



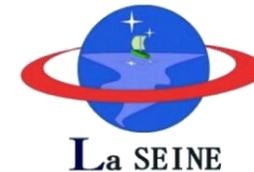
BIRDS Project Newsletter

Issue No. 1 (January 2016)



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Kitakyushu, Japan.



The project logo (above) was designed by Ernest Teye Matey, student from Ghana.

Bangladesh



Nigeria



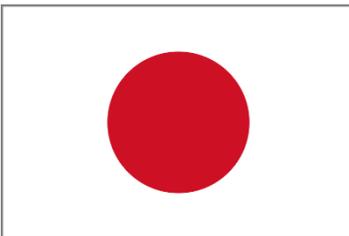
Mongolia



Ghana



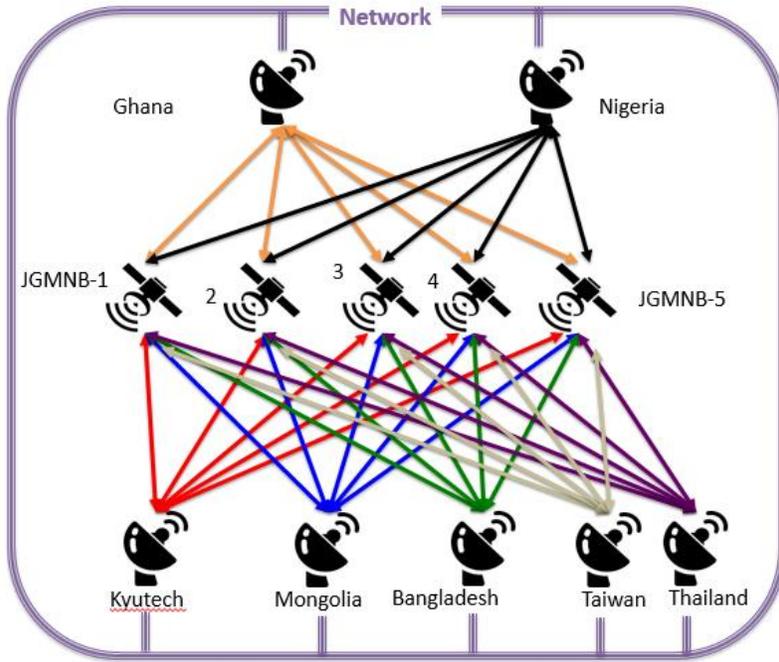
Japan



The nations of the BIRDS Project

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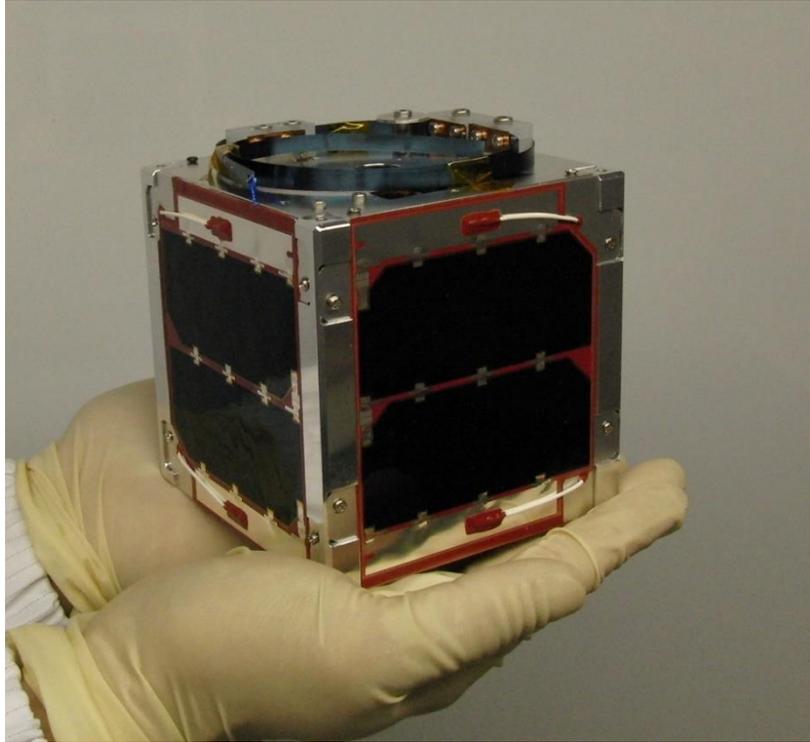


1. Introduction

The name “BIRDS” comes from the official title: **Joint Global Multi-Nation Birds Project**, or **JGMNB** Project. The first letter in each word also represents the nations in this project. It is a constellation of satellites as well as a constellation of ground stations. For many participating nations (Ghana, Mongolia, Bangladesh), it is their first indigenous satellite into space.

Objectives

- Teach engineering graduate students (from overseas and from Japan) the entire process for putting a satellite into space – from mission planning, to hardware design, to spacecraft testing, to launching, and to in-orbit operation.
- Lay down the foundation for a sustainable space program in non-space-faring countries by building-up human capital in universities – i.e., create a university space research and education program using graduating students.
- Most importantly, using the same students, create an *international human network* that can assist members to develop their infant space programs through cooperation and by sharing information and experiences.



1U cubesat example
(roughly 10cm x 10cm x 10cm)

2. The Mission Statement

Make the first step toward creating an indigenous space program by designing, building, testing, launching, and operating, the first satellite for participating nations.

(In some cases, the first university satellite.)

Important Note

The cubesats of the *BIRDS Project* are designed, fabricated, integrated, assembled, and tested, by the students of the respective participating nations. Kyutech acts only in a supervisory capacity.

3. Profiles of the student members of the BIRDS Project (in no particular order)



My name is: TEJUMOLA Taiwo Raphael
My country is: Nigeria
My major in college: Applied Science for Integrated System Engineering (D1)

My role in the BIRDS Project:

I am currently playing the role of Project Manager of the BIRD project. My role is to coordinate the project development stages, organize team members to play important roles throughout the lifecycle of the project based on the project integrated management plan and motivate team members to achieve assigned task. I also try to adapt myself to changing demand of the project and the team members as this is a cross boarder multidisciplinary project. I also do the important role of keeping a watch on schedule.



My name: BONSU BENJAMIN

My country is: Ghana

My majors :

Bachelor of Engineering in ELECTRONICS AND COMMUNICATION ENGINEERING

Master of Engineering in APPLIED SCIENCE FOR INTEGRATED SYSTEM ENGINEERING

My role in the BIRDS Project:

Antenna Deployment

Make sure Antenna can be successfully deployed after satellite is launched

Design Dipole and Monopole Antenna and ensure it can be able to radiate VHF and UHF radio signals from satellite to ground

Ensures Antenna can withstand Space Environment

Ground Station (GS)

To make sure communication link between the satellite and ground is established to exchange uplink command and telemetry data

To perform link budget calculation to obtain the margin to verify the GS system receiver sensitivity can tolerate an additional attenuation between the transmitter and the receiver, and it would still just barely work.

Determination and prediction of the orbit of the satellite.

Observation planning and scheduling.

Development of Ground Station software interfaces

Ground station network operations and data base management

Frequency Co-ordination

To make sure Birds satellites acquire registered amateur frequency to operate under the IARU and ITU regulation law

Interface Control Management

To keep track and make documents on all the subsystems interface with one another and ensure is updated for troubleshooting purposes.

Fault Tree Analysis

Responsible for creating a logic diagram of the overall satellite system by mapping the relationship between faults, subsystems, and redundant safety design elements to improve reliability.



My name is: Maisun Ibn Monowar
My country is: Bangladesh
My major in college: Electrical and Electronics Engineering

My role in the BIRDS Project:

I have been assigned to communication subsystem for BIRDS projects. My role is to ensure every components related to communications functions as they are intended. The challenge we are currently facing in our project is to accommodate Radio transmitter powerful enough within the given space. BIRDS satellites will not only transmit scientific mission data, but also a song / music for a particular time period, which anyone with a HAM Radio receiver can listen to. This makes my job challenging and fun at the same time.



My name is: ADEBOLU IBUKUN OLUWATOBI
My country is: Nigeria
My major in college: MECHANICAL ENGINEERING

My role in the BIRDS Project:

STRUCTURE CONFIGURATION DESIGN

My role in the Birds' Project is Structure Design. Drawing on my background in Mechanical Engineering, I am saddled with the task of ensuring that our satellites have sufficient strength and rigidity to survive the rigorous launch and space environments. In order to achieve this, I have to ensure that all payload and Bus System are properly accommodated within the 10 cubic centimeter structure. I find this very challenging, because it involves a lot of optimization and trade-offs. In the future, I hope to work more on other aspects of satellite design.



My name is: ERNEST TEYE MATEY
My country is: Ghana
My major in college: Electronics and Communication Engineering

My role in the BIRDS Project:

My role in BIRDS project is to determine precise position of the BIRD satellite in Space so our Ground Station can track it accurately. I also work on the communication sub-system and the configuration of the satellite. Presently, there is a need for me to study more on software simulations to accomplish my task. Working on the entire configuration of the Satellite gives me a platform to study almost everything about CubeSat integration.

This knowledge will be a great asset even as I go back to my country (Ghana) to start a major Space project in my school (All Nations University College). The BIRDS project is a great platform for enhancing my engineering skill under the supervision of my skilled professors here.

Editor’s note: Ernest designed the official logo of the BIRDS Project.





My name is: Abdulla Hil Kafi
My country is: Bangladesh
My major in college: B.Sc. in Electrical and Electronics Engineering
My role in the BIRDS Project:

In BIRDS project I am working on several systems including Attitude Determination and Control System(ADCS), SNG , Single Event Latch-up(SEL), RESET System Design. For a satellite, it is very important to make the satellite stable while orbiting in the space to communicate with ground station and to take picture of our homeland. And I am working to make our satellite stable using passive stabilization system with permanent magnet and hysteresis damper. For the detection of the Earth direction during CAM mission execution BIRDS's ADCS will equip with gyro sensors and Magnetometer.

For SEL Mission's my work is to identify correlation of SEL occurrence with satellite locations, time, and space weather. It will help the future Lean satellite builders to have good knowledge about SEL occurrences. Satellite itself a very sensitive device. And the Space environment is very complex. Many undesirable event like single event latch-up may hamper its system. To look after main motherboard and to make sure OCP is working perfectly or not we use a RESET system. If OCP fail to reset the circuit after any SEL occurrences or if any malfunction happened in main motherboard this RESET System will reset whole system. The key feature of SNG mission is to send a song file from ground to JGMNB-Satellite and then be broadcasted to Ham-receivers on ground. For general people in developing country, it will be a matter of amazed that they will hear song from space and this mission will definitely give them positive knowledge about satellite technology. So, this SNG mission will serve the purpose of expanding the satellite radio communication technology, educating the younger generation of the numerous benefits of voice communication via satellite and to advance their skills in this field.



My name is: Turtogtokh Tumenjargal
My country is: Mongolia
My major in college: Physics and Electronics

My role in the BIRDS Project:

I am very excited to be as a part of Birds project that is cooperation between multinational universities. In Birds project, I am primarily working on On-board Computer (OBC) system and my major role is to provide reliable and proper operation of brain for our satellites. OBC has high responsibility for satellite's properly working in space and It's duty is not only execution of commands from ground station but also collecting and managing housekeeping data, time and schedule, and controlling subsystems such as payloads, antenna deployment and electrical power supply.

Editor's Note:
He drinks a lot of coffee to get his work done.

I observe that our project is very effective to learn space and system engineering from the beginning. We learn a lot of things within in last two months. I hope that Birds journey will be extraordinary and result will be great.

Of course, before seeing the result, I have to finish many cups of coffee.



My name is: Raihana Shams Islam Antara
My country is: Bangladesh
My major in college: Electrical and Electronics Engineering

My role in the BIRDS Project:

I am working on Antenna deployment system of BIRDS project and in charge to bring out a totally new concept of Antenna Deployment. Previously all the nano-satellite project used the outside mechanism for deployment but for our project the plan is using the inside mechanism for deployment system which is kind of complicated work and this makes my task challenging. If the deployment will successful, then it will pave a way to new innovation for deployment system. I am also designing the antennas that will deploy for starting the communication between satellite and ground station

Besides this I am working with SNG mission. SNG is one of the main mission of BIRDS project and it is considered as an outreach missions. The general idea of SNG is to be able to receive audio file (music) from satellite using Ham-Radio receivers via (UHF) band. For countries whose first satellite project is JGMNB-BIRD's CubeSat, this mission will be one of the novel missions to be introduced to its general public. I am also the part of the "Ground Station Team". The ground station network is very important to start the early operation of satellite. After completing the antenna deployment system, I will start working with the ground station team.



My name is: Dagvasumberel Amartuvshin
My country is: Mongolia
My major in college: Physical Electronics Engineering

My role in the BIRDS Project:

I am assigned to the Camera team and our purpose is to design and develop a camera subsystem for the BIRDS satellite. The BIRDS satellite's camera subsystem consists of 2 different cameras. One is the high resolution camera which is able to take pictures of the Earth's surface in sufficiently high resolution and another one is low resolution backup camera. In this project, the focus is on design and implementation of the subsystem for the camera, such that it is able to take pictures, save the data and communicate with other subsystems in the satellite.



Editor's note:

**His name is too long.
We call him "Erka" for
short -- but not sure
why.**

My name is: DASHDONDOG ERDENEBAATAR

My country is: Mongolia

My major in college:

Bachelor: Physics and Electronics, National University of Mongolia

Master: Physics and Electronics, National University of Mongolia

Doctoral (in process): Engineering of High Power Semiconductor Device, Space Engineering international Course (SEIC)

My role in the BIRDS Project:

My roles in project are Electrical Power System in Productive section and Interface management in non-productive section of Satellite Development. Electric Power System consists of Solar panels as power generator, Ni-MH battery as Power storage and Power management and Distribution unit. We will make Solar panel attachment on surface by workmanship. In interface case, all sub-systems and missions communication and power interfaces should be as much as compact. After BIRDS, I will comeback my country to work as teacher of Space Engineering in University and have planned to accomplish our individual Cubesat project based on what we are doing now.



My name is: Apiwat Jirawattanaphol
My country is: Thailand
My major in college: Electronics and Telecommunication Engineering

My role in the BIRDS Project:

I'm working on ground station subsystem for BIRDS projects. My role is to develop ground station which use to transmit command and receive mission data from BIRDS project satellites to ensure ground station can communicate with satellites smoothly. In the BIRDS project, we will use ground station that located on ours project member country and connect all station to be a ground station network. The Ground station network can increase a time windows that mean we can have more time to download scientific and picture data from satellites. Moreover, I have been assigned to work as frequency coordination people to request frequency for ours satellites. This makes me learn more Engineering and Communication skills at the same time.

Editor's note:
Thailand provides an Important ground station for this project.



My name is: Quansah Joseph Neenyi Kojo Krobo
My country is: Ghana
My major in college: Electronics and Communication Engineering

My role in the BIRDS Project:

As being first of its kind and also aiming at performing state of the art missions. One of the missions is to measure the atmospheric density at low earth orbit using a constellation of CubeSat and I am assigned to that task. The mission aims at predicting the atmospheric density with the change in satellite altitude as it orbits. We love BIRDS and wouldn't want to lose track of it in orbit, therefore I am also assigned to the ground software determination of the BIRDS attitude and orientation in orbit.

The project also ensures to have a good management and development process and due to that, I am also included in a team responsible for the production and risk management of this project which leads to the fulfilment of its manager.

Editor's note:

He can cook a great beans & sausage dish from Ghana.



My name is: Yasuhiro Tokunaga
My country is: Japan
My major in college: Environment test

My role in the BIRDS Project:

My role is mainly Integration management. Now I develop OBC, COM and EPS, but I'm second person in each team. I think I shouldn't develop anything mainly because I'm in the position can understand many function of parts. Then, I can support every members!



My name is: Naoki Nakamura
My country is: Japan
My major in college: Systems engineering

My role in the BIRDS Project:

My role in this project is structure and thermal design. This is product element. In the non-product element, my role is parts procurement and management. Fortunately, I got many works in this project. I want complete my works.



My name is:

Masanori Shigyo

My country is:

Japan

My major in college:

Systems engineering

My role in the BIRDS Project:

I work on developing camera module to take pictures of our homeland as a CAM team member and also Non-product Element Data Distribution for team members.

CAM team try to take high quality pictures by using 5MP on-board camera but this is very challenging. And we take the picture by 5MP camera and VGA camera called SCAMP to get wider picture and compare high quality image for understanding surrounding area.

I want to do my best.

END OF PROFILES – *The preceding young people are the satellite engineers.*

4. BIRDS Mission Design Summary

(the next two pages)

19 December 2015

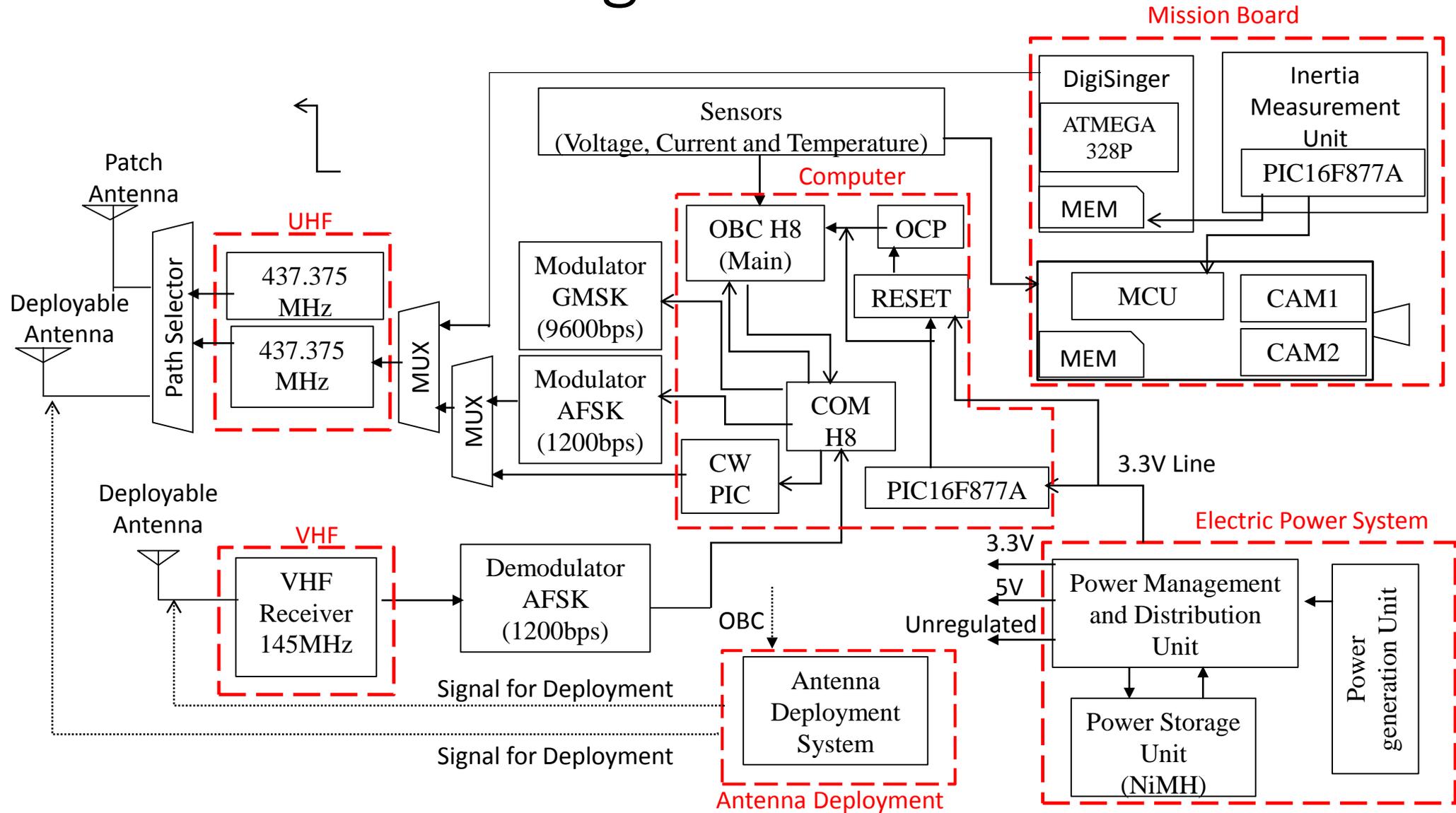
Version 3.0

by Tejumola Taiwo

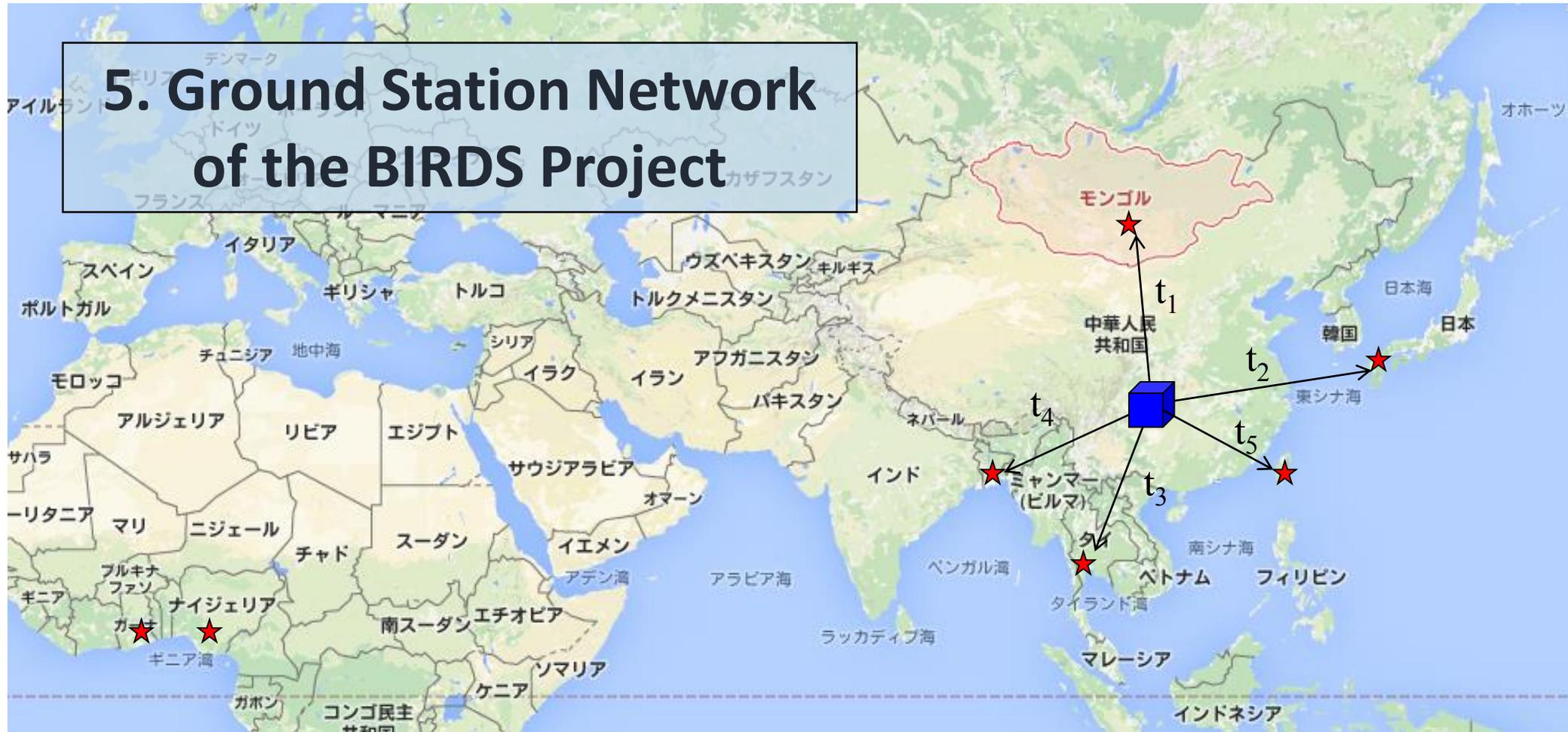
BIRDS Mission – Six Functions

1. Take photograph of homeland via onboard cameras (CAM)
 - Using 2 Cameras (SCAMP at 3MP and OV5642 at 5MP located on +Y).
2. Digi-singer Mission (SNG)
 - Broadcast of signals from satellites to Ham Radio receivers (UHF band)
3. Determination of Satellite Precise Location (POS)
 - Using analysis of TOA from time lag among multiple ground stations.
4. Atmospheric Density Measurement (ATM)
 - Using Orbital analysis from precise satellite tracking information (POS).
5. Demonstrate Ground Station Network for CubeSat Constellation (NET)
 - Using Amateur radio frequencies.
6. Measure single-event-latchup in orbit (SEL)
 - By taking log of microcontroller reset events over period of time.

BIRDS Block diagram

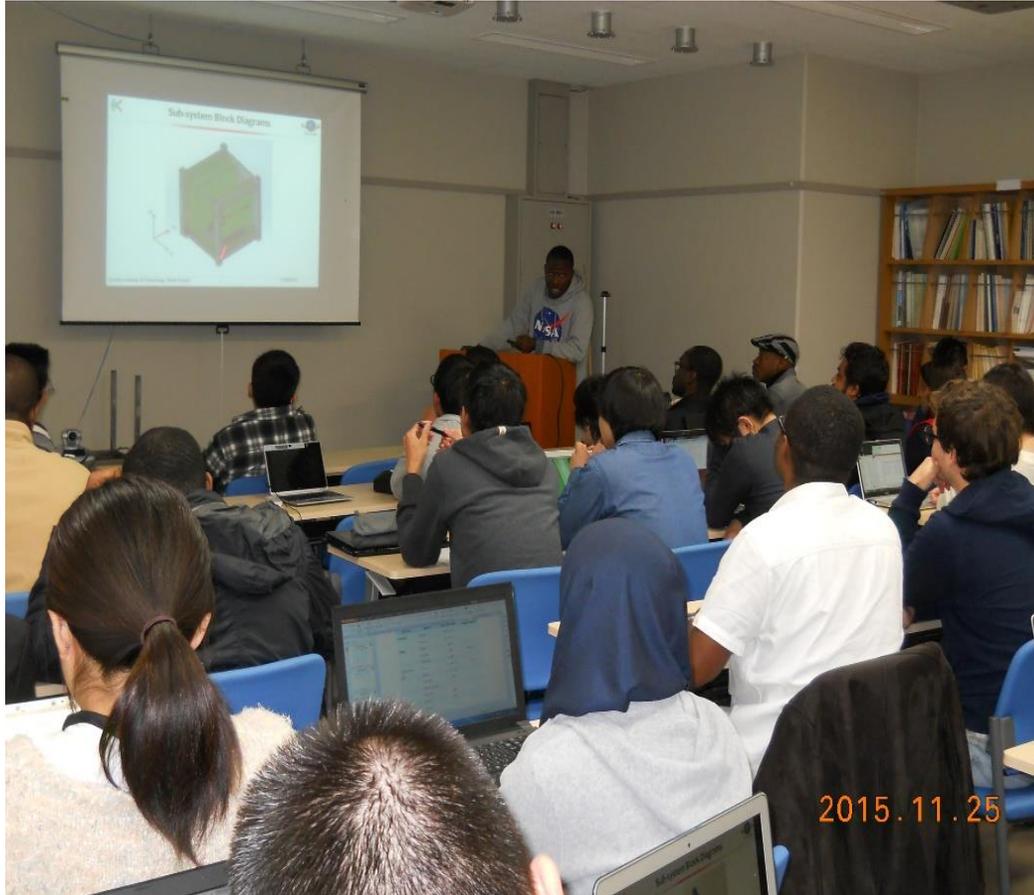


5. Ground Station Network of the BIRDS Project



The **red stars** designate the ground stations. From the West:
Ghana, Nigeria, Bangladesh, Thailand, Mongolia, Taiwan, and Japan

6. Mission Design Review (MDR)



One by one, Power Point presentations are given.

Mission Design Review (MDR):
This was the first major milestone
of the project.

This is where everyone agreed,
“This is what we are going to do.”

9:00 AM – 2:30 PM,
25 November 2015.

Seminar Room of the 4th floor of
S2 Building at Kyushu Institute of
Technology, Tobata Campus, Japan.

7. ANUC of Ghana becomes the first official overseas member of the project



On 6 January 2016, ANUC (All Nations University College) of Ghana became the first participating university to sign the BIRDS Project CRA (*Cooperative Research Agreement*). Seated at the left is **Dr. Donkor** (President of ANUC), who signed on behalf of ANUC. Seated at the right is **Dr. Matsunaga** (President of Kyutech), who signed on behalf of Kyutech.

This is basically a build and launch contract for a 1U cubesat.

END OF ISSUE NO. 1