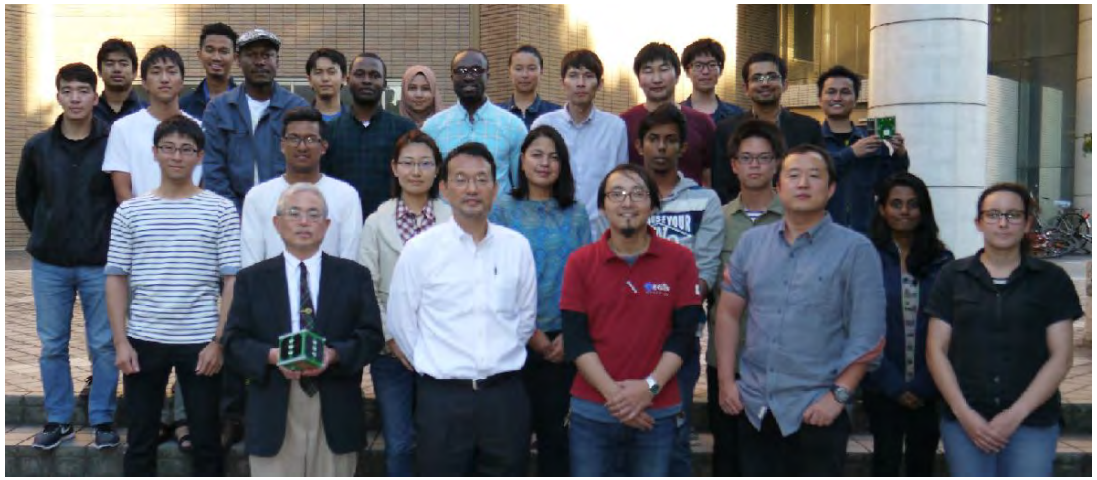
ISSN 2433-8818

# BIRDS Project Newsletter

Issue No. 27
(27 April 2018)

*Edited by:*
G. Maeda
Laboratory of Spacecraft Environment Interaction Engineering (LaSEINE)
Kyushu Institute of Technology (Kyutech)
Kitakyushu, Japan



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

**Archive website:** http://www.birds-project.com/birds1/newsletter.html
All back issues are archived at this website.

**Acknowledgment of support:** This newsletter is supported, in part, by *JSPS Core-to-Core Program, B. Asia-Africa Science Platforms.*

La SEINE

SEIC Space Engineering International Course

All back issues of this newsletter can be easily downloaded.
Go to here: http://www.birds-project.com/birds1/newsletter.html and scroll down to the desired issue.

## Table of Sections



## The Guest Box

### From Malaysia (BIRDS-2)

### Introducing Putrajaya, Malaysia

The streets are elegantly designed with a European feel, along with well-paved roads while the government buildings are a blend of modern architecture with Islamic arts. Commercial, authoritative and residential areas have been divided into precincts that blend into each other cohesively . . .

Continued on Page 13

This page is intentionally blank.

# 01. Kyutech receives prestigious “Space Development and Utilization Award (Minister of Foreign Affairs)”

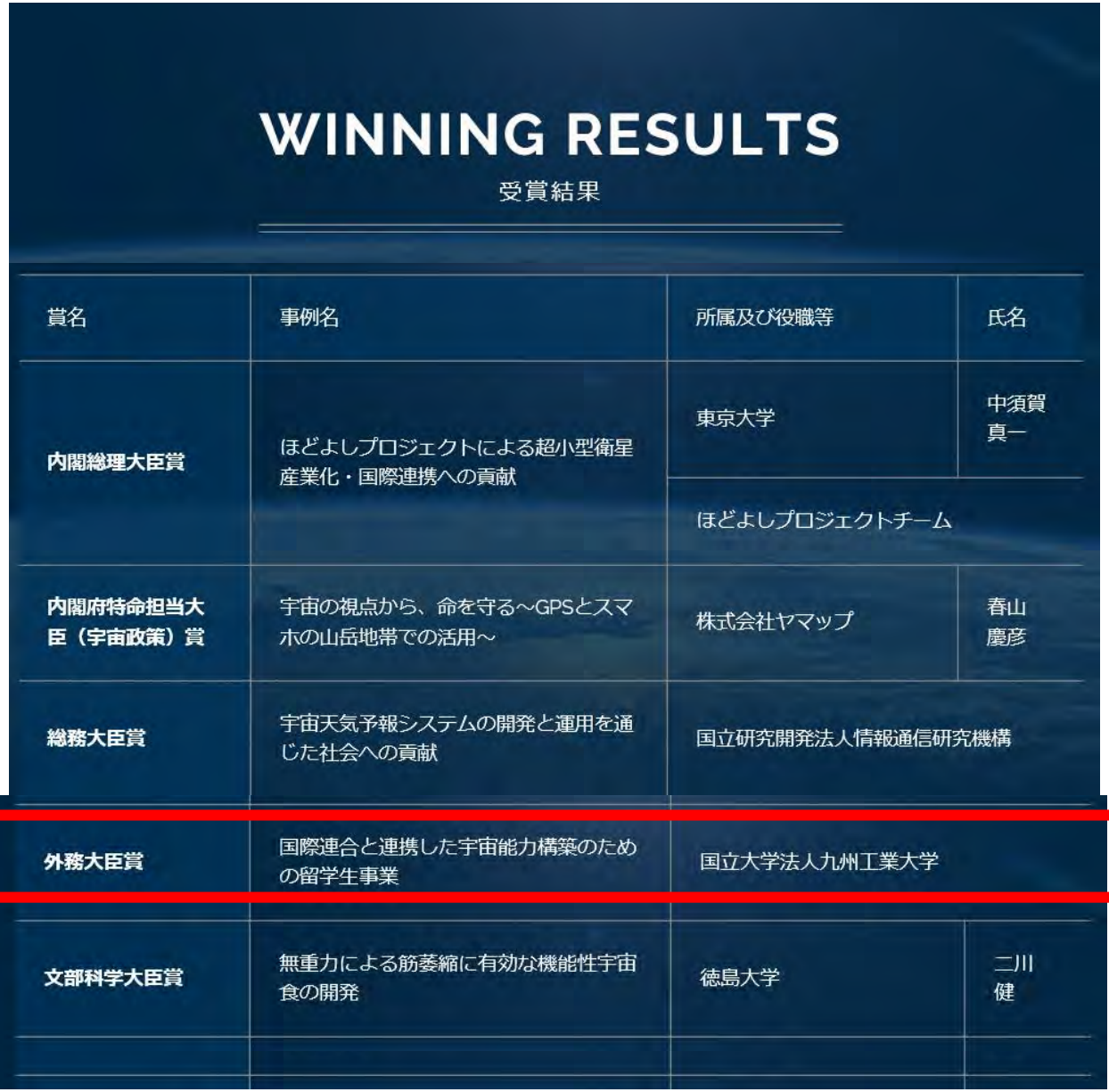

**To all concerned parties:**

Yesterday (20 March 2018), Kyutech received the **Space Development and Utilization Award** (from the Ministry of Foreign Affairs) in recognition of our DNST/PNST/SEIC activities toward capacity building and international collaboration. The official announcement is in Japanese only – it can be viewed here

http://www.uchuriyo.space/taishou/

On behalf of Kyutech, I thank everybody who made our endeavor possible and look forward to working with you more in the future.

Thank you very much,
Mengu Cho



# WINNING RESULTS

受賞結果

| 賞名 | 事例名 | 所属及び役職等 | 氏名 |
|---|---|---|---|
| 内閣総理大臣賞 | ほどよしプロジェクトによる超小型衛星産業化・国際連携への貢献 | 東京大学 | 中須賀真一 |
| | | ほどよしプロジェクトチーム | |
| 内閣府特命担当大臣（宇宙政策）賞 | 宇宙の視点から、命を守る～GPSとスマホの山岳地帯での活用～ | 株式会社ヤマップ | 春山慶彦 |
| 総務大臣賞 | 宇宙天気予報システムの開発と運用を通じた社会への貢献 | 国立研究開発法人情報通信研究機構 | |
| 外務大臣賞 | 国際連合と連携した宇宙能力構築のための留学生事業 | 国立大学法人九州工業大学 | |
| 文部科学大臣賞 | 無重力による筋萎縮に有効な機能性宇宙食の開発 | 徳島大学 | 二川健 |

**Dear Mengu and colleagues,**

Congratulations for receiving this Award!
It is yet another nice recognition of the important work Kyutech is doing and a confirmation that we were on the right path when we started the UN/Japan DNST/PNST in 2009.

Wishing you continued success with PNST/SEIC!

With best regards,
Werner
21 March 2018, Geneva

**Kyushu Institute of Technology**

http://www.uchuriyo.space/taishou/

# Congratulatory message from the Prime Minister of Japan, Mr. Abe

## 祝辞

第3回宇宙開発利用大賞を受賞された皆様に、心よりお祝い申し上げます。
近年、宇宙の開発利用の発展は目覚ましく、海外では、ベンチャー企業による低コストでのロケット打上げ、小型衛星から得られるビッグデータとAIを軸としたデータビジネスの進展など、民間活力によるイノベーションが進んでいます。我が国においても同様に、民間企業による革新的な挑戦が始まっており、世界最先端の舞台で熾烈な競争が繰り広げられています。

民間企業等の多様なプレイヤーの創出・育成は、我が国宇宙産業の厚みを増すだけでなく、宇宙基本計画で掲げられた「安全保障」「産業振興」「科学技術」の3本柱全ての進展につながるものです。GDP600兆円に向けた生産性革命の柱の1つとして宇宙産業の振興を図るべく、宇宙基本計画に沿った取組を着実に進めるとともに、宇宙開発利用大賞、宇宙データ利用モデル実証事業やビジネスアイデアコンテストなど、新たなプレイヤー振興の取組も迅速に進めてまいります。

今回の受賞案件は、小型衛星の礎を築いたパイオニアから農業、健康食品関係者まで、多様性に富むものとなりました。こうした取組が、我が国の宇宙開発利用の深化へとつながっていくことを期待しています。今回、宇宙開発利用大賞を受賞されました皆様方の益々のご活躍と発展を祈念いたしまして、私の祝辞といたします。

平成30年3月20日 20 March 2018

内閣総理大臣 安倍晋三

http://www.uchuriyo.space/taishou/

第3回 宇宙開発利用大賞

# 外務大臣賞

外務省
Ministry of Foreign Affairs of Japan

事例名 国際連合と連携した宇宙能力構築のための留学生事業

受賞者 国立大学法人 九州工業大学 Kyutech

## 事例の概要

受賞者は、途上国・新興国の宇宙能力構築のニーズに応えるため、国連宇宙部と連携して、大学院宇宙工学国際コース(SEIC)に、過去5年間で26ヶ国71名の留学生を受け入れた。持続可能な宇宙プログラムをゼロから立ち上げられる人材を育成し、宇宙空間の平和利用の推進・拡大に貢献することを目指す。実践的教育の一環として国際共同衛星開発を推進し、7ヶ国にとって初の人工衛星を開発するのに寄与している(うち3ヶ国は打上済)。

宇宙工学国際コース学生の出身国分布(2017年10月時点)

修了生(スーダン)による国連宇宙平和利用委員会でのプレゼン

BIRDS-I プロジェクト学生とフライトモデル

BIRDS-Iの国際宇宙ステーションからの放出(2017年7月7日)

BIRDS-I放出日(2017年7月7日)の各国代表者記念写真(筑波宇宙センター)

## 選考委員会講評／受賞のポイント

国連宇宙部と連携し、国際的に宇宙分野での人材育成に貢献した点を評価。宇宙技術が国際貢献の一つの重要なツールと認められたことの意義は大きい。

http://www.uchuriyo.space/taishou/

← This is the award that Kyutech received from the Minister of Foreign Affairs.

← This is all BIRDS or SEIC related stuff.

*CONTINUED ON THE NEXT PAGE*

## ポイント・具体的成果等

### 1. 宇宙開発利用の新たな領域創造への貢献

国連宇宙部と連携した衛星技術に関する学位取得に至る唯一の奨学金プログラム(DNST/PNST)を、2011年から7年間にわたり実施。SEICには2013年からの5年間で、26ヶ国71名(うちPNSTが29名)の留学生が入学。2017年度のPNST選考では、98ヶ国1439名が事前Web登録を行い、31ヶ国128名からの願書が届いた。

また、アジア・アフリカ諸国と超小型衛星を共同開発・運用する国際的な衛星開発プロジェクトであるBIRDSプロジェクトを実施しており、そのうち数ヶ国の参加国は、国家初の人工衛星開発を実現した。更に、国連宇宙部職員や宇宙法の専門家を講師として招き、留学生に今後10年間の各国の宇宙戦略を立案させている。

### 2. 宇宙開発利用市場の拡大への貢献

途上国・新興国に宇宙インフラを輸出していく上で不可欠な人材育成とのパッケージングにおいて、英語で学位取得できる大学院正規課程の受け皿を構築。

超小型衛星試験センターにて8ヶ国の衛星に対する試験を実施。

また、途上国・新興国による利用拡大を目的とし、「きぼう」日本実験棟からの超小型衛星放出推進のための包括的な連携協力協定をJAXAと締結。

さらに、BIRDSプロジェクトで使用した衛星バスを企業が商品化し、MakeSat.comにて販売中。BIRDS衛星運用のために、6ヶ国の地上局をベンチャー企業と共同でネットワーク化。今後、修了生のネットワークを活用し、世界中の地上局をつなぐビジネスへと発展させる予定。

### 3. 産業、生活、行政の高度化及び効率化への貢献

CubeSatにより宇宙利用が低コストで迅速に実現することで、途上国・新興国の産業・生活・行政の差し迫った課題を解決するとともに、それらの高度化・効率化に貢献。

ガーナでは、鉱毒による河川の水質汚染調査に活用することで、鉱山監視行政の大幅な効率向上が期待される。また、ブータンでは、災害時の緊急通信に活用することで、迅速かつ的確な救難・復旧対策が可能となり、災害管理行政の高度化・効率化に大きく貢献することが期待される。

### 4. 技術への貢献

SEICの留学生17名が参加した超小型衛星HORYU-IV(2016年打上げ)では、世界で初めて軌道上での放電現象の画像と電流波形の取得に成功。

BIRDS-Iでは、単一大学による超小型衛星コンステレーションとしては世界最多の5基の同一設計の1U CubeSatを打上げ。

さらに、UHF/VHF帯を使用するキューブサットコンステ(BIRDS-I)を、世界6ヶ国の地上局でネットワーク運用する実証実験を実施中。超小型衛星のデータ通信速度の遅さを地上局の数を増やすことで補い、衛星とのデータ通信量を飛躍的に拡大させる効果が期待される。

### 5. 普及啓発への貢献

国内外で130件以上の報道実績。途上国・新興国でも、自らで衛星を開発して、自国の実情とニーズにあった宇宙開発利用ができることを実証。

また、国連宇宙空間平和利用委員会において、7年間で5回のテクニカルプレゼンを実施。13ヶ国が参加するBIRDSワークショップを2016年から毎年持ち回りで開催するなど、SEIC修了生を中心としたネットワークにより、非宇宙先進国間の水平協力で、揺籃期の宇宙プログラムを支えあうシステムを構築。

平成30年度には、日本初の「宇宙システム工学科」(学部)を開講予定。

問い合せ先
九州工業大学工学部大学院係
TEL：093-884-3057　Mail：koh-daigakuin@jimu.kyutech.ac.jp

# The explanation of why Kyutech received this award

http://www.uchuriyo.space/taishou/

## Award ceremony was in Tokyo on 20 March 2018

**表彰式**

日時：2018年3月20日(火)　15:45～16:30

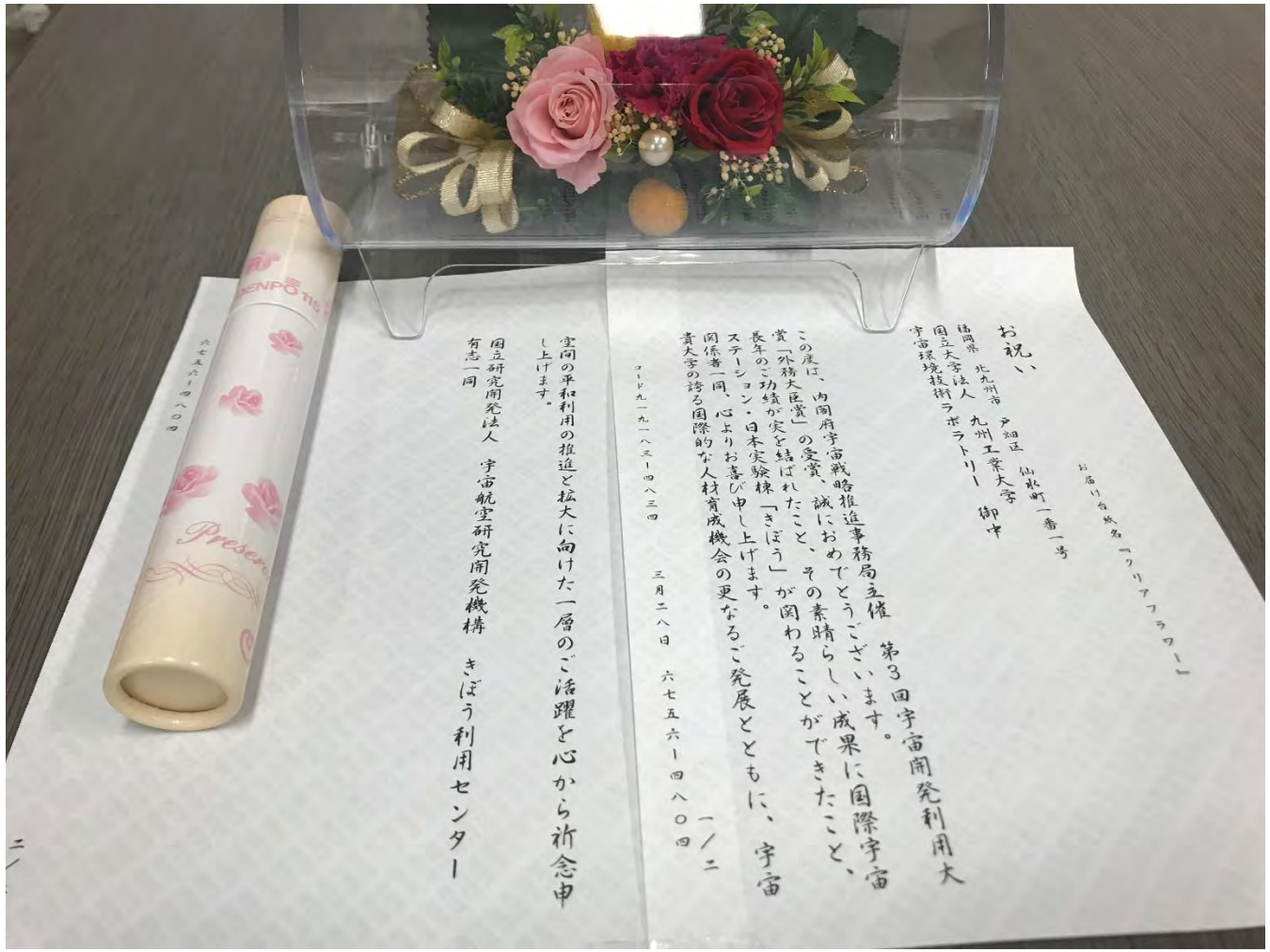
会場：イイノホール&カンファレンスセンター(東京都千代田区)
※内閣府主催宇宙シンポジウムにおいて開催

内容：表彰状授与、受賞内容のパネル展示、選考委員によるトークセッション等


**Prof. Nakao received the award on behalf of Kyutech**


Winners of various categories

# Congratulatory Telegram and Flowers from JAXA「きぼう利用センター一同」




**These were sent from the JAXA Kibo Team to Prof Cho and his laboratory on 27 March 2018.**

**Thank you, JAXA !**

## See here for English-language media coverage of our award:

http://www.spacetechasia.com/the-10-space-projects-that-won-japans-space-awards/


**4. Foreign Minister's Award: Kyushu Institute of Technology (Kyutech)**

The Foreign Ministry's award went to Kyutech for its work with the United Nations Office for Outer Space Affairs (UNOOSA). More specifically, the university was awarded for the Long-term Fellowship Programme on Nano-Satellite Technologies, which accepts 6 international students per year for a postgraduate course in nanosatellites and basic space technology.

**End of this section about the Space Utilization Award**

## 02. Guest Box continued

A waterway cuts through the city, flowing into a large lake. The concrete landscape is balanced with lots of parks, greenery and wetlands but because the land is relatively flat, it does not look lush. There are several places that visitors can explore. Those coming from KLIA airport will only take minutes to reach Putrajaya.

**Putrajaya** is Malaysia's third and latest Federal Territory. Built on an expansive marshland and former oil palm estate in Selangor, the city spans an area of almost 5,000 hectares and lies 25 km from Kuala Lumpur. It is located around 30 km from Universiti Teknologi MARA (UiTM).

Putrajaya takes over the administrative functions of the capital city Kuala Lumpur and is part of the Multimedia Super Corridor project of the Malaysian government. Much organization and planning have gone into the development of Putrajaya as a modern city with the latest communication technologies and progressive infrastructure.

This Guest Box was prepared by Nur Nabila, a student under
Assoc. Prof. Ir. Dr. Mohamad Huzaimy Jusoh
- Director, Center for Satellite Communication
Faculty of Electrical Engineering
Universiti Teknologi MARA
40450, Shah Alam, Selangor, MALAYSIA

# 04. Superb 9-min. video by our SEIC-PNST student from Kenya

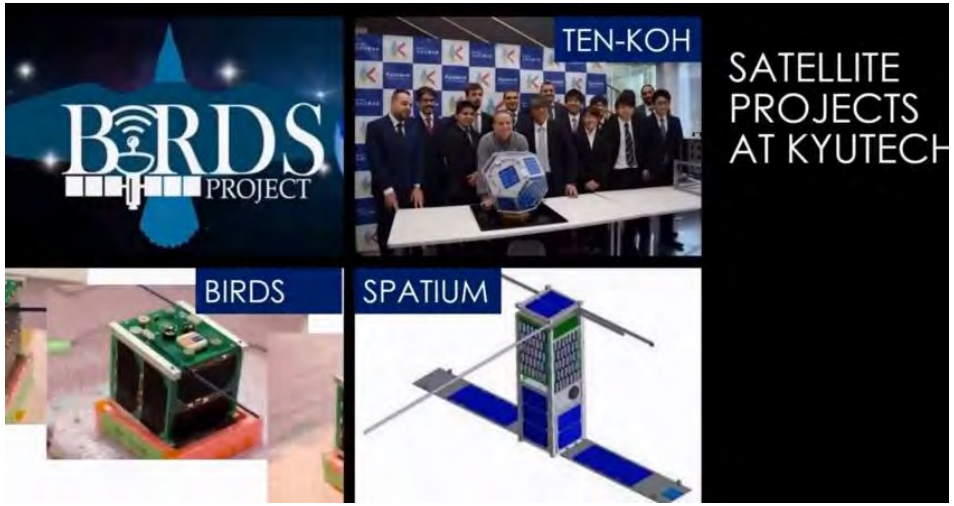
**Cosmas, our SEIC student from Kenya, produced an excellent video (targeted at an audience in Kenya) about space engineering studies at Kyutech.**

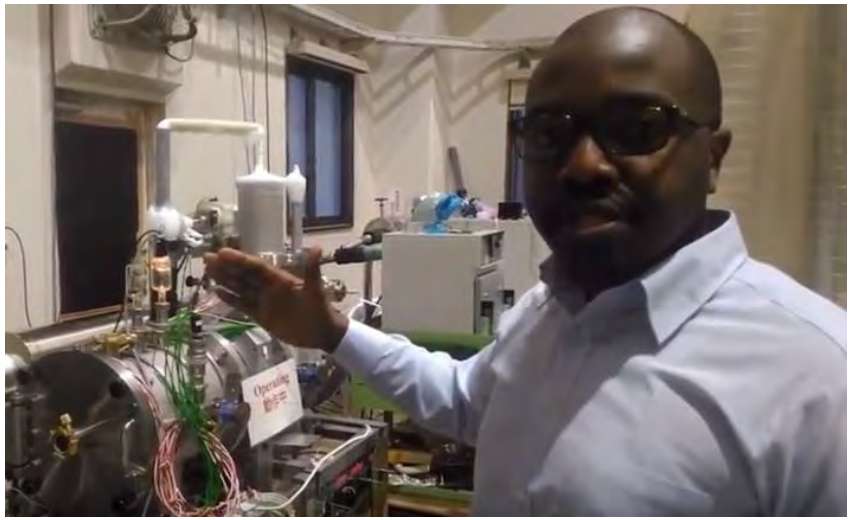

**You are invited to view it.**

https://www.youtube.com/watch?v=Idn_YcPrfJA&feature=youtu.be

## Screen shots of the video


Above: Dr Faure explains the facilities to Prof Mbuthia of Kenya

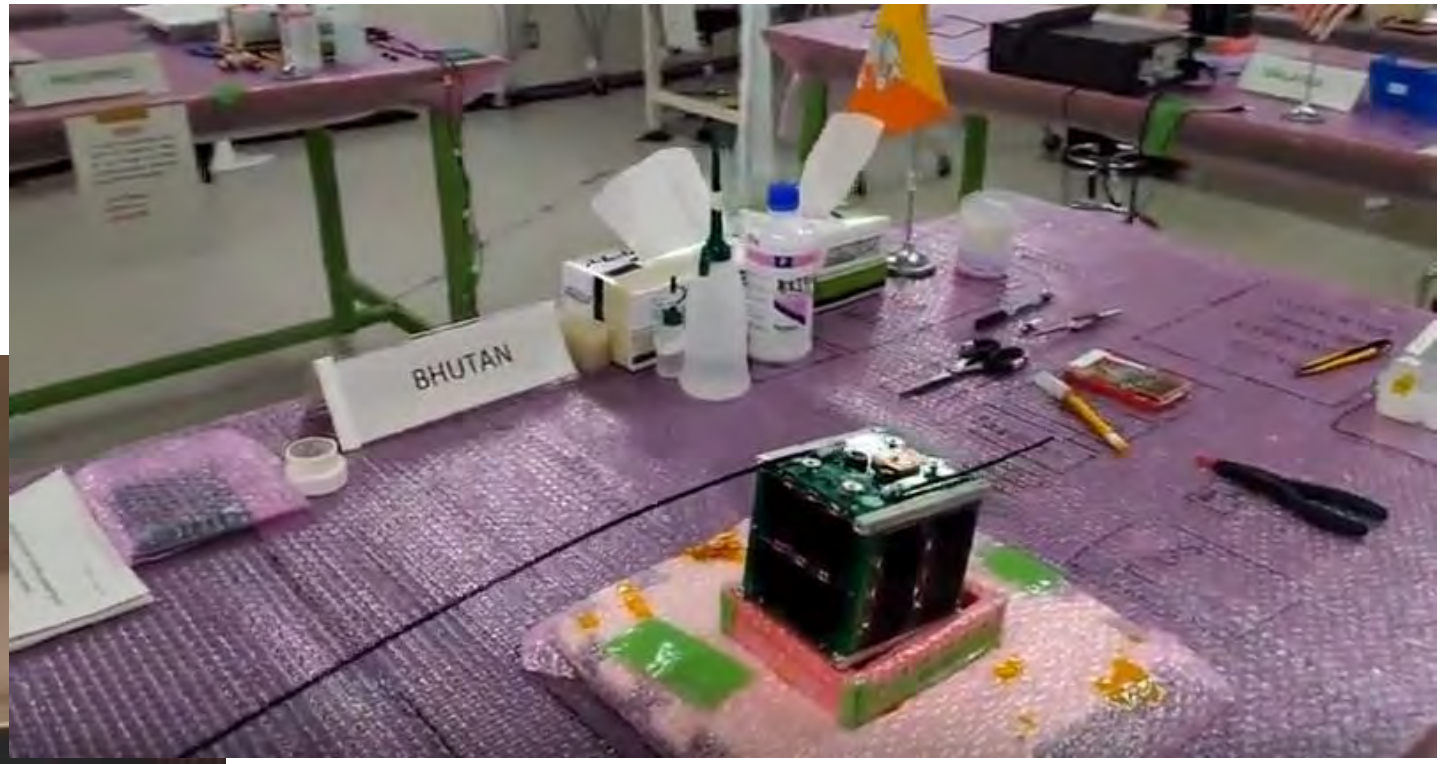


Cosmas explains the various satellite test machines of Kyutech.

## Screen shots of the video

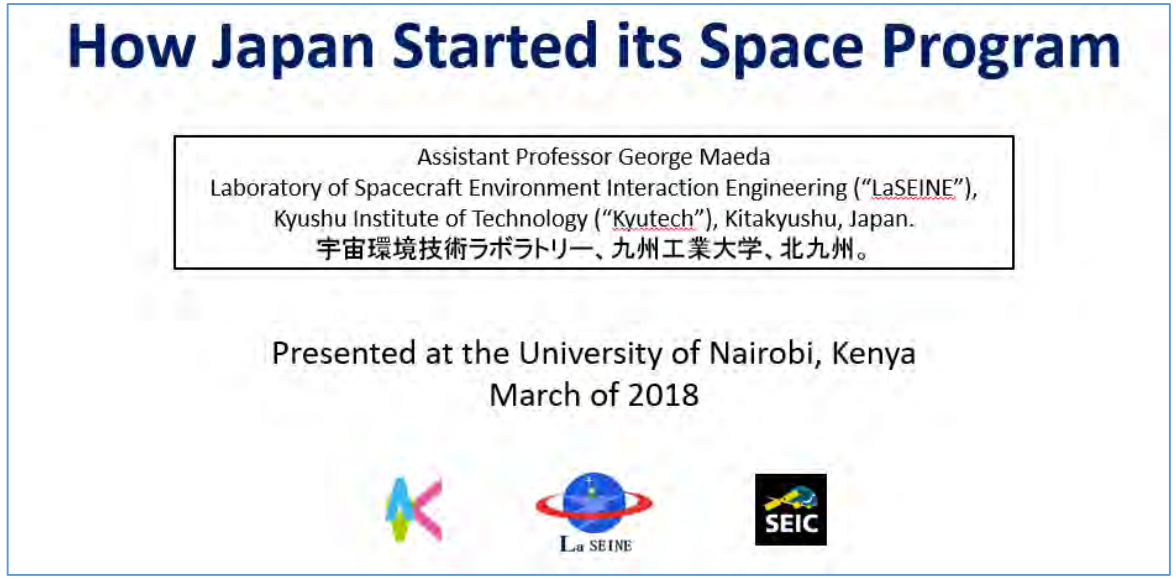
SEIC is a mix of lectures and hands-on lab work




Above:
The flight model of Bhutan BIRDS-2 in the clean room.

**END OF ARTICLE ABOUT COSMAS' VIDEO**

# G. Maeda delivers two lectures on 20 March 2018 before the College of Engineering, University of Nairobi, Kenya




The first lecture.


The second lecture.




# Chandaria Centre

[central lecture hall at the Univ. of Nairobi]


Article on the next page

**GM's lecture on Tuesday makes the top news of the Home Page of the University of Nairobi on 22 March 2018. During this lecture the video by Cosmas was also shown.**

http://www.uonbi.ac.ke/content/kenyans-urged-build-their-own-satellites

UNIVERSITY OF NAIROBI
A world-class university committed to scholarly excellence

Students Staff Partners NIW2018

HOME ACADEMICS ADMISSION UNIVERSITY LIFE ABOUT UON MEDIA CENTRE

Home

# Kenyans urged to Build their own Satellites

Share: Facebook Twitter Google Plus

**In a passionate public lecture about the 'Value of space' delivered by Prof. George Maeda of Kyutech, Japan, Kenyans were urged to build, test and launch their own satellite into space that will help the country solve its needs.**

*Prof. George Maeda, KYUTECH Institute, Japan at Chandaria Auditorium on Tue, Mar 20, 2018*

"To fully exploit space for national profit, it is necessary to design, build, test and launch your own satellite. Buying satellite does not develop your workforce," said Prof. Maeda.

During the Tuesday lecture at Chandaria auditorium, March 20, 2018, Prof. Maeda challenged Kenyan scientists to develop tailor made satellites citing that the technical competence of kenya's workforce can only be enhanced when they unite and build their own device.

"Japan took its first few steps from universities laboratories and I think Kenya should do the same."He noted that the team that builds a satellite is multi-disciplinary. He urged Kenyans to engage with systems; anyone who has worked with and understood how a system and applications works can participate in the building of satellites.

**FULL TEXT NEXT PAGE**

# Kenyans urged to Build their own Satellites

Prof. George Maeda, from KYUTECH, Japan,
Chandaria Auditorium on Tue, Mar 20, 2018

**In a passionate public lecture about the 'Value of space' delivered by Prof. George Maeda of Kyutech, Japan, Kenyans were urged to build, test and launch their own satellite into space that will help the country solve its needs.**

"To fully exploit space for national profit, it is necessary to design, build, test and launch your own satellite. Buying a satellite does not develop your workforce," said Prof. Maeda.

During the Tuesday lecture at Chandaria Auditorium, March 20, 2018, Prof. Maeda challenged Kenyan scientists to develop tailor-made satellites citing that the technical competence of kenya's workforce can only be enhanced when they unite and build their own device.

"Japan took its first few steps from universities laboratories and I think Kenya should do the same."

He noted that the team that builds a satellite is multi-disciplinary. He urged Kenyans to engage with systems; anyone who has worked with and understood how a system and applications works can participate in the building of satellites.

While giving his opening remarks, Prof. Mwangi Mbuthia, Dean, School of Engineering, UoN, challenged the students to participate in developing an application that will be used to capture audio in the first Kenya University Nanosatellite device to be launched in May. This follows a competition that the University of Nairobi in partnership with University of Rome won to send a 1U cubesat from KiboCube into space.

Prof. Mbuthia gave a history of how space exploration opportunities developed in Kenya since 1962. How these opportunities and partnerships have grown to the extent that Kenya now awaits a launch of the first nanosatellite into space.

Prof. Mbuthia concluded by saying, "exciting times are ahead of us. I ask all of you who are interested to come forward and participate in this emerging industry."

www.unoosa.org/documents/pdf/psa/activities/2017/GrazSymposium/presentations/Tuesday/Presentation9.pdf

GM's lecture was timed to occur just before the launch of **1KUNS-PF**. The launch is due in early April, with ISS deployment a few weeks after that. This lecture explains to the public what needs to be done next (and, of course, that is BIRDS-4).

Deployment of 1KUNS-PF into space by astronauts of ISS is set for the 11th of May 2018. "Irazu" satellite of Costa Rica will also be deployed at that time, via the ISS.

**The First Kenya University NanoSatellite 1KUNS-PF: capacity building using the KiboCube launch opportunity**

John Kimani, Kenya Space Agency
Mwangi Mbuthia, University of Nairobi
Fabio Santoni, DIAEE, Sapienza University of Rome
Fabrizio Piergentili, DIMA, Sapienza University of Rome

This presentation about **1KUNS-PF** was given at the following event

**United Nations / Austria Symposium**
**Access to Space: Holistic Capacity Building for the 21st Century**
**Graz, 3-7 September, 2017**

**The following report is reprinted in this newsletter with the permission of the author of the report. He recently replaced the lamp of Kyutech's solar simulator. This device is needed to shine light on satellites to simulate the light it would receive from the sun when it is in orbit around the earth.**

# Solar simulator test report

## (New lamp)

by Dmytro Faizullin

Laboratory of Space Dynamics

Laboratory of Spacecraft Environment Interaction Engineering

Kyushu Institute of Technology

Kitakyushu, Japan

30.03.2018

# Introduction

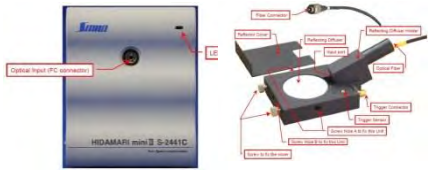
- Solar simulator lamp was degraded after 4 years of usage and needed to be changed
- A new lamp was mounted in the simulator on 28.03.2018
- Spectrums and irradiance powers of the solar simulator with old and new lamps were measured
- Near to AM0 specter irradiated by the solar simulator with a new lamp was found

# Mounting a new lamp

# Test setup

Solar simulator: SML-2K1MV1
Spectrum Analyzer: S-2440C (measuring range 300-1100nm)
Pyranometer: MS-802

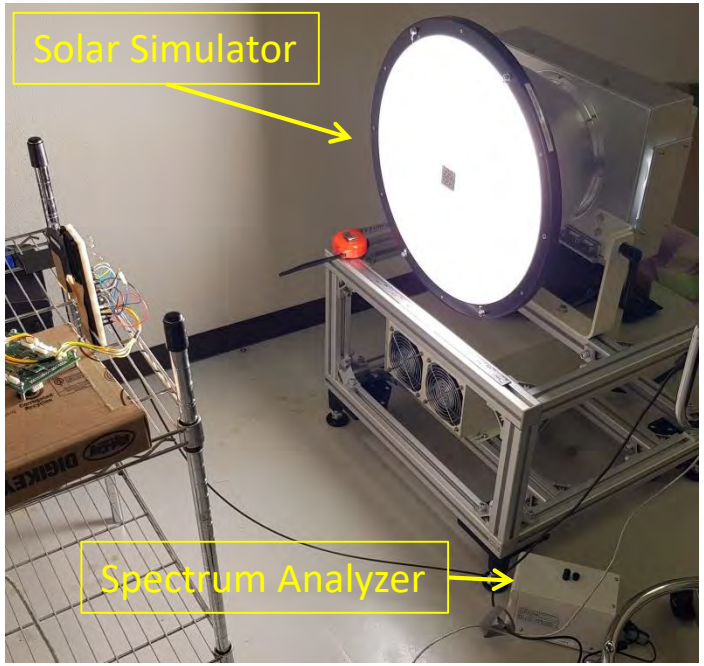
Spectrum Analyzer: S-2440C



MS-802 Pyranometer


Tests with an **old** and a **new lamps** were performed on 28.03.2018

- **Distance** between the solar simulator and a measurement point was **60 cm**
- **Powers** of the solar simulator were set to: **10%, 30%, 35%, 50%, 65%, 70%, 90%, 100%**

# Irradiance of the solar simulator with a new lamp taken from calibration report (2014)

The report was provided by the solar simulator manufacturer (approx. 2014)

Conditions for the calibration:

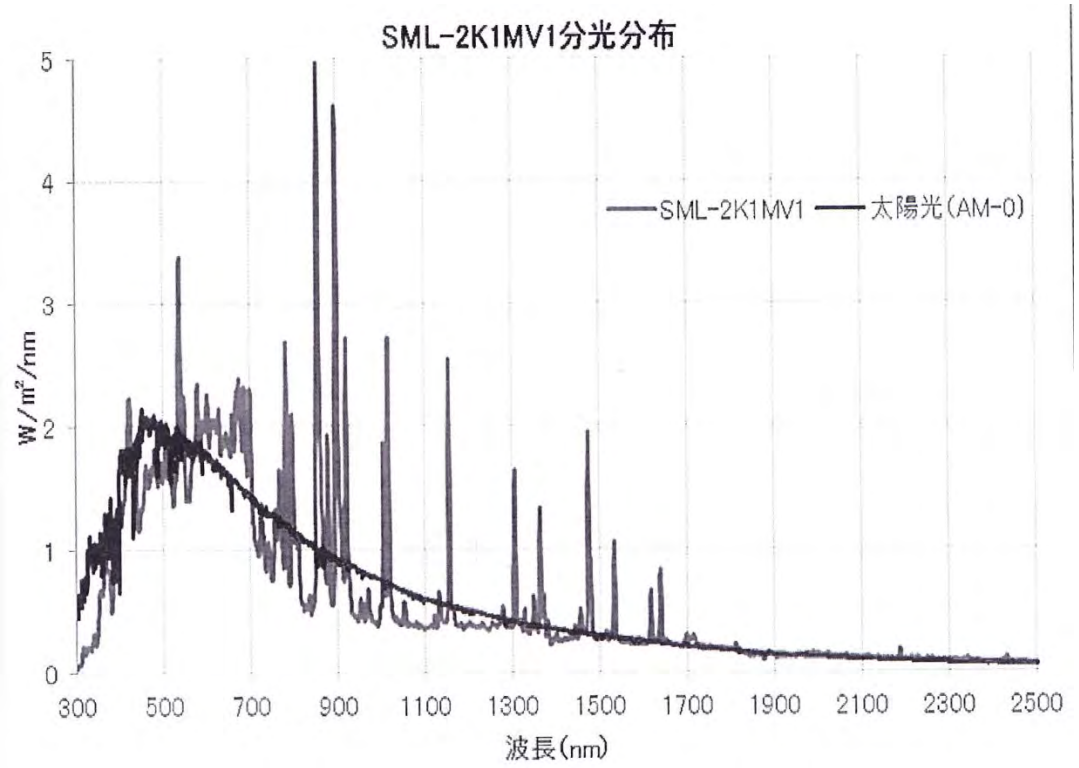
- Distance to the solar simulator: 60 cm
- Power of the solar simulator: 35%

Obtained irradiance power:

- 300-2500nm: 1416 W/m$^2$
  - 300-1100nm: 73%
  - 1100-2500nm: 27.0%

Sun light irradiance power in space (AM0):

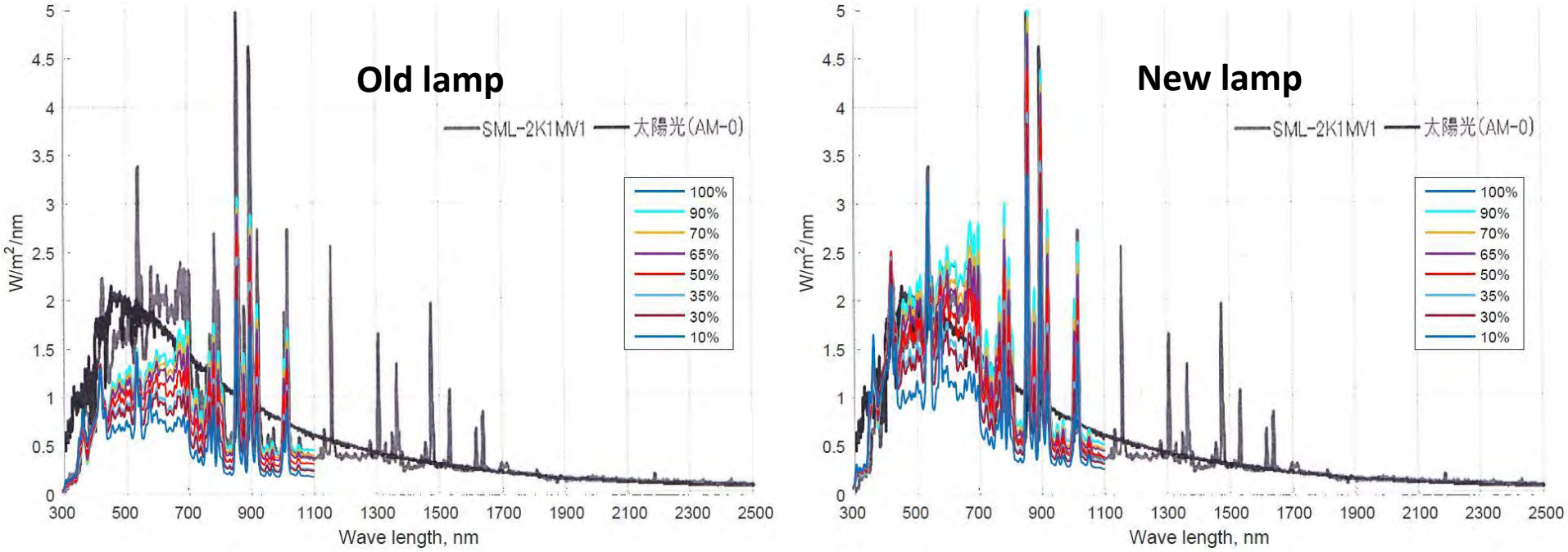
- 280-4000nm: 1367 W/m$^2$




Irradiance of the solar simulator (SML-2K1MV1) and AM0
where, AM-0 is a sun light intensity in orbit

# Irradiance powers of the solar simulator with different power of the simulator

Specter of the solar simulator with old and new lamps measured by the spectrum analyzer

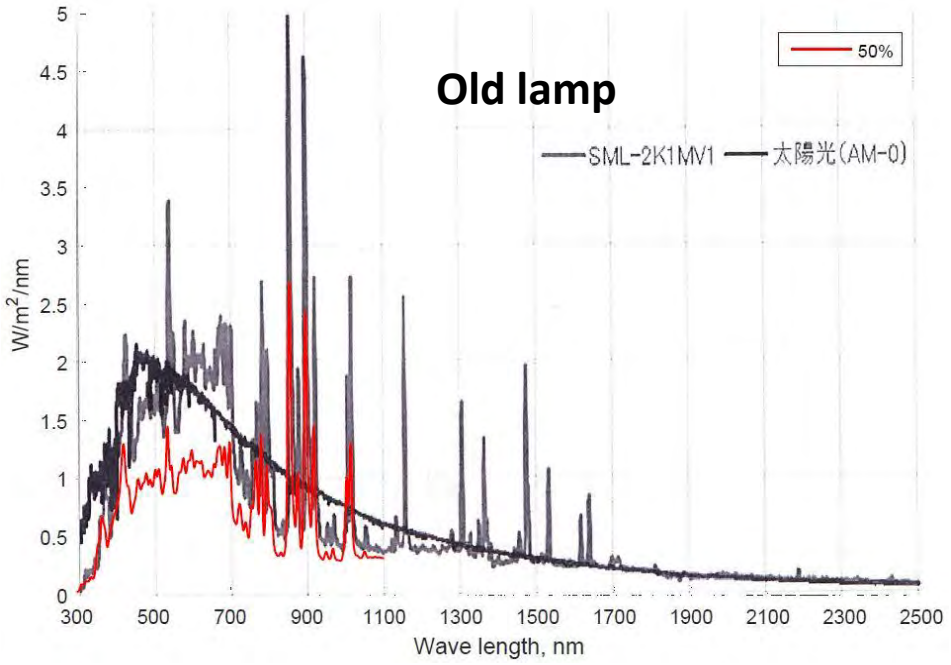


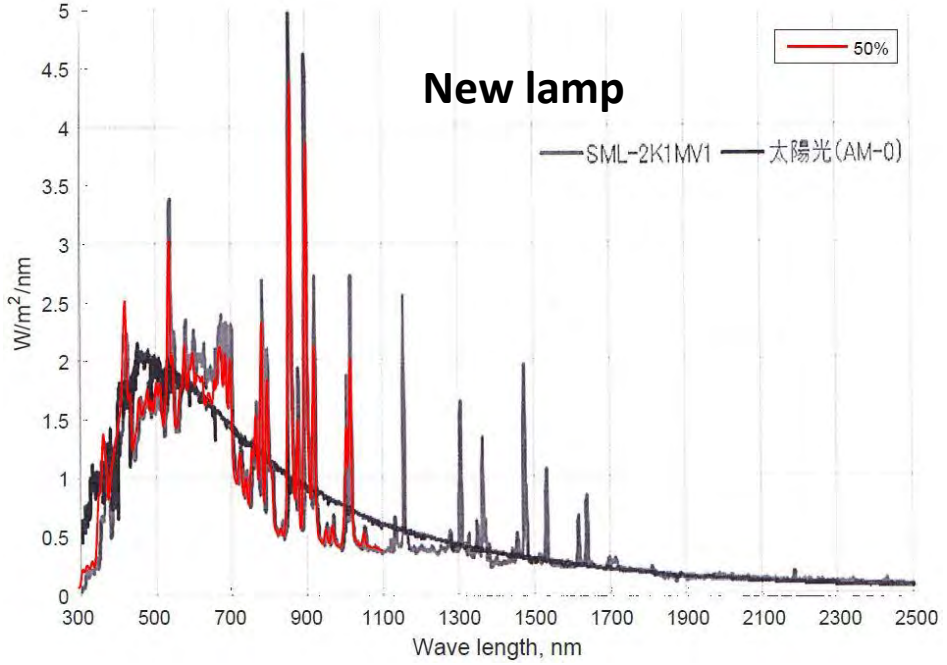

Irradiance power of the solar simulator with old and new lamps measured by the pyranometer

| Power of the solar simulator, % | | 10 | 30 | 35 | 50 | 65 | 70 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|
| Pyranometer, W/m^2 | Old lamp | 849.9 | 991.5 | 1133.1 | 1274.8 | 1558.1 | 1558.1 | 1699.7 | 1699.7 |
| | New lamp | 991.5 | 1274.8 | 1274.8 | 1416.4 | 1628.9 | 1699.7 | 1841.4 | 1841.4 |

# Irradiance powers of the solar simulator with 50% power of the simulator

Specter of the solar simulator with old and new lamps measured by the spectrum analyzer



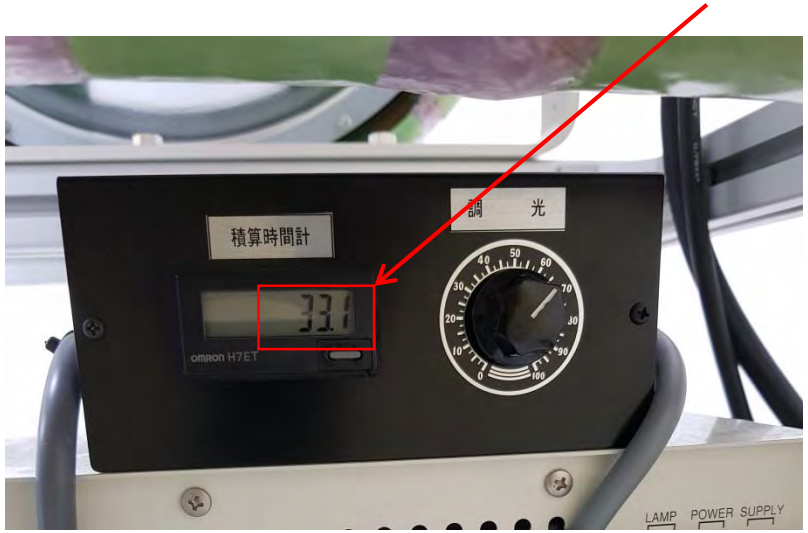




Irradiance power of the solar simulator with old and new lamps measured by the pyranometer

| Power of the solar simulator, % | | 10 | 30 | 35 | 50 | 65 | 70 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|
| Pyranometer, W/m^2 | Old lamp | 849.9 | 991.5 | 1133.1 | 1274.8 | 1558.1 | 1558.1 | 1699.7 | 1699.7 |
| | New lamp | 991.5 | 1274.8 | 1274.8 | 1416.4 | 1628.9 | 1699.7 | 1841.4 | 1841.4 |

# Recommendations

- **Distance 60cm** and the solar **simulator power 50%** should be used for getting near to **AM0** irradiance
- The lamp should be **changed after 2000 hours** usage
- **Don’t press a button** near a power regulator on the solar simulator. It is for resetting a counter of the simulator operation time




**End of solar simulator article**
**by Dr. Dmytro Faizullin**

## 07. You are encouraged to use the material found in this newsletter

All the material you find in this newsletter (this issue as well as all past issues) can be used for your needs -- however please always give credit to this newsletter when such material is used.

Please mention the following:

- **Page number(s)**
- **Issue Number**
- **"BIRDS Project Newsletter"**
- **ISSN 2433-8818**

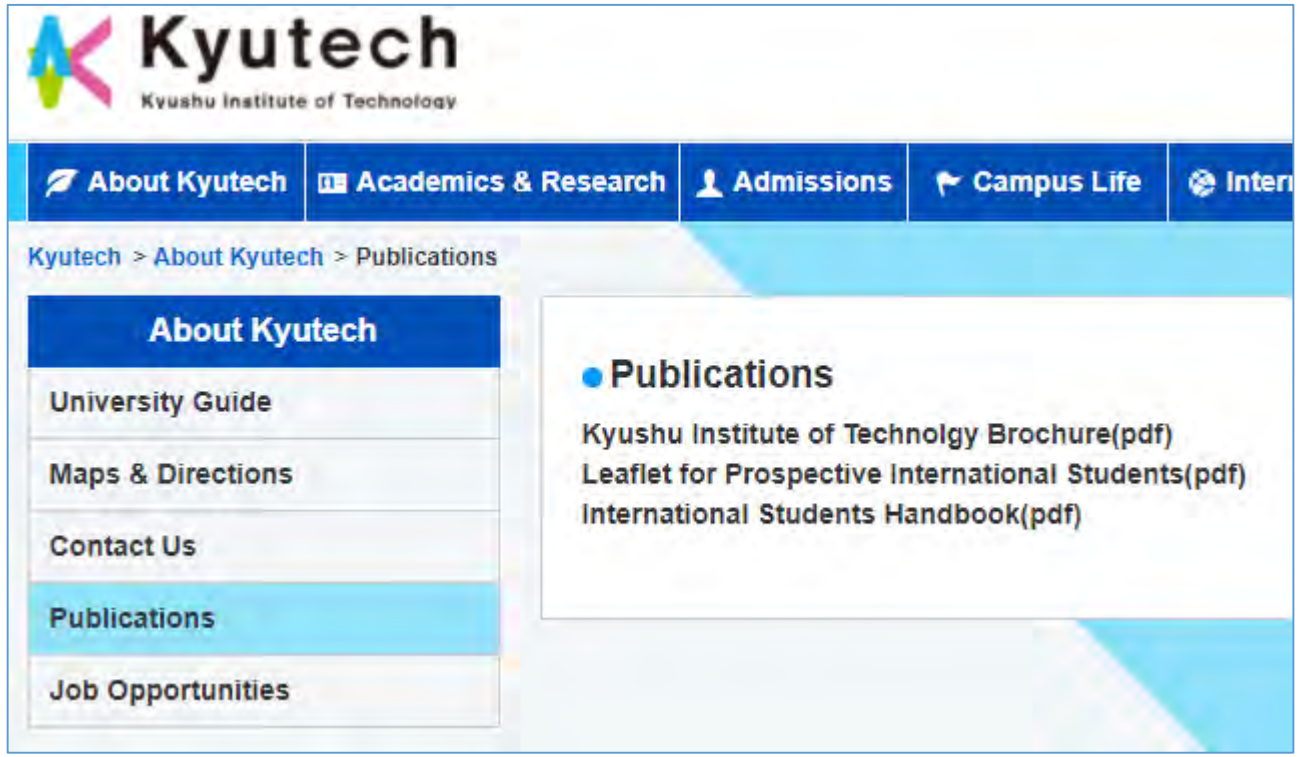
Your cooperation is appreciated.
- The Editor.

http://www.wilmarschaufeli.nl/wp-content/uploads/2012/11/publication.jpg

INTERNATIONAL STANDARD SERIAL NUMBER

# 08. How to download the 33-page Kyutech “Handbook for International Students”


Kyutech’s 2018 Handbook for International Students




http://www.kyutech.ac.jp/english/about/publications/

Please go to this website to download various Kyutech publications that can assist new students.

# 09. The 2nd BIRDS International Workshop in Ghana: Media presence

**These are the TV stations that were invited:**

1. TV3 http://www.tv3network.com
2. Ghana Live TV http://www.ghanalive.tv
3. Multi TV
   - Joy TV
   -Adom TV

https://www.multitvworld.com/newworld/live/

4. HomeBase TV http://hbtvghana.com

Most showed up.

The journalists from radio stations that attended the workshop shared the news to their listeners right after the workshop. Radio stations invited are listed below:

1. Joy FM .....99.7MHz
2. Starr FM .....103.5MHz
3. Eastern FM ..... 105.1MHz
4. Bryt FM..... 99.1MHz
5. Oman FM..... 107.1MHz
6. Citi FM..... 97.3MHz
7. Okay FM..... 101.7MHz
8. Adom FM..... 106.3MHz
9. HITz FM..... 103.9MHz

The information shown on this page are courtesy of Benjamin Bonsu (BIRDS-1, Ghana)

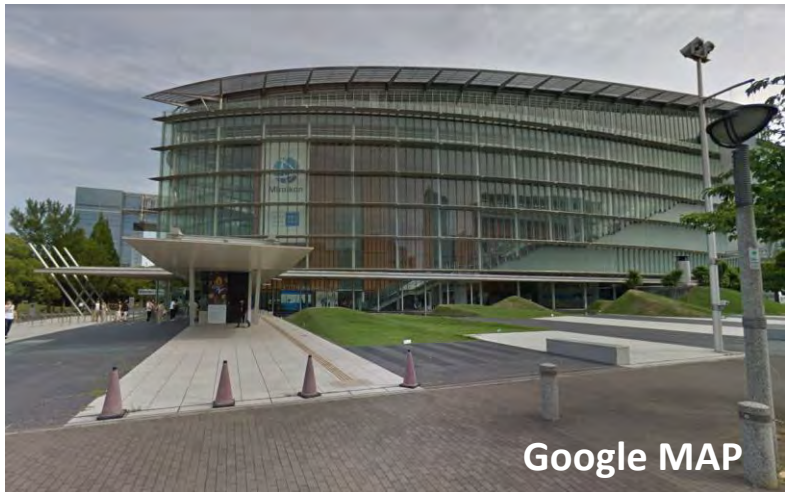
## 10. BIRDS students attend JAMSAT meeting

# JAMSAT Symposium 2018


Report by
Apiwat Jirawattanaphol (BIRDS-1) and Makiko Kishimoto (BIRDS-3)

The JAMSAT **Symposium 2018** was held at the National Museum of Emerging Science and Innovation (Miraikan) on March 10-11. The purpose of symposium is sharing knowledge among members of JAMSAT and people who interested in amateur radio satellites.

This year, **Apiwat and Kishimoto** represented the BIRDS Project.




**Miraikan**

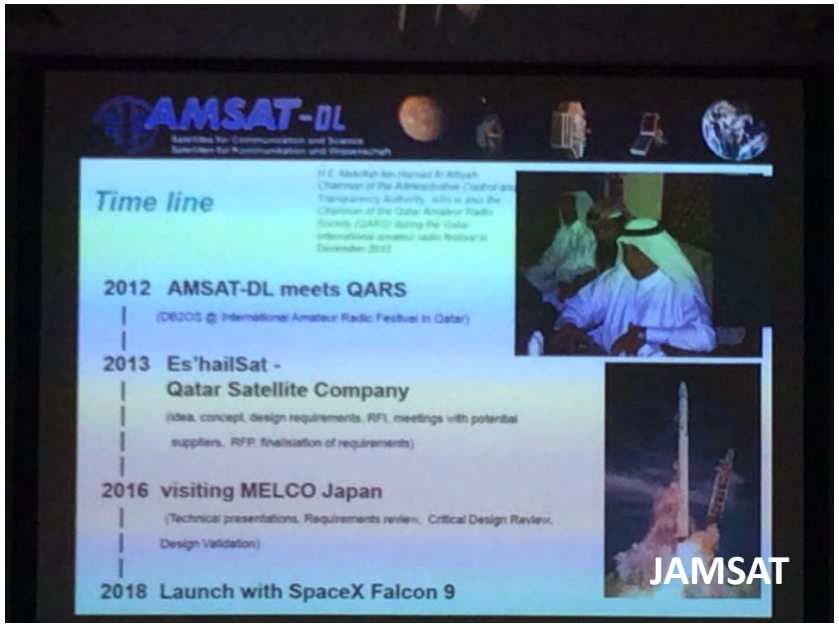
# First day of symposium


**Welcome Speech by President of JAMSAT**

The symposium was started at 13.30 in Miraikan 7th floor.
About 60 participants attended on the first day.
Presentation on the first day are include:

- Satellite radio reception of amateur radio band
- NEXUS Satellite project
- OMOTENASHI ultra-small Moon landing satellite
- RYMANSAT satellite project
- Es 'hail-2 (P4-A) satellite from AMSAT Germany

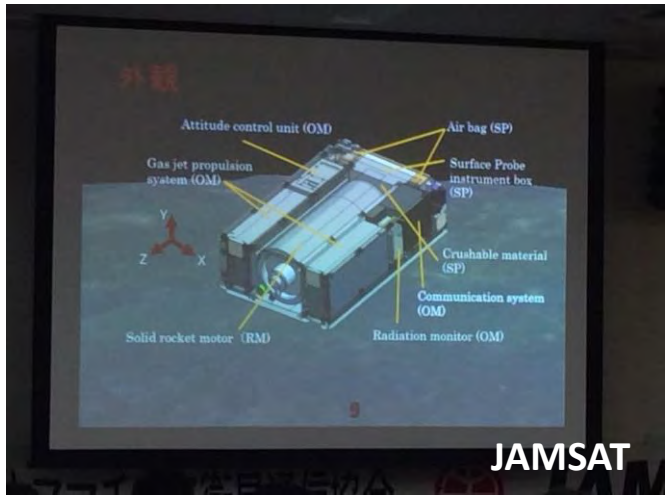
# Presentation on first day




Es 'hail-2 (P4-A) satellite by Peter Guelzow from AMSAT Germany. The P4-A project planned to put amateur radio transponder onboard Es 'hail-2 which is geostationary satellite.


Satellite reception of amateur radio by Kurahara Naomi, Infostellar Inc.


NEXUS Satellite project by Kiyoshi Yamaguchi , Nihon University




OMOTENASHI ultra-small Moon landing satellite by Wataru Torii, JAXA Ham radio club


RYMANSAT satellite project by Takafumi Shimamura

# Reception dinner

**Kampai (Cheers)**

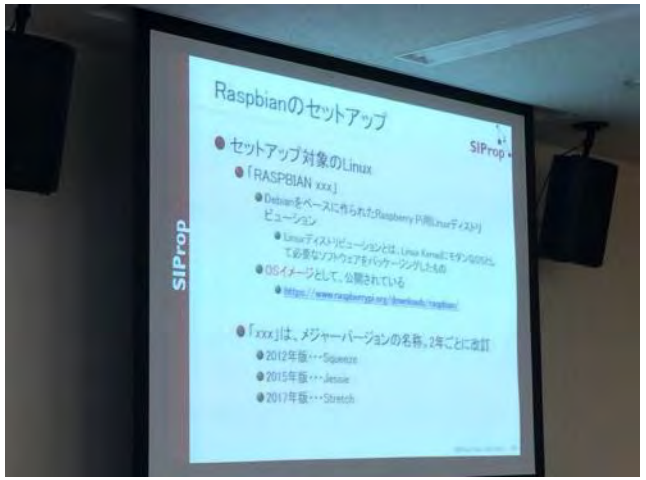
End of the first day, the reception was held at the restaurant near by Miraikan. There 38 people attended the reception and most of topics were about satellite communication and amateur radio.

Kishimoto with JAMSAT president and member of NEXUS satellite team from Nihon University

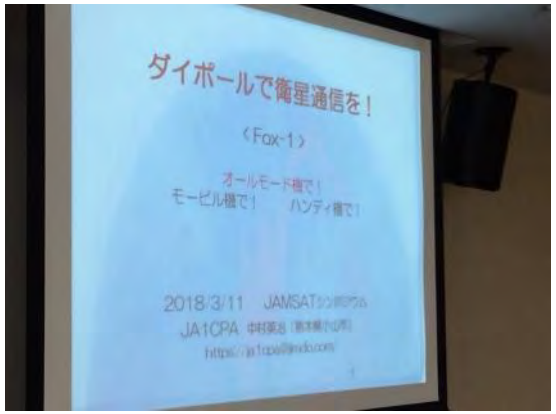
# Presentation on second day


AMSAT NA's Fox-1 and GOLF projects by Paul Stoetzer


ISS TV Reception
By Katsumi Morita




SDR Satellite Ground Station
by Noritsuma Imamura, Shizuoka U.



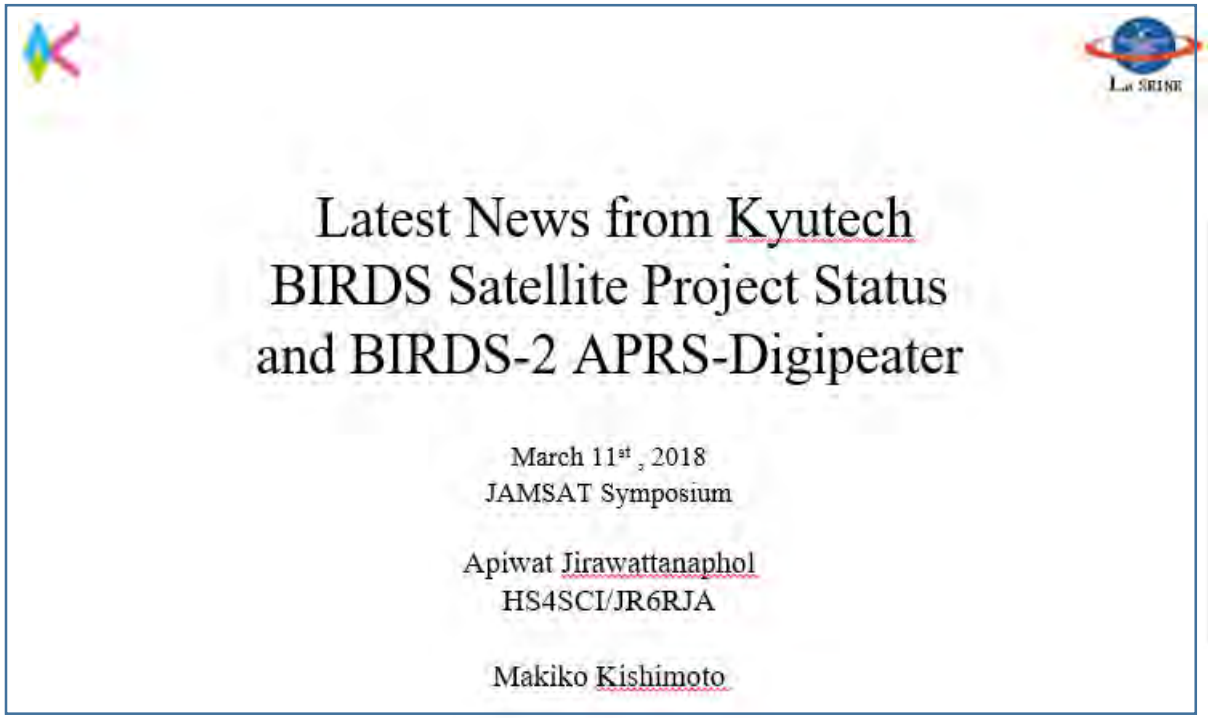

Enjoy Satellite Communication with dipole Ant. by Eiji Nakamura

BIRDS satellite project
by Apiwat J. and Makiko Kishimoto


OrigamiSat-1 project
by Sakamoto Hiroshi,
Tokyo Tech

# BIRDS Project Presentation


Presentation about BIRDS project
by Apiwat and Kishimoto

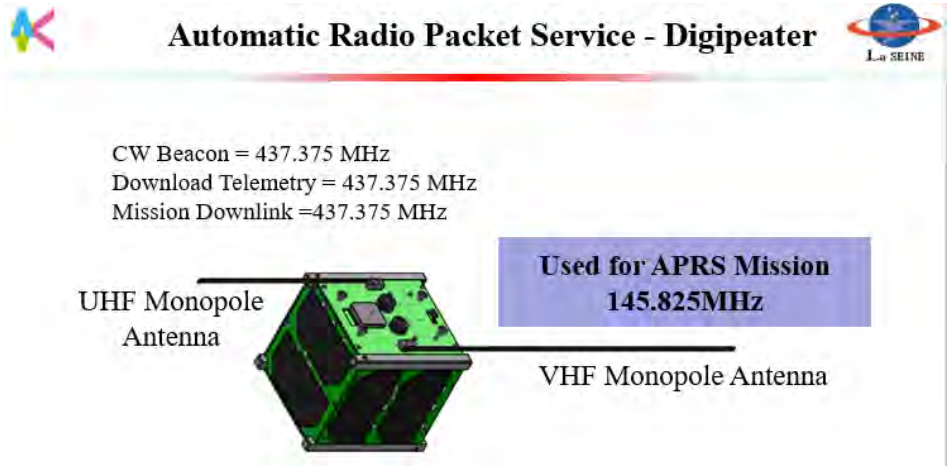



The presentation is includes overview of BIRDS project, BIRDS-1, 2 and 3 project status. Also, APRS mission of BIRDS-2 presented in this presentation.

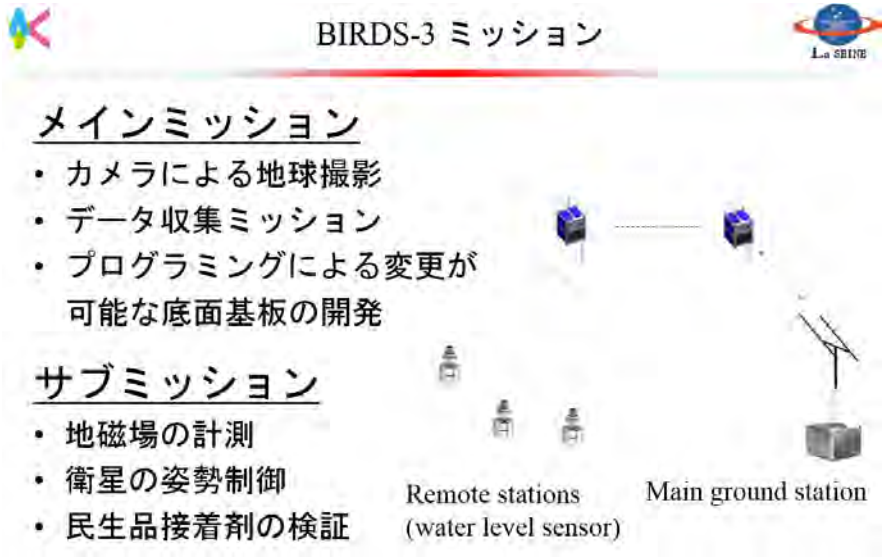
# BIRDS Project Presentation (2)


Picture show satellites delivery date to JAXA and on other slides show status of BIRDS-1 satellites.


Kishimoto presented on overview and mission of BIRDS-3 satellite project.




Apiwat introduced APRS mission of BIRDS-2 to JAMSAT symposium participants.




***End of Report***

## 11. Take note: Image sensors are getting better and better


https://www.youtube.com/watch?v=mZNWt-GRD7s

The Canon 35MMFHDXS is a new high-sensitivity image sensor. You can view its promotional video.

This information came from Dr Kim of LaSEINE

# 12. Spring Orientation (2018, Kyutech): Prof Cho introduces SEIC to Japanese grad students

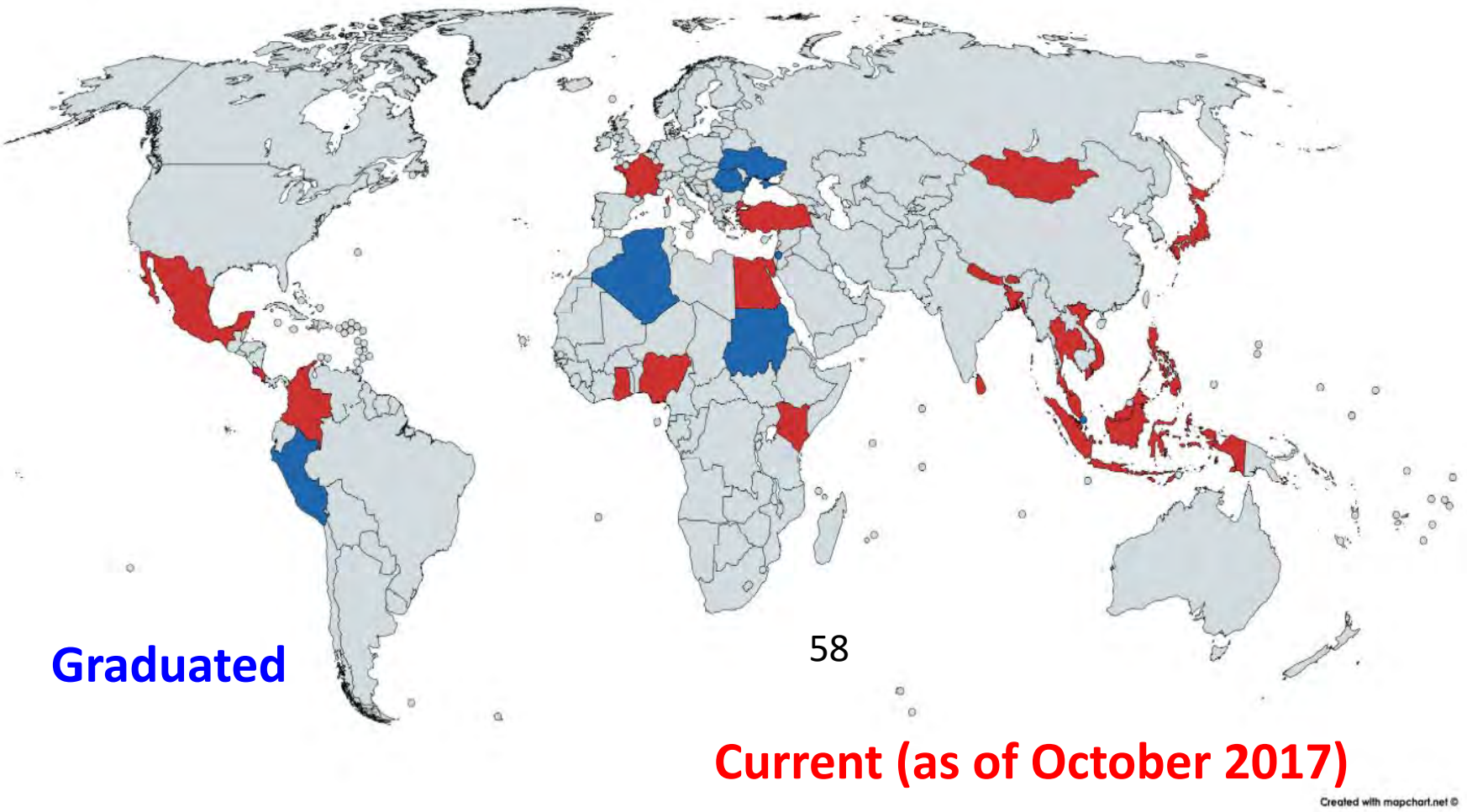

In Japan, the academic year starts in April – which is 6 months out of phase with most of the world. So at SEIC, the Japanese students generally start in the spring and the international students generally start in the fall.

On 5 April 2018, as shown in this photo, Prof Cho, Program Director of SEIC, did a 15-minute presentation outlining the merits of joining SEIC.

To highlight SEIC's remarkable diversity, he presented a map of the world indicating where SEIC students come from – **see the next page**.

## The fantastic diversity of SEIC of Kyutech:

71 foreign students from 26 countries enrolled in 5 years




**SEIC = Space Engineering International Course**

## 13. All back issues of the LaSEINE Annual Report are available on line


The **BIRDS Project** is conducted by **LaSEINE**, Laboratory of Spacecraft Environment Interaction Engineering, whose director is Prof. Mengu Cho.

The Laboratory issues an annual report (mainly in Japanese) each year in March – the cover of the March 2018 issue is shown at the left. It covers fiscal year 2017 (which ended 31 March 2018).

All back issues are available as pdf. Please go to this web link to download any one of them:

http://laseine.ele.kyutech.ac.jp/download/download.html

-- The BIRDS Project Newsletter Editor

# 14. Bhutan students are interviewed for radio program in Bhutan

KUZOO fm
voice of the youth

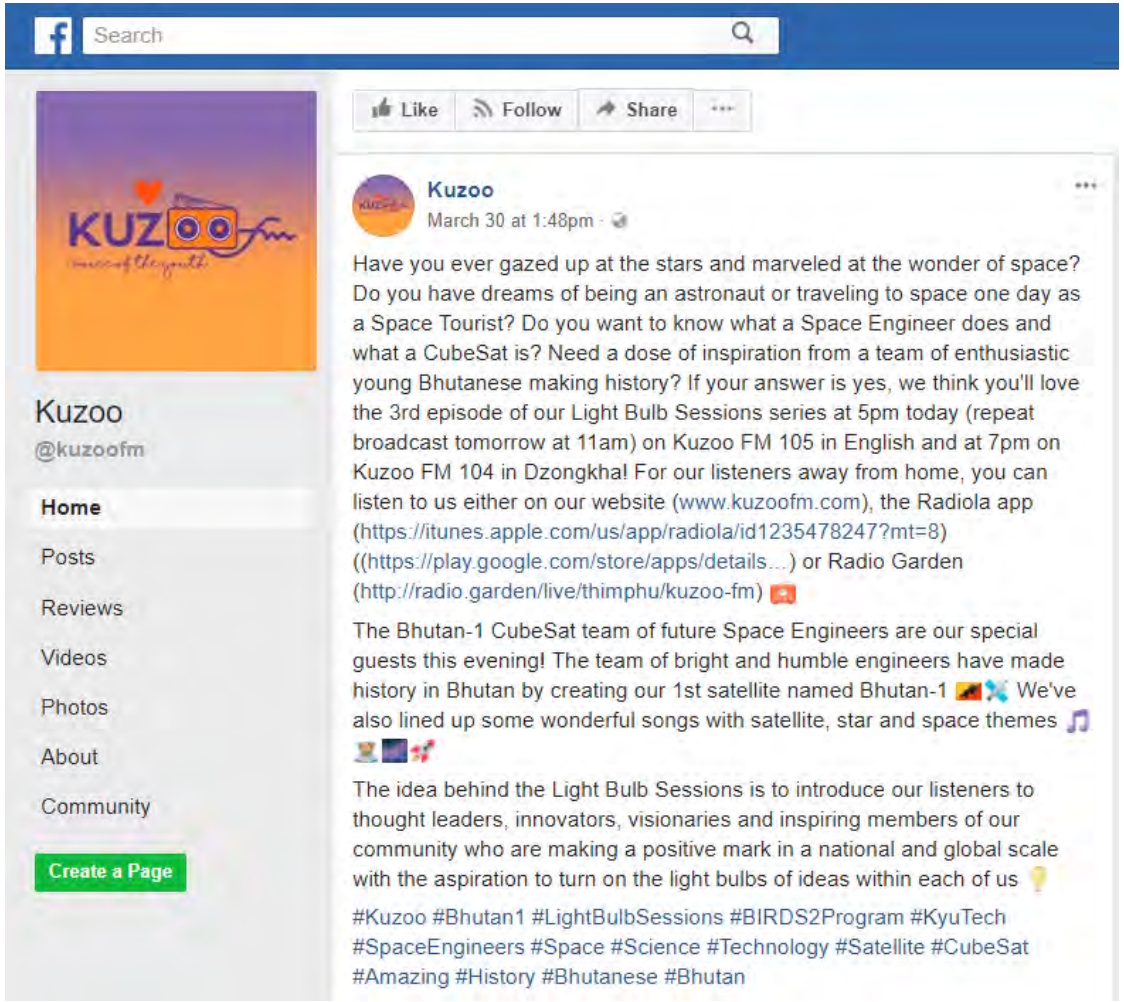
## Our Story

KUZOO · THURSDAY, MARCH 22, 2018

Kuzoo is a youth oriented radio station and the first project implemented under the People's Project of His Majesty's Secretariat.

Our first broadcast was aired on 26 September 2006. Kuzoo FM has 2 stations - one airing all content in English and the other in Dzongkha, our national language. We are Bhutan's second largest radio station with nation-wide coverage! We are headquartered in the capital city of Thimphu.

At Kuzoo, we are passionate about music, interacting with our listeners on our call-in shows, and through our social media pages such as Facebook and Instagram. We love producing quality programs that inform, educate, inspire and entertain.




**Continued on the next page**


Yeshey Cheki Kiran

This interview for radio was recorded on 27th March 2018, and aired on 30th March 2018. It was aired again on 31th March.

This section was submitted by Cheki (BIRDS-2, Bhutan)

# 15. GEDC Airbus Diversity award is written up in Kyutech periodical

KYUSHU INSTITUTE OF TECHNOLOGY 2018 SPRING

九工大通信

KYUTECH TIMES

VOL. 51 2018.4.1 SPRING

KYUSHU INSTITUTE OF TECHNOLOGY

「BIRDS（バーズ）プロジェクト、エアバス ダイバーシティ賞を受賞」

アジア、アフリカ諸国との間で衛星を共同開発するプロジェクト（BIRDSプロジェクト）は、昨年の7月7日に各国の衛星（5基）を宇宙空間へ放出することに成功しました。このBIRDSプロジェクトにおいて実践してきた新興国・途上国出身の留学生を対象とした宇宙工学教育が高く評価され、「GEDC Airbus Diversity Award 2017」を受賞しました。

この賞は世界的航空機メーカーのエアバス社が、工学教育に多様性をもたらす成功例を対象として国際的機関を表彰するもので、今回は18ヶ国45件の応募の中から、本プロジェクトが見事に今年の受賞団体に選出されるという快挙を成し遂げました。

また、現在、その後継プロジェクト「BIRDS2プロジェクト」が平成30年6月頃の衛星放出にむけ準備を進めています。

右端：リーダーのタイウォさん

BIRDS Project

Spring 2018 issue of “Kyutech Times” (Vol. 51) describes the Airbus award that the BIRDS Project received last year.  It is a big feather in our cap.

## 16. Dates of 3rd BIRDS International Workshop, in Mongolia


# 16-19 August 2018

http://sas.num.edu.mn/birds2018/

# 17. Prime Minister of Bhutan meets the President of JAXA on 11 April 2018

© JAXA

www.jaxa.jp/projects/int/index_j.html

## Bhutan's first satellite (BIRDS-2) will be deployed from the ISS this summer.

平成30年4月11日、JAXA山川理事長は、ブータン王国のツェリン・トブゲー首相と会談を行いました。両者は、夏頃に予定されているブータン初の超小型衛星（九州工業大学のBIRDSプロジェクト（※1）の枠組みで開発）の「きぼう」からの放出を通して、宇宙分野における協力関係がさらに深まることに期待を示しました。また両者は、人材育成などの今後の協力可能性についても意見交換を行い、今後のブータンの宇宙プログラムが拡大されることに期待を表明しました。

[text from JAXA website]

Continued next page

総合トップ　ビジネス　デジタル　ライフ　エンタメ　プレゼント

マイナビニュース　テクノロジー

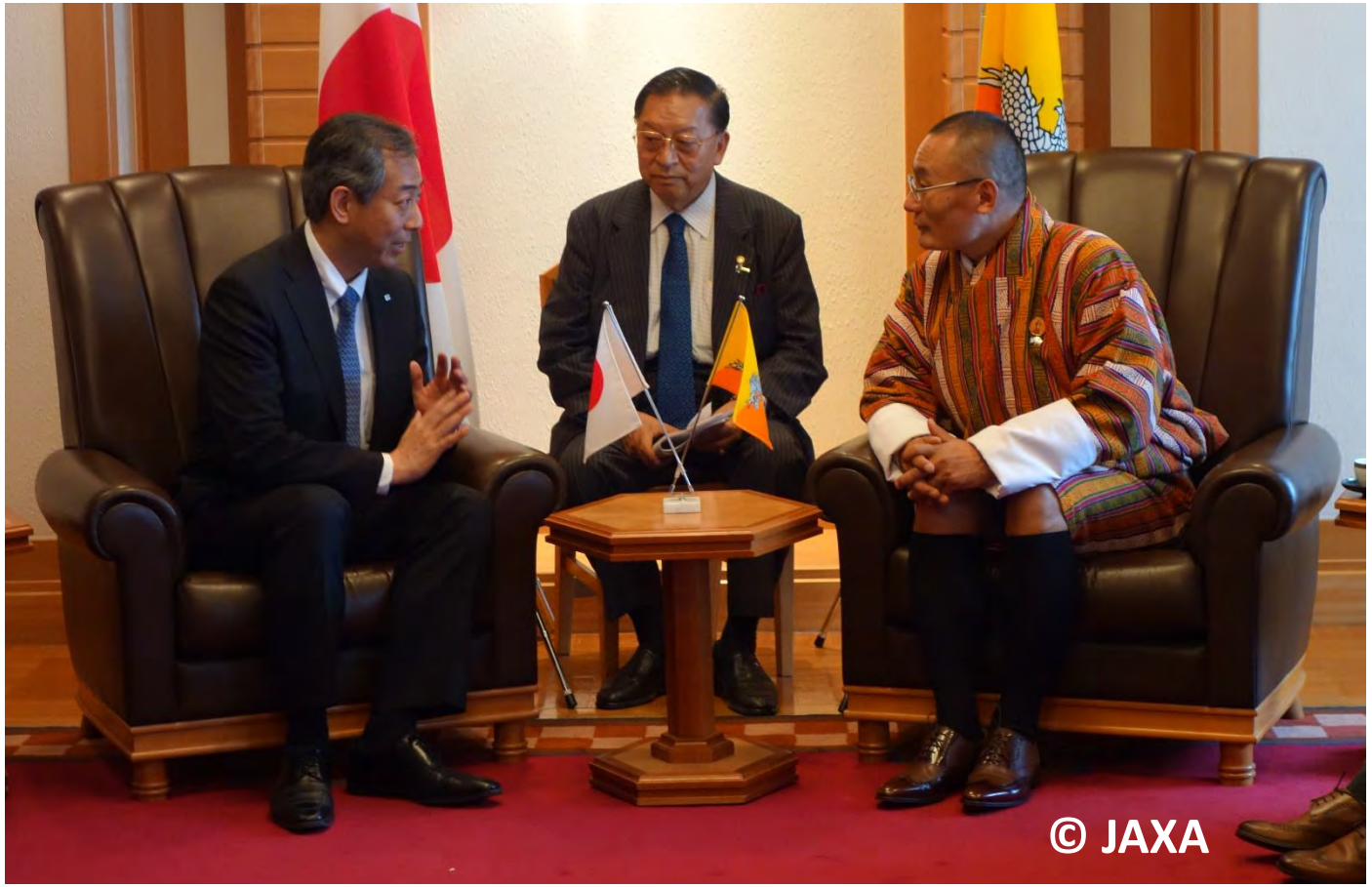
2018/04/11 19:37:35

# 日本の超小型衛星を世界が活用へ -- ブータン首相がJAXAを表敬訪問

小林行雄

関連キーワード: 宇宙 JAXA 人工衛星 天文学

日本から途上国・新興国に宇宙インフラの輸出を目指すことを掲げ、九州工業大学(九工大)が進めている1辺10cmの超小型衛星(キューブサット:CubeSat)をアジア・アフリカ諸国と共同で開発・運用することを目指す国際的な衛星開発プロジェクト「BIRDS」。その参加国の1つであるブータンの衛星フライトモデルが2018年2月に完成した。




JAXAの山川理事長(左)とブータン王国のトブゲー首相(右)による会談の様子。会談内容の詳細は明らかにされていないが、今後、ブータンが宇宙を活用していくにあたっての、人的交流や二国間での連携の強化などが話し合われた模様だ (写真は編集部撮影)

https://news.mynavi.jp/article/20180411-615130/

# 18. Project Manager of BIRDS-3 (Abhas) took an extended visit to Nepal for affairs of BIRDS-3

Arrival to Kathmandu by Korean Airlines

At the Ministry of Finance


International Conference on Renewable Energy Technology organized by Kathmandu University


Nepal-Japan Cultural Exchange at Patan

## Trip report by Abhas

NEPAL: TOUCHDOWN

I was back in the capital of Nepal, Kathmandu to support and facilitate NAST's payment of BIRDS-3 fund for Nepal to Kyutech from March 12 to April 2, 2018. The capital city is bustling metropolis of 2.5 million and is located inside Kathmandu Valley where cities such as Lalitpur and Bhaktapur are also located. During that time, a lot of events were happening including a very interesting Nepal-Japan cultural exchange that I got to witness in passing.

NAST

Nepal Academy of Science and Technology (NAST) is the stakeholder of NepaliSat-1 for BIRDS-3 Project. It was essential that NAST was briefed on the situation and progress of BIRDS-3, released the fund to Kyutech on time and created budget for sustainable space development in Nepal through NAST. Hari Ram Shrestha of NAST will also be joining Kyutech on October 2018 and will play an important part in BIRDS-3.

Presentation about BIRDS-3 Project Progress at NAST

Meeting on BIRDS-3 at Vice Chancellor's Office


Secretary of NAST Dr. Buddhinath Khadge



Hon. Minister of Finance
Dr. Yubaraj Khatiwada

Secretary (Revenue)
Shishir Kumar Dhungana

(1.) Secretary
Shankar Prasad Adhikari

(2.) Advisor to Minister of Finance
Dr. Ram Kharel

## MINISTRY OF FINANCE

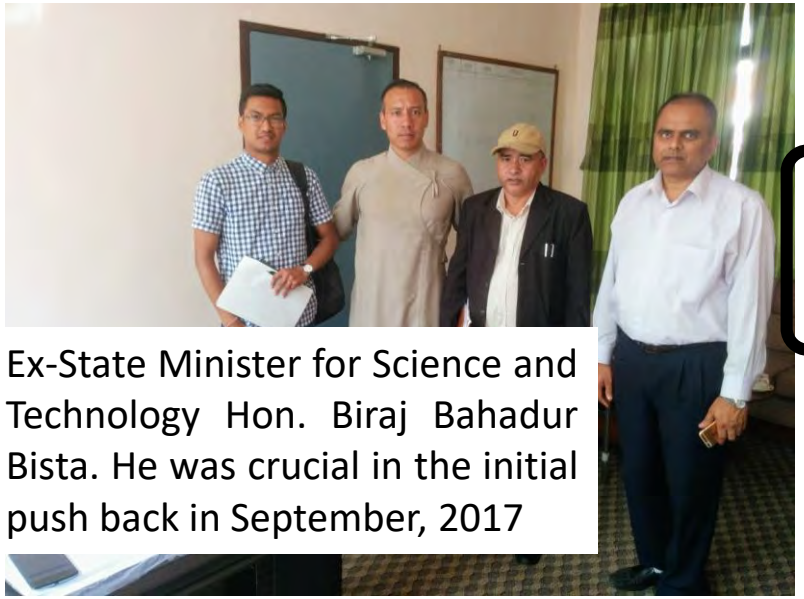
From the very start, Nepal Government's Ministry of Finance (MOF) has been strongly supportive of the BIRDS-3 Project. Both Secretaries as well as the advisor has been briefed on the Project and it's long term sustainable objectives. Prime on the agenda was to allocate budget from the next financial year for indigenous space development. The Ministry is very positive to support any such initiatives.

## MINISTRY OF EDUCATION, SCIENCE & TECHNOLOGY

After elections on late 2017, the Ministry of Education and Ministry of Science and Technology has combined to form Ministry of Education, Science & Technology. Since BIRDS-3 proposal was submitted last year, the Ministry has undergone three different Ministers. Current Hon. Minister Giriraj Mani Pokharel has given the project a priority after he was briefed on the project on March 2018.

First Presentation back in April, 2017 with Prof. Maeda

(1.) Hon. Minister Giriraj Mani Pokharel

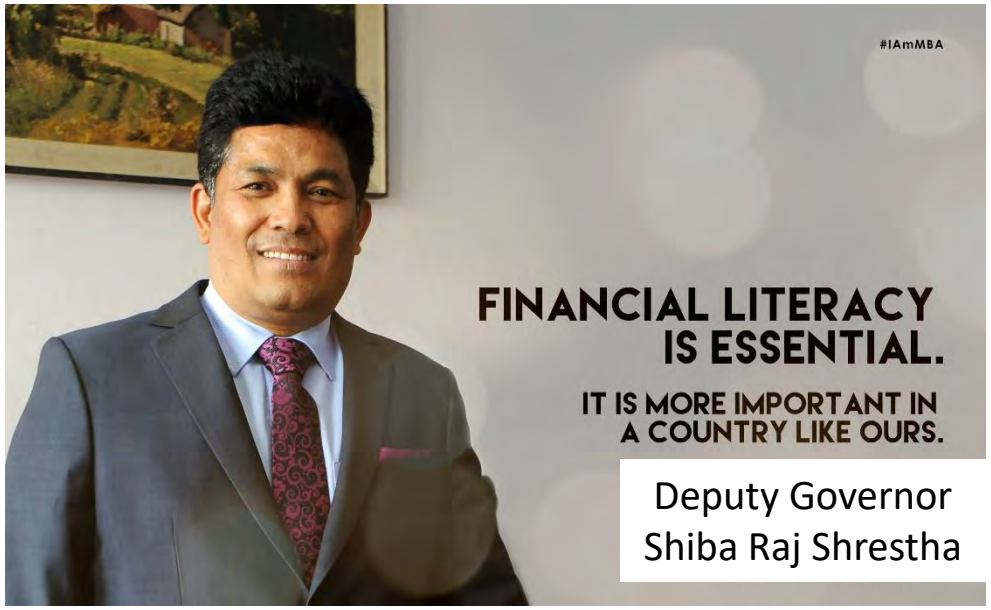


Ex-State Minister for Science and Technology Hon. Biraj Bahadur Bista. He was crucial in the initial push back in September, 2017

(1.)

Meeting at the Ministry on March, 2018

## NEPAL RASTRA BANK



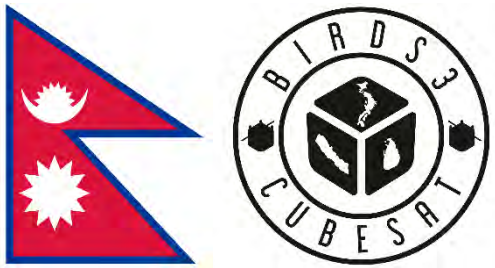
Deputy Governor
Shiba Raj Shrestha

Nepal Rastra Bank, the Central Bank of Nepal is responsible of overseeing all the capital outflow from the country. In case of BIRDS-3 for Nepal, NAST has to transfer the payment to Kyutech located in Japan. For that, the only bank in Nepal which has the legal jurisdiction to do so is the Rastra Bank. Deputy Governor, Shiba Raj Shrestha, understood the importance of the project and pushed the process into fast track so that NAST could transfer the funds before the CRA was terminated.

The transfer of the fund actually takes place at a branch office located in Kathmandu. The branch office only completes the transaction if the head office of Nepal Rastra Bank has no objection for the money to be transferred to Japan. The picture on the right shows NAST's Accounting Division, led by Head Accountant Mr. Pundit going to one of the department inside the bank. NAST continued to push on to complete the payment of Nepal's first satellite on time.


The Accounting Division of NAST
at the Nepal Rastra Bank

Remittance procedure from
NAST to Kyutech for BIRDS-3 Nepal




Government Releases Fund to NAST

Ministry of Finance
(अर्थ मन्त्रालय)

Financial Comptroller General Office
(महालेखा नियन्त्रक कार्यालय)

Accounting Branch
(कोष तथा लेखा नियन्त्रक कार्यालय)

Permit

Permit

Cheque

Kyutech, Japan

Remit

Nepal Rastra Bank Branch Office

Tax Clearance?

No Objection

No Objection Letter?

Internal Revenue Office

Tax Clearance

Nepal Rastra Bank Head Office
(नेपाल राष्ट्र बैंक)

Decides the Tax

Pays Tax

Financial Comptroller Branch Office

How to pay tax?

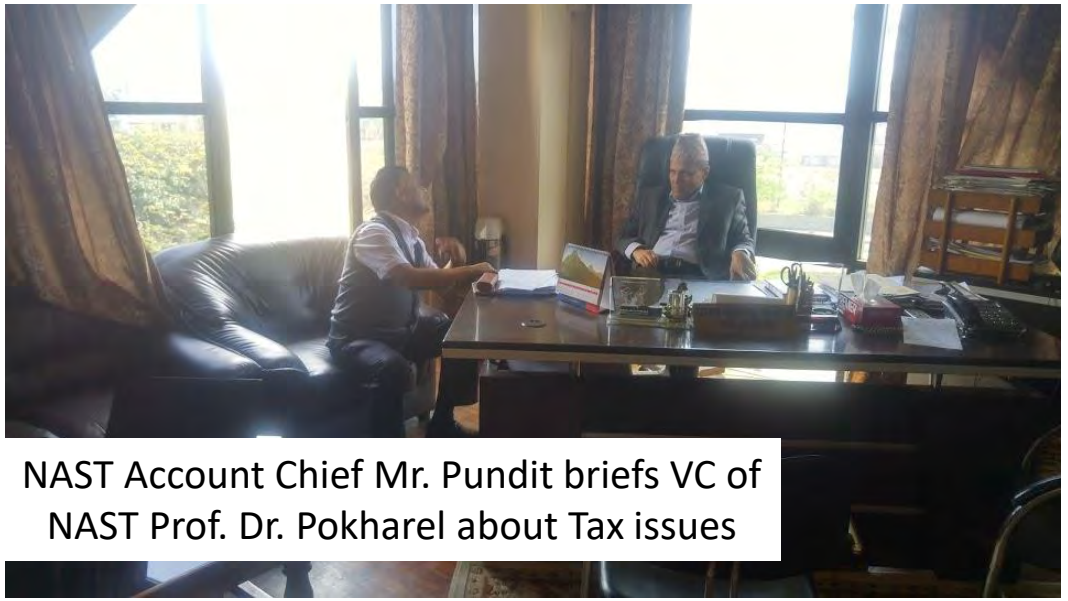
NAST

Follow up

Ministry of Education, Science & Technology

INTERNAL REVENUE DEPARTMENT

Because no such project had ever come through to this stage, the Internal Revenue Department had to make a decision regarding whether to 1) tax or not tax 2) if to tax, by how much 3) do apply VAT? The department called BIRDS-3 project a “peculiar” project. Top officials from the department sat down, discussed and issued a 10% Tax with a 13% VAT on the payment NAST was making to Kyutech.



NAST Account Chief Mr. Pundit briefs VC of NAST Prof. Dr. Pokharel about Tax issues

Tax Section Chief Lal Bahadur Khatri


With NAST’s accountant Mr. Phuyal at Internal Revenue Office

National Planning Commission Member Hon. Dr. Sunil Babu Shrestha

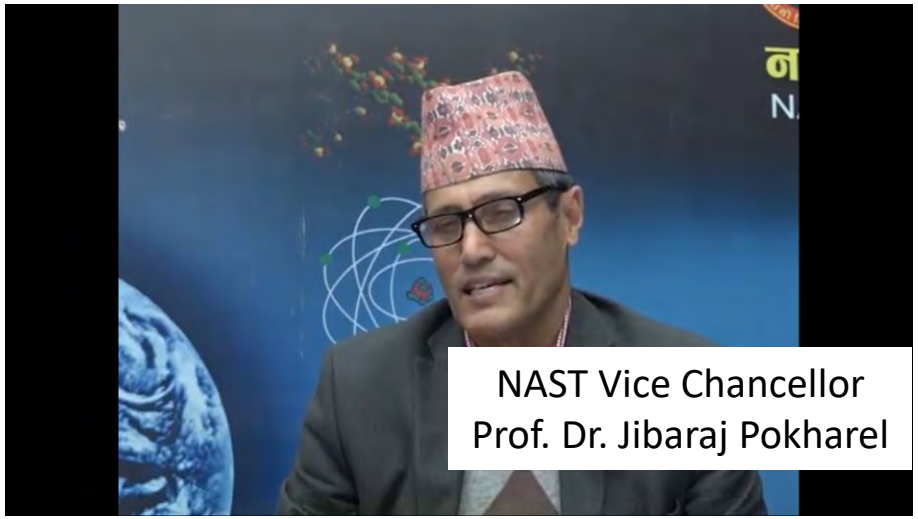
NATIONAL PLANNING COMMISSION

Under the new federal structure of Nepal, it is not yet clear what the role of National Planning Commission (NPC) . However, during the initial stages for the push of BIRDS-3 satellite project for Nepal, the NPC was instrumental with the help of then Hon. Vice Chairperson Dr. Swarnim Wagle and Member Dr. Sunil Babu Shrestha. During a meeting again in March 2018, with Dr. Shrestha, he expressed his support to the project.

**End of Trip Report by Abhas** – *good job Abhas!*

# 19. Media Watch: BIRDS-3 described on television in Nepal


NAST's Program "Bigyan Prawidhi" [Scientific Technologies]



NAST Vice Chancellor Prof. Dr. Jibaraj Pokharel

BIRDS-1 Team

BIRDS-2 Team

NEPAL TELEVISION
Communication for Development

In Nepal Academy of Science and Technology (NAST)'s weekly program on national television, Nepal TV, Prof. Jibaraj Pokharel gave an interview about NAST-Kyutech Cooperative Research Agreement to build Nepal's first satellite. He gave a short introduction about the BIRDS project, Nepal's involvement in BIRDS-3 to build the first satellite and also a short history about city of Kitakyushu. The program was aired on March 10, 2018.

**This page was provided by Abhas.**

# BIRDS-3 DATA COLLECTION MISSION

By: Tharindu Dayarathna (BIRDS-3, Sri Lanka)

# Mission Statement and Objective

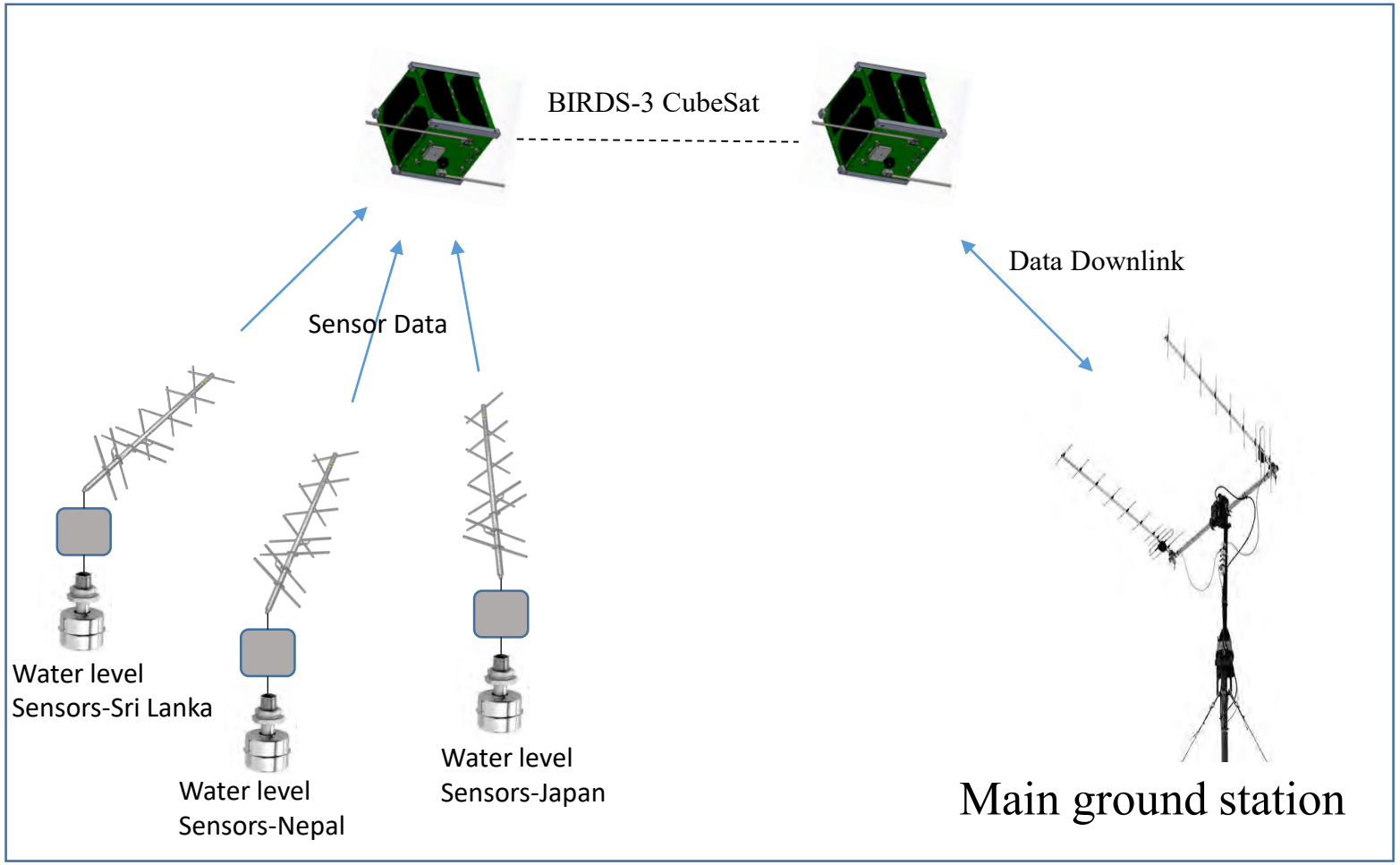
## Mission Statement

Satellite based data collection system is necessary for participating countries, specially Sri Lanka and Nepal, for better early disaster warning system (ex. Floods, GLOF) in the future.

## Mission Objective

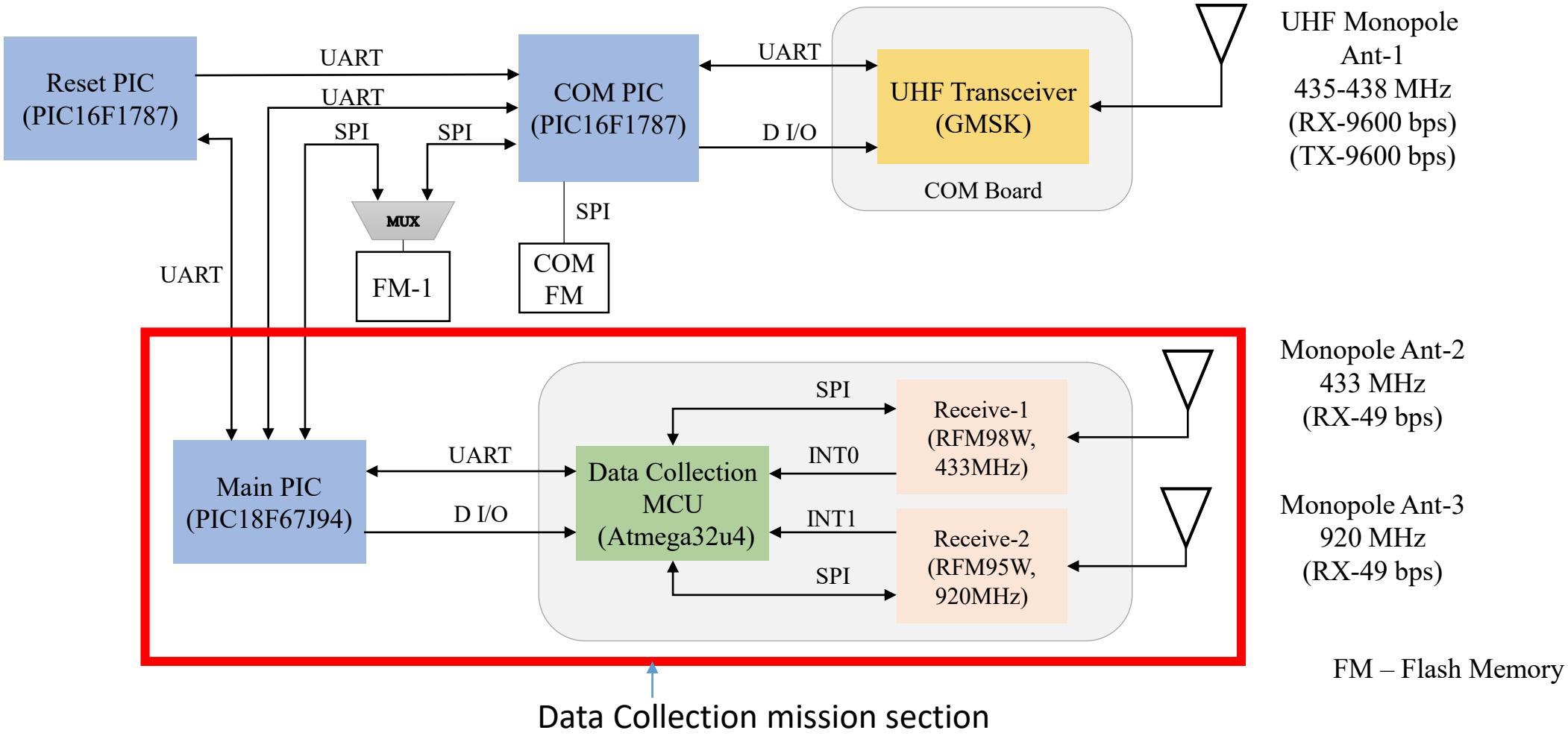
To demonstrate the use of a CubeSat constellation-based data collection system for remote data collection by using remote stations with low power transmitter.

# Introduction




- BIRDS-3 Satellite will have LoRa receivers operating in two different frequencies. Dedicated receiver will only be turned on when the satellite passes over particular region (for japan 920 MHz ,for Nepal and Sri Lanka 433MHz).
- Every participating country will have remote station with LoRa transmitters and they will be sending water level data of selected rivers.

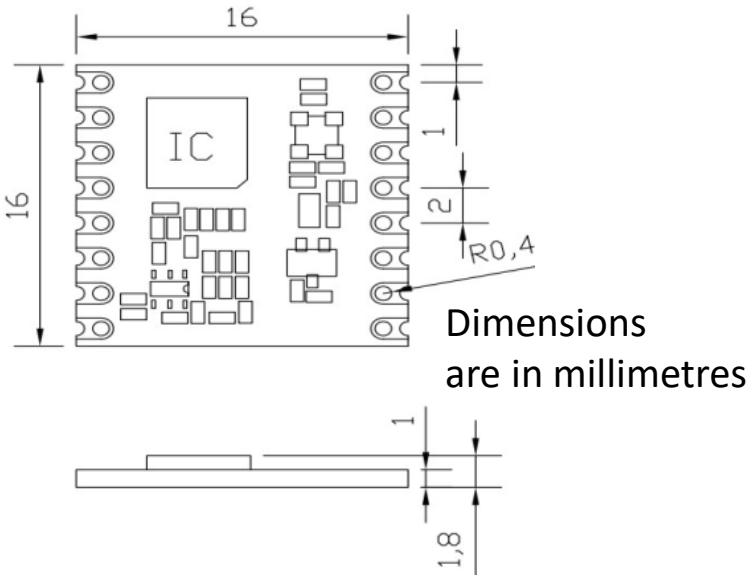
# Data Collection Mission Block Diagram



# LoRa modules used for BIRDS-3 Data Collection mission


RFM98W (433MHz Module)


RFM95W (920MHz Module)




Dimensions are in millimetres

## Key Parameters of modules

| Part Number | Frequency | Spreading Factor | Bandwidth | Effective Bitrate | Est. Sensitivity |
|---|---|---|---|---|---|
| RFM95W | 920 MHz | 6 - 12 | 7.8 - 500 kHz | .018 - 37.5 kbps | -111 to -148 dBm |
| RFM98W | 433MHz | 6- 12 | 7.8 - 500 kHz | .018 - 37.5 kbps | -111 to -148 dBm |

# Remote station and onboard receiver properties

**Remote station transmitter**

| | **Specifications** |
|---|---|
| Frequency | 920MHz or 433MHz |
| Modulation | LoRa |
| Power consumption | 3.3 V, 100 mA |
| RF transmission power | 20 mW |
| Bit rate | 49 bps |
| Interface | RS-232 |

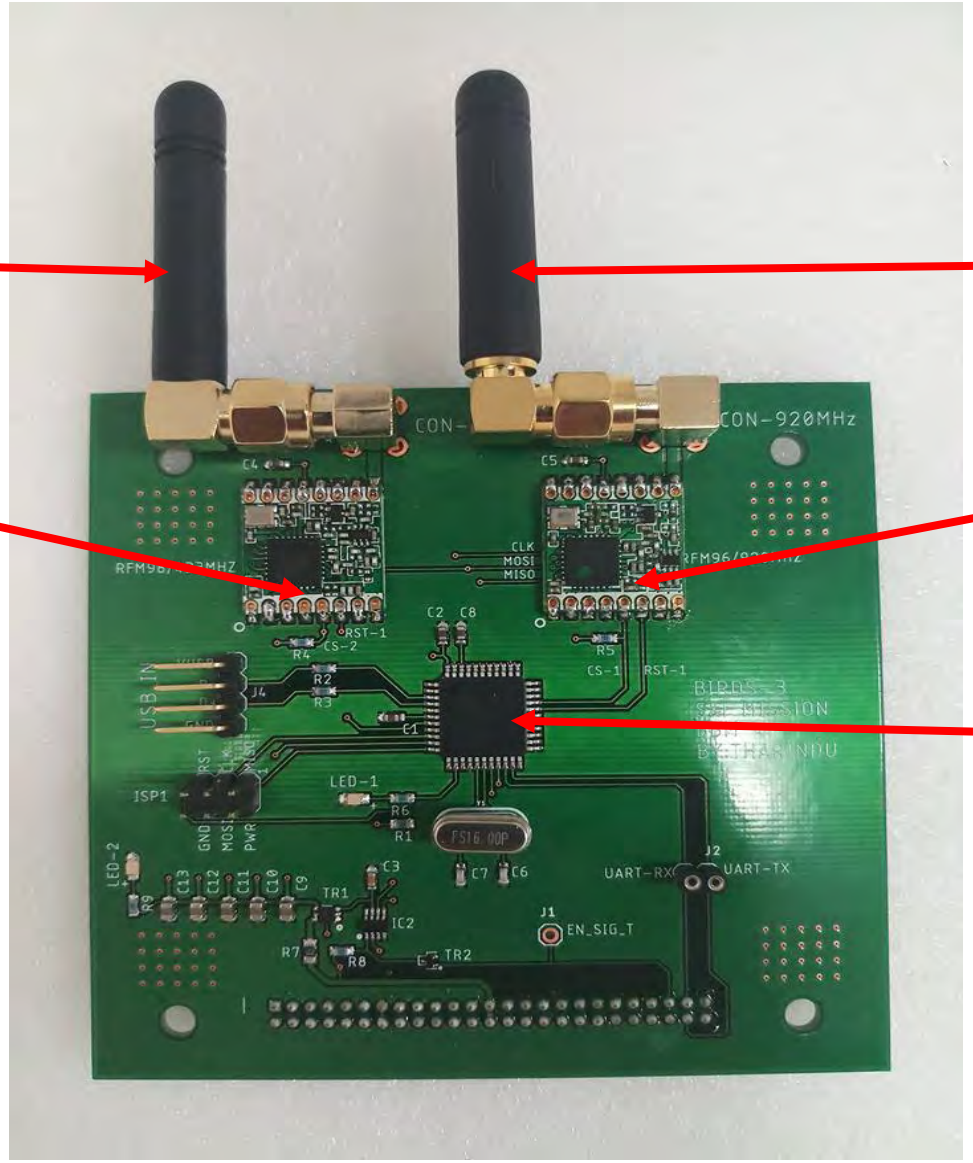
**Receiver onboard**

| | **Specifications** |
|---|---|
| Frequency | 920MHz or 433MHz |
| Modulation | LoRa |
| Power consumption | Both receivers – 3.3V, 38mA receiving |
| | Only one receiver – 3.3V , 28mA receiving |
| Sensitivity | -145 dBm |
| Interface | RS-232 |

# Data Collection Mission BBM Board

433 MHz
Helical antenna
(Gain 2 dBi)

920 MHz
Mono Pole antenna
(Gain 2.14 dBi)




433 MHz
LoRa
Receiver

920 MHz
LoRa
Receiver

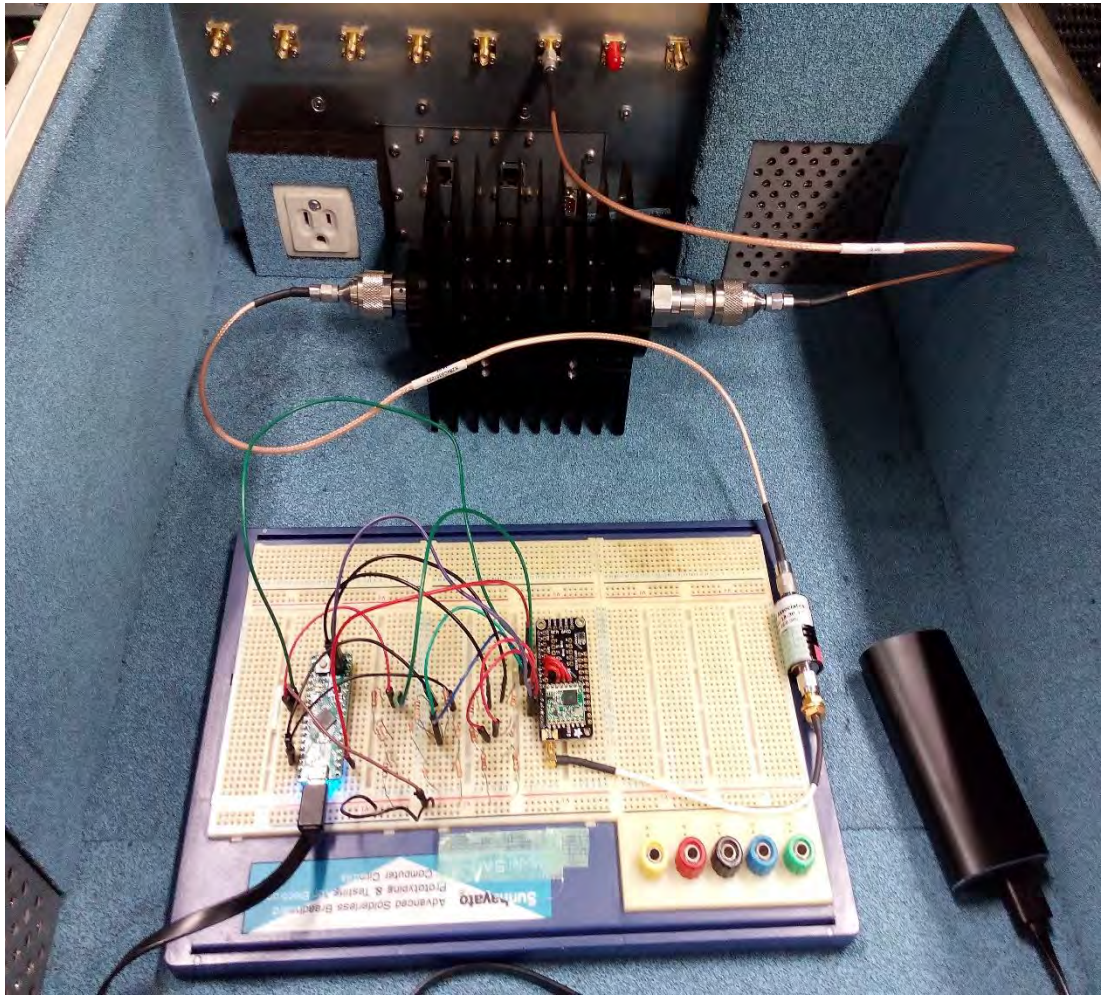
MCU
(Atmega32u4)

BBM - Bread board model

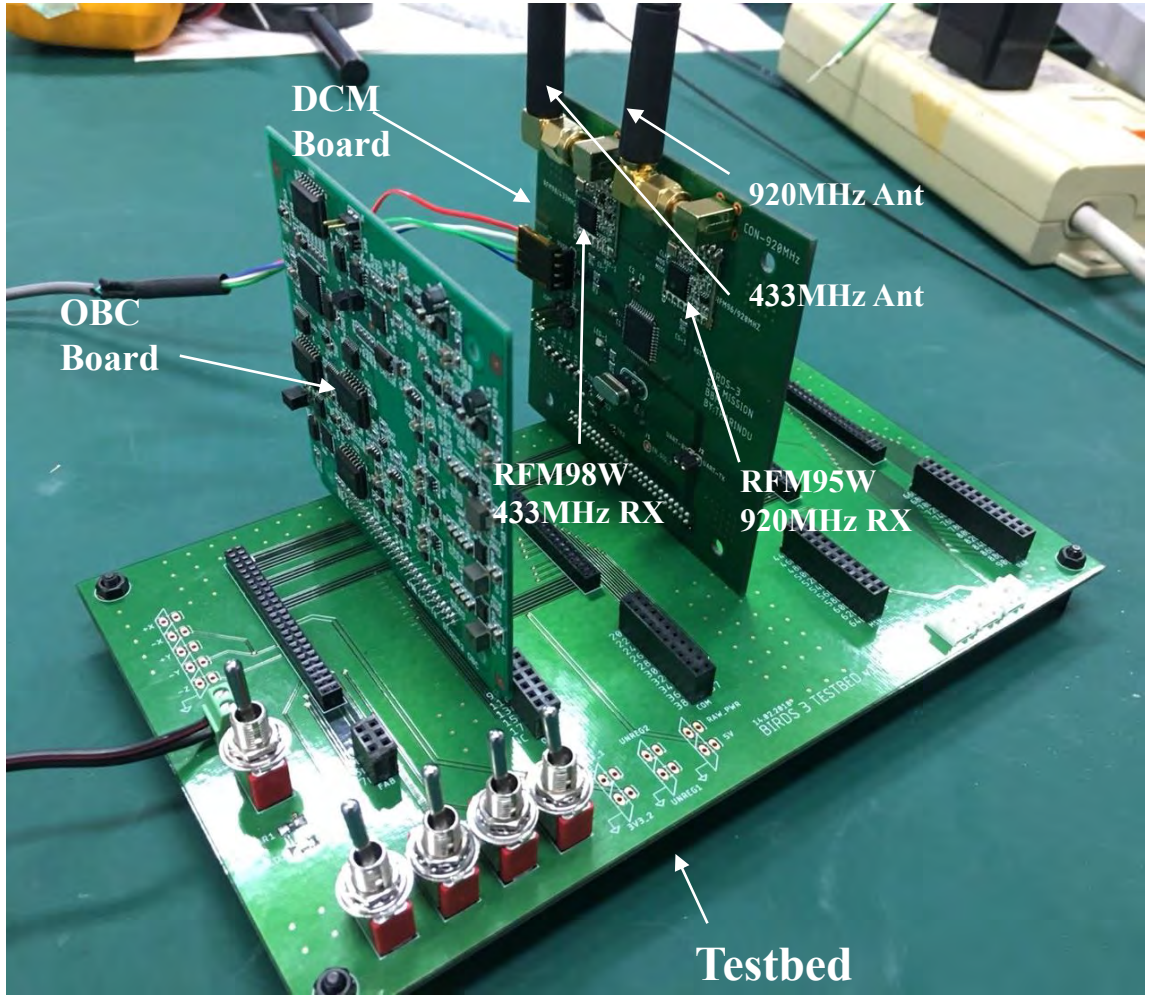
BBM - Bread board model
OBC - On board computer
DCM - Data Collection Mission

End of report by Tharindu
-- good summary !

# Data Collection BBM Board testing



Transmitter BBM




Receiver (Satellite side)

# 21. BIRDS-2 students visit remote station in Bhutan

**Report by Pooja Lepcha**

- continued on the next page.

Cheki Dorji and Pooja Lepcha, members of BIRDS-2 Project from Bhutan visited one of the remote weather stations located in Kabesa, Thimphu. One of the missions of BIRDS-2 is demonstration of remote data collection using satellite based Store and Forward system. On Bhutan's side, the data collection system (GST) will be implemented in collaboration with the National Centre for Hydrology and Meteorology (NCHM) using the data from sensors already in place for weather forecasting used in the county.


Figure: One of the NCHM officials demonstrating the data collection system

The officials of NCHM expressed their interest in coming up of the nano-satellites for data collection since the expenditure incurred in using the services of IRIDIUM was expensive. They said they looked forward for the success of the country's first satellite and the mission.


The GST will be developed in Kyutech and sent to Bhutan for implementation in one of these remote stations.

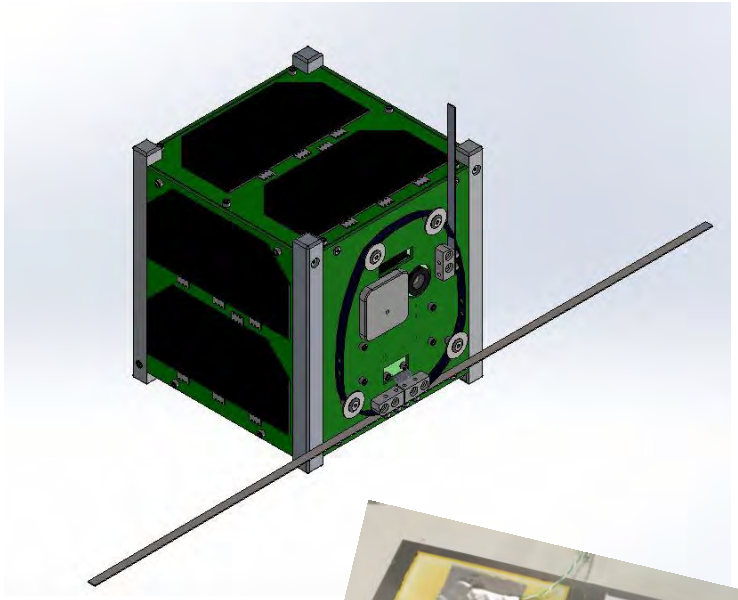
The remote station has various sensors to measure temperature, humidity, wind speed, wind direction, is solar powered and operates independently. The station sends the data to the central station using the IRIDIUM satellite.

# 22. BIRDS-3:  Structure and glue

By Sasaki  (佐々木悠二 )

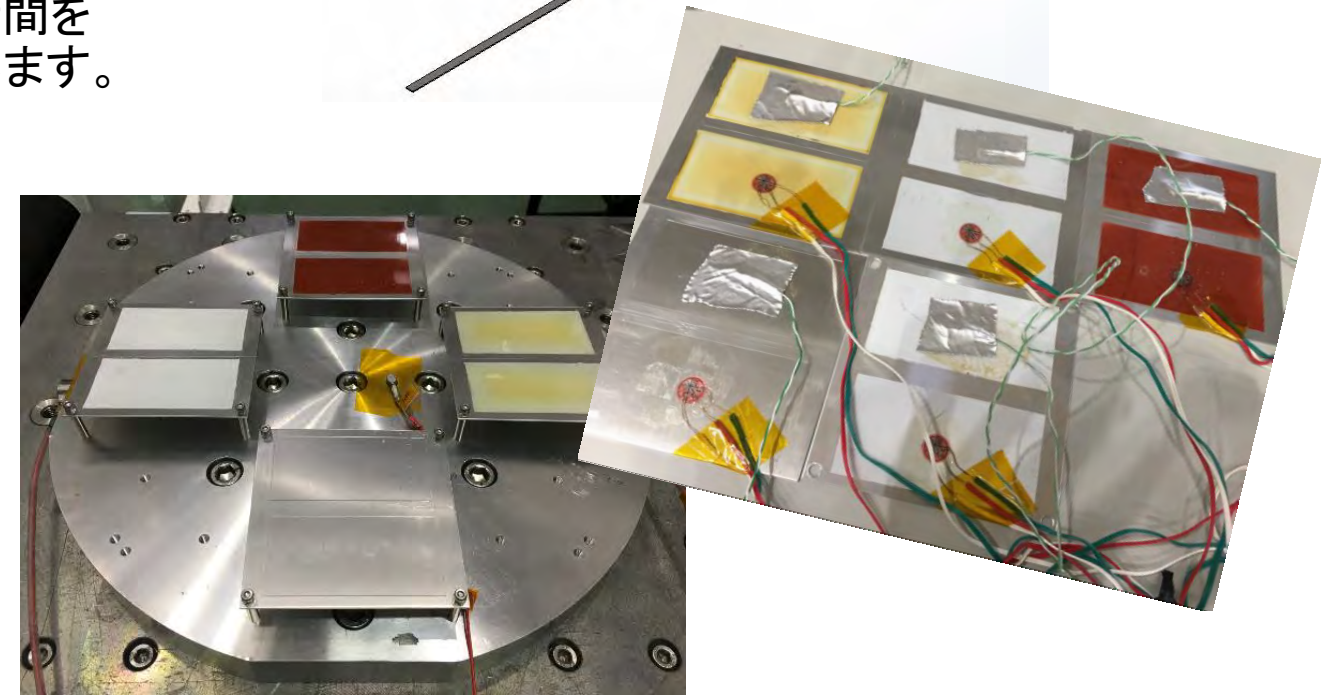
## Structure

BIRDS3の構体を設計しました。ベースはBIRDS2をもとに改良しました。図からわかるようにアンテナが2つから3つに増えました。他にもバックプレーンの配置が変わりました。フレームの設計はほとんど同じにして設計の時間を短くすることで開発期間を短くすることを目的としています。



## Glue

宇宙用の接着剤に代わる民生品の接着剤を選定してコストの削減、納期の短縮を図ります。選定した接着剤を宇宙で使用可能か確認するために熱サイクル試験とランダム振動試験を実施した。試験後のサンプルに変化はあまり見られなかった。これから他の試験を実施して選定をしていく。



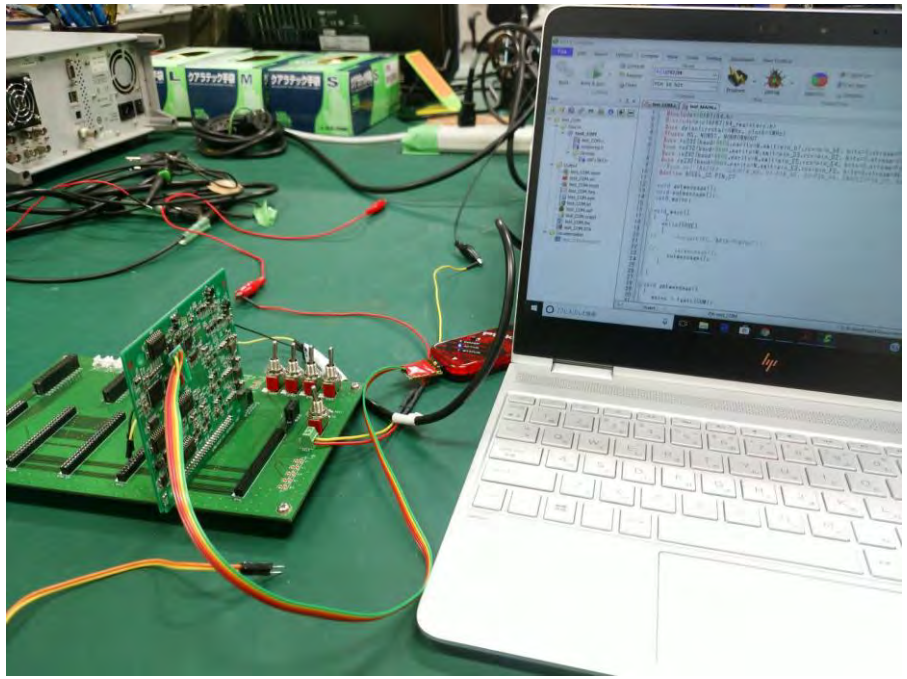
# 23. BIRDS-3:  OBC work　[On Board Computer]

私は、BIRDS-3で姿勢制御担当だったものの、紆余曲折ありOBCに転向した柿本です。

OBCは各サブシステムへ指令を出したり、ミッションデータ、センサデータ等を受け渡したりと、システムの中枢に位置する部分になります。

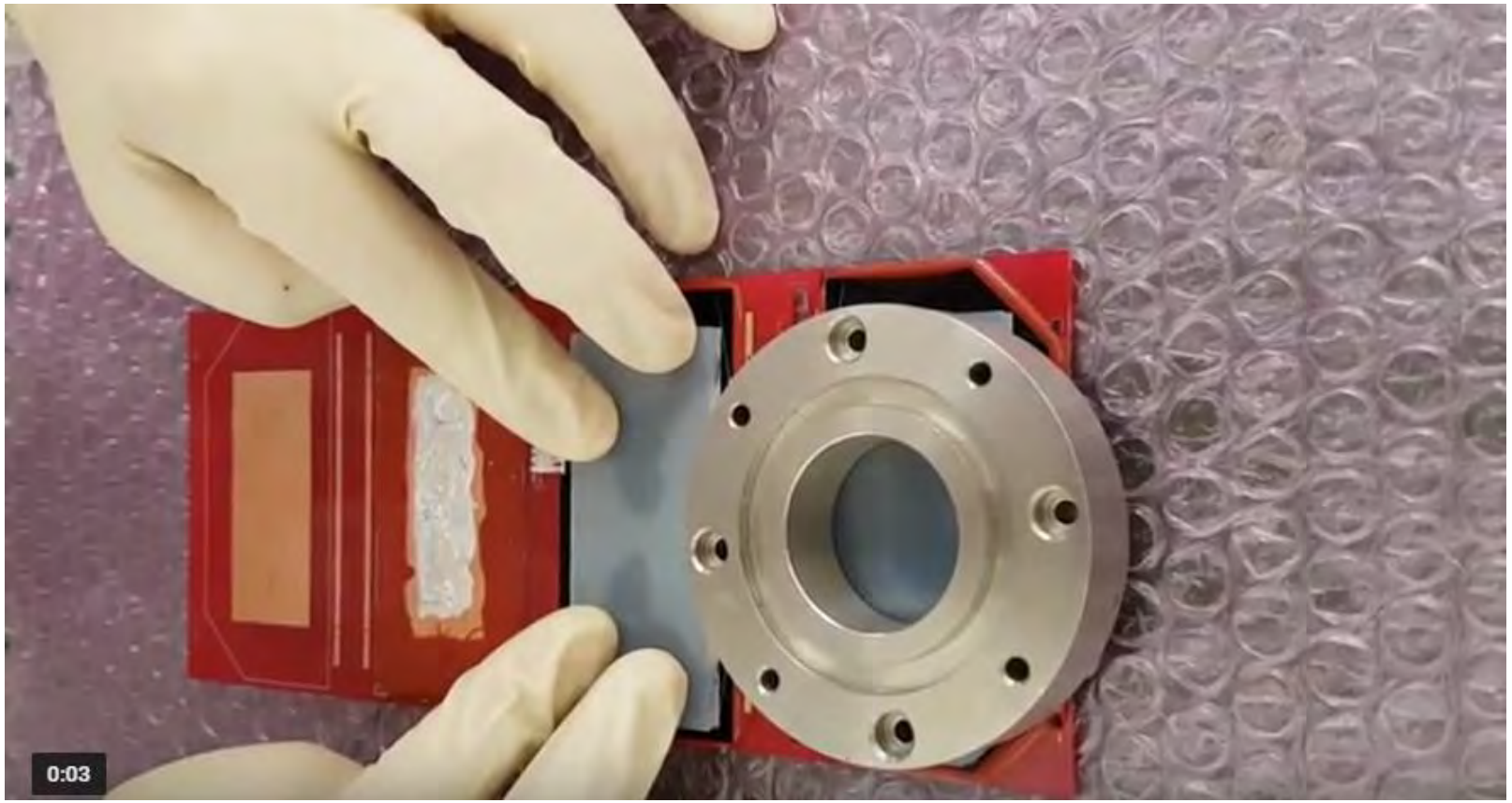
現在は各サブシステムのマイコン（PIC）との通信を確認している段階です。私はPICプログラミング初心者であるため、PICの様々な機能を勉強しながら開発を進めています。

今後はフローを考え、それに基づいてOBCを設計していきたいです。



# 24. A short video showing how solar cells are glued to satellite surface

This one-minute video was provided by Dr. Kateryna Aheieva (Project Manager of SPATIUM) to illustrate roughly how it is done.  After placement, you need to wait at least one day to let the glue cure.




https://drive.google.com/open?id=1YBKj8Xyx-8zeXdTmCpBrKC7MyvlzEx5f

# BIRDS-2 Members' Bowling Competition!

Prepared by:

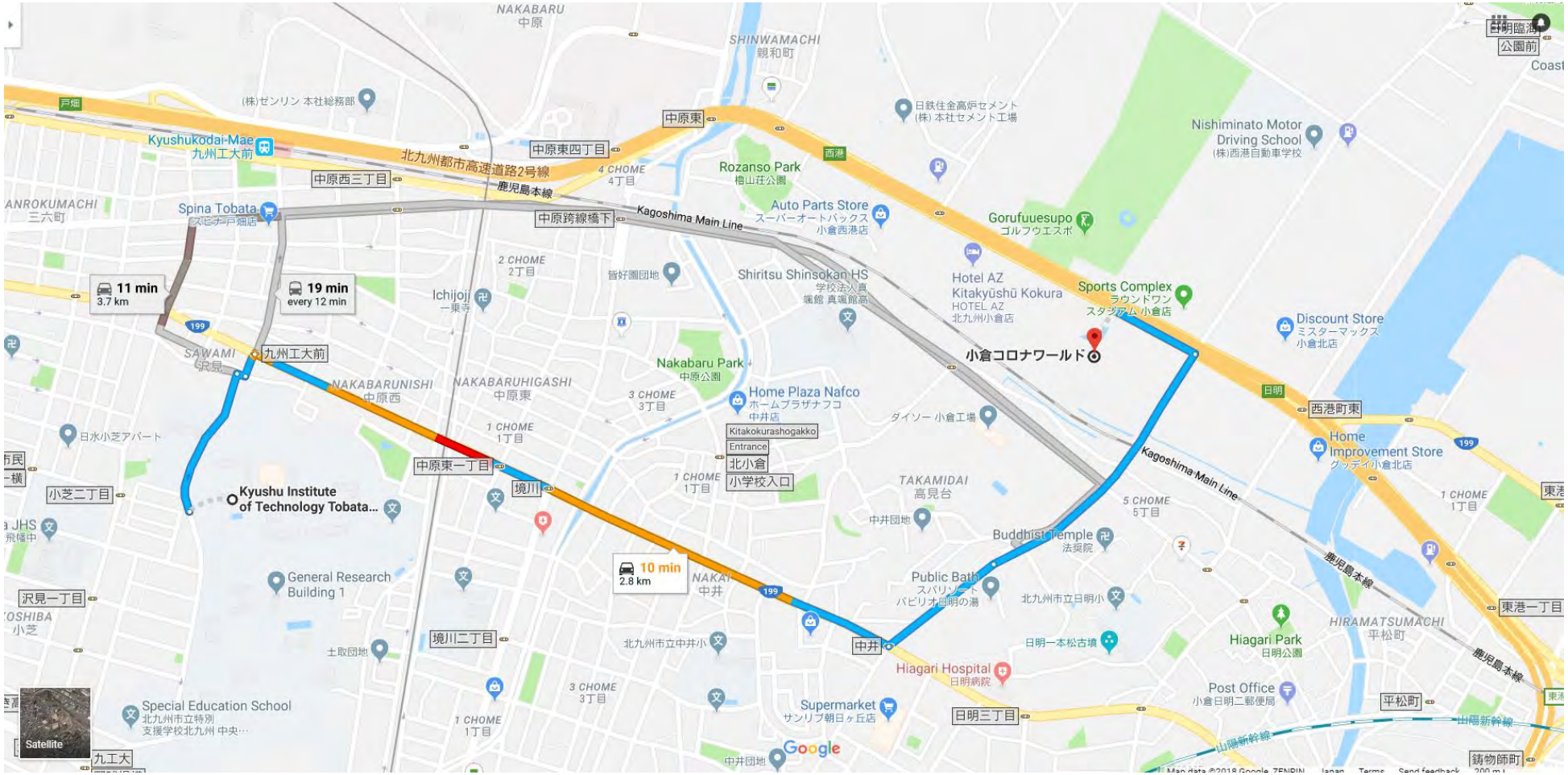
Adrian C. Salces (BIRDS-2 member from the Philippines)

Credit for the photos:

Cheki Dorji (BIRDS-2 member from Bhutan)

# Date and Venue:

- April 18, 2018, Korona Amusement Center, Kitakyushu City, Japan



# The Players

- Team A: Cheki Dorji, Daiki Yamaguchi, Adrian Salces, Hasif Azami
- Team B: Kiran Pradhan, Tomoki Uemura, Joven Javier, Akmal Rasheeq (Syazana's husband)

From left to right: Hasif, Yamaguchi, Cheki, Joven, Kiran, Uemura, Akmal

From left to right: Adrian, Hasif, Yamaguchi, Cheki, Joven, Uemura, Kiran, Akmal

# Games before the bowling competition


# Photos during bowling competition – everyone was competitive!

Adrian's turn



Joven's turn

Cheki's turn (the best player!)


At stake: The winners had to pay only 600 yen while the losing team members had to pay 1000 yen.

# Photos during bowling competition – everyone was competitive!

Uemura's turn



Yamaguchi's turn

Kiran's turn


At stake: The winners had to pay only 600 yen while the losing team members had to pay 1000 yen.

# Teams' Scores

Round 1


Team A: 411; Team B: 406
Team A won the 1st round – but only by a small margin.

Round 2


Team A: 467; Team B: 435
Team A also won the 2nd round – this time by a large margin. ☺

**END OF BOWLING REPORT BY ADRIAN**
**. . . . nice report, thanks. The Editor.**

# End of this **BIRDS Project Newsletter**

(ISSN 2433-8818)

# – Issue Number Twenty-Seven

This newsletter is archived at the BIRDS Project website:
http://www.birds-project.com/birds1/newsletter.html

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.