

Regional Report Thailand

Phongsatorn Saisutjarit

King Mongkut's University of Technology North Bangkok (KMUTNB)

Outline

- CanSat Thailand Competition
- High School Satellite Projects
 - BCCSAT (1U CubeSat)
 - OWLSAT (1U CubeSat constellation)
- Establishment of UNISEC Thailand

Thailand CanSat Competition

CanSat Thailand Competition for high school students has been hosted by National Science Museum (NSM) since 2017

* Ministry of Higher Education, Science, Research and Innovation



High School Satellite Projects

- BCCSAT (Bangkok Christian College)
- OWLSAT (Other 5 High schools in Bangkok)



High school student satellites
project

BCCSAT-1 PROJECT

The 1st Student -built Satellite in Thailand

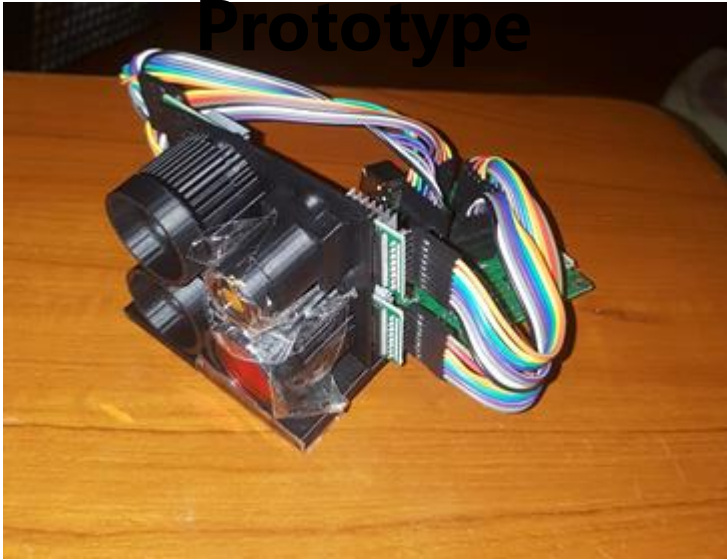
STUDENT TEAM



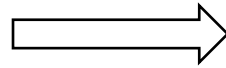
**28 STUDENTS (GRADE 10,
2018)**

Multispectral Imaging Mission

First Payload's



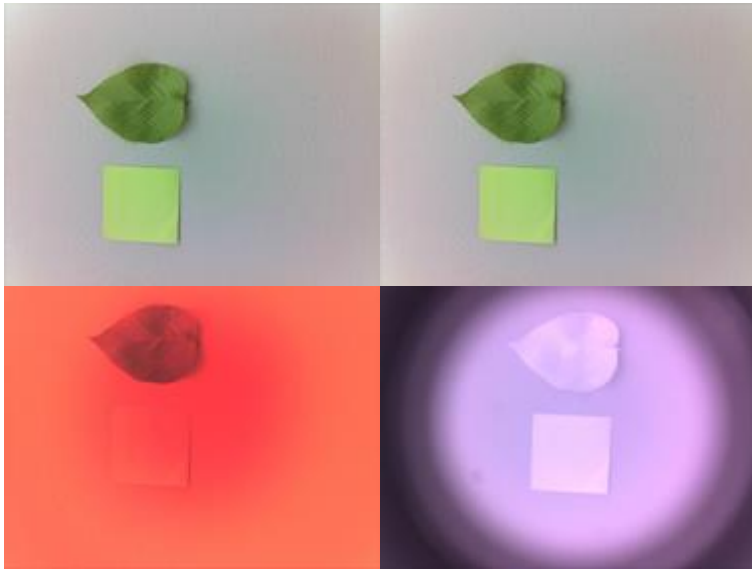
(4arducam OV5642 prototype)



Camera bands

Optical sensor	Triple Bands
Red filter	Red Edge

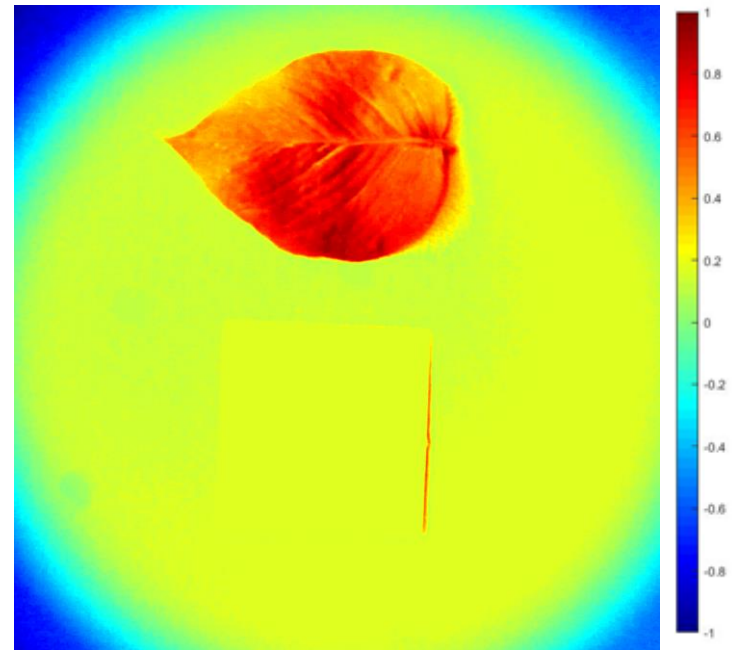
ENGINEERING MODEL DEVELOPMENT



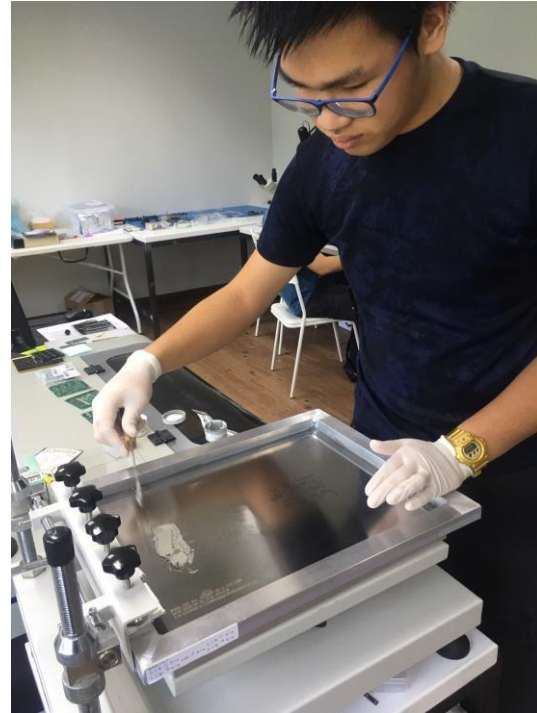
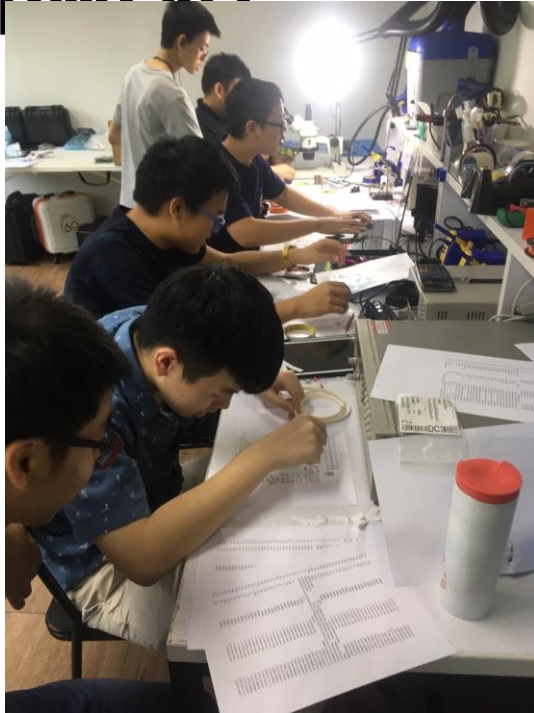
Healthy leaf & Green paper
(Arducam OV5642 - 5MP resolution)



NDVI result



ENGINEERING MODEL DEVELOPMENT



Components Preparation

ENGINEERING MODEL DEVELOPMENT

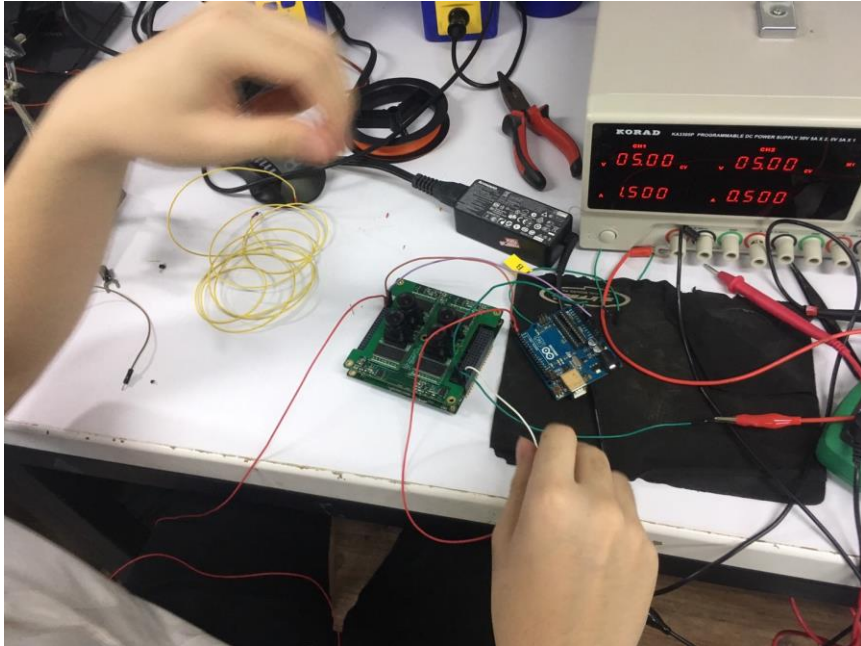


PCB Board is baking in the oven



PCB board is checking and fixing the problems

ENGINEERING MODEL DEVELOPMENT



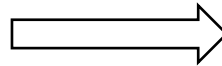
Payload Board Testing

ENGINEERING MODEL

DEVELOPMENT

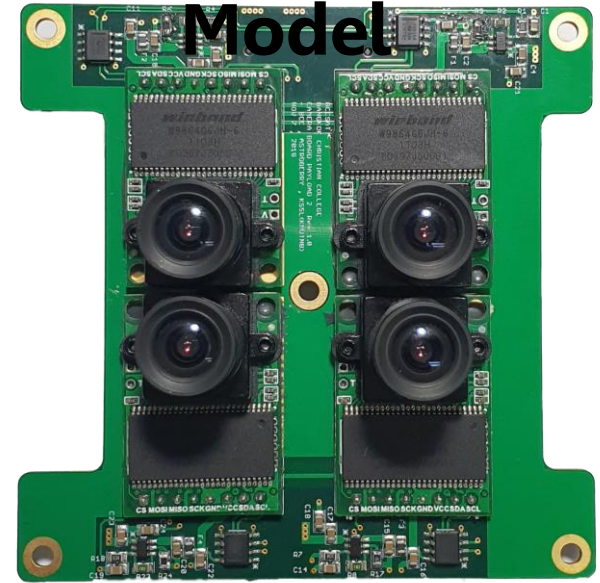
First Payload's

Prototype



First Engineering

Model



ENGINEERING MODEL



Experiment

ENGINEERING MODEL DEVELOPMENT

Natural

TB(Green, Blue, NIR)

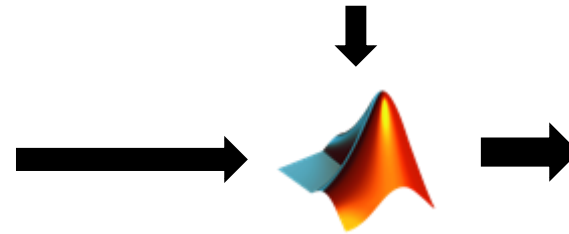
Extract from TB

NIR



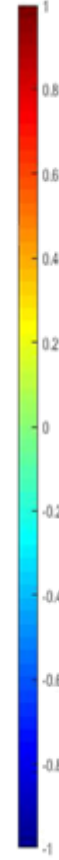
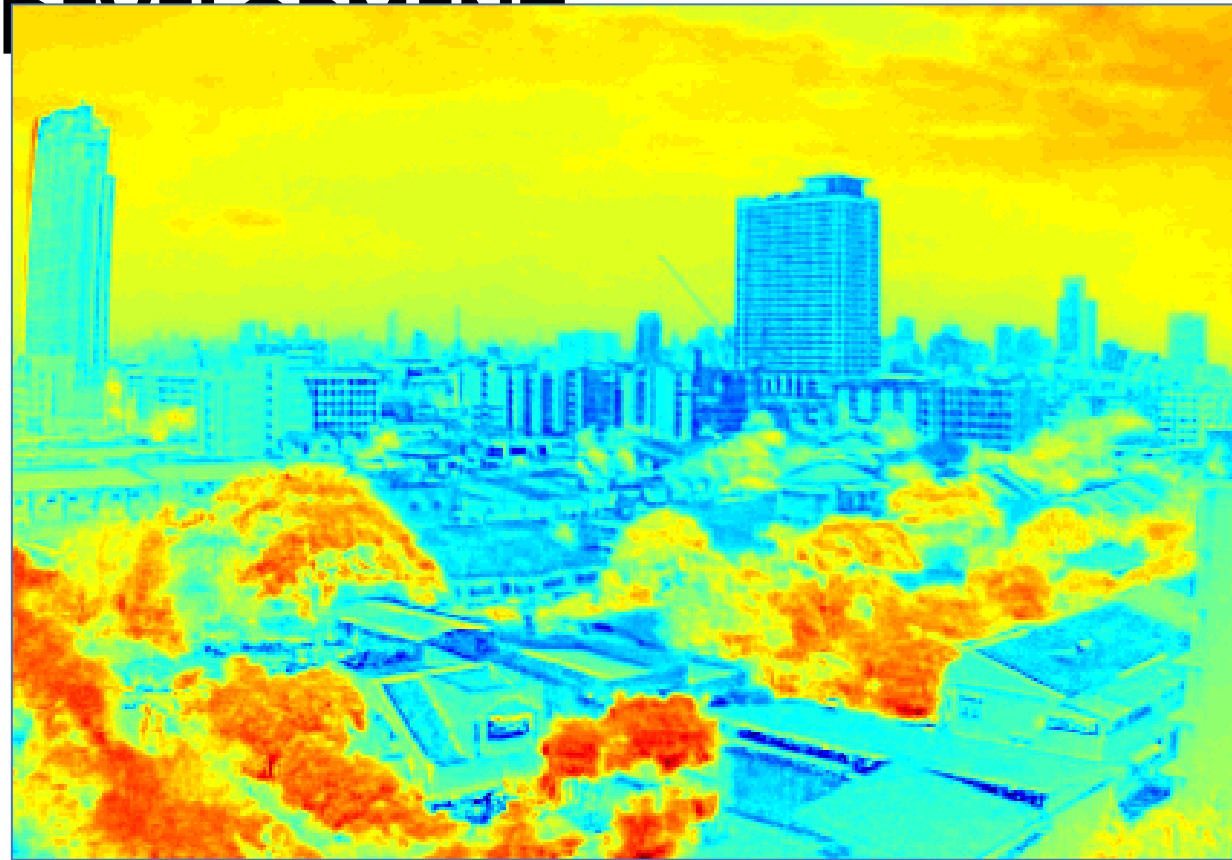
Red Edge

Red



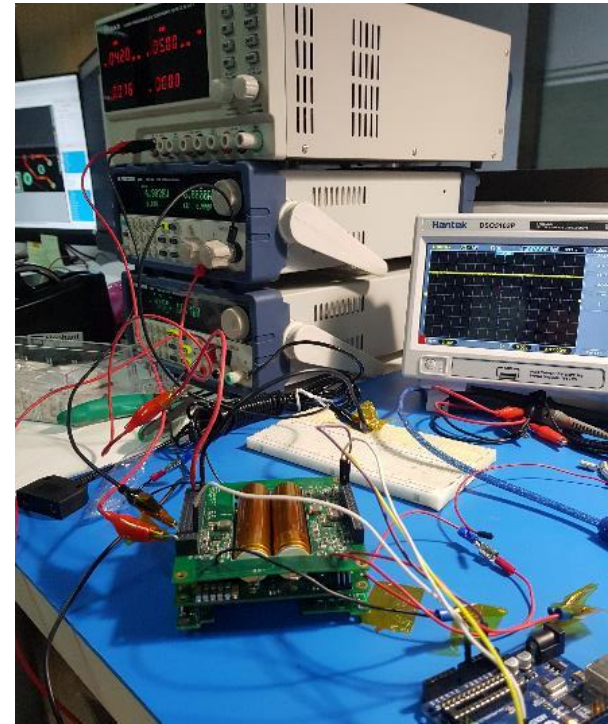
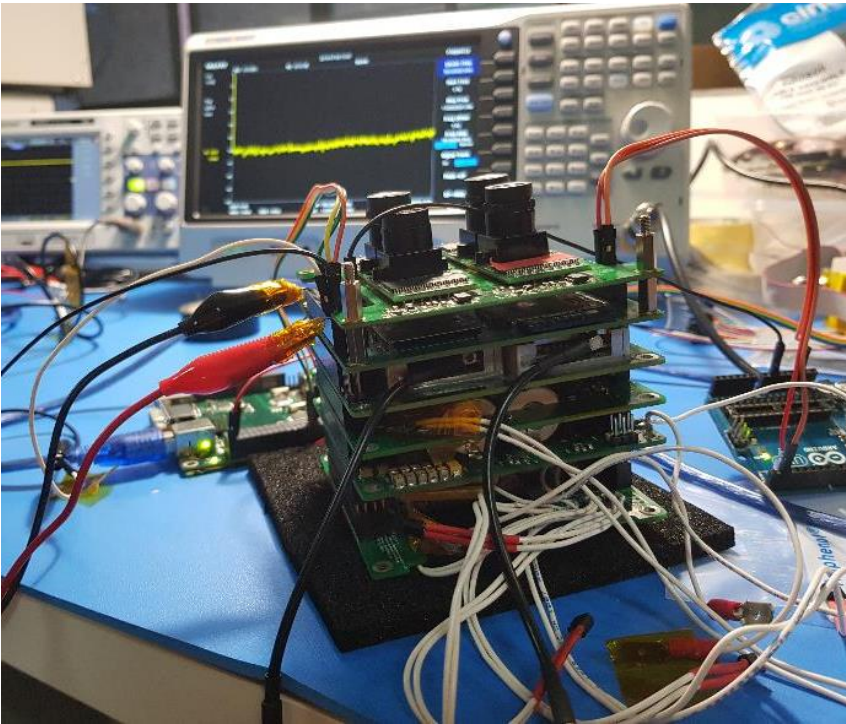
Experiment 1 : NDVI

ENGINEERING MODEL



Result Image

ENGINEERING MODEL DEVELOPMENT



BCCSat – 1 Engineering Model

ENGINEERING MODEL DEVELOPMENT



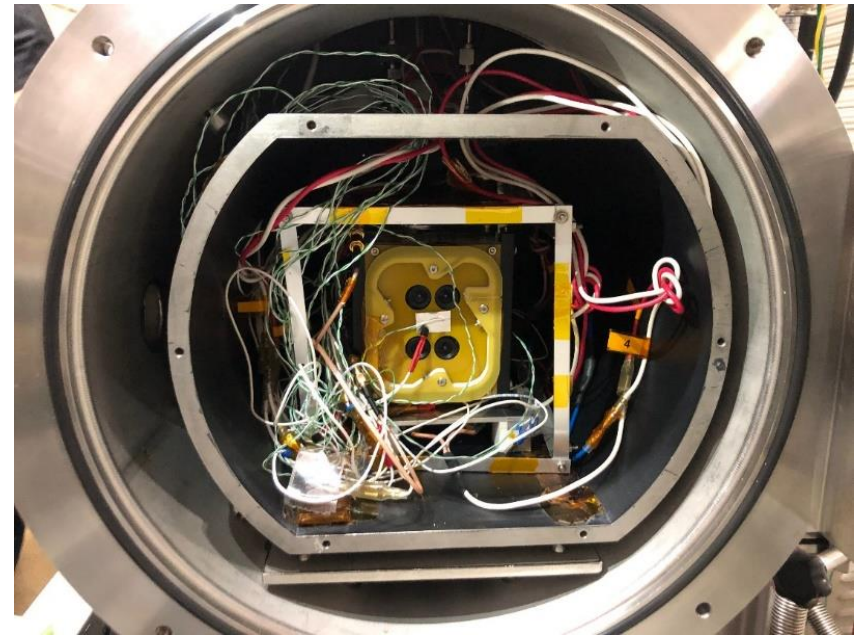
Preliminary Design Review

ENGINEERING MODEL DEVELOPMENT

Objective : To verify the satellite function and component under extreme vacuum and temperature

Location : Center for Nano satellite Testing (CeNT) in Laboratory of Spacecraft Environment Interaction Engineering

Located: Kyushu Institute of technology



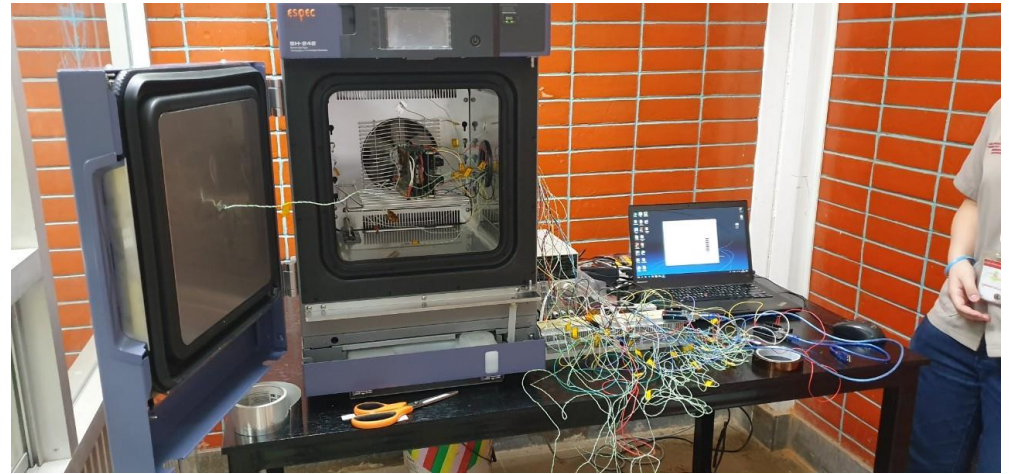
Thermal Vacuum Testing

ENGINEERING MODEL DEVELOPMENT

Objective : To verify the satellite function under thermal shock

Location : Royal Thai Air Force Academy (RTAFA)

Located: Thai Air Force



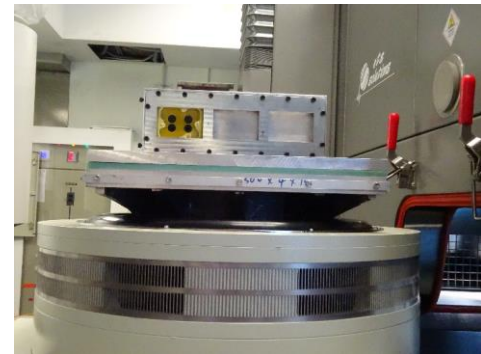
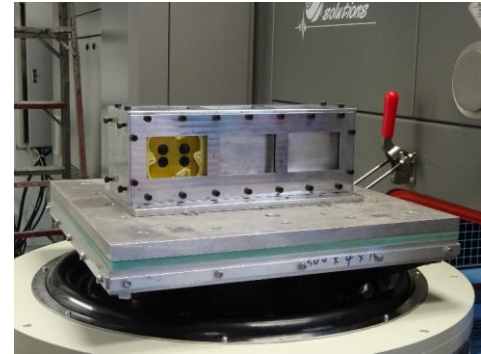
Thermal Cycling Testing

ENGINEERING MODEL DEVELOPMENT

Objective : To verify the satellite structure that can withstand under vibration during rocket launching

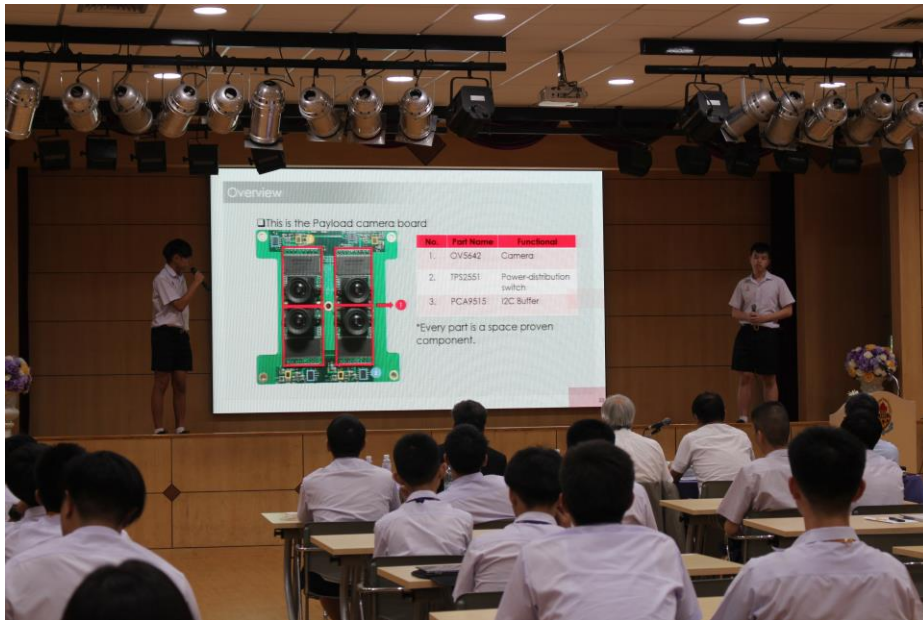
Location : TUV SUD

Located: Thailand Science Park



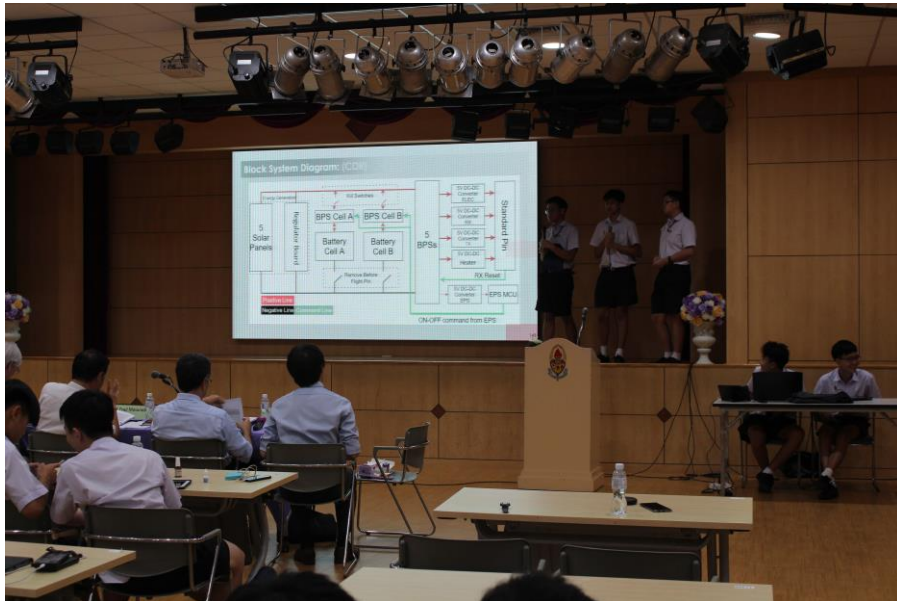
Vibration Testing

ENGINEERING MODEL DEVELOPMENT



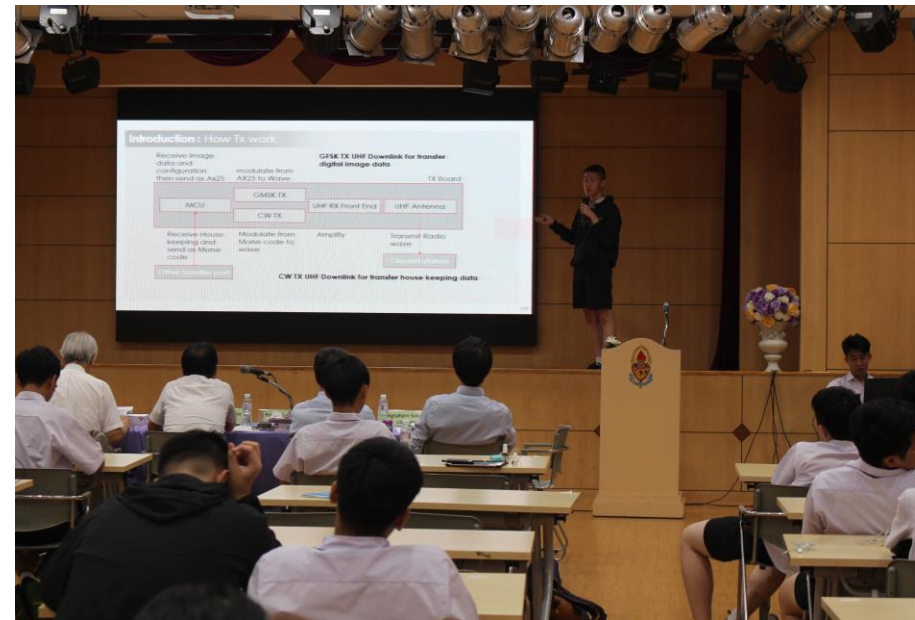
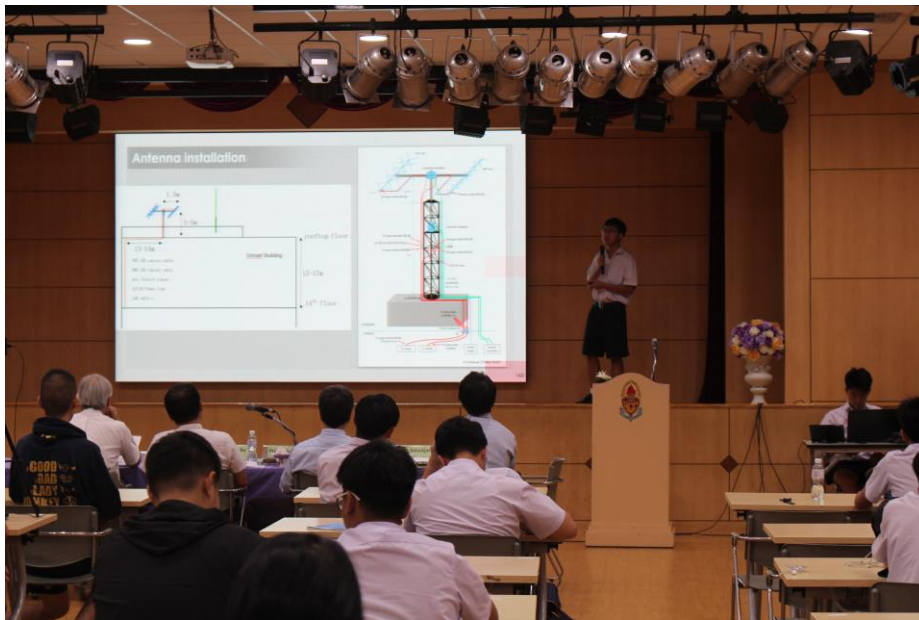
Critical Design Review

ENGINEERING MODEL DEVELOPMENT



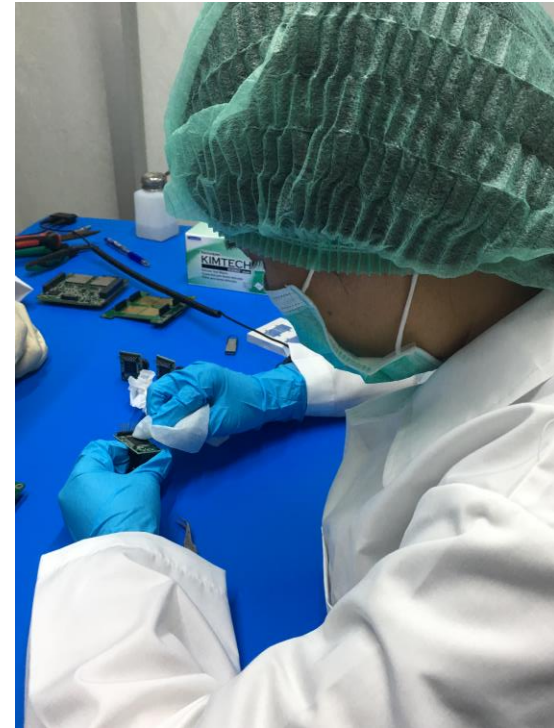
Critical Design Review

ENGINEERING MODEL DEVELOPMENT



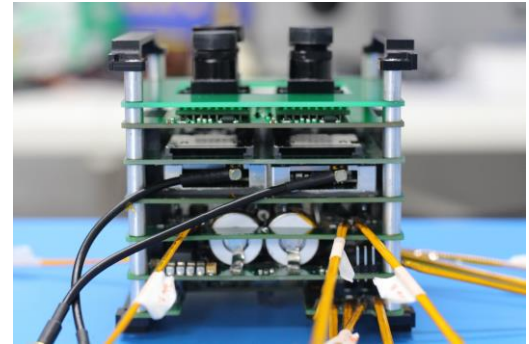
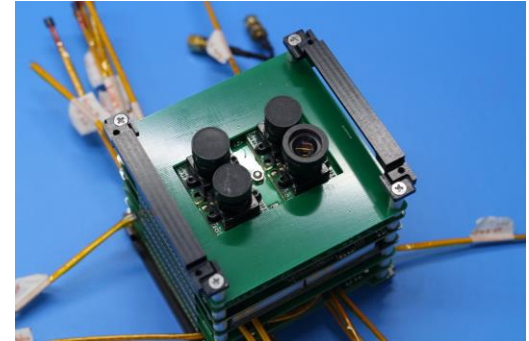
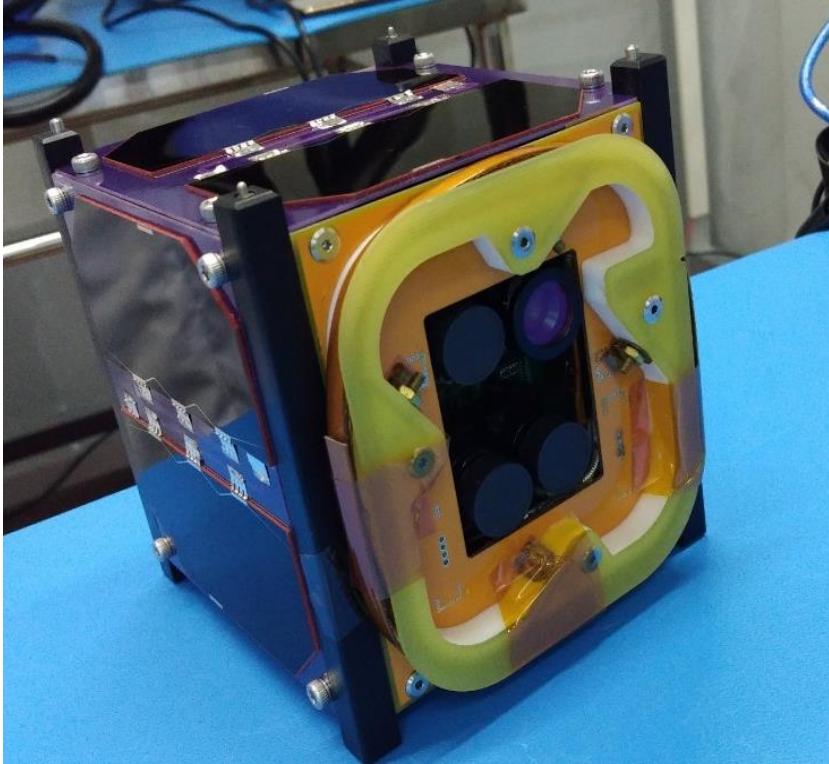
Critical Design Review

FLIGHT MODEL DEVELOPMENT



BCCSat – 1 Flight Model
Assembly

FLIGHT MODEL DEVELOPMENT



BCCSat – 1 Flight Model

LAUNCH PLAN



BCCSAT-1 will be launch to the
atmosphere at Russia;

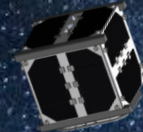
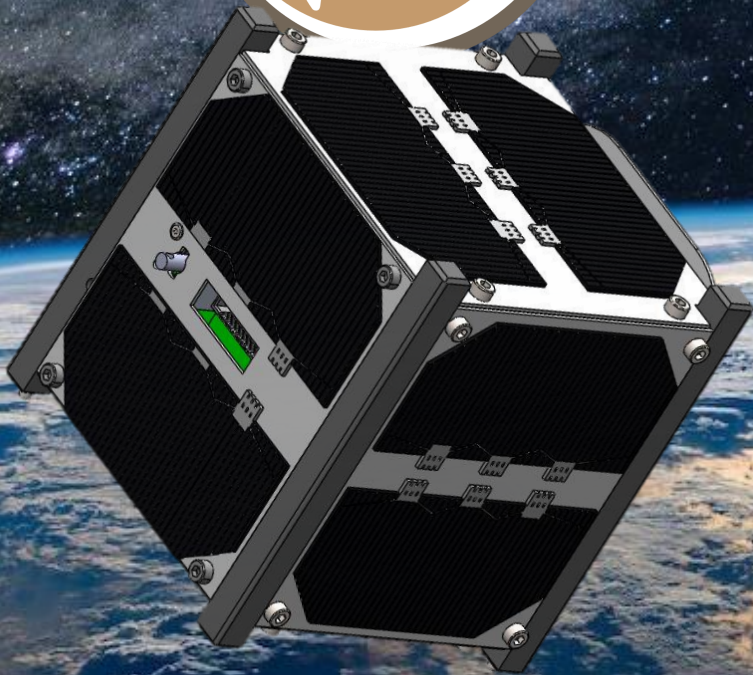
Soyuz 2 LEO → 550 km
Russian Soyuz Type Rocket

2nd – 3rd Quarter of 2020



OWLSAT Program

High school student satellites constellation project
- The 1st Tiny BIRDS project in Thailand



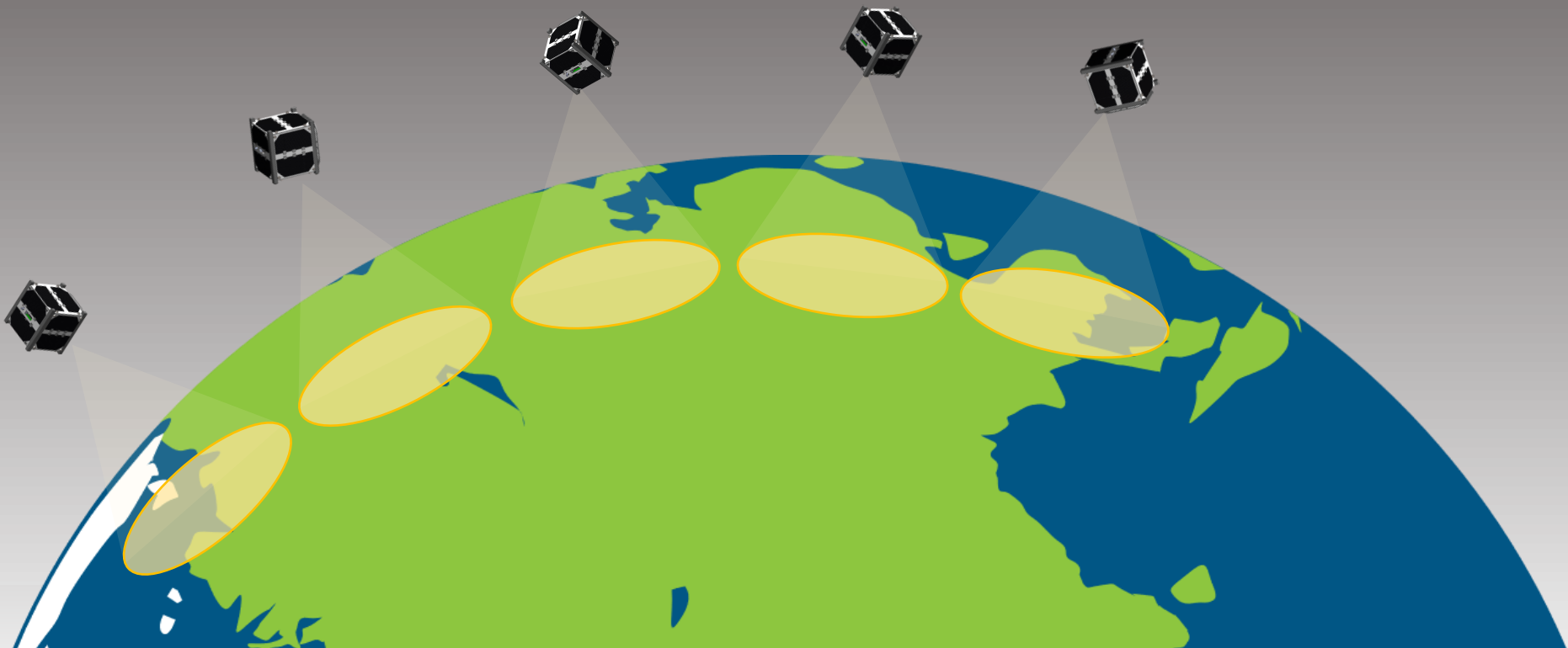
What is OwlSat ?

OwlSat is a collaborative technological transfer framework between *The University of Tokyo, Kyushu Institute of Technology, and King Mongkut's University of Technology north Bangkok and AstroBerry Limited.*



What is OwlSat ?

OwlSat is an experimental satellite constellation consisting of five nano-satellites or CubeSats working together on a telecommunication mission known as Store and Forward (S&F).



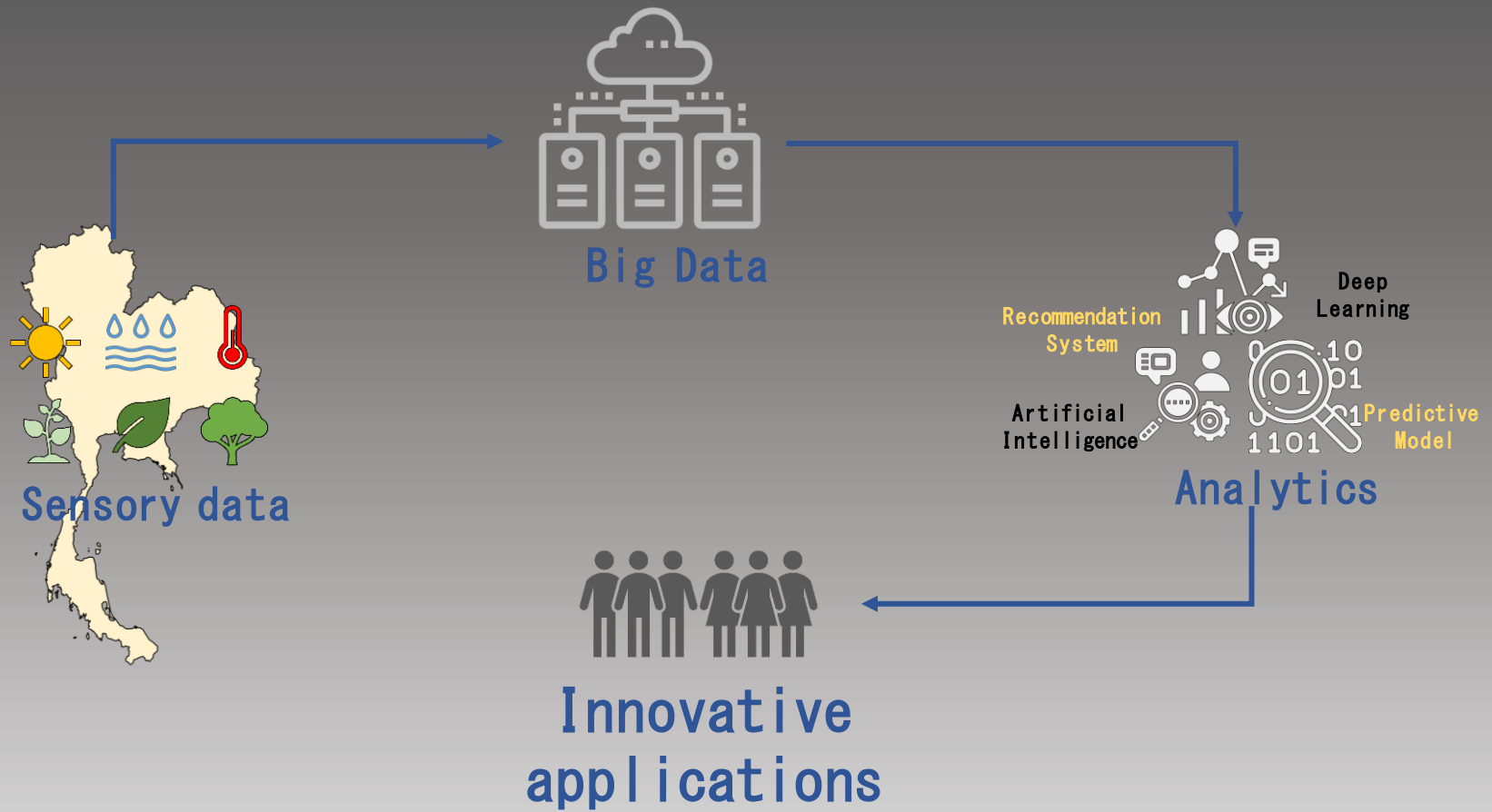
OWLSAT PROJECT CONCEPT

“Capacity Building for High School Students in Bangkok, Thailand”

- Inspiration for young generations
- New generations for space industries in Thailand
- Young-Blood space technology knowledge practice

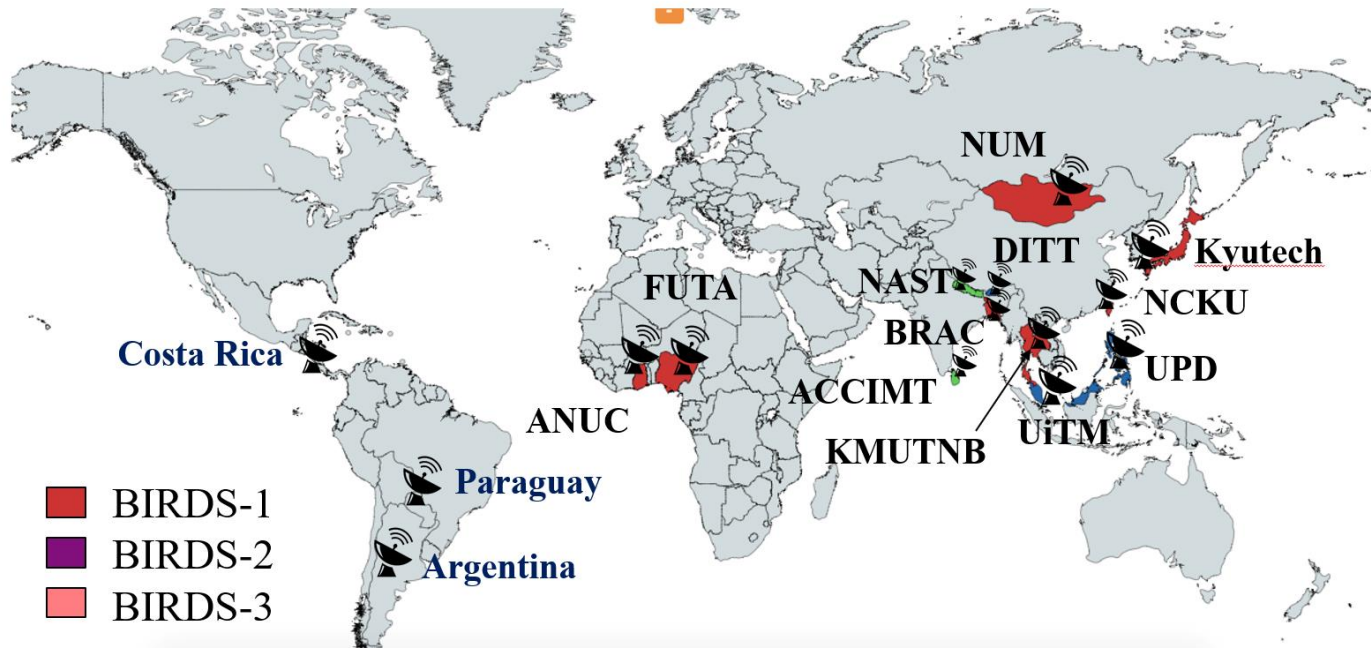


USE of Sensory data



OwlSat with BIRDS GSN

Links to KyuTech BIRDS Ground Station Network



<https://mapchart.net>

15 Ground Stations Member

OwlSat Program Outline



5 selected high schools in Bangkok



Qualified 10 Students and 2 teachers

Development of a 1U CubeSat within
2 years

- Payload design
- Assembly and Integration
- Environmental Test
- Operation

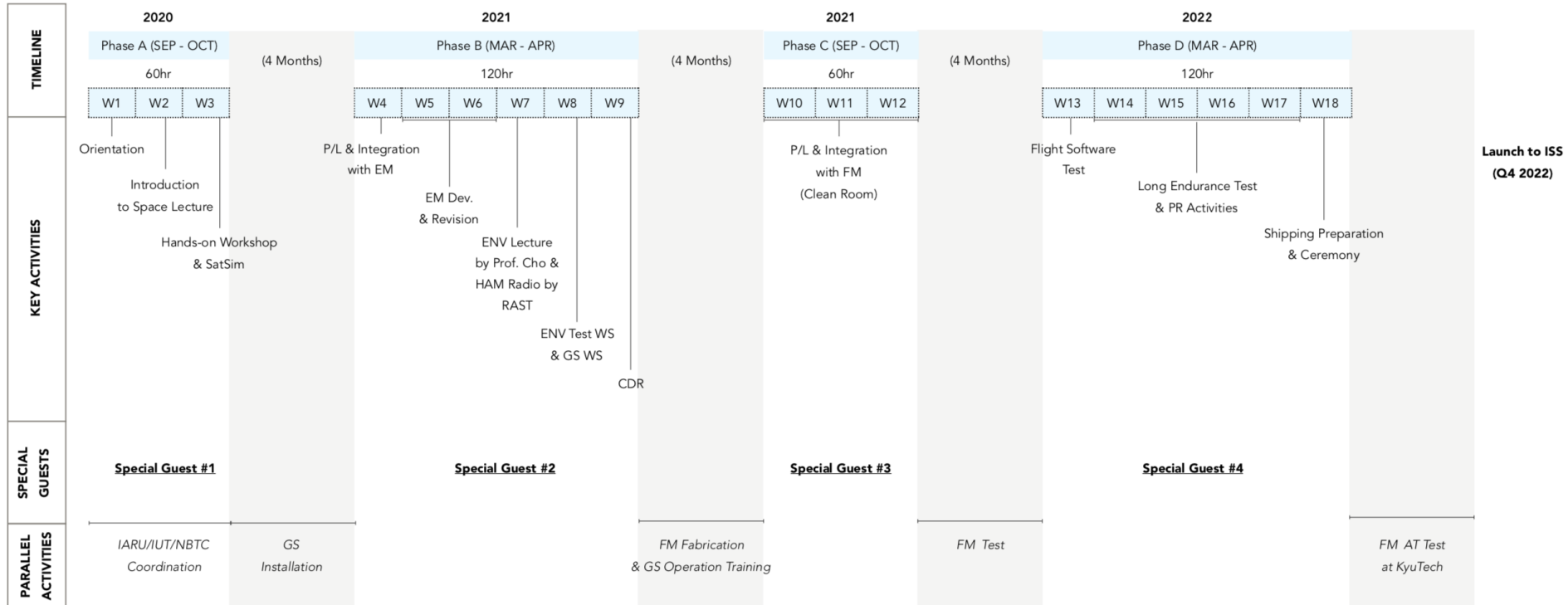


OwlSat Curriculum



- Introduction to Space Engineering
- Fundamental in Electronics
- Fundamental in Computer Programming
- Introduction to Mechanics
- Hands-on Workshop
- Payload Integration
- Engineering Model Development
- Environment Test
- Critical Design Review
- Flight Model Development
- Long Endurance Test
- To be deployed from ISS

OwlSat Timeline



KMUTNB Plan in 2020-2023

- Establish **UNISEC Thailand** (with KMITL, KMUTT)
- Establish a **Space Research Institute** (MOU with MAI, UT, Kyutech, TUS)
 - To educate enterprises, support SME's technology
 - Form consortium of private companies
 - International collaboration
 - AIT facilities (CubeSat class)
 - Space Academic (OwlSat project, etc.)
 - Provide opportunities for research and jobs