BIRDS Project Newsletter

Issue No. 12 (13 Jan. 2017)

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Project website: http://birds.ele.kyutech.ac.jp/
All back issues are archived at this website.
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At the top, click on the tab called NEWSLETTER. You will get a menu for all back issues.

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An art design by Amartuvshin Dagvasumberel
Department of Applied Science for Integrated System Engineering
Asami Laboratory
Graduate School of Engineering
Kyushu Institute of Technology
Kitakyushu, Japan.
1. Thanks and farewell to Salehin (who helped BIRDS-1 on antenna issues)

The engineering activities by Salehin during his stay are described in Issue No. 11 of this newsletter --- see Section 5, Issue No. 11, pages 10-11; it was written by Salehin.

Below: Pics from Section 5 of Issue No. 11.
2. BIRDS-1 and BIRDS-2 mentioned during Joint Session of SEU-WG and ST-WG of recent APRSAF (in Manila)

SEU=Space Environment Utilization
ST=Space Technology
At the right is page 23 of 29 of the final report by SEUWG.

AV-3, BIRDS-1, BIRDS-2, and DIWATA-1 are mentioned here.
3. BIRDS-2 Team celebrates 109th National Day of Bhutan

Photos of Section 3 were taken by Asst. Professors Kim and Maeda.

Date and Time:
17 Dec. 2016,
About noon to 13:30.

Location:
Cho Lab Seminar Room of the 4th floor of Building S-2 of Tobata Campus, Kyutech.

Syazana and her husband arrived later.

Continued on the next two pages.
Prof. Cho lights the candle for this occasion.

“Butter lamps are a common feature in Buddhist temples and monasteries throughout the Himalayas. A lighted butter lamp represents the illumination of wisdom and helps to focus the mind and aid meditation.”

From The Bhutan Canada Foundation

https://bhutancanada.org/bhutan-photo-of-the-week-butter-lamps/

Spicy hot meat dish by Cheki

Dishes by Yeshey
Before eating lunch, Kiran delivers a PowerPoint presentation about Bhutan – interesting stuff.

We enjoyed a great lunch.

Yeshey explains the dishes to Prof. Cho.
This Japan-Malaysia university-based engineering symposium took place on the Tobata Campus of Kyutech on the wintry weekend of 17 December. Around 95 students (70% women) flew in from UPM to participate.

During the banquet, Prof. Oie (President of Kyutech) chats with Ibukun, our BIRDS satellite engineer of Nigeria.

SEIC students mingle with the students of UPM.
15-minute oral presentations by Ibukun and Bonsu on 18th December 2016 as indicated by the SAES_2016 Program

<table>
<thead>
<tr>
<th>Ibukun Adebolu</th>
<th>JOINT GLOBAL MULTI-NATION BIRDS Project: An Overview</th>
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<tbody>
<tr>
<td>B. Bonsu</td>
<td>Preliminary Performance and Accuracy Evaluation for the 2.4GHz S-band Ground Station for Lean Satellite Tracking and Operation</td>
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Ibukun makes the case for capacity building

Bonsu extols the virtues of S-Band

Great job gentlemen!

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Handsome SEIC fellows pose for this shot.
5. BIRDS-1 engaged in assembly of Flight Models

All these photos were taken in the BIRDS-1 clean room. Note that each country team has its own work bench.
6. TV film crew comes from Mongolia to Kyutech

During the week of 19 December 2016, a film crew (shown at the left) from NUM (National University of Mongolia) and MNB (Mongolian National Broadcaster) came to Kyutech to shoot material for a MNB documentary about BIRDS-1, LaSEINE, SEIC, Kyutech, and various aspects of Kitakyushu. Their primary host was Prof. Kikuchi of Kyutech. This crew interviewed Prof. Cho on the BIRDS-1 Project and on LaSEINE.

From left to right:
1) Mrs. Tsevegsuren PUREVSUREN - Staff, Department of research and innovation, NUM
2) Mr. Tsogoo GANKHUU, Producer, Mongolian National Broadcaster
3) Mrs. Sayo Tsukinari, Secretary, LaSEINE, Kyutech, Japan
4) Mrs. Shuurai MENDBAYAR - Head of International affairs, NUM
5) Mrs. Osor OTGONJARGAL - Journalist, Mongolian National Broadcaster
In 2009, when Kyutech celebrated the 100th anniversary of its founding, it held a logo competition. The winning design came from a 4th year undergraduate student, 澤野大地氏.
8. Filming TV in Kitakyushu

[Image of a film poster titled "Devil Lover"]

8. Filming TV in Kitakyushu

Newsletter “Kitakyushu Bridges” by the City of Kitakyushu
http://www.city.kitakyushu.lg.jp/english/e20100007.html

Kitakyushu Supports a Thai Television Series!

Since the establishment of the Kitakyushu Film Commission in 1989, Kitakyushu has been branching out to television, film and media sectors by assisting various forms of support for film, drama and commercial makers such as providing shooting locations in the city. In total, more than 190 movies and television series have been supported by the commission and Kitakyushu, and the city is gaining publicity both home and abroad for being a well-known filming spot.

In September 2015, it was announced that “Devil Lover”, part of a new genre of romance-science-fiction, will be airing nationwide in Thailand from October and that the TV series was shot mainly in Kitakyushu, with around 120 local residents volunteering as unpaid extras. The filming took place for 11 days, spanning 30 filming locations, including the Hiraodai Limestone Plateau (a natural rock formation) and Koka Castle.

Pitchaya Nitipasankul (a.k.a. Golf), the protagonist and the producer of the drama commented that the appeal of the diverse range of locations convinced the creators to select Kitakyushu as the main shooting location at the press conference. Subsequently, Golf was appointed as Kitakyushu’s Cultural Ambassador to Thailand, where he will help to promote better mutual relations between Kitakyushu and Thailand.

Mayor Kitaishi also joined the production team at the press release which took place at the Japanese ambassador’s residence in Bangkok. During the interview, the mayor praised the local residents’ enthusiastic cooperation and also stated his anticipation of the training camp site to be provided by Kitakyushu for the Thai Olympic team for the upcoming 2020 Summer Olympics in Tokyo. The city also hopes to trigger a tourism boost from the increased media exposure.

Mission Definition Review (MDR)
[from Wikipedia]

“The MDR examines the proposed requirements, the mission architecture, and the flow down to all functional elements of the mission to ensure that the overall concept is complete, feasible, and consistent with available resources.”

Azami (Malaysia)

Thanks to Jesus and Dima for participating in this MDR

Yeshey (Bhutan)

Syazana (Malaysia)

Adrian (Philippines)

Held in the Cho Lab Seminar Room
The BIRDS-2 Team pose for group photo after the MDR.

Dr Amelia Greig (in the center, wearing green) was a guest participant of this MDR.

Members of the BIRDS-2 Team on 28 December 2016
10. Celebration of BIRDS-2 MDR completion, and the completion of Year 2016

On the evening of Wednesday, 28 Dec 2016, members of BIRDS 1 and 2 gathered to celebrate the completion of BIRDS-2 MDR, and also the completion of Year 2016.

We had a party .... see the next page.

Prof. Cho encourages the troops
BIRDS End-of-2016 Party

Happy New Year

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11. New Year Greetings from the BIRDS-1 Team (in the assembly clean room)

The photo at the right is from Taiwo’s Facebook.

The BIRDS-1 team has worked throughout the winter break – except for 01 January 2017, which was deemed a day of rest.

Heavy work schedule resumed on 02 January 2017 at 10:00 AM (vibration testing).
12. Paper to be published soon: *Classification of Countries Worldwide according to Satellite Activity Level*, by J. Polansky and M. Cho

**Classification of Countries Worldwide according to Satellite Activity Level**

By John Polansky\(^1\) and Mengu Cho\(^1\)

\(^1\)Laboratory of Spacecraft Environment Interaction Engineering, Kyushu Institute of Technology, Kitakyushu, Japan

(Received June 21st, 2015)

Emerging countries worldwide can benefit technologically, economically, and socially from domestic space-related activities. However, limited resources and lack of know-how prevent many non-space faring nations from initiating space projects, much less building sustainable space or satellite programs. New opportunities exist to overcome these barriers. The number of small satellites launched in the last three years has increased by an order of magnitude, and the market of satellites less than 50kg is projected to grow from $700M USD in 2014 to $2B USD by 2019. This paper gives an overview of space-related activities in various emerging countries and categorizes countries in nine regions worldwide according to level of satellite activity.

**Key Words:** Capacity Building, Lean Satellite, Small Satellites, Emerging Countries, Space Market

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This paper, highly relevant to the BIRDS Project and to its goals, will soon be published in the Transactions of JSASS, *The Japan Society for Aeronautical and Space Sciences*. Only the abstract is shown here at the right.

After publication, this newsletter will provide info on how you can access it because the contents are quite fascinating.
To communicate with BIRDS satellites you must have a valid radio operator's license

Article (the next four pages) prepared by:
Kiran Kumar Pradhan (Bhutan/BIRDS-2)
with support from Apiwat Jirawattanaphol (Thailand/BIRDS-1)

8 January 2017
Amateur Radio (Ham Radio)

Amateur radio (also called ham radio) describes the use of radio frequency spectrum for purposes of non-commercial exchange of messages, experimentation, self-training, private recreation, and emergency communication.

International Telecommunications Union (ITU) establishes the Amateur Radio services:
- International Telecommunications Regulations (ITR)
- Frequency allocation

National governments are responsible for:
- Operational procedures (Parameters)
- Call sign allocation
- Licenses (operators/stations)
BIRDS CubeSats operate in Amateur Radio frequencies:
- Downlink in **UHF Band**
- Uplink in the **VHF band**.

Thus, for BIRDS project,
- Each member needs an operator license
- all the Ground stations communicating with the BIRDS satellites need a station license.
Licensing

Responsibility of National Government/Regulator of a country.

For operation in a foreign country, obtain license from that foreign country through one of the following means:

1. Conversion of license if reciprocity agreement exists between the two nations.

2. If there is no reciprocity agreement then undertake the exam.
Licensing - BIRDS

All BIRDS members need to obtain valid operators license.

- Japanese members take Japanese exams
- Foreign participants take English-based USA exam coordinated by Federal Communications Commission (FCC).
  - The license obtained is then converted to Japanese license
- All the ground stations in each of the participating nations has to be registered with respective regulators with a valid call sign assigned to stations.
- License reciprocity exists between Japan and USA.
14. Ground Station (GS) of UiTM --- a status report

UiTM Ground Station

Universiti Teknologi MARA (UiTM)
Shah Alam, Selangor, MALAYSIA
Status report by Azami of BIRDS-2 Team on 6 January 2017
The Ground Station is at Level 21, Tower 2, Engineering Complex, UiTM

Faculty of Electrical Engineering, Engineering Complex, Universiti Teknologi MARA
# UiTM Ground Station Parameters

<table>
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<th>Components</th>
<th>Details</th>
</tr>
</thead>
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<tr>
<td>Transceiver</td>
<td>ICOM 9100</td>
</tr>
<tr>
<td>Antenna</td>
<td>2x Yagi-Uda antennas (UHF &amp; VHF)</td>
</tr>
<tr>
<td>Rotator</td>
<td>YAESU G-5500 (Az-El rotator)</td>
</tr>
<tr>
<td>Terminal Node Controller</td>
<td>KAM-XL</td>
</tr>
<tr>
<td>Antenna Frequency</td>
<td>UHF (430-438 MHz), VHF (144-148 MHz)</td>
</tr>
<tr>
<td>Data Rate</td>
<td>45-9600 bps</td>
</tr>
<tr>
<td>Station Call Sign</td>
<td><em>In Progress</em></td>
</tr>
<tr>
<td>Altitude (above sea level)</td>
<td>Very roughly 100 m</td>
</tr>
<tr>
<td>Latitude</td>
<td>3 04’23.30” N</td>
</tr>
<tr>
<td>Longitude</td>
<td>101 29’50.51” E</td>
</tr>
<tr>
<td>Installation Goal</td>
<td>2017</td>
</tr>
</tbody>
</table>
UiTM Ground Station Block Diagram Overview
The UiTM Ground Station Team

Location where the antennas will be installed – Dr Huda
Taken on 17 December 2016

Dr Norsuzila, Dr Huzaimy, Dr Idnin, Hasif
(not in the photo: Dr Huda and Dr Tarmizi)
Taken on 3 January 2017
15. Thermal Test Plan for BIRDS-1 Flight Models – the plan was drafted by Nakamura-san

Introduction
The thermal vacuum tests of the five Flight Models of BIRDS-1 satellites demonstrate the ability of the satellite to meet qualification requirements under vacuum conditions and temperature extremes which simulate those predicted for flight plus a design margin, and to withstand the thermal stressing environment of the satellite thermal vacuum acceptance test plus a qualification margin on temperature range and number of cycles.

Purpose
Overall test description
- Verify the satellite temperature under the worst conditions
- Verify the satellite functionality under the orbit environment conditions
- Verify the operation of the thermal monitor and control system

To perform thermal testing, thermocouples are attached to several points inside of the flight model. Then the entire satellite is placed in a test chamber, and taken through cycling of temperatures.

The test schedule (per the plan)

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<th>2017</th>
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<td>Setting</td>
<td>09 Jan</td>
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<tr>
<td>Vacuuming</td>
<td>10 Jan</td>
</tr>
<tr>
<td>Starting TV test</td>
<td>11 Jan</td>
</tr>
<tr>
<td>Finish TV test</td>
<td>11 Jan</td>
</tr>
<tr>
<td>Removing satellites from chamber</td>
<td>12 Jan</td>
</tr>
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