



BIRDS Project Newsletter

Issue No. 21 (25 October 2017)



Supermarket in
Tobata, Kitakyushu



Members of BIRDS -1, -2, and -3 on 4 October 2017, at Tobata Campus

Project website: <http://birds.ele.kyutech.ac.jp/>
All back issues are archived at this website.

Edited by:
G. Maeda

Laboratory of Spacecraft Environment Interaction
Engineering (LaSEINE)
Kyushu Institute of Technology (Kyutech)
Kitakyushu, Japan



All back issues of this newsletter can be easily downloaded. Go to here: <http://birds.ele.kyutech.ac.jp/>
At the top, click on the tab called NEWSLETTER. You will get a menu for all back issues.

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The Guest Box

From Bhutan



Meeting between Department of Information Technology and Telecom (DITT) and College of Science and Technology (CST). A government agency and a university discussing about collaboration for the future of space activities In Bhutan.

Received 11-Oct-2017

01. Prof Cho discusses BIRDS at COSPAR in Korea



Photo by Rodrigo of Mexico

TITLE:

BIRDS Program: CubeSat Constellation for Cross-Border Inter-University Collaboration on Space Research and Education

AUTHORS:

Mengu Cho, George Maeda, Sangkyun Kim, and Hirokazu Masui

SESSION:

Education and Capacity Building in Science and Engineering Using Small Satellites II

PLACE: Room C (Baekrok Hall A)

DATE AND TIME:

2017 September 21 (Thursday) 09:30-10:55

ABSTRACT ON THE NEXT PAGE →

ABSTRACT

BIRDS Program is a multinational lean satellite program where students enrolled in Kyushu Institute of Technology are engaged in designing, manufacturing, integrating, testing, and operation 1U cubesat constellation. The first constellation, BIRDS-I made a five 1U CubeSats were by students from Ghana, Mongolia, Nigeria, Bangladesh, Thailand and Japan and will be released from ISS in 2017. The second constellation, BIRDS-II, made of three 1U Cubesats are being made by students from Philippine, Malaysia, Bhutan and Japan following the BIRDS-I project by one year. The BIRDS program mission is to make the first step toward indigenous space program by successfully building and operating the first satellite of the country. The satellites for Ghana, Mongolia, Bangladesh and Bhutan are truly the first satellite of the countries.



Photo by Rodrigo of Mexico

In the BIRDS program the students experience the entire processes of satellite development from the mission definition to the disposal in two years that fits into the degree timeline of a Master degree. The constellation will be operated by a network of ground stations distributed over the member counties that include Taiwan. The BIRDS program aims to foster the cross-border inter-university collaboration on space research and education by providing two networks to assist the infant space program the students initiate after they go back to their home countries. One is human network cultivated in two years' intensive team works and another is ground station network. The paper presents the two years experience of BIRDS project since it was started in October 2015. **END**

APRSAF No. 26 NEWS LETTER

AUGUST 2017

APRSAF
ASIAN-PACIFIC REGIONAL
SPACE AGENCY FORUM

www.aprsaf.org



BIRDS members of the ISSM at University



Wahid Saadli (1/10/17)

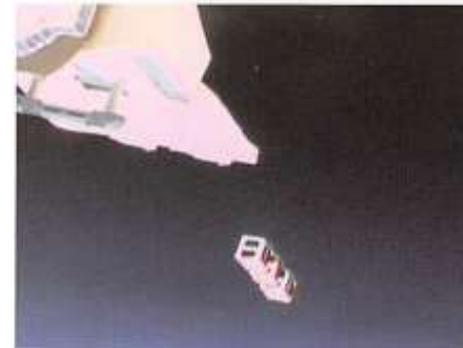
Copyright by Max (Blue Camera) (1/1/17)

©2014 NASA (1/1/17)

BIRDS PROJECT, CAPACITY BUILDING FOR SMALL SATELLITE DEVELOPMENT UTILIZING THE JAPANESE EXPERIMENT MODULE "KIBO"

The Joint Global Multi-Nation Birds Satellite Project, also known as the "BIRDS Project," is a cross-border university project for the development and operation of CubeSats led by Japan's Kyushu Institute of Technology (Kyutech). Japan and Asian-African nations are participating in this two-year project to provide students with opportunities to experience the complete cycle of designing, building, testing and operating 1U-sized CubeSats, which will be deployed from the Japanese Experiment Module "Kibo" of the International Space Station (ISS). Moreover, this project aims to educate students so that they become capable of developing satellites for their own nations.

As the first round of the project, BIRDS-1 (2015-2017), five 1U CubeSats from Japan, Ghana, Mongolia, Nigeria, and Bangladesh were sent up to the ISS aboard the Dragon CRS-11 spacecraft



Credit: JAXA/NASA



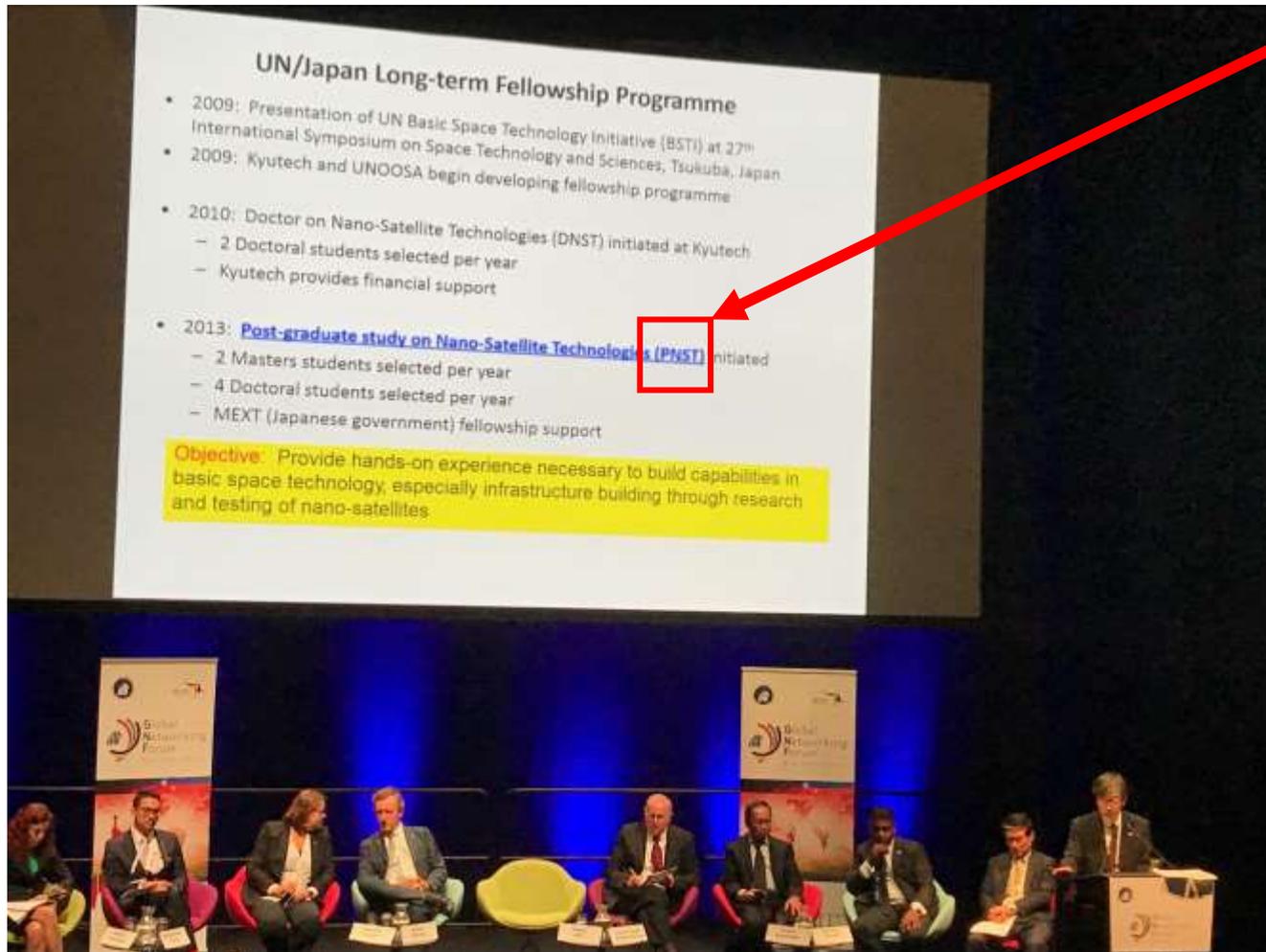
Credit: JAXA/NASA

(SpX-11) on June 4, 2017 (JST). On July 7 (JST), the CubeSats were successfully deployed into orbit from Kibo. These CubeSats are operated from seven ground stations of the five participating countries plus Taiwan and Thailand.

The second round of the BIRDS project, BIRDS-2 (2016-2018), is an ongoing project following the success of BIRDS-1.

Students from Bhutan, Malaysia, and the Philippines are participating in BIRDS-2. A preliminary design review was held on March 28, 2017. Additionally, BIRDS-3 will start from autumn 2017. For further information about the BIRDS project, please visit the following websites: BIRDS Project, and BIRDS-1 <http://birds.ele.kyutech.ac.jp/> BIRDS-2 <http://birds2.ele.kyutech.ac.jp/>

03. PNST (the UN-Kyutech Fellowship) is recognized during Global Networking Forum at 2017 IAC



PNST recognized by JAXA at 2017 IAC Adelaide during GNF

GNF

=Global Networking Forum

09:30 - 11:30 AM (27 Sept 2017) **GNF** - *The Evolving Relation Between Public Procurement and Industry on Space and Defence programmes with Strategic Perspectives Towards Respecting Costs and Schedules on Large Contracts*

Note: Many BIRDS students are on PNST scholarships.

Photo courtesy of Prof. M. Cho.

04. JAXA exhibits at 2017 IAC



JEM SMALL SATELLITE
ORBITAL DEPLOYER
(J-SSOD)

All BIRDS satellites are deployed into space by the ISS using this special “deployer” .



Venue of 2017 IAC
*The Adelaide
Convention Center*



Maisun Dr Huda Taiwo Amar



Taken at Adelaide Airport

05. BIRDS students deliver presentations at IAC



Session:

B.4: 18th Workshop on Small Satellite Programmes at the Service of Developing Countries

Title:

Changing the Paradigm of Developing Countries Space Program: Lean Satellite Project as a Pragmatic Option (IAC-17-B4.1.5.38211)

Authors: Taiwo Raphael Tejumola, George Maeda, Mengu Cho



Symposium: 24th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS

Session: B4.9 / GTS5 / Small Satellite Missions Global Technical

Title:

BIRDS Project: Development and operation summary of a CubeSat constellation project

Authors: Maisun in monowar, BIRDS project partners, Mengu Cho.



06. Mr Benjamin Bonsu (Ghana, BIRDS-1) receives award at IAC



BEST INTERACTIVE PRESENTATION AWARD

Title:

First Educational Satellite to Enhance Sustainable Space Program in Ghana

Category E: SPACE AND SOCIETY

Space Education and Outreach Symposium

Web-based news story here:

<https://www.graphic.com.gh/news/education/ghanasat-1-project-leader-honoured.html>

07. LaSEINE welcomes new students (including many BIRDS students) with BBQ



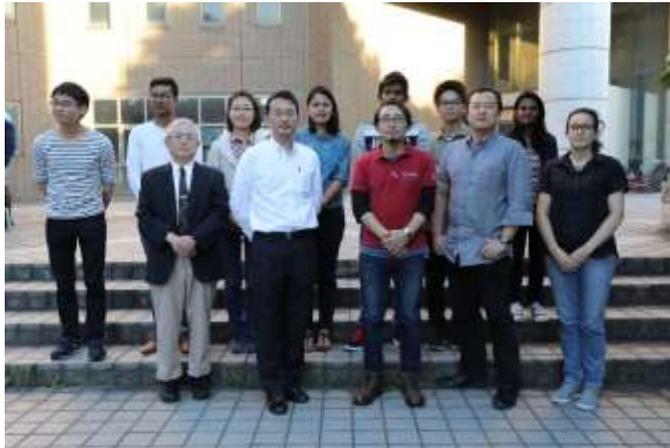
Fall 2017 LaSEINE's "Welcome Barbeque" (or Ice Breaker) for incoming students

Photos on this page by Dr. Kim.

MORE PICS NEXT PAGE



08. BIRDS-3 Kick Off Meeting of 4 October 2017



“In every beginning dwells a certain magic”

-- Hermann Hesse,
German poet

**MORE MEETINGS PICS
NEXT PAGE**

BIRDS program mission statement

- By successfully building and operating the first satellite of nation, make the first step toward indigenous space program at each country

OBJECTIVES

- Learn the entire processes of a satellite program from mission planning to satellite disposal
- Lay down foundation of sustainable space program by accumulating human resource in universities and launching a university space research and education program
- Create international human networks to mutually assist infant space programs



This was the first meeting of the BIRDS-3 Team.



09. Ground station report from Sri Lanka – a member of the BIRDS-3 Project

This ground station is located at ACCIMT in Sri Lanka.



G. Maeda visited ACCIMT (The Arthur C. Clarke Institute for Modern Technologies) on 19 April 2017. He took the photo above, the main building of ACCIMT. It belongs to the Government of Sri Lanka.

GROUND STATION PHOTO REPORT FROM SRI LANKA by Dulani Chamika, 4 October 2017

Details and the progress work of the AMSAT ground station being built at ACCIMT, Sri Lanka

1. The team members

1. Mr.Tharindu Dayarathna
2. Miss.Dulani Chamika
3. Mr.Kaveendra Sampath
4. Mr.Jayakamal Abeysekera
5. Mr.Dinusha De Silva
6. Mr.Prasanna Jayadewa
7. Mr.Chaminda Jayalath

2. Equipment

1. Elevation rotator
2. Azimuth rotator
3. Elevation and Azimuth dual controller
4. Antennas



1. Elevation rotator

2. Azimuth rotator

- Model number G-600



3. Elevation and Azimuth dual controller

- Model: KR-5600 S



4. Antennas

ACCIMT is using MASPRO antennas



VHF
antenna



UHF
antenna

3. Activities



Note: Ten years ago ACCIMT had operated one AMSAT Ground station. In accordance to the new requirements, the current staff is in the process of acquiring the latest processing units to improve the system.

End of GS Photo Report from Sri Lanka

10. A short article about the BIRDS Project Newsletter

This was
the
first issue
(start of
2016)



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

BIRDS Project Newsletter

Issue No. 1 (January 2016)

Edited by:

G. Maeda, Tejumola Taiwo, M. Cho,
Laboratory of Spacecraft Environment Interaction
Engineering (LaSEINE),
Kyushu Institute of Technology,
Kitakyushu, Japan.



No.	Issue date	Number of pages
1	Jan-16	24
2	24-Mar-16	30
3	15-Apr-16	38
4	16-May-16	28
5	20-Jun-16	38
6	12-Jul-16	21
7	11-Aug-16	33
8	15-Sep-16	23
9	19-Oct-16	15
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16	29-May-17	63
17	26-Jun-17	81
18	30-Jul-17	88
19	25-Aug-17	39

The BIRDS Project Newsletter

So far, **19 issues** have been published.

Average number of pages is
39.7

The BIRDS Project Newsletter



Objectives:

- Keep stakeholders informed
- Provide detailed information about the project to prospective new countries
- Maintain a permanent record of our activities

The BIRDS Project Newsletter

Sample Page

Page 13 of 21
of Issue No. 6

BIRDS Workshop Press Conference



Above: **Main Panel** - Prof. Oie (President of Kyutech), Prof. Cho (PI of the BIRDS Project), and Taiwo (BIRDS Project Manager).



Above: Taiwo delivers the main presentation (in English).
Below: One of his slides.



Above and below:
Many questions from Mainichi, Yomiuri, NHK, FBS, etc.



Sub-panel: Prof. Rhaman (Bangladesh), Dr Carlene (Ghana), Prof. Bat-Erdene Reasuren (Mongolia), Dr. Pom (Thailand), Dr Jyh-Ching (Taiwan), and Ogawa-san (JAXA, nearest to the camera).



BIRDS Project Newsletter – No. 6

Continued on the next page

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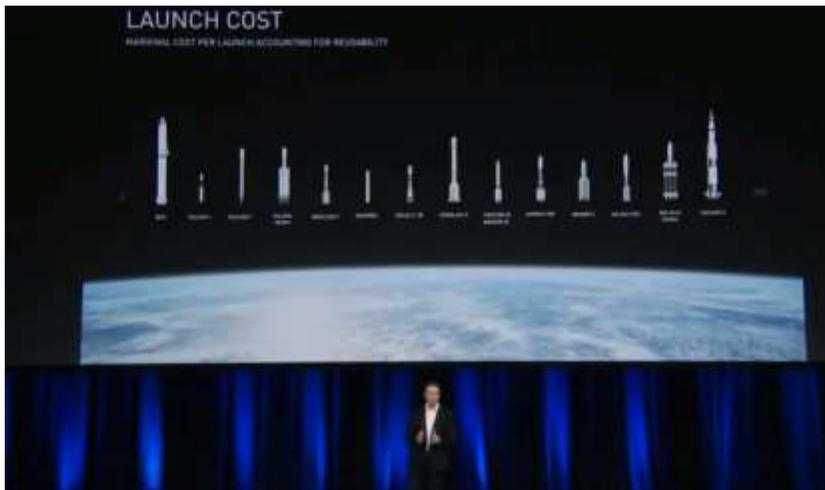
11. Two space videos worth seeing (both at YouTube)



<https://www.youtube.com/watch?v=bEYkA4NfmLc>

HOW IT WORKS The International Space Station 1080p, 60fps YouTube

Contents: What it is like living in the ISS.
About 30 minutes in length.



<https://www.youtube.com/watch?v=-25lz8ecocQ&t=1s>

Elon Musk - Making Life Multiplanetary | 2017 International Astronautical Congress

“Elon Musk presentation / speech at International Astronautical Congress in Adelaide 2017 -- Full Event -- Musk talks about why he wants humans to be multiplanetary and then shows the new plan with a smaller vehicle for travelling, the "BFR". Elon also shows video of the raptor engine testing and stats about the cost savings and efficiency of the whole system. Lastly, he shows he new concept of using these rockets for travelling on Earth, making every trip on Earth shorter than 1 hour. “ -- text from YouTube.

Length of video: About 45 minutes.

12. Apiwat met UN space expert in Bangkok on 16th Sept 2017

This page was prepared by Apiwat.



Jim Thompson Thai House Museum

“The Jim Thompson House is a museum in central Bangkok, Thailand, housing the art collection of American businessman and architect Jim Thompson, the museum designer and former owner. It is one of the most popular tourist destinations in Thailand.”

(Wikipedia.com)

More information: <http://www.jimthompsonhouse.com/>



The water jar that was an inker for silk cloth.



Living room (Easybook.com)



UN ESCAP Thailand Office



Dr. Werner Balogh is currently working at Space Application Section of the United Nations ESCAP office in Thailand. Apiwat is the only Thai member of the BIRDS-1 project.

13. NUM celebrates its 75th anniversary and Kyutech/BIRDS receives special recognition



NUM's 75th anniversary ceremony at Parliament
(NUM=National Univ. of Mongolia)



Kyutech President Oie receives
Crystal Trophy from NUM President.
All photos courtesy of Mr. Wakabayashi

Dates of this event: 5 & 6 Oct. 2017

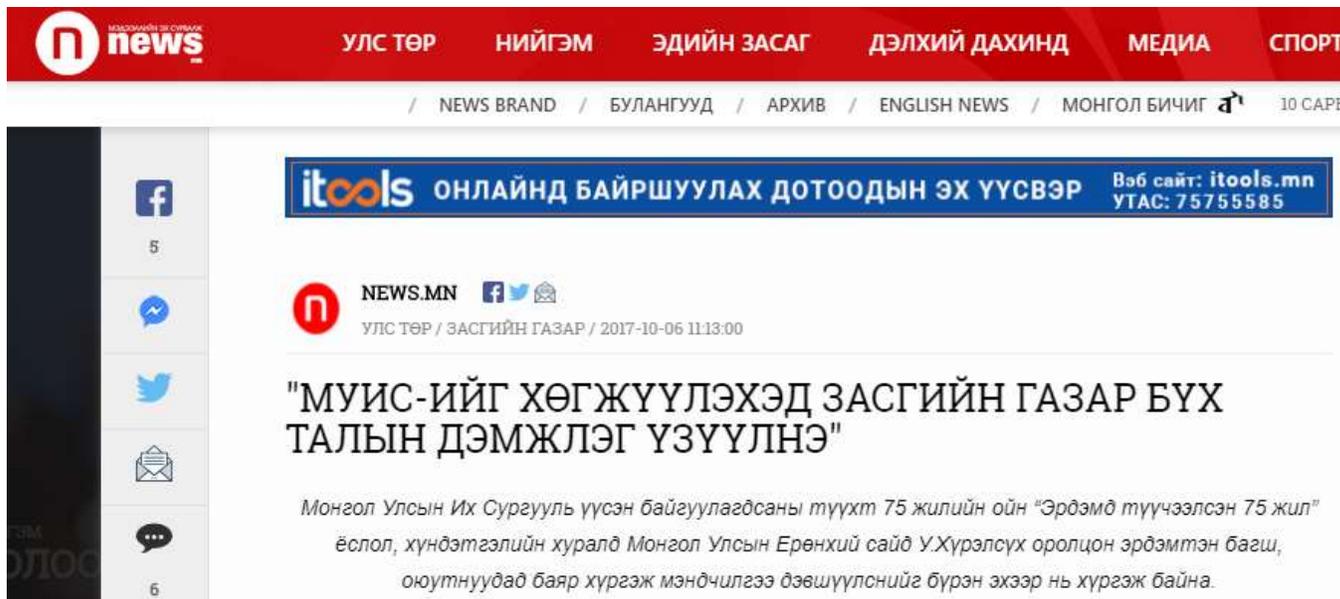


VP Yamaguchi, President Oie, Erka, and Mr Wakabayashi.
Erka is a member of the BIRDS-1 Team; he is now also a member of the faculty of National University of Mongolia.

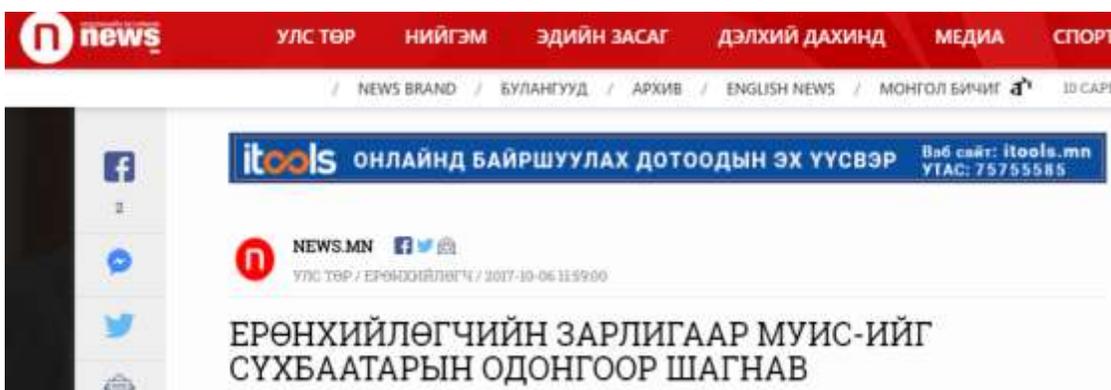


The 75th anniversary events are mentioned in the Mongolia press:

below is <https://news.mn/?id=11506>



The title says: Prime Minister U.Khurelsukh: “Government will comprehensively support NUM. “ Also in his speech: “... NUM and its students and researchers built first satellite of the country with Japanese Kyushu Institute of Technology. “ -- translation by Erka in Mongolia.



NUM received the "Sukhbaatar Medal" award for enhanced development of Mongolia.

Above is <https://news.mn/?id=11513>



14. BIRDS Project wins Airbus-GEDC Award for Diversity in Engineering

Editor's Note: This award was originally described on **pages 9-12 in Issue No. 20** of this newsletter.

AIRBUS

Press Release

Japanese Project wins Airbus Award for Diversity in Engineering
Fifth edition of UNESCO-backed Award is announced at global engineering deans' conference in Canada

Toulouse, 12th October 2017: Airbus, the worldwide leader in aeronautics, space and related services and the Global Engineering Deans Council (GEDC), the leading global organisation for engineering education, have announced the recipient of the 2017 GEDC Airbus Diversity Award. Japan's Kyushu Institute of Technology's BIRDS Satellite Project was selected, with the Schulich School of Engineering: Discover Engineering Programme at Canada's University of Calgary and the Women in Engineering (WIE) Programme at the University of New South Wales in Australia as runners up.

Now in its 5th edition, the Award was developed and funded by Airbus in partnership with the GEDC, and this year was granted UNESCO patronage. It aims to shine a light on successful projects which have encouraged more people of all profiles and backgrounds to study and succeed in engineering. Diversity has become an increasingly prominent metric for business success, with 69% of executives rating diversity and inclusion an important issue in 2017, up from 59% in 2014.*

"Diversity is a cornerstone of our business and an indispensable component for our continued success," said Jean-Brice Dumont, upcoming Executive Vice President (EVP) of Engineering Airbus Commercial Aircraft, member of Airbus' Diversity and Inclusion Steering Board, and Patron of the Award. Diversity is not just important; it's part of Airbus' DNA. We are committed to further encouraging and enabling all types of diversity to maintain a high level of innovation in our industry. Our partnership with the GEDC is one illustration of this commitment, as we work together to identify successful projects like the one that has just been awarded to develop our next generation of diverse global engineers."

The 2017 GEDC Airbus Diversity Award recipient, BIRDS Satellite Project, trains graduate students from developing countries in using cost-effective innovative systems engineering to execute a comprehensive two-year satellite project, with the long-term goal of equipping them to commence a sustainable space programme in their respective home countries.

Taiwo Tejumola from the Kyushu Institute of Technology, presented the project to a Jury** of industry experts and distinguished guests, as well as 200 international engineering education leaders gathered for the 2017 GEDC Conference in Niagara Falls, Canada. The three finalist projects were evaluated on the basis of the impact of their work, evidence of generating results and the possibility to be scaled-up. The winning project was awarded US\$ 10,000, and the runners up US\$ 1,500.

Speaking at the Award Ceremony, Taiwo said that "The BIRDS Project team at the Kyushu Institute of Technology, Japan appreciates this recognition. Our collaborative programme provides a unique opportunity for young engineers to compete in today's global market, teaching specialised waste-minimising systems engineering models, developing core skills and building a supportive peer network. The project also creates a sustainable pathway for participants to implement training initiatives in their home countries, further contributing to the diversification and globalisation of engineering skills".

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Press Release

"One of the Award criteria is for projects with the potential to be successfully replicated in other institutions and countries. All three of our 2017 finalist projects have made a significant impact in increasing the diversity of students pursuing engineering studies, and my hope is that my fellow GEDC members will be inspired to initiate similar projects in their home institutions and in their countries," said Peter Kilpatrick, McCloskey Dean of Engineering at the University of Notre Dame, USA, and Chairperson of the GEDC.

For the 2017 edition, 45 projects were submitted, from 18 countries and 39 institutions.

Media contacts :

Anne Galabert: +33 (0)561931000 email: info@gedcairbusdiversityaward.com

More information is available at: www.company.airbus.com/diversityaward

Pictures available on: <http://www.airbus.com/newsroom.html>

Facebook: <https://www.facebook.com/AirbusCareers/>

About Airbus

Airbus is a global leader in aeronautics, space and related services. In 2016, it generated revenues of € 67 billion and employed a workforce of around 134,000. Airbus offers the most comprehensive range of passenger airliners from 100 to more than 600 seats. Airbus is also a European leader providing tanker, combat, transport and mission aircraft, as well as Europe's number one space enterprise and the world's second largest space business. In helicopters, Airbus provides the most efficient civil and military rotorcraft solutions worldwide.

Airbus is a corporate member of the GEDC (Global Engineering Deans Council), a leading global organisation whose members are individuals responsible for setting the agenda for higher education in engineering in their countries and universities. Since 2017, GEDC Airbus Diversity Award is under UNESCO patronage.

One of the award's criteria is how well the project can be replicated in other institutions and countries. *Editor.*

Notes to editors

2017 GEDC AIRBUS DIVERSITY AWARD RUNNER UP PROJECTS

Project Title: UNSW Women in Engineering (WIE) Programme

Project Representative: Alex Bannigan, Women in Engineering Manager

Organisation: University of New South Wales, Australia

The Women in Engineering (WIE) Programme aims to break down barriers and raise awareness of Engineering opportunities for women; improving recruitment and retention of female engineers through outreach, scholarships and opportunities at all academic levels, from school student to professional engineers. The programme delivers a comprehensive range of workshops and activities targeted at changing the image of engineering among female students, parents, employers, and teachers. Also focussed at raising awareness amongst industry, and helping companies achieve their diversity goals and transformations. Alumni and industry partners are engaged as speakers, mentors and sponsors. The project's mission is to address gender imbalance and create a strong community of support and guidance for engineering students at a national level.

Project Title: The Schulich School of Engineering: Discover Engineering Programme

Project Representative: Qiao Sun, Associate Dean (Diversity & Equity)

Organisation: The Schulich School of Engineering at the University of Calgary, Canada

Discover Engineering is a teaching initiative used to introduce secondary level students to engineering. 25 trained student facilitators, primarily from underrepresented groups themselves, lead engineering career workshops for Grade 11 and 12 students. The programme's goal is to increase the diversity of future University of Calgary

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Continued on the next page.



Press Release

students; helping students to develop a deeper understanding of engineering, introducing them to the wide range of career paths, and demonstrating how engineers solve problems in society.

*SOURCE : Deloitte, Human Capital Trends, 2017

**GEDC AIRBUS 2017 JURY

- **Jean-Brice Dumont**, upcoming Executive Vice President Engineering at Airbus Commercial Aircraft, member of Airbus' Diversity and Inclusion Steering Board, and Patron of the Award
- **Peter Kilpatrick**, Matthew H. McCloskey Dean of Engineering, University of Notre Dame, USA and GEDC Chair
- **Marie Paule Roudil**, Director of the UNESCO Liaison Office, New York
- **Tania Bueno**, Chair of the Scientific Council - Research - Electronic Government Institute - i3G, Brazil and GEDC Member
- **Hélène Séguinotte**, ICD.D., Corporate Director
- **Prof. Theo Andrew**, Executive Dean, Durban University of Technology, South Africa and GEDC Executive Member

Diversity

Diversity is the inclusion of individuals that represent variations in gender, ethnic background, disability, sexual orientation, age, socio-economic status, nationality and other non-visible differences resulting in an environment rich in intellectual variety and respect for the individual, and optimally suited to address the technological, business and societal needs of the future.

(Source, American Society of Engineering Education and Airbus)

End of Press Release by Airbus

More here: <https://www.facebook.com/AirbusCareers/>



Taiwo during a presentation rehearsal on 5-Sept-2017.

Venue: LaSEINE Summer Camp in Oita Prefecture.

合宿の発表練習



Airbus Careers @AirbusCareers · 1h

Congratulations to BIRDS Satellite Project @kyutech, Japan - #DiversityAward2017 winner at #GEDC2017! #EmbraceDiversity



Taiwo delivers his presentation near Toronto, Canada, on 10 October 2017.

Continued on the next page.



Continued on the next page.





Rejoice

(嬉しがる、喜ぶ、祝う)



Continued on the next page.

For more information about the Diversity Award (given to the BIRDS Project of Kyutech)

In Japanese:

<http://www.sankeibiz.jp/business/news/171013/prl1710131411100-n1.htm>

<http://flyteam.jp/news/article/85383>

<https://prw.kyodonews.jp/opn/release/201710136819/>

In English:

Perform a Google Search on “Diversity award BIRDS” or “Diversity award Kyushu”.

Lots will show up.



TravelNewsAsia

Project from Japan's Kyushu Institute of Technology
Wins 2017 GEDC Airbus Diversity Award

Fri, 13 Oct 2017

Japan's Kyushu Institute of Technology's BIRDS Satellite Project has been selected as the winner of the 2017 Global Engineering Deans Council (GEDC) Airbus Diversity Award.

The runners up are the Schulich School of Engineering: Discover Engineering Programme at Canada's University of Calgary and the Women in Engineering (WIE) Programme at the University of New South Wales in Australia.

This year, 45 projects were submitted from 18 countries and 39 institutions.

Now in its 5th edition, the award was developed and funded by Airbus in partnership with the GEDC, and this year was granted UNESCO patronage. It aims to shine a light on successful projects which have encouraged more people of all profiles and backgrounds to study and succeed in engineering. Diversity has become an increasingly prominent metric for business success, with 69% of executives rating diversity and inclusion an important issue in 2017, up from 59% in 2014<http://www.asiatraveltips.com/news17/1310-KyushuInstitute.shtml>

Continued on the next page.



Accessed on 16 October 2017

Home Page of Kyutech

www.kyutech.ac.jp/english/

Maps & Directions

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Language



Text Size

small

Large

About Kyutech

Academics & Research

Admissions

Campus Life

International Exchange

University Library & Facilities



Continued on the next page.





Taiwo presents the GEDC Airbus Diversity Award to Professor Cho on 16 October 2017.

Nice job, Taiwo !

Continued on the next page.



Video link provided by the organizers of the award ceremony

<http://hosting.epresence.tv/livemedia/160/Watch/1037.aspx>

It is about 30 minutes long, and the video is well made. You can see a lot of Taiwo, the Project Manager of BIRDS-1.

End of section on GEDC Airbus Diversity Award

15. Friday, 13 Oct. 2017: Activities of BIRDS-3 team



Team enjoys lunch together at Kyutech student cafeteria – this team has team spirit !

- all photos on this page from Abhas



PCB Design Workshop I:
The workshop gave an overview of Eagle CAD for PCB Design.

[There will be a more hands on training in the next session]



16. In support of BIRDS and other space activities, UiTM opens “Center for Satellite Communication” on 10 August 2017

All of the following text and photos were furnished by Dr Mohamad Huzaimy Jusoh.

Center for Satellite Communication (UiTMSAT) launched at UiTM Shah Alam on August 10th, 2017. The launching event taken place at the Dewan Kuliah C, Fakulti Kejuruteraan Elektrik, UiTM Shah Alam and was inaugurated by The Honorable Tan Sri Dato’ Academician Ir. Dr. Ahmad Zaidee Bin Laidin, FASc, Chairman of the Board of Directors of UiTM.

Leading the Center is Assoc Prof Ir Dr Mohamad Huzaimy Jusoh as Director and Assoc Prof Dr Norsuzila Ya’acob is appointed as Deputy Director. Dr Siti Amalina Enche Ab Rahim, UiTM is the Center’s Coordinator. It consists of five (5) PhD students and five (5) Msc students; including one PhD student **Mrs Syazana Basyirah Mohammad Zaki** and one Msc student **Mr Muhammad Hasif Azami** who were sent to Kyushu Institute of Technology, Japan (Kyutech) since December 2016.

Continued on the next page.





This Center has collaboration locally and internationally such as Angkasa (National Space Agency) and Kyutech, Japan. As such, with Japan, Bhutan and Philippines, in a program called Joint Global Multi-nation BIRDS-2 Project, two UiTM students together with another eight students; three (3) from Japan, two (2) from Philippines, three (3) from Bhutan; are developing and testing three Nanosatellites (one satellite per country: Malaysia, Philippines and Bhutan). The activity centered at Laboratory of Spacecraft Environmental Interaction Engineering (LaSEINE) Kyushu Institute of Technology (Kyutech). “UiTMSAT-1” is chosen as codename for Malaysia’s Team Nano-satellite.



Center for Satellite Communication is established as to provide support on administrative and management of UiTMSAT-1; which is also the first Nano-satellite for Malaysian University. In preparation for the Nanosatellite launching, UiTM has arranged for Ground Station installation which will be completed latest by the end of 2017. Currently under development above the rooftop of Menara 2 Fakulti Kejuruteraan Elektrik. Two Yagi antennas (VHF & UHF) will be installed, and added with one VHF Satellite Antenna for polar orbiter satellites. The control room is directly below the rooftop and for remotely operation will be based at the center itself.

Continued on the next page.



**End of report from
UiTM – many thanks
to Dr Huzaimy for
sending it in.**



17. World Space Week (WSW) celebrated at Kyutech

AN EXHIBITION WORLD SPACE WEEK 2017



11TH OCTOBER 2017

AT NAKAMURA CENTENARY MEMORIAL HALL

ORGANISED BY

YESHEY CHODEN

KYUSHU INSTITUTE OF TECHNOLOGY

[This report was written by Y. Choden]



World Space Week

The largest public space event on Earth



An exhibition showcasing some of the on-going satellite projects at Kyutech was organized for 2017 WSW





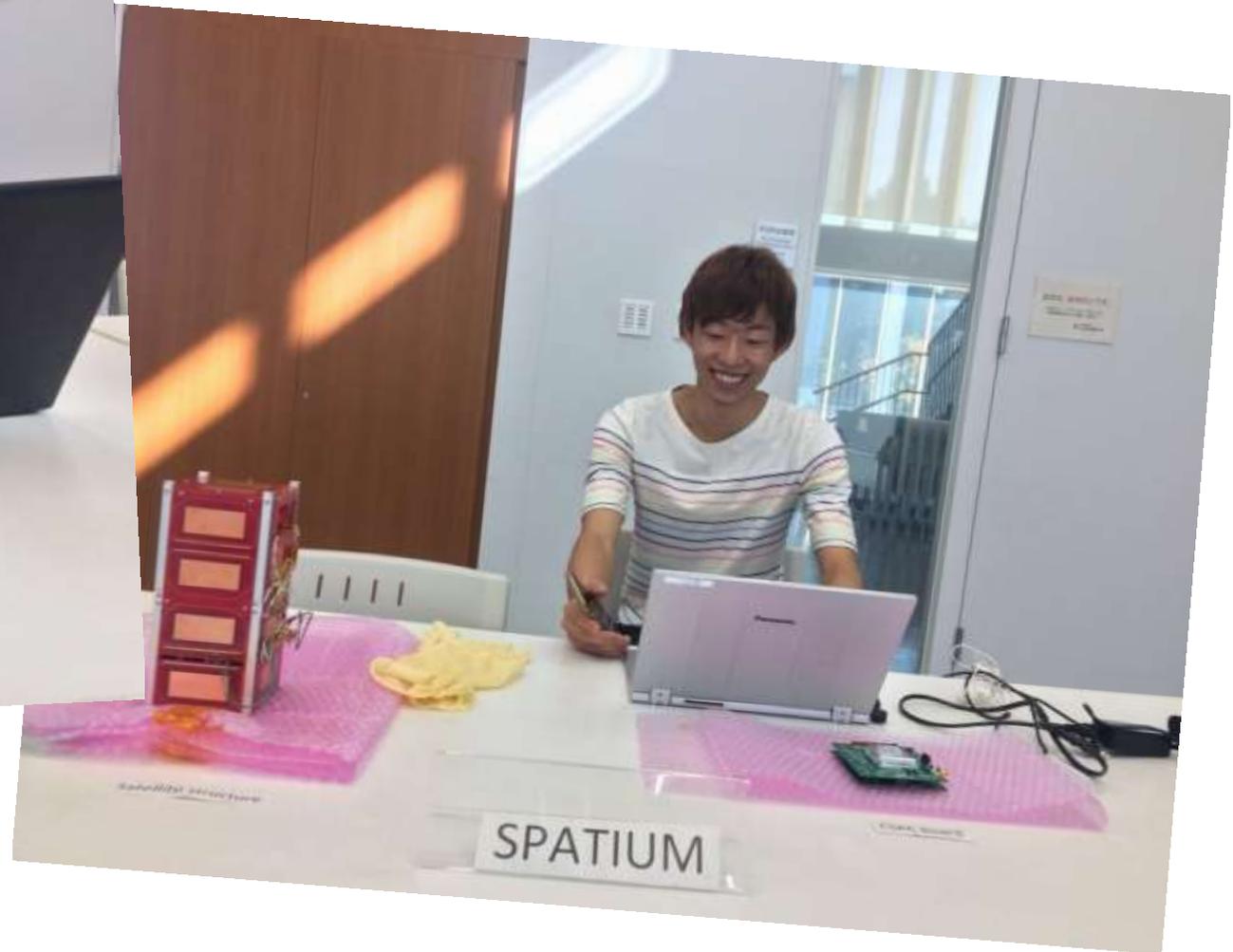
Four satellite projects took part in the exhibition:

BIRDS-2

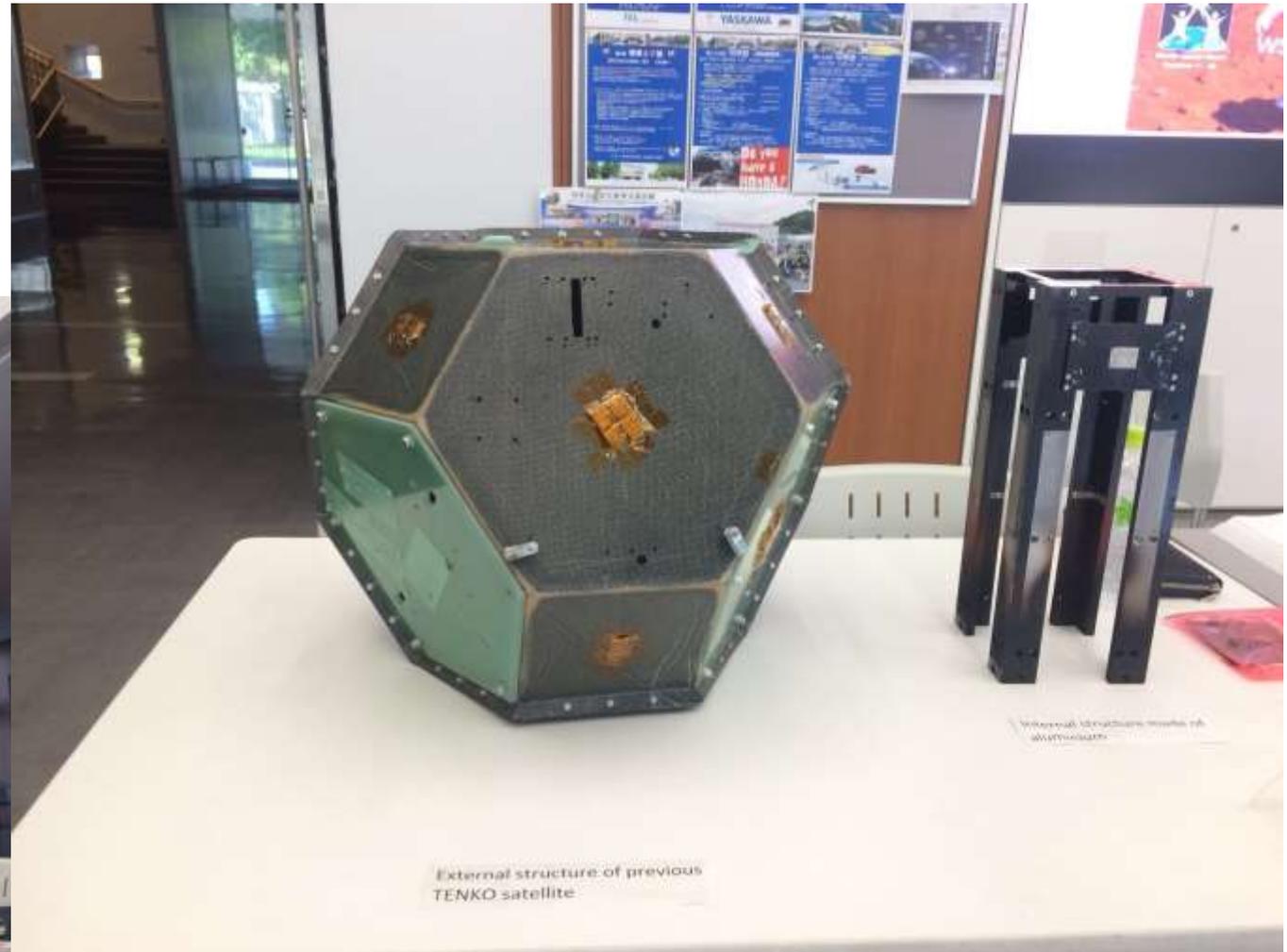
TEN-KOH

AOBA VELOX III

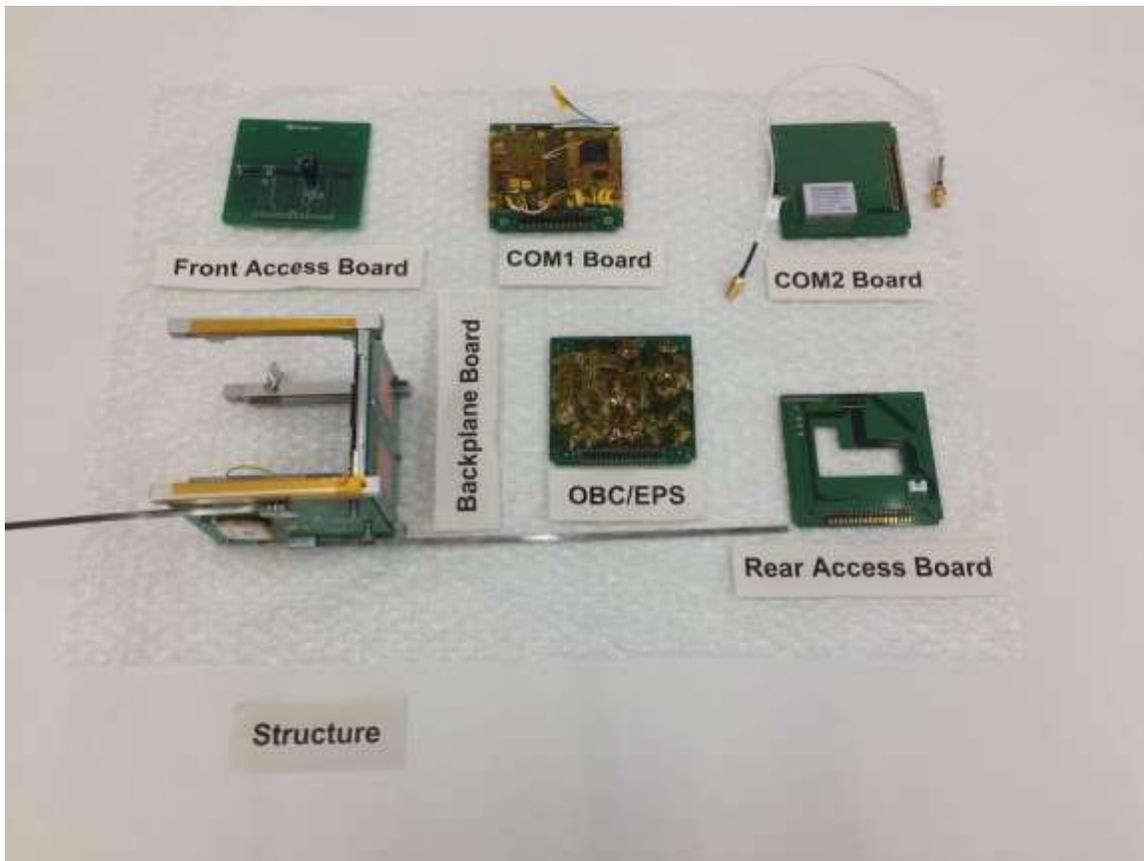
SPATIUM



Project representatives exhibiting hardware and software of their respective projects



Project TEN-KOH's external and internal structure on display



BIRDS-2 EM structure and boards on display



END OF WSW REPORT

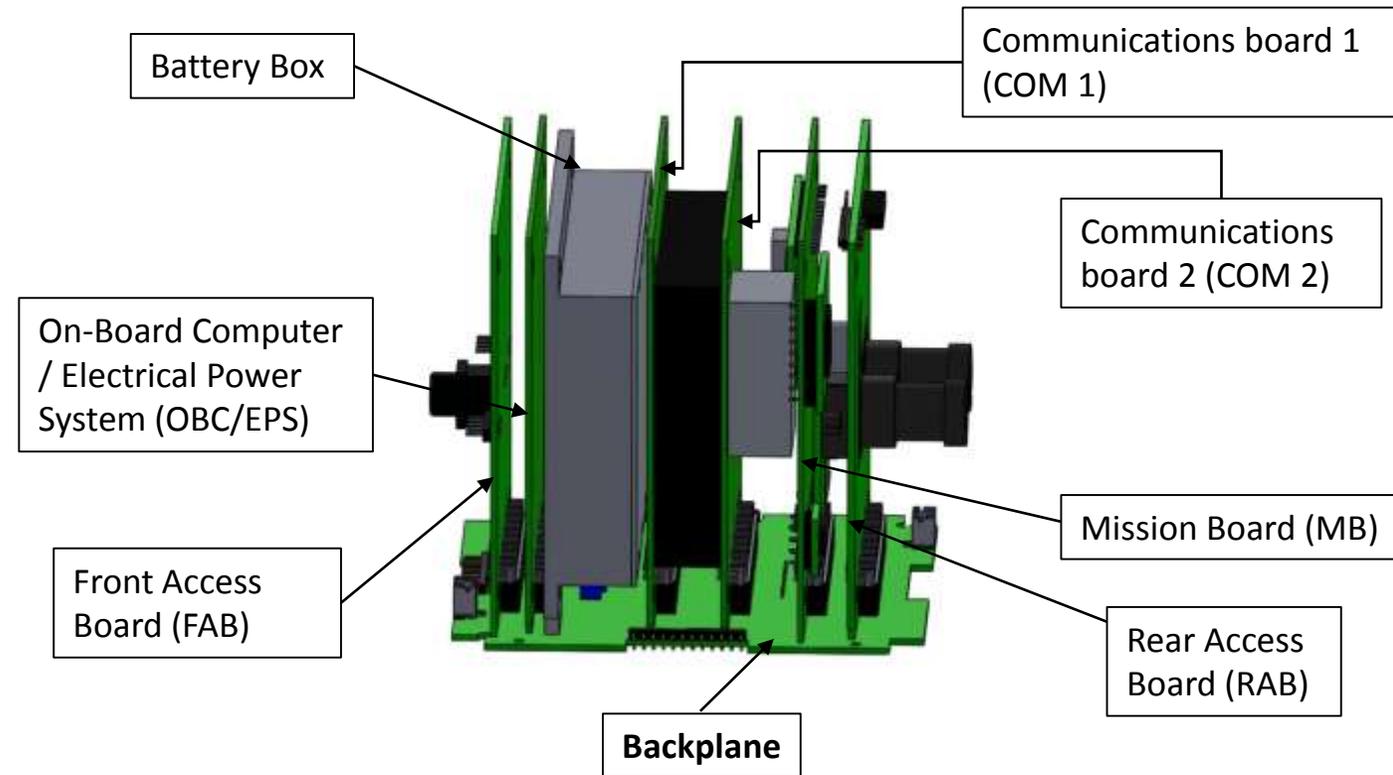
BIRDS-2 BUS SYSTEM

Pictures Courtesy of Tomoki Uemura, BIRDS-2

Article by Kiran Kumar Pradhan, BIRDS-2, 16 Oct. 2017

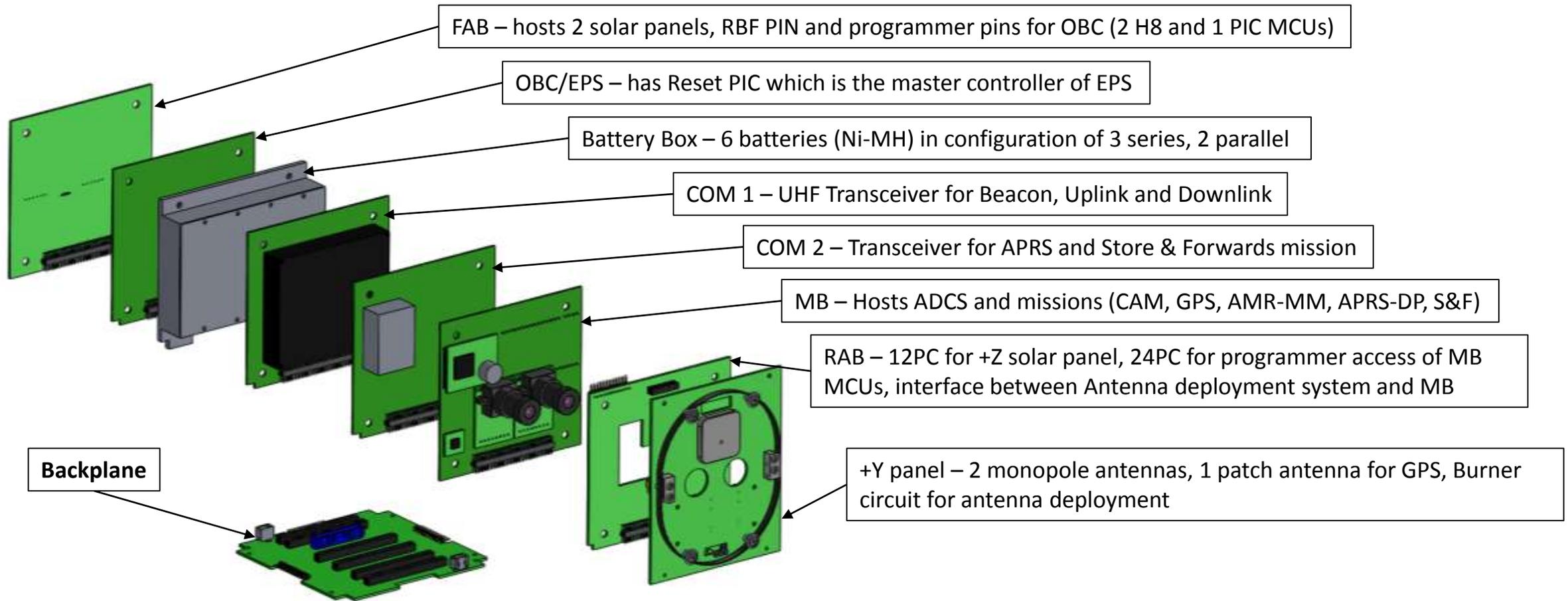
Overview

- The bus architecture of the BIRDS project is based on the University of Wolfsburg CubeSat UWE3.
- Consists of one motherboard called the “backplane”.
- All other boards are mounted on the backplane.



Pic: Internal Boards configuration of BIRDS-2 EM-2

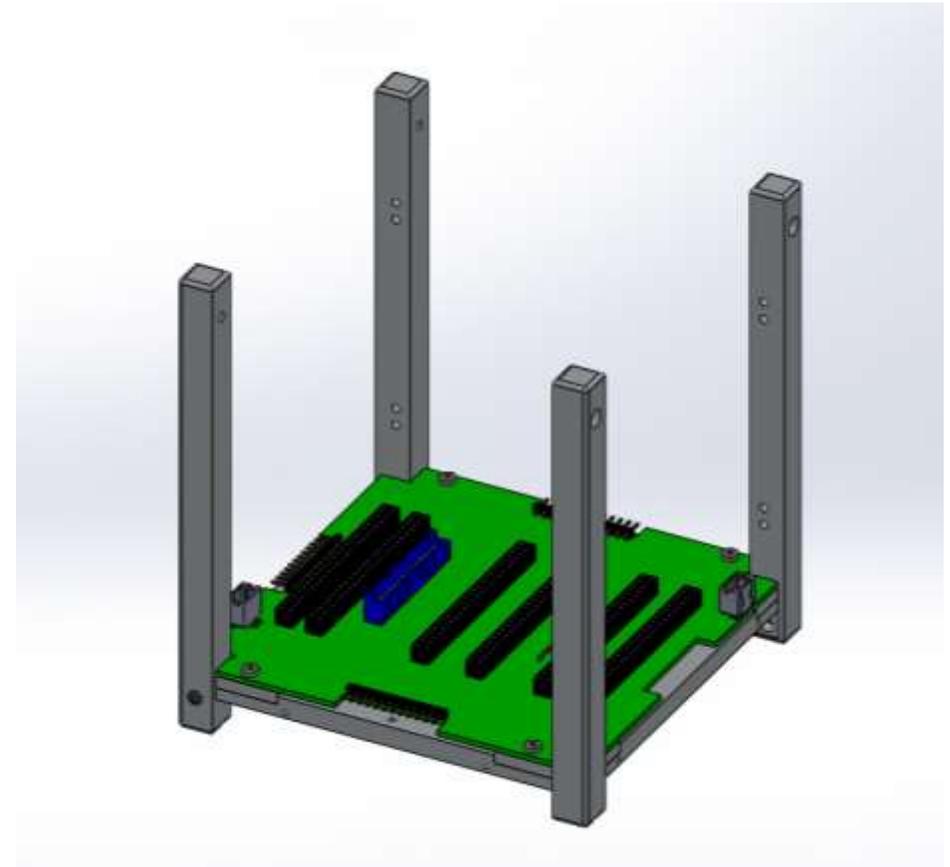
BIRDS-2 boards layout (exploded view)



Pic: BIRDS-2 Boards arrangement

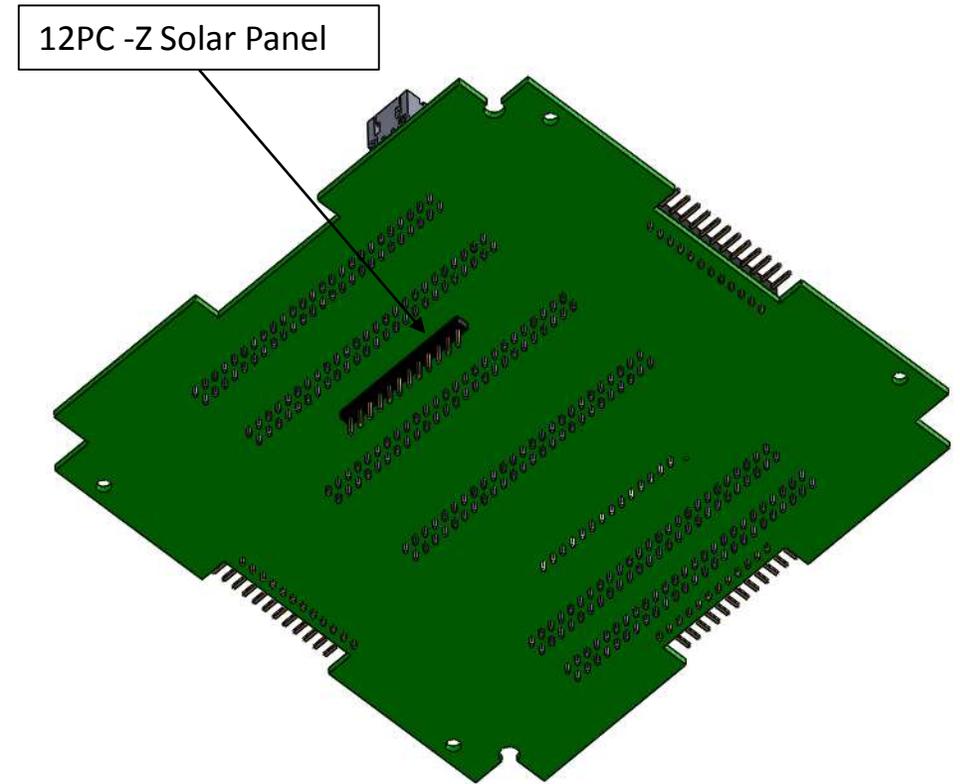
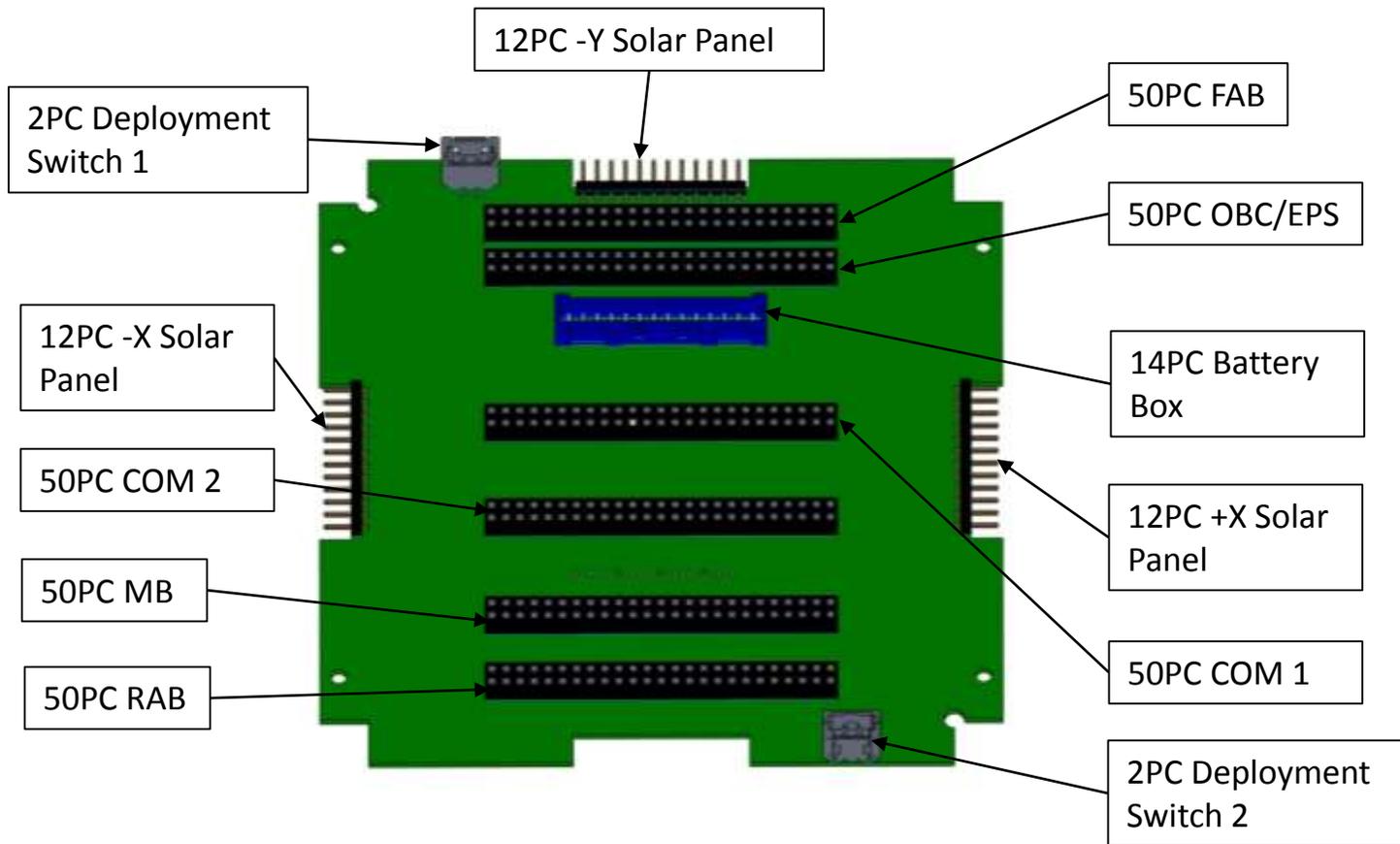
Backplane

- The backplane is mounted at the base of a 1U CubeSat Structure (fig.2).
- Connectors:
 - 6 → 50 pin connectors (50PC) for other boards
 - 1 → 14 pin connector (14PC) for battery box
 - 2 → 2 pin connectors (2PC) for deployment switch
 - 4 → 12 pin connectors (12PC) for solar panel boards
- 3 Analog to Digital Converters (ADCs)
 - 1 connected to OBC subsystem
 - 2 connected to ADCS subsystem



Pic: Backplane mounted with the structure frame

Backplane Board

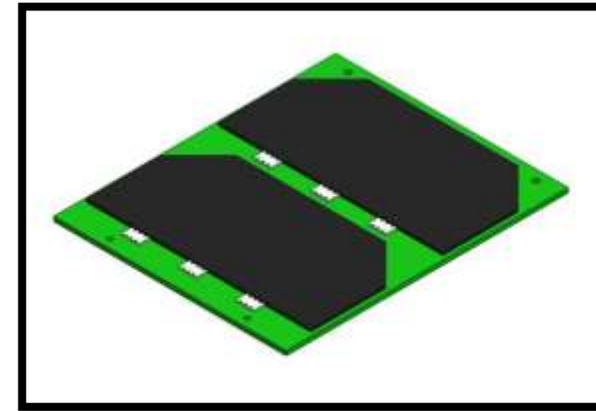


Pic: Interface configuration of Backplane board

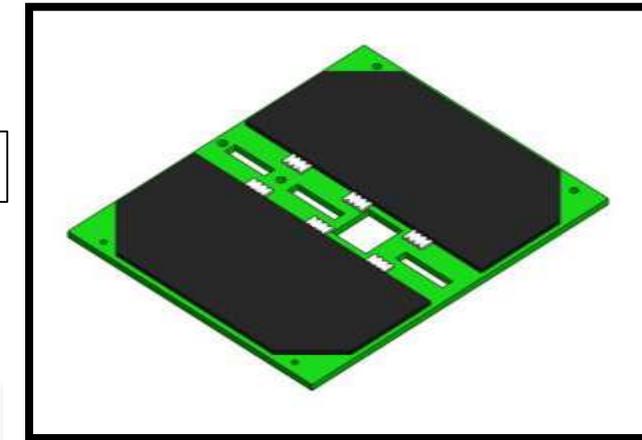
Note: The 12PC for +Z Solar Panel is located on the RAB

Electrical Power System

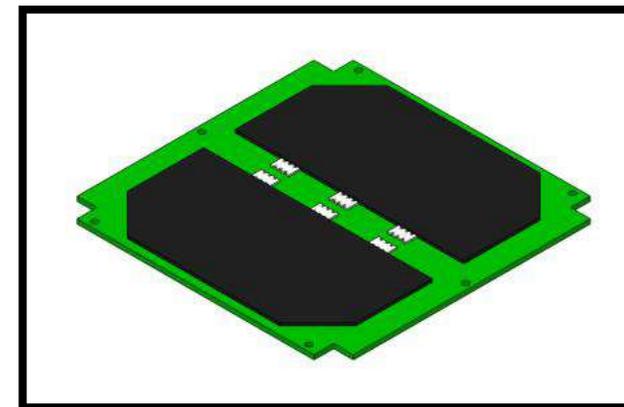
Sl. No	Power Source	Type	Details
1	Primary	Solar Cells	2 on + X
			2 on - X
			2 on +Z
			2 on - Z
			2 on - Y
2	Secondary	Battery (rechargeable)	3 cell in series 2 packs in parallel



Pic: +X and -X panel



Pic: -Y panel



Pic: +Z and -Z panel

Note: Maximum supply voltage from EPS to the Load (CubeSat sub-systems) is 4.2 V

End of Bus Article



BIRDS-2 GPS Mission

- Mission Objective is to use the GPS COTS for technology demonstration for BIRDS-2 cubesat.
- The Success of proven GPS chip for space application which is low power, cheap, small, COTS and reliable will benefit by future cube satellite development.

Prepared by:
Joven C. Javier

BIRDS-2 GPS Mission

The Objective of this Mission for the BIRDS-2 Cubesat is to demonstrate the use of the GPS COTS (Commercial of the Shelf) component which is low cost and low power consumption and compatible in a size when it comes to cubesat which compared to the usual GPS used in Space application.

Some Detail Specs.

- Cost = \$99.00
- Size = 10mm x 10mm x 1.3mm
- Weight = 0.3 g
- Tracking = 16mA (52.8mW)
- Acquisition (4 satellites) = 23mA (75.9mW)
- Main Supply voltage = 3.3 V
- Operating Temperature -40 C to 80 C

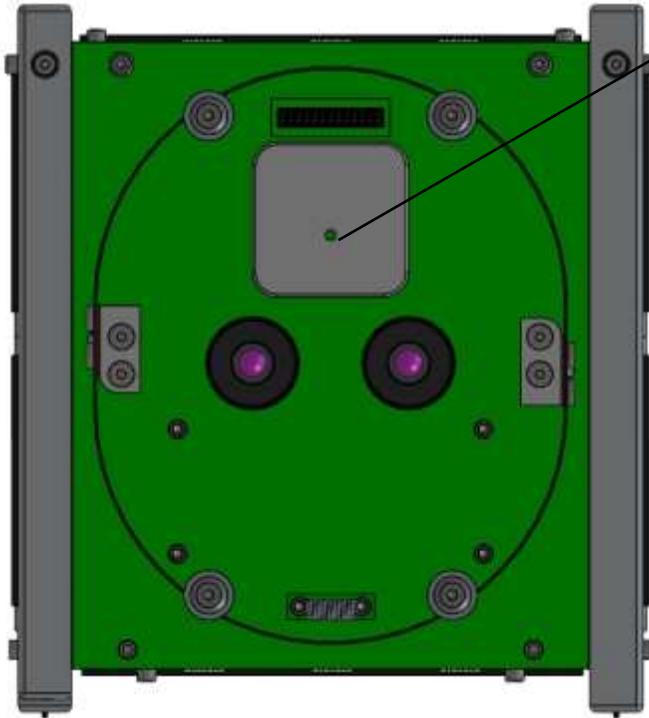


Venus838FLPx-L GPS Chip

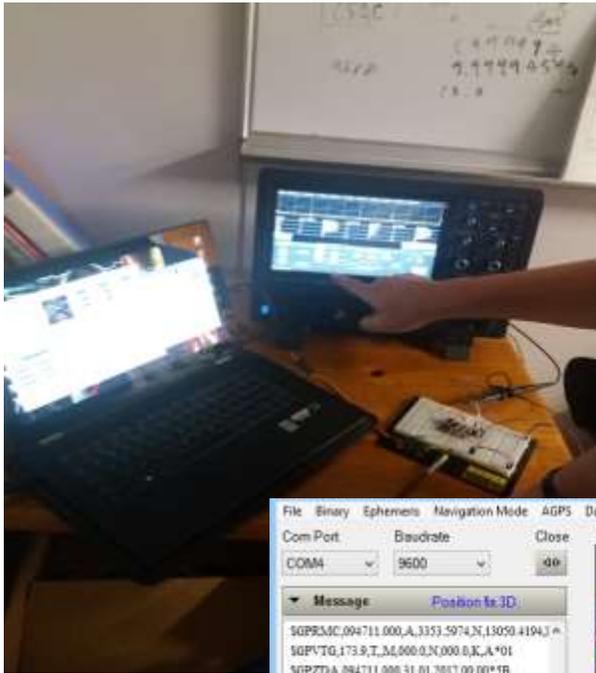
- It is a normal GPS ground used but firmware modified so that doppler shift is compensated when use in space mobility and signal can lock at the speed of around 7 km/s tested at the University of Tokyo.
- BIRDS-2 team also put this test on radiation environment by means of TID (Total Ionization Dose) at the Kyushu University

GPS Antenna Location

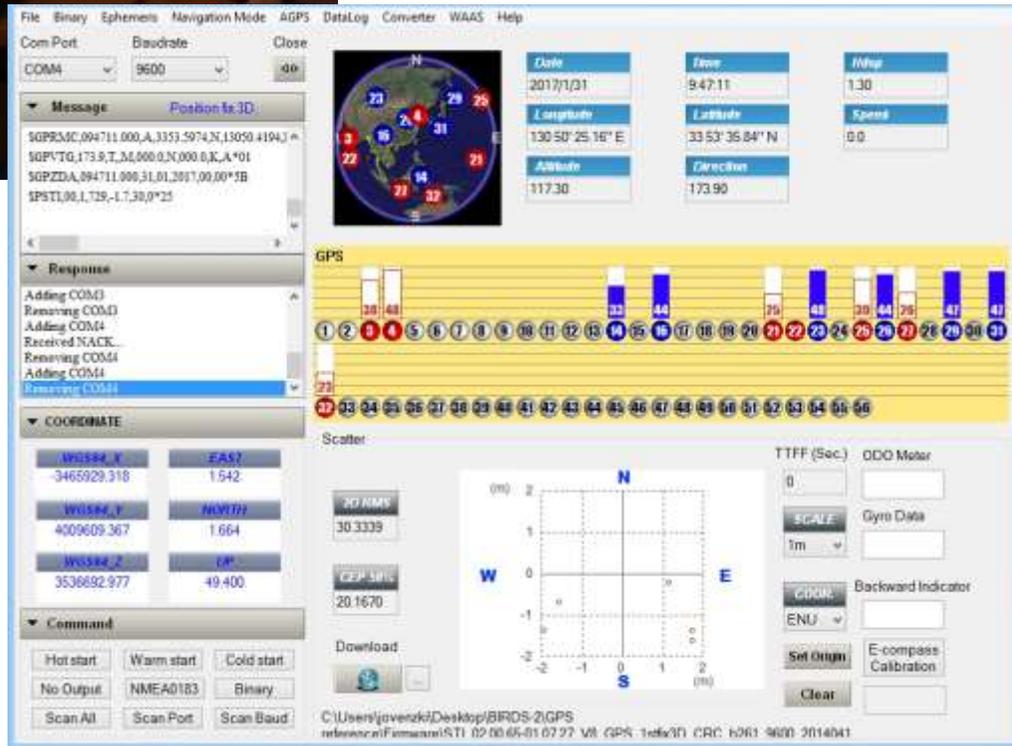
GPS Patch Antenna



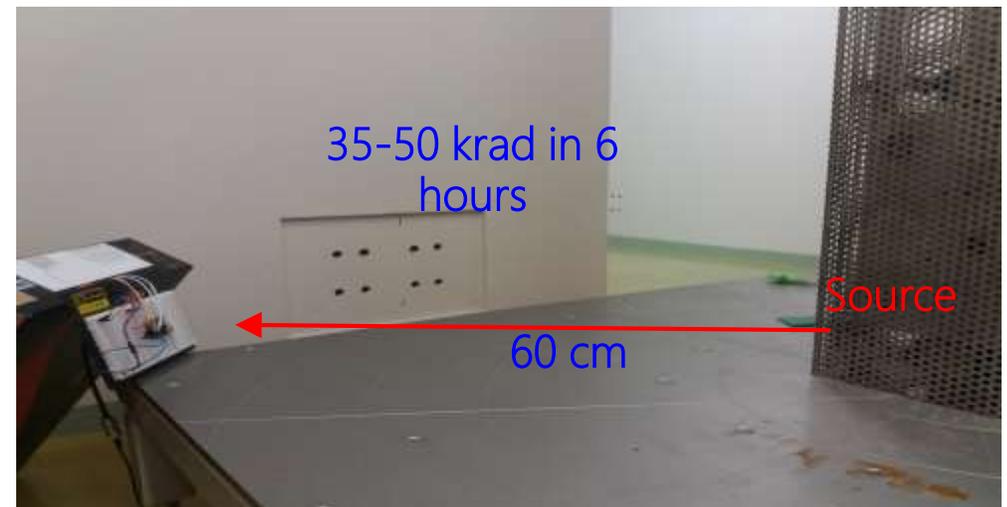
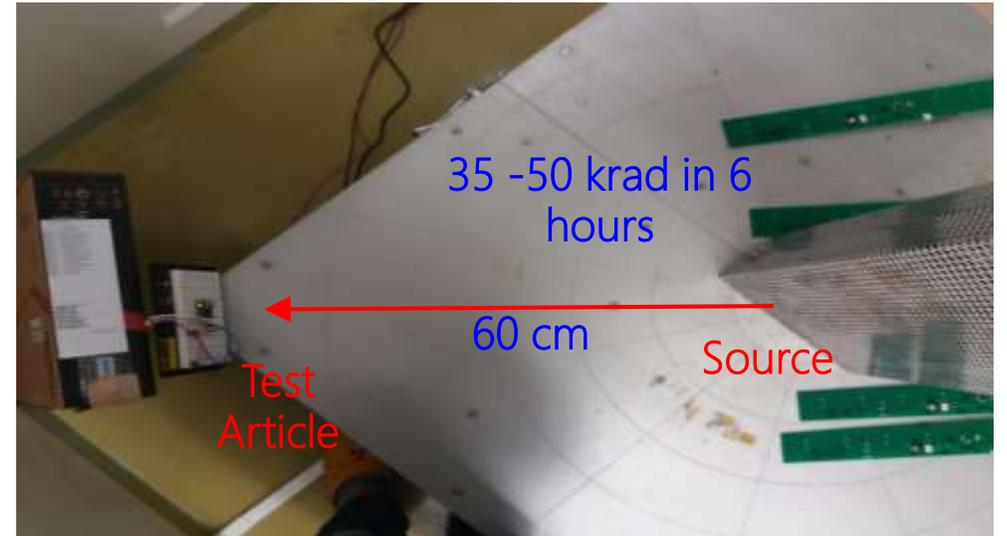
Range Of Receiving Frequency	1575.42MHz ± 1.023MHz	
Center Frequency	1580MHz ± 3MHz	With 65.8×51.8 mm GND Plane
Bandwidth	15 MHz min	Return Loss@-10dB
VSWR	1.5 max	Center Frequency
Gain at Zenith	+5.0 dBi typ.	
Gain at 10° Elevation	-1.0 dBi typ.	
Axial Ratio	3 typ.	
Polarization	RHCP	Right Hand Circular Polarization
Impedance	50 Ohm	
Frequency Temperature Coefficient (τ_f)	-40°C to +105°C	0 ± 20ppm / °C
Operating Temperature	-40°C to +105°C	



Functional Testing



TID Radiation Testing



20. Nepal signs BIRDS-3 CRA Application



NEPAL ACADEMY OF SCIENCE AND TECHNOLOGY
Science & Technology for National Development



Shown at the left:

Prof. Dr. Jiba Raj Pokharel

Vice-Chancellor of Nepal Academy of Science and Technology (NAST). He is signing the CRA Application.

What is NAST?

An independent wing of the government that looks after the advancement of science and technology in Nepal.

Place of signing?

Vice Chancellor's office at NAST, Lalitpur, Nepal.

Date of signing?

22 September 2017

Also present was:

Dr. Suresh Kumar Dhungel, Chief of Faculty of Technology

Progress of the Store-and-Forward (S&F) Mission of BIRDS-2

Contributors:

Adrian Salces (Kyutech, Japan; also from the Philippines),

Izrael Bautista (UPD, Philippines),

Nur Amirah Bt Azahari (UiTM, Malaysia)

Introduction

In **BIRDS Project Newsletter Issue No. 15** pages 72-81, I introduced the S&F mission of the 3-member 1U CubeSat constellation of the BIRDS-2 Project (one each from Bhutan, Malaysia and Philippines). I provided a brief background on the topic of S&F satellites then described the proposed idea of employing a CubeSat constellation as a low-cost data relay in a remote data collection system (RDCS). The BIRDS-2 constellation is a perfect opportunity to demonstrate this concept. Overall, the S&F mission aims to accomplish the following objectives:

- (1) By demonstrating a S&F Cubesat constellation-based RDCS, gain results, practical experience and engineering insights that may guide similar future missions;
- (2) Investigate communication and other technical challenges of such a system – including the impact of link budget on performance, “lean” implementations of ground sensor terminal and S&F payload, experiments on appropriate data format, multiple access scheme, data distribution, etc.; and
- (3) Collect data from ground sensor terminals deployed in remote sites in home countries using the experimental system.

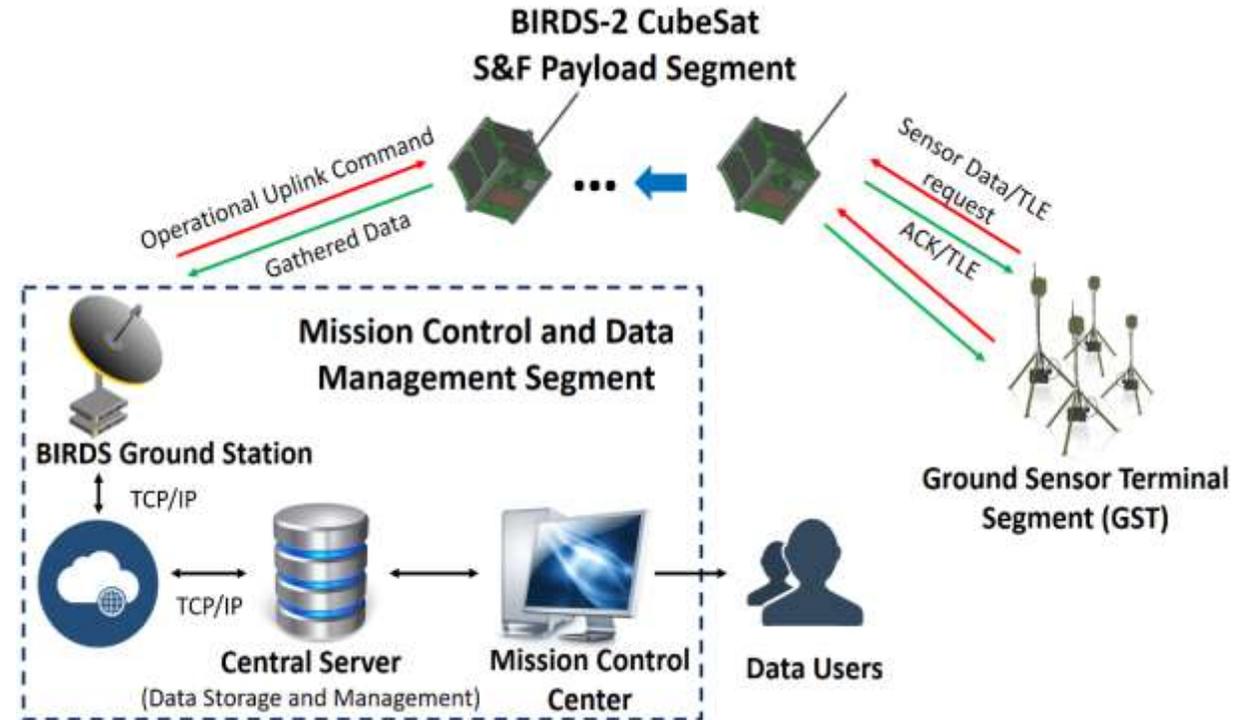
Stakeholders at the home countries, who are the intended users of the experimental RDCS, will choose a sensing parameter to monitor according to their desired application, build and deploy ground sensor terminals. The development of ground sensor terminals at the home countries is being done in parallel with that of the S&F payload and CubeSat at Kyutech. During the Critical Design Review held last July 2016, the plans and technical implementation details were discussed with the stakeholders, who provided us helpful feedback.

In this article, I will discuss the progress of the S&F mission, incorporating the reports from the GST developers (represented by the named contributors on the title page).



BIRDS-2 Remote Data Collection System Architecture

As shown in the figure, the BIRDS-2 S&F nanosatellite-based remote data collection system (RDCS) consists of three main segments: (1) Ground Sensor Terminal Segment (“GST”), (2) CubeSat-onboard S&F Payload Segment (“Payload”), and (3) Mission Control and Data Management Segment (“MCDM”). Each GST consists of one or more sensors, a microcontroller unit, a half-duplex VHF transceiver, an antenna with optional rotator (for satellite tracking) mounted on a mast, and a solar-battery power system for autonomous operation. The GSTs will be deployed to remote sites in home countries to monitor the chosen parameters such as magnetic field, river water level and soil humidity.



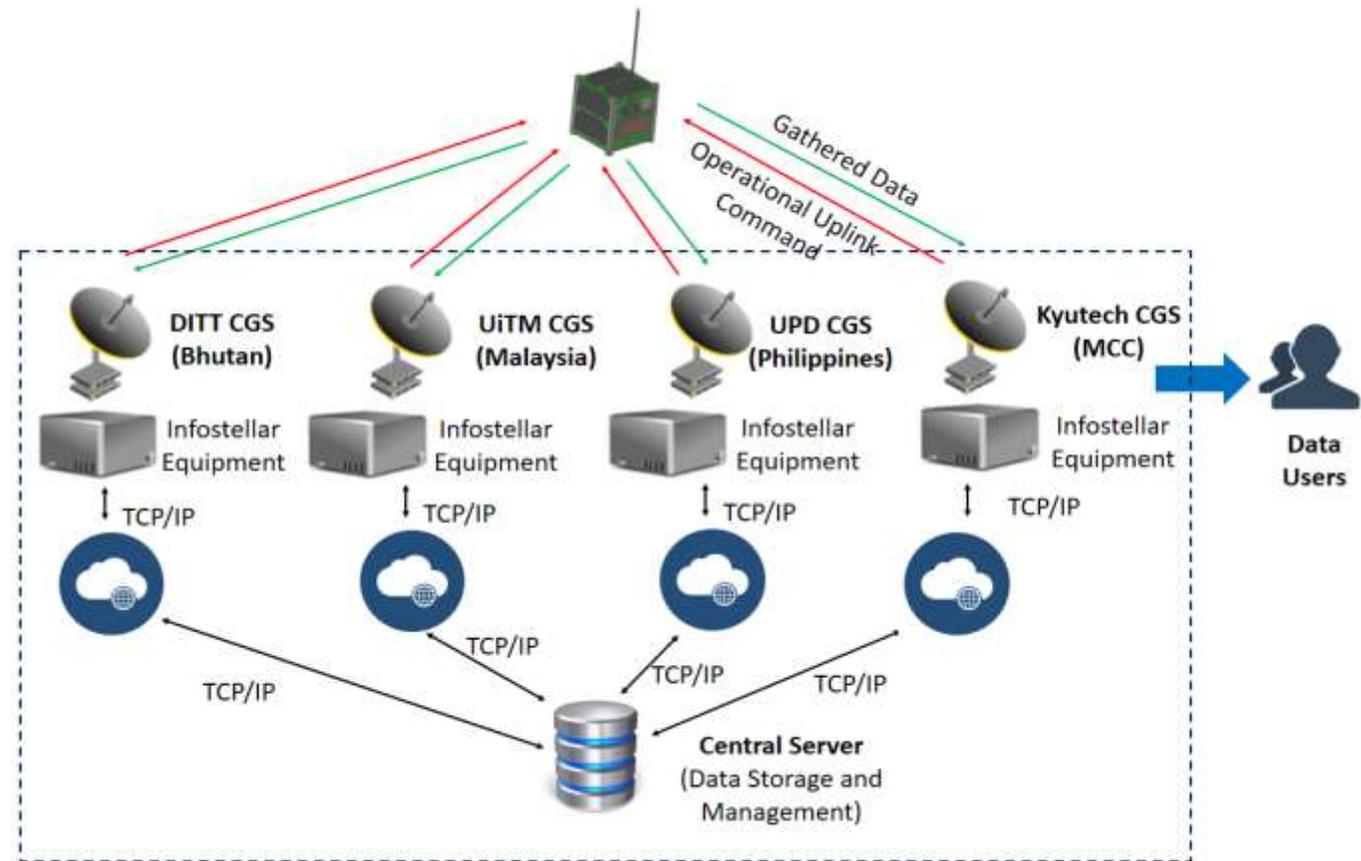
System architecture of BIRDS-2 S&F CubeSat constellation-based remote data collection system (RDCS)

In the “store” phase, the Payload receives data from any GST that transmits a packet during its pass and saves them in an onboard flash memory. In the “forward” phase, after an uplink command, gathered data are downloaded to the Mission Control Center (MCC) in Kyutech.

Mission Control and Data Management (MCDM) Segment

Downloaded data are transferred to a central server for future processing and distribution to users. The Mission Control and Data Management Segment (MCDM) handles the operation of the CubeSats and their Payloads, data download, storage, processing, and distribution to the users. By employing a three-member CubeSat constellation, the “store” (upload) data capacity will be thrice of the single CubeSat case. Also, by using a network of control ground stations, we can achieve more download flexibility and frequency in the “forward” phase.

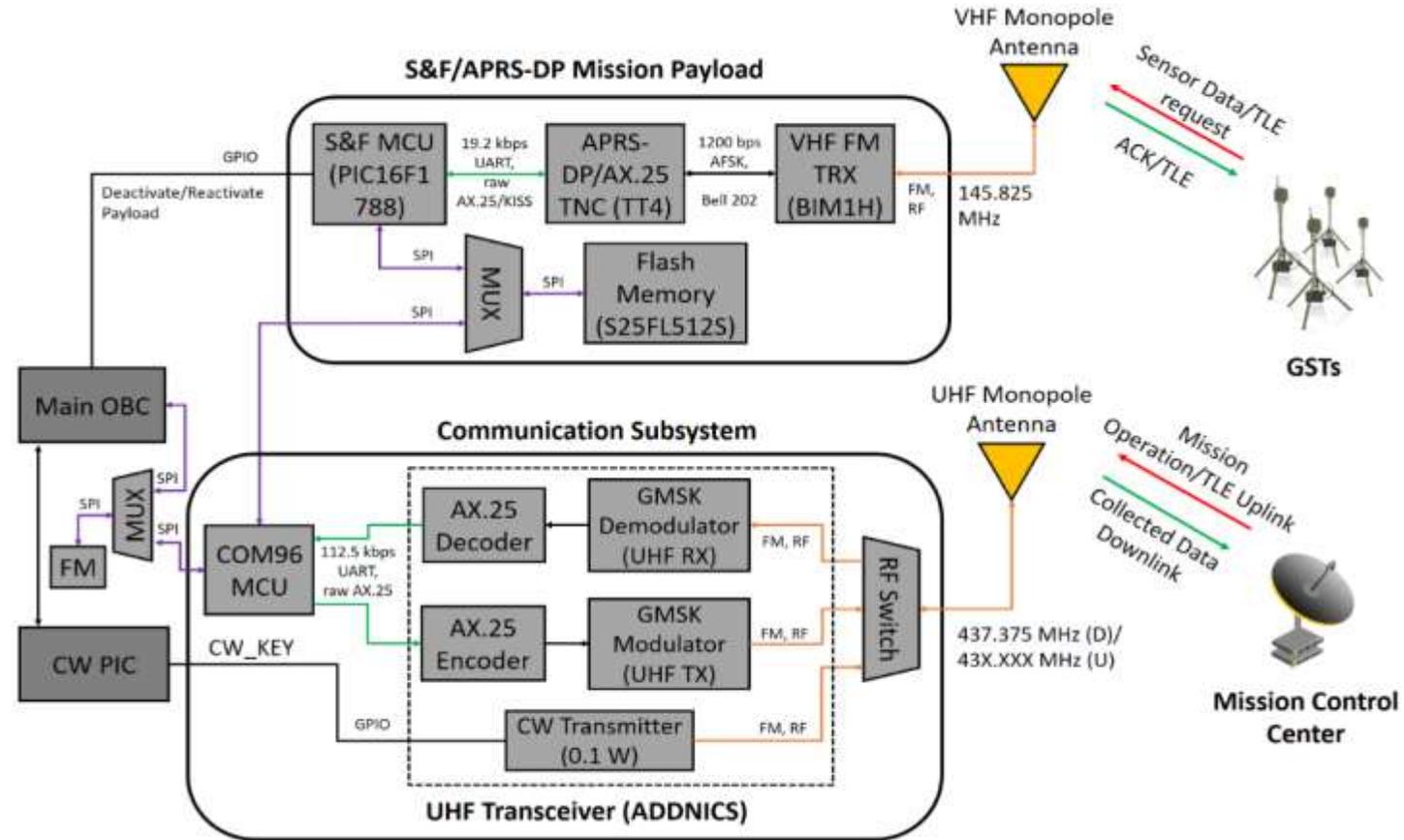
Using the same hardware as the S&F mission, we will also perform the APRS-DP (Automatic Packet/Position Reporting System Digipeater) mission to provide a messaging service to the amateur radio community.



Block diagram of the Mission Control and Data Management (MCDM) Segment

S&F Payload Segment

The implementation of the S&F/APRS-DP payload (or “Payload” for short) is shown in the figure. It is made by integrating individual COTS electronic components – including a 0.5 W VHF FM transceiver (Radiometrix’s BIM1H), a stand-alone APRS-DP/AX.25 TNC module (Byonics TT4), a microcontroller unit (“S&F MCU”, Microchip’s PIC16F1788), a multiplexer (ADI’s ADG774) and a 64-Mbyte flash memory (Cypress’ S25FL512S). Aside from having cheap prices, the components were selected based on size, power requirements and the ease of interfacing and programming. A deployable VHF monopole antenna (about 51 cm long) with nichrome wire burning mechanism is connected to the VHF transceiver.



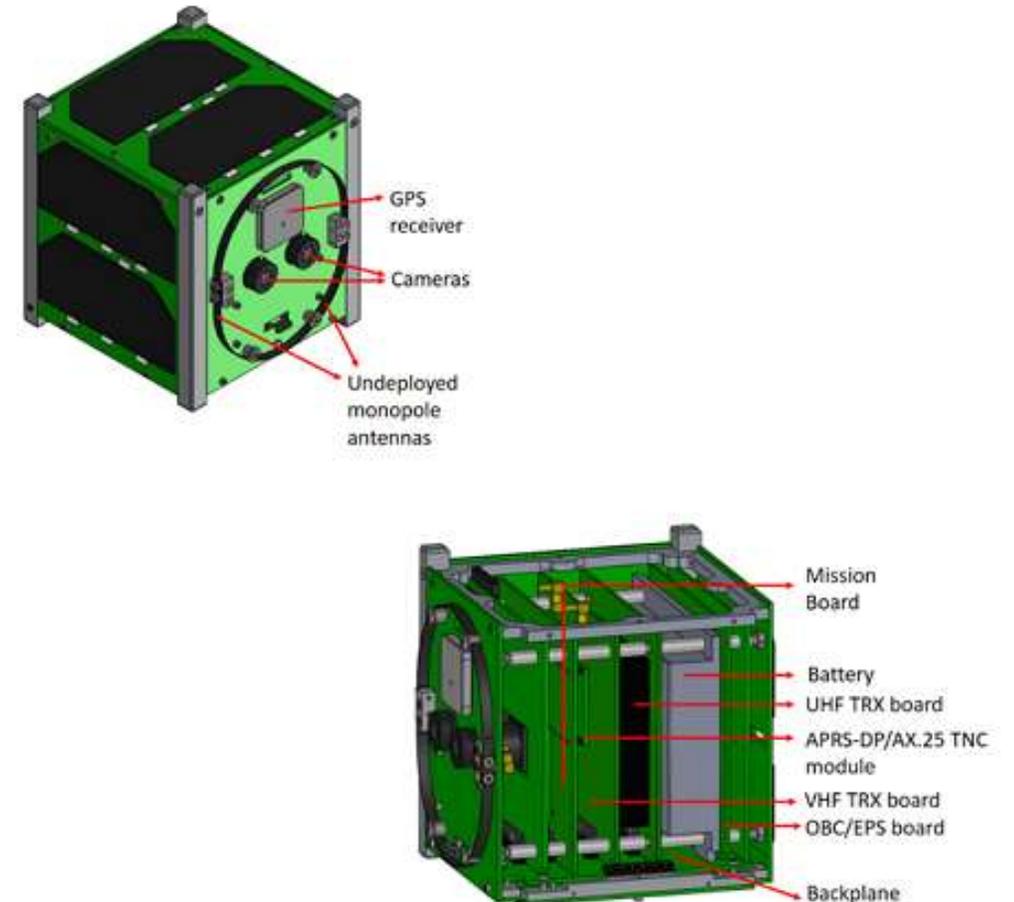
Block diagram of onboard S&F Mission Payload Segment and CubeSat’s Communication Subsystem

S&F Payload Segment with the BIRDS-2 CubeSat

The VHF transceiver has a transmit power of 0.5 W and operates at an RF frequency of 145.825 MHz for both uplink and downlink, in half-duplex mode. The use of a single frequency keeps the payload design simple and the cost minimal, so that other mission payloads and subsystems can still be accommodated even with the very limited space. The APRS-DP/AX.25 TNC module is a stand-alone device providing all necessary functionalities – digipeater, AX.25 terminal node controller (TNC) with KISS protocol support for UART communication between it and the S&F MCU, and a 1200 bps AFSK modem. Its original package is altered and soldered to the mission board using a customized adaptor board.

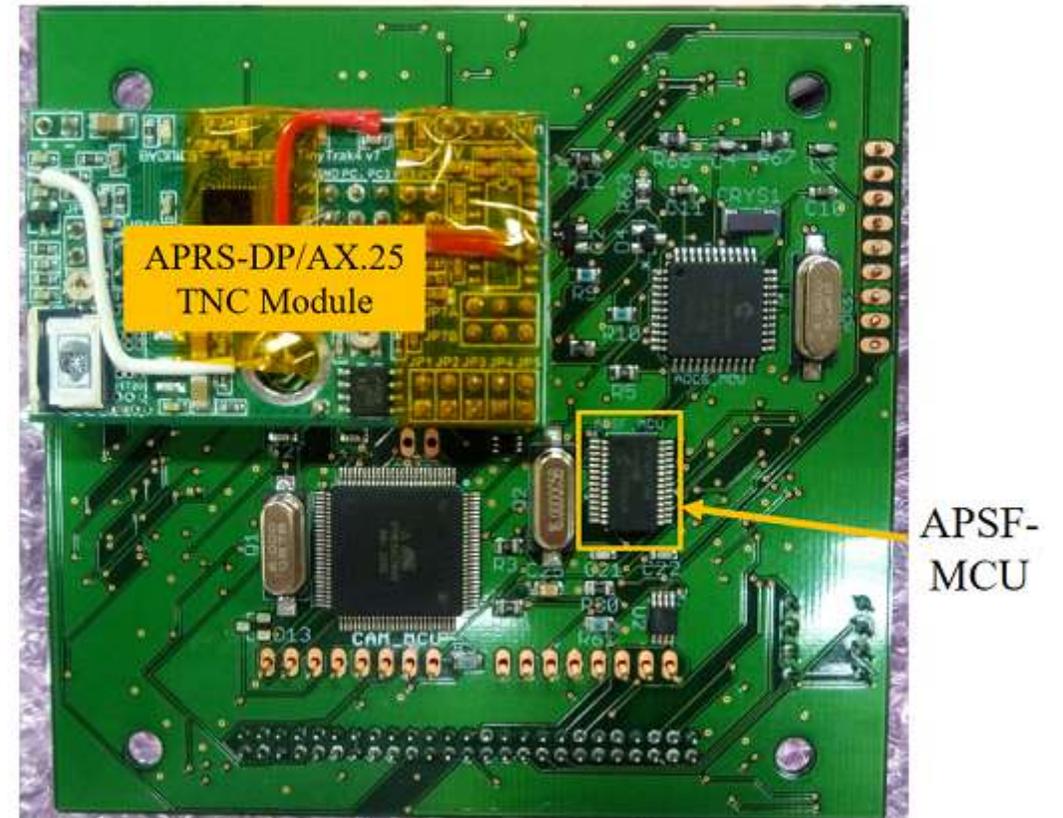
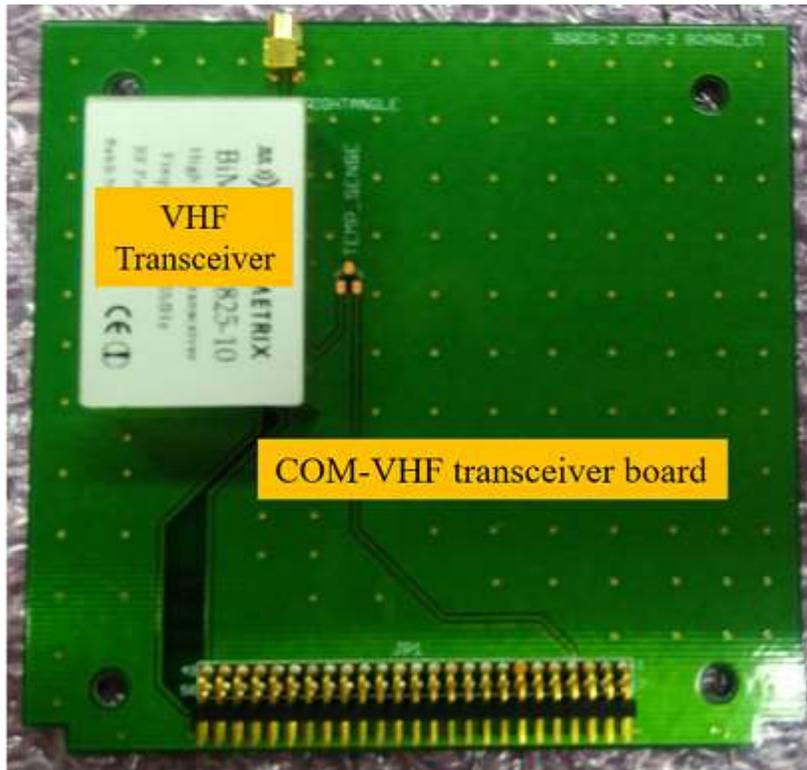
Whenever the Payload receives a valid data packet from any GST, it saves the data in the flash memory and automatically sends an acknowledgment (ACK) packet. As an added feature, it also broadcasts a packet bearing the satellite's updated TLE information whenever there such a request from a GST.

3D drawing of the BIRDS-2 CubeSat EM-2



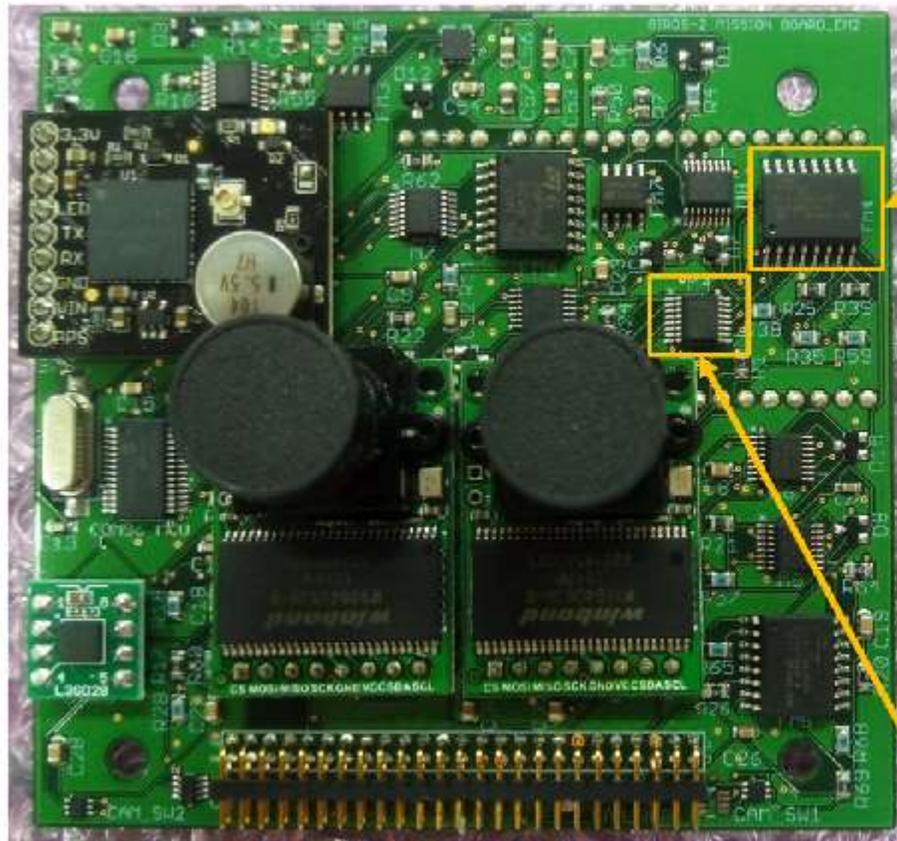
Integration of S&F Payload on the Mission Board and in BIRDS-2 CubeSat EM-2

The payload has been integrated with the mission board and the 2nd engineering model of the CubeSat (EM-2), as shown in the following photos. Functionality tests of the payload and the whole CubeSat are ongoing.



APRS-DP/AX.25 TNC module soldered on the mission board (back side), which also houses other parts of S&F payload and other mission payloads and subsystems

Integration of S&F Payload on the Mission Board and in BIRDS-2 CubeSat EM-2



Mission board (front side)

S&F MCU

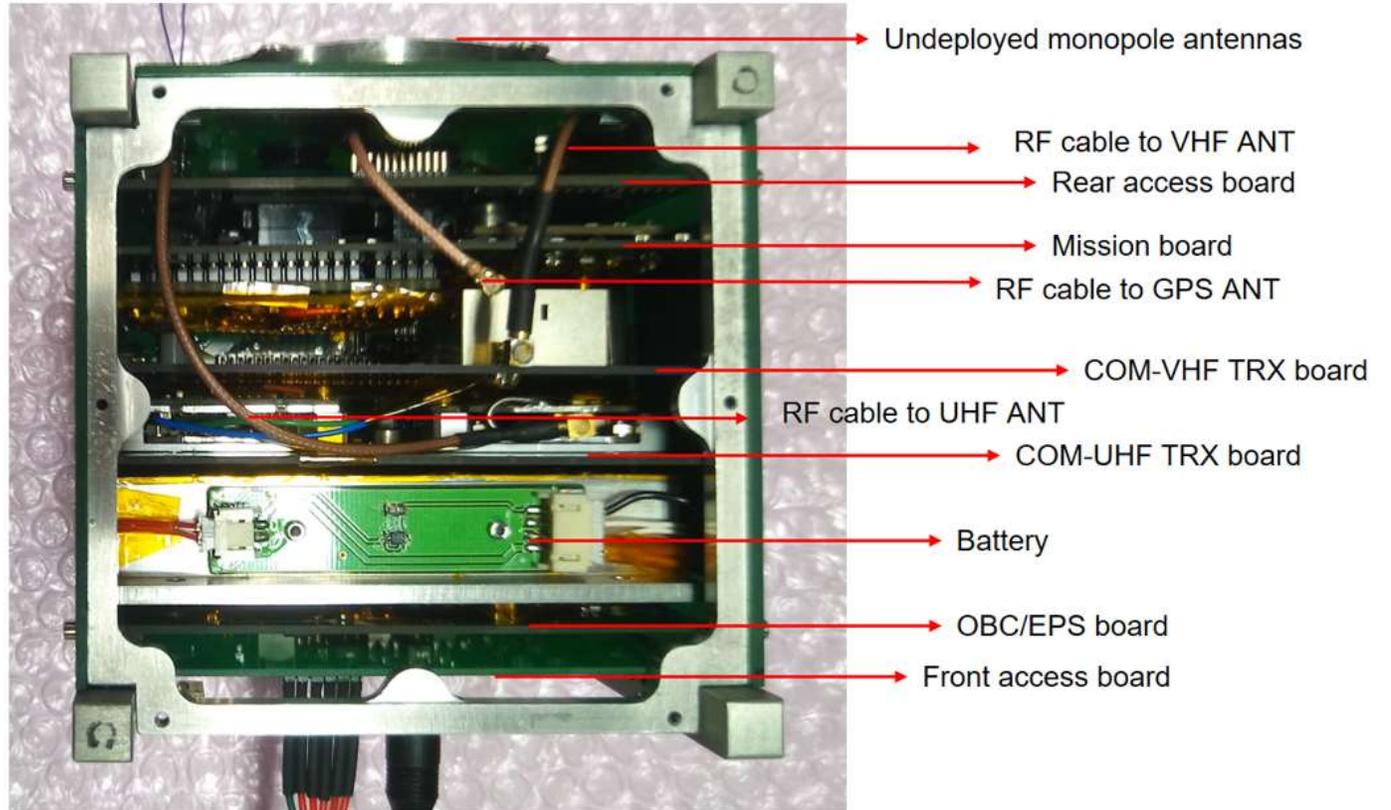
Multiplexer



VHF ANT

UHF ANT

Integration of S&F Payload on the Mission Board and in BIRDS-2 CubeSat EM-2



Summary for the Payload Development

Accomplished Work:

- Programming work on the microcontroller unit (MCU) of the Payload to implement the communication protocol
 - Receiving and interpreting different types of the packets from the GST
 - Saving received packets to the flash memory
 - Sending an acknowledgment packet and a packet bearing the CubeSat's latest two-line element (TLE)
- Design and fabrication of the S&F Payload for EM-2
- Integration to the Mission Board and CubeSat
- Communication testing with a dummy GST in Kyutech
- Written an interface document for the GST developers to guide their development work: "*Communication Protocol and Interfaces for BIRDS-2 S&F Ground Sensor Terminals_ver1.1_20170908b*"
- Fabrication of a compressed S&F payload board. This will be used by the GST developers for local testing of their GST. Target delivery to UPD and UiTM is by the end of October 2017
- Performed antenna pattern testing in RF anechoic chamber (by the BIRDS-2's antenna person)

Next Steps:

- Vibration test and thermal vacuum test of the S&F payload (integrated with the whole satellite) by 3rd-4th October 2017
- Perform a communication verification test in RF anechoic chamber to verify the link budget
- Long range communication test of the S&F payload and all communication parts in November 2017
- Testing of the S&F payload with the GST – to be done by UPD and UiTM at the respective universities
- Assembly and testing of GST prototype in Kyutech (for the unit to be deployed in Bhutan)

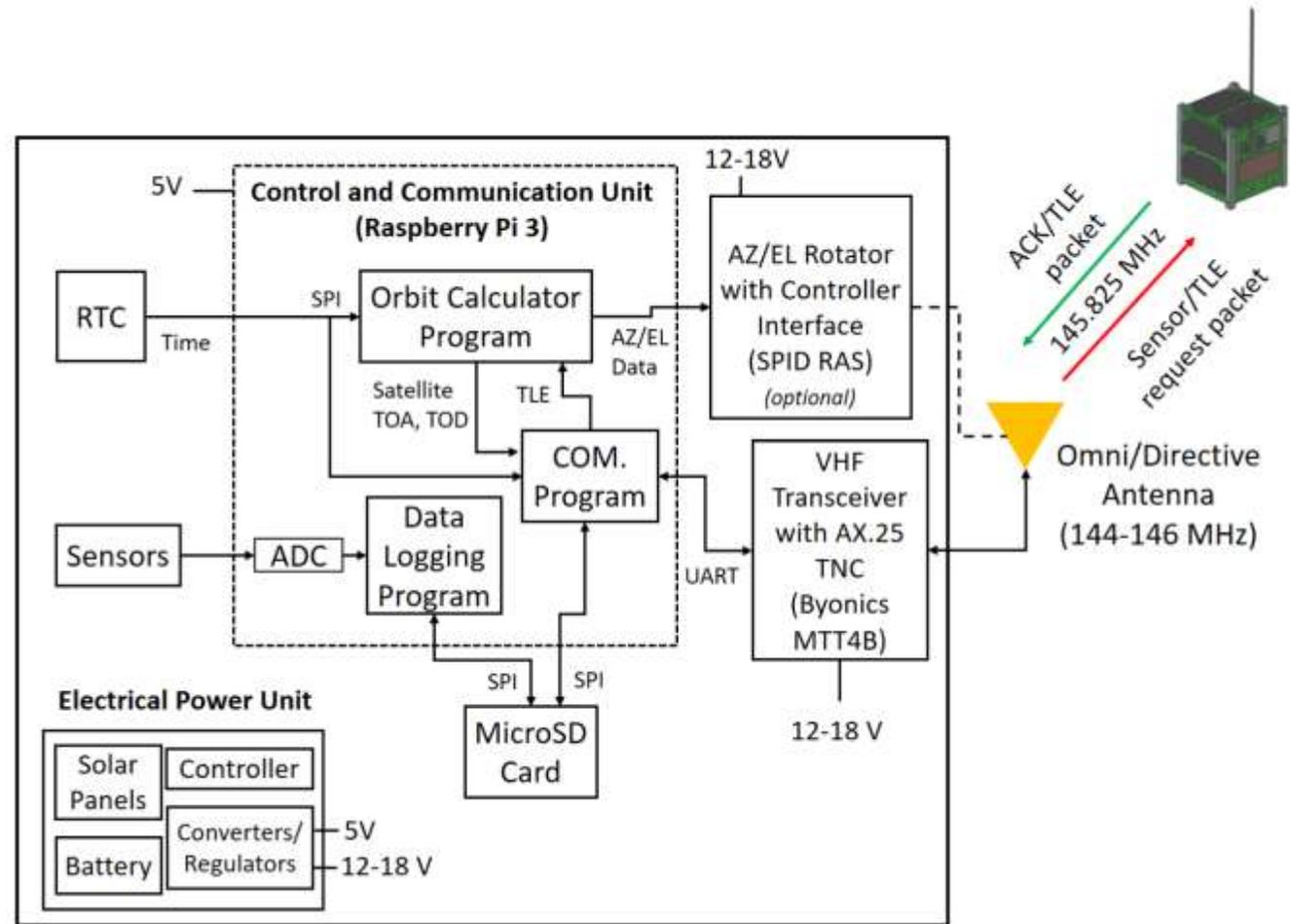
GST Development at UPD, Philippines

Report prepared by: Mr. Izrael Bautista of UPD.

GST development at UPD is being done by a team of engineers who are also part of the PHL-MICROSAT Project. UPD will implement both omnidirectional antenna case (without rotator) and directive antenna case (with rotator) so that the performance of the two cases can be compared, such as in amount of data that can be supported and the available communication time between GST and Payload.

Target application: soil monitoring for agricultural applications

- Temperature
- Humidity
- Geotagging



Block diagram of UPD's GST implementation

GST Development at UPD, Philippines

GST Building Blocks:

- Orbit calculation unit - determines the satellite passes
- Data logger and processing unit - logs and processes data from sensors
- Real time clock - keeps track of time
- Sensors - temperature and humidity measurements
- Data storage flash memory - stores all data from Data logger, OCU, and RTC
- AZ/EL Rotator with Controller Interface - azimuth-elevation mount for tracking the satellites
- FM Transceiver with AX.25 TNC - communicates with satellites using AX.25 protocol
- Electrical Power Unit - solar power supply unit for the whole system

Summary of Updates:

- Selection of hardware modules (Raspberry Pi 3, RTC, Byonics, etc)
- Implemented the orbital calculation unit (OCU) and Data Logger in software
- Integrated both programs with the sensors and RTC modules through Raspberry Pi 3
- Design of Electrical Power Module

Future Work:

- Design of Antenna + Rotator Module
- Integration of central system (OCU, Data Logger, RTC, sensors) with FM Transceiver, EPU, and Rotator modules

GST Development at UPD, Philippines

Upcoming passes for ISS

AOS	LOS	Duration	Max El	AOS Az	LOS Az
2017/08/22 18:05:16	2017/08/22 18:15:19	00:10:03	26.01°	306.83°	162.76°
2017/08/23 07:21:41	2017/08/23 07:32:02	00:10:21	32.03°	233.09°	25.21°
2017/08/23 17:12:49	2017/08/23 17:23:23	00:10:34	77.44°	320.71°	145.55°
2017/08/24 06:29:16	2017/08/24 06:39:57	00:10:40	86.32°	216.11°	38.00°
2017/08/24 16:20:41	2017/08/24 16:31:01	00:10:19	34.79°	333.62°	128.49°
2017/08/25 05:37:17	2017/08/25 05:47:31	00:10:14	28.95°	199.09°	51.60°
2017/08/25 07:14:31	2017/08/25 07:23:08	00:08:36	10.25°	258.44°	6.97°

Gpredict

Date	Brightness (mag)	Start			Highest point			End			Pass type
		Time	Alt.	Az.	Time	Alt.	Az.	Time	Alt.	Az.	
22 Aug	-	18:07:33	10°	WNW	18:10:19	26°	SW	18:13:05	10°	S	daylight
23 Aug	-	07:23:54	10°	WSW	07:26:54	32°	NW	07:29:52	10°	NNE	daylight
23 Aug	-	17:14:54	10°	NW	17:18:08	77°	SW	17:21:21	10°	SSE	daylight
24 Aug	-	06:31:22	10°	SW	06:34:38	86°	ESE	06:37:54	10°	NE	daylight
24 Aug	-	16:22:53	10°	NNW	16:25:53	35°	NE	16:28:53	10°	ESE	daylight
25 Aug	-	05:39:31	10°	S	05:42:25	29°	SE	05:45:19	10°	ENE	daylight
25 Aug	-	07:18:20	10°	NW	07:18:51	10°	NW	07:19:20	10°	NW	daylight

Heavens above

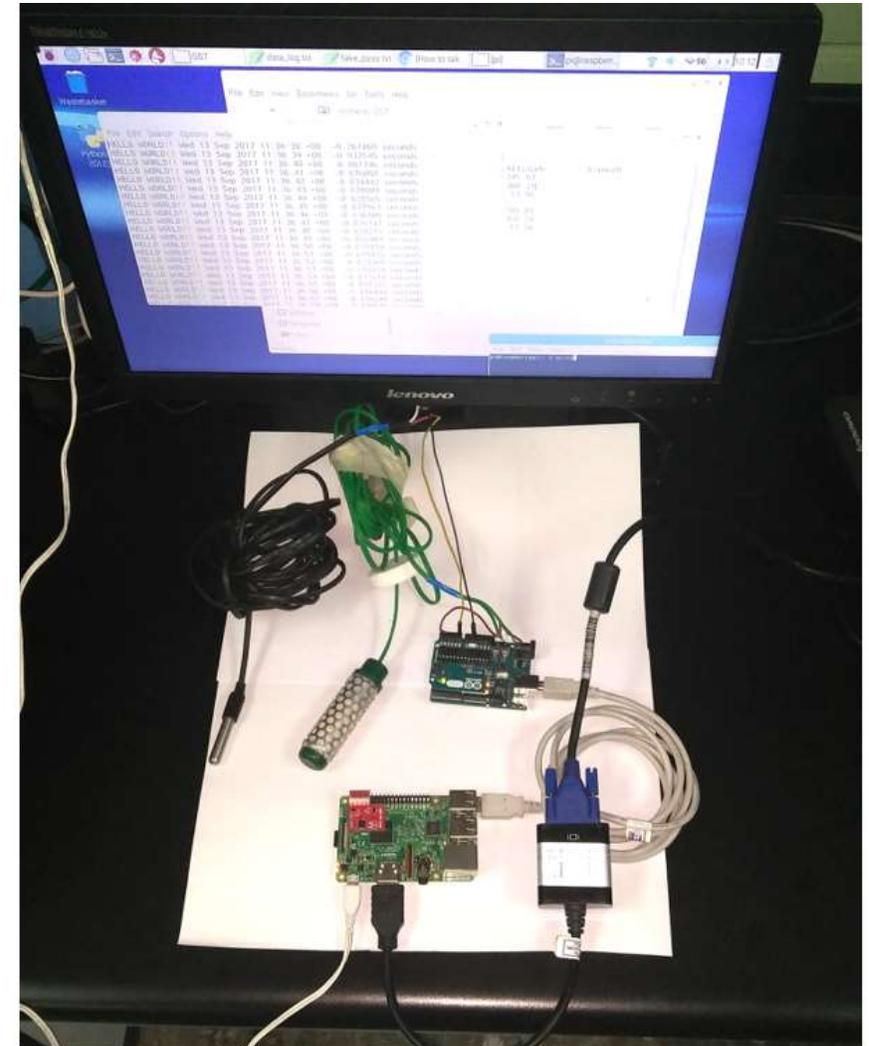
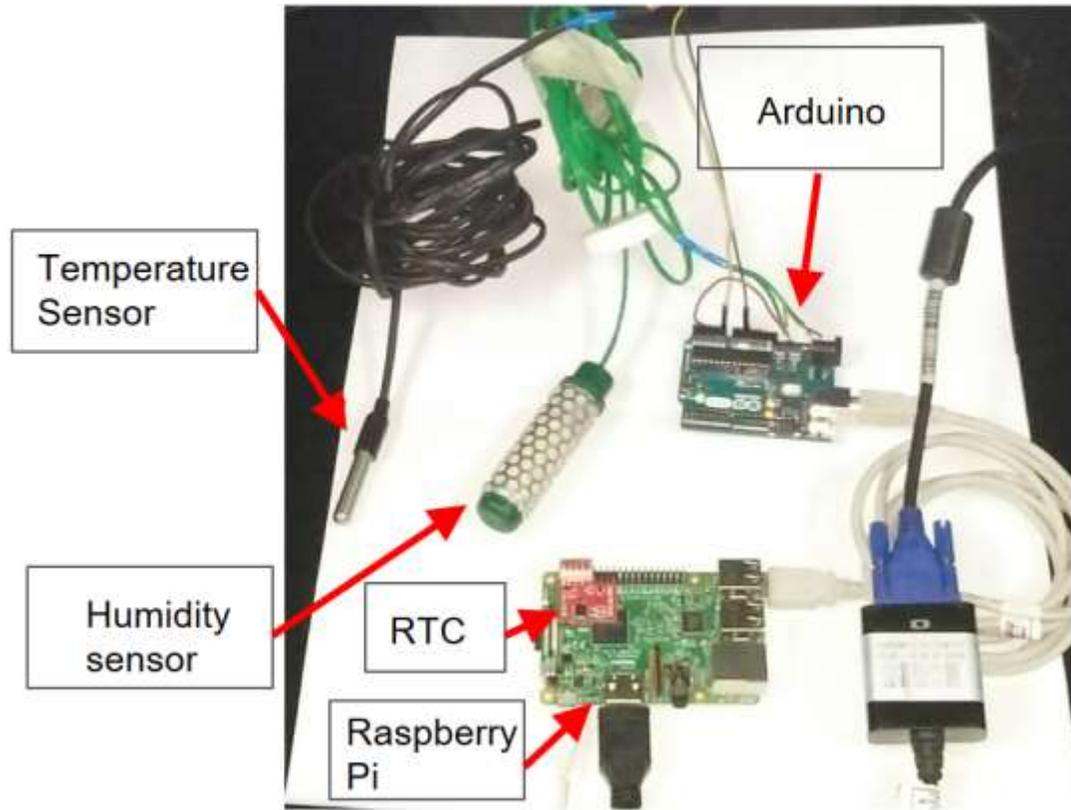
```
>>>
Searching for ISS Zarya tracks...
Processing TLE until 2017/8/25 00:00:00...
Found 7 overhead passes...
```

	Date	Altitude	Azimuth
AOS	2017/8/22 18:07:27	9.55	294.86
MAX	2017/8/22 18:10:17	26.05	236.06
LOS	2017/8/22 18:13:11	9.54	174.89
AOS	2017/8/23 07:23:49	9.59	242.7
MAX	2017/8/23 07:26:53	32.09	309.02
LOS	2017/8/23 07:29:57	9.59	15.44
AOS	2017/8/23 17:14:49	9.57	319.57
MAX	2017/8/23 17:18:08	77.46	231.25
LOS	2017/8/23 17:21:26	9.56	146.83
AOS	2017/8/24 06:31:16	9.51	215.75
MAX	2017/8/24 06:34:38	86.24	125.63
LOS	2017/8/24 06:37:59	9.59	38.2
AOS	2017/8/24 16:22:47	9.51	342.38
MAX	2017/8/24 16:25:53	34.81	51.23
LOS	2017/8/24 16:28:58	9.55	119.82
AOS	2017/8/25 05:39:26	9.54	188.38
MAX	2017/8/25 05:42:25	28.96	125.63
LOS	2017/8/25 05:45:25	9.55	62.18
AOS	2017/8/25 07:17:55	9.52	296.44
MAX	2017/8/25 07:18:46	10.34	311.18
LOS	2017/8/25 07:19:47	9.51	328.89

Own Python implementation (in Raspberry Pi3)

Screenshot of output of commercial orbit calculation software and our own Raspberry Pi 3 implementation. The satellite pass prediction will be used to control transmission and to track the satellite.

GST Development at UPD, Philippines



Photos of the initial GST development setup. Programming of the Control and Communication Unit (Raspberry Pi 3) has been focused to implementing the communication protocol, data logging and satellite pass prediction.

GST Development at UiTM, Malaysia

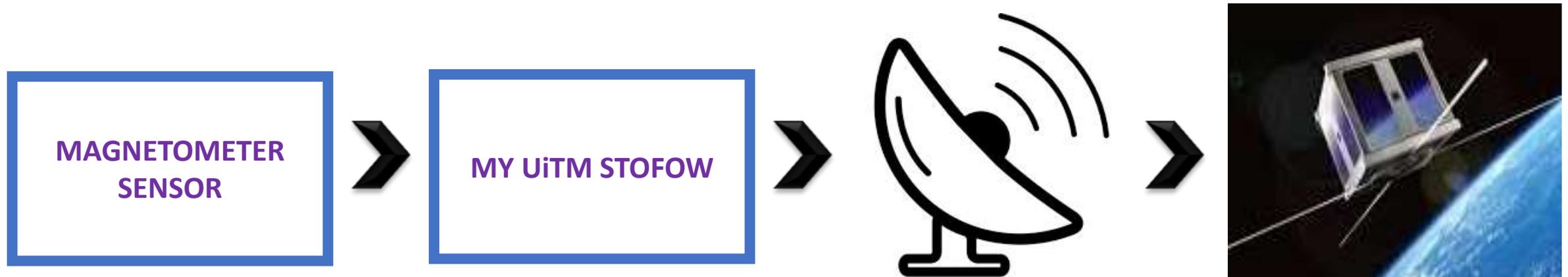


My UiTM Store & Forward (StoFow) for Ground Station Integrated Mission (G-SIM)

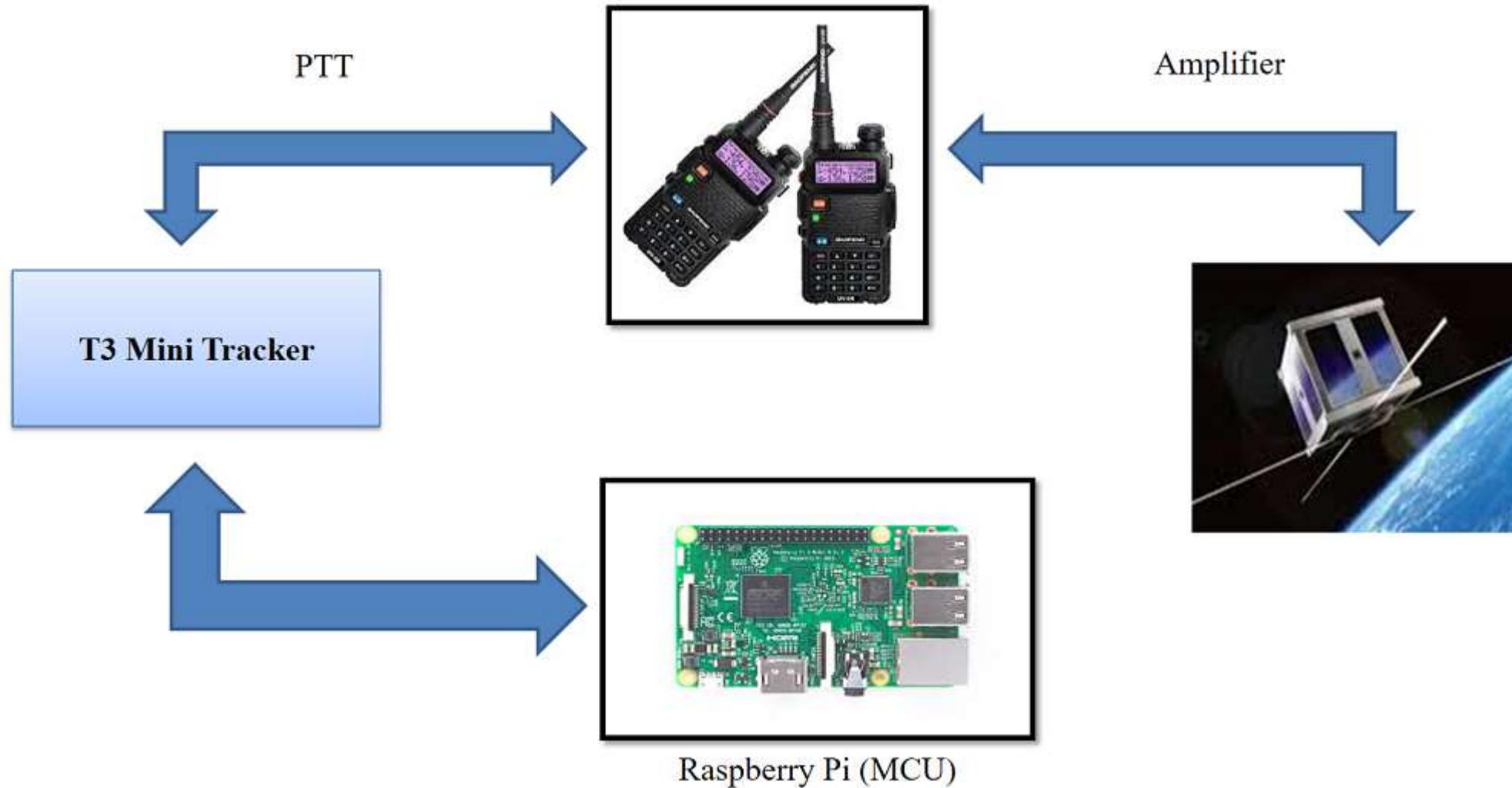
PREPARED BY : NUR AMIRAH BT AZAHARI

GST Development at UiTM, Malaysia

My UiTM Store & Forward is designed to collect data from Magnetometer Sensor , the data will be either in term of H, D or Z value and later will be shared to the BIRDS-2 Ground Station



GST Development at UiTM, Malaysia



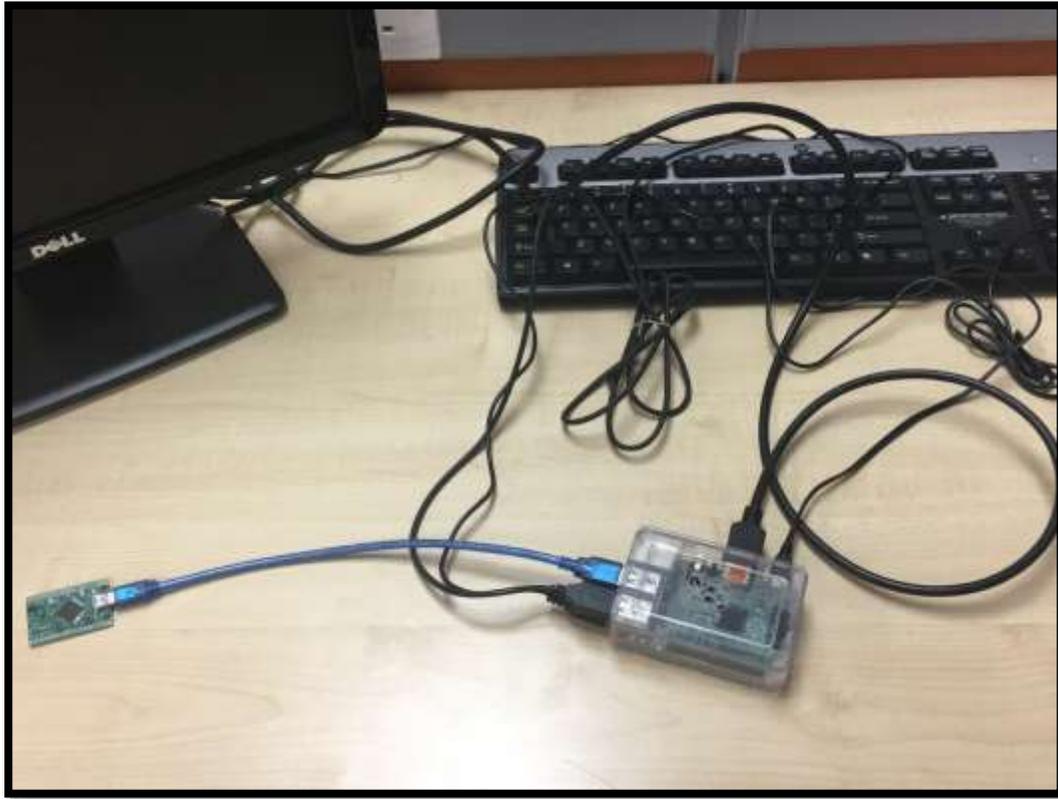
Progress & Project Development

The data from the cloud storage are extracted and still on configuration so that, they able to be read and process by T3 Mini Tracker

The radio module were tested so that it able to operate at specific frequency that use by the BIRDS-2 Cubesat.

Next, the circuit for connecting the radio module and T3 Mini-Tracker will be build and tested.

GST Development at UiTM, Malaysia



Shows the connection of Raspberry Pi with T3 mini tracker



The radio modules were tested

GST Development at UiTM, Malaysia

Future Plan for My UiTM Store & Forward

For the future plan, My UiTM StoFow will be install at the top floor of engineering faculty of UiTM Shah Alam. The whole system will be tested to determine the effectiveness level. The complete equipment for this project also will be tested at Kyutech to get the guidance from the expert about the whole system for the improvement, so that it can achieve its objective.

END OF S & F UPDATES

22. Small party to celebrate the taking of First Place of 2017 GEDC Airbus Diversity Award



The evening of 18 October 2017, Cho Lab Seminar Room, Kyutech – a pizza party



Tawio and Wakabayashi-san



Part of the BIRDS-2 Team
-- Kyutech's Super Students



AIRBUS

BIRDS Satellite Project
The Kyushu Institute of Technology,
Kitakyushu, Japan

Presented at the GEDC Conference
Niagara Falls, Canada
11 October 2017



Tsukinari-san, Kennedy-san, Shirakawa-san

**Kyutech's
Super
Staff**





End of **BIRDS Project Newsletter** – Issue Number Twenty-One

This newsletter is archived at the BIRDS Project website:

Project website: <http://birds.ele.kyutech.ac.jp/>



Happy Halloween

When a new issue is entered in to the archive, an email message is sent out over a mailing list maintained by the Editor (G. Maeda, Kyutech). If you wish to be on this mailing list, or know persons who might be interested in getting notification of issue releases, please let me know.

This newsletter is issued once per month. The main purpose of it is to keep BIRDS stakeholders (the owners of the satellites) informed of project developments.