for CubeSat

- Tips from mission design to launch and operation
- Review (discussion) guide
- Two CubeSats will be developed
- (Available for nano-sats larger than CubeSat)



SPROUT

NEXUS

### 4) Dissemination

- "On site" Lecture
- UNISEC-Global (Deorbit Device Contest)
- Web site to introduce satellites by UNISEC member



Contest



Lecture

# Project member

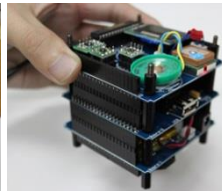
- Yasuyuki Miyazaki (Nihon University)
- Ms. Rei Kawasima (UNISEC Office)
- Prof. Cho Mengu (Kyushu Institute of Technology) : Center for nano-satellite testing
- Prof. Shinichi Kimura (Tokyo University of Science) : OBC and camera
- Prof. Hironori Sahara (Tokyo Metropolitan University) : propulsion
- Prof. Ryu Funase (University of Tokyo, ex JAXA) : deep Space Explorer
- Prof. Masahiko Yamazaki (Nihon University) : CubeSats (1U, 8U)

## 1) Hands-on training program for basic skill of nano-sat development

- i-CanSat: Prof. Kimura and Prof. Sahara
- Hepta: Prof. Yamazaki
- Dr. Werner Balogh (UN) will help us



i-CanSat



Hepta

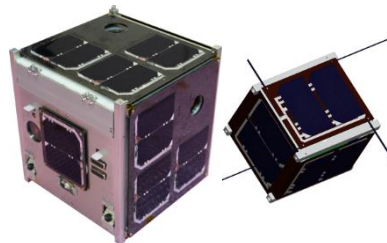
## 3) Review (discussion forum) for nano-sat

- All members
- Voluntary review committee (UNISEC member)



## 2) Guidebook for CubeSat

- All members
- Prof. Mohammed Khalil Ibrahim (Cairo University) will help us.
- Prof. Nishio (AIT) will help us.
- **We need input**



SPROUT

NEXUS

## 4) Dissemination

- All members
- Deorbit Device Contest committee



Contest



Lecture



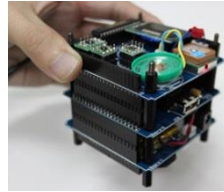
# Current status

## 1) Hands-on training program for basic skill of nano-sat development

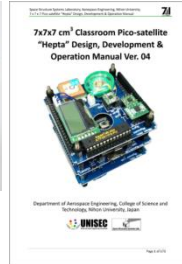
### [Hands-on training tools and texts]



i-CanSat



Hepta



### [Hands-on training program]



CLTP



Hepta workshop

### [Internet distribution]

- Movie of the training program
- Texts for CanSat



YouTube  
NICONICO  
USTREAM



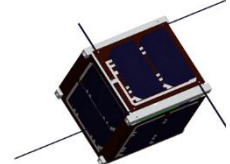
## 2) Guidebook for CubeSat

[Manuscript (data) on tips for development, launch, and operation]

- Not yet...
- Input from project member
- Input from two satellites (AIT satellite and NEXUS) that will be developed within a few years
- Input from the discussion forum
- Documents on SPROUT (launched in 2014)



SPROUT



NEXUS

## 3) Review (discussion forum) for nano-sat

- Reviewer
- Tomorrow's forum
- Forum will be hopefully held in autumn 2017 and spring 2018

## 4) Dissemination

- Lecture at several universities
- Deorbit Device Competition
- Digital archive site



# Objectives of the forum for review procedures

## Test case to discuss on other university's satellite for mission success

- **How can we discuss on other university's satellite for its mission success?**
- One of the output is a list of “check points” and idea for discussion.
- It's not a “review”, but discussion with developers.
- Tomorrow's forum is a simulation of the future forum for student satellite. The developers are not students, but university faculties. They have not experienced launch of their own satellite yet.
- (We will have the forum for student satellites in next fiscal year)
- It will be easy to provide some tips to the developers, but it is not easy to fill the knowledge completely within a short time. We will consider how to encourage the developers (students).
- Mission design is quite important, but sometimes the detail of the design of mission components can not be opened, which means it is not easy to evaluate the validity of the mission design (Success of the mission may depend on the mission components).