



According to Bryce Space & Technology Co., among academic operators, Kyutech is No. 1 in number of small satellites launched



Members of BIRDS -1, -2, -3, -4 and -5, on 30-Oct-2020 in front of the lab building

**Archive website:** <http://birds1.birds-project.com/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.*

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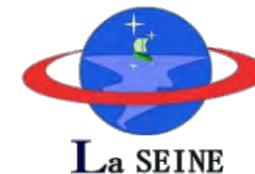
# BIRDS Project Newsletter

Issue No. 69  
(19 Oct. 2021)



*Edited by:*  
G. Maeda

革新的宇宙利用実証ラボラトリー  
*Laboratory of Lean Satellite Enterprises  
and In-Orbit Experiments (La SEINE)*  
Kyushu Institute of Technology (Kyutech)  
Kitakyushu, Japan



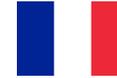
All back issues of this newsletter can be easily downloaded.

Go to here: <http://birds1.birds-project.com/newsletter.html> and scroll down to the desired issue.

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From France



The Guest Box



If you walk into a cheese shop in France, this variety may be the first to catch your nose's attention. One of France's iconic blue cheeses, *Roquefort* is ripened in underground caves constructed during the Middle Ages. The caves are located near Millau, also the site of the tallest bridge in the world, the cable-stayed Millau viaduct. After spending around 6 months in the caves' natural year-round 10-degree temperatures, the cheese wheels (or *meule* in French) are ready to be sliced and savoured. Roquefort is typically best enjoyed as a topping on salad, or served with fruit on a slice of bread.

-- Max Berthet, visiting student from UTokyo (France/UK)

# *JSPS Reminder*

**When you publish a paper on a topic related to BIRDS, please include this acknowledgement in the paper:**

**This work was supported by JSPS Core-to-Core Program, B. Asia-Africa Science Platforms.**

**JSPS provides the airfare funds of BIRDS International Workshops and for Ground Station Workshops.**



# 01. 4th International Workshop on Lean Satellite – January 2022

## 4th International Workshop on Lean Satellite – January 2022

A “lean satellite” is a satellite that utilizes non-traditional, risk-taking development and management approaches – with the aim to provide value of some kind to the customer at low-cost and without taking much time to realize the satellite mission. These approaches differ significantly from traditional approaches to satellite development. The term “lean satellite” was born during the activities related to the international standardization of small/micro/nano/pico satellite testing starting from 2011. At that time there was no clear definition of the terms “small”, “micro”, “nano”, “pico” that was agreeable to all concerned. So to capture the essence of development and management philosophy -- rather than categorizing on the basis of mass or size -- the term “lean satellite” was adopted.

Every year since 2011, an international workshop to discuss various aspects of lean satellites. This international effort has led to the publication of ISO-19683 “Space systems — Design qualification and acceptance tests of small spacecraft and units” in July, 2017, and ISO-TS-20991 “Space systems -- Requirements for small spacecraft” in August, 2018.



**leansat**



**Kyutech**

The purpose of this three-day workshop (the fourth workshop since the name settled into the present one) in January 2022 is to further promote the study on lean satellites. To deliver the satellites' value to stakeholders at affordable cost and permissible waiting time, there are various issues to be examined further, such as standards, testing, operation, manufacturing, interface, project management, etc. This year's workshop puts an emphasis on "CubeSat platform". CubeSat platform is a solution to CubeSat developers who want to develop a satellite quickly. The platform can be developed in-house for the developers who wish to carry out a series of satellite projects as a program, or purchased from an external vendor for the developers who wish to have a quick solution. To accommodate a variety of payloads, the interface must be carefully designed. The design shall also take into account the ease of production and the supply chain considering the evolution toward mass-production. During the workshop, a recently submitted CubeSat Interface Standard draft will be also discussed in detail, that involves the platform-payload interface. This workshop intends to serve as an open forum for people interested in making and using satellites differently from the traditional ways. The workshop consists of the following activities

- Presentations about various issues related to lean satellites
- Round-table meeting to discuss the topics related to lean satellites

Presentations are solicited with emphasis on the following but not limited to:

- (a) CubeSat interface
- (b) Lean Satellite Concept
- (c) Satellite Verification & Testing (Hardware and Software)
- (d) Project Management (including Lessons Learned)
- (e) Constellation (Design, Verification, Manufacturing and Operation)
- (f) Cubesats (other than interface)
- (g) Satellite Operation (Communication Protocols, Ground Station Networking, etc.)
- (h) Lean satellite data mining and distribution
- (i) International Projects
- (j) New Standards (k) Frequency Allocation (Radio Spectrum)
- (l) Capacity Building
- (m) Debris
- (n) Safety
- (o) Others



This workshop is organized by Kyushu Institute of Technology with the support of the Ministry of Economy, Trade and Industry, Japan & City of Kitakyushu.

Dates: January 12 ~ January 14, 2022

Venue:

Kitakyushu International Conference Center  
3-9-30, Asano, Kokurakita-ku,  
Kitakyushu-shi, Fukuoka ken (Prefecture), Japan.  
Website: <https://hello-kitakyushu.or.jp/en/>

The workshop will be done in hybrid style, a combination of in-person and remote participation



## Agenda

- ◆ January 12 (Wednesday) Keynote, Presentation, Reception
- ◆ January 13 (Thursday) Presentation, Laboratory tour (Kyutech)
- ◆ January 14 (Friday) Presentation, Round-table discussion

To participate, you must first register for this workshop. Go to to the following website and then skip to the bottom. There you will see a registration form where you can enter your individual details for this workshop. At the end, just press “Confirm” button.

[https://lean-sat.org/2022\\_nets-regist/](https://lean-sat.org/2022_nets-regist/)

**END OF THIS SECTION**

## 02. Kyutech celebrates WSW (World Space Week) with Women in Space production



**Moderator Timothy (Zimbabwe)**



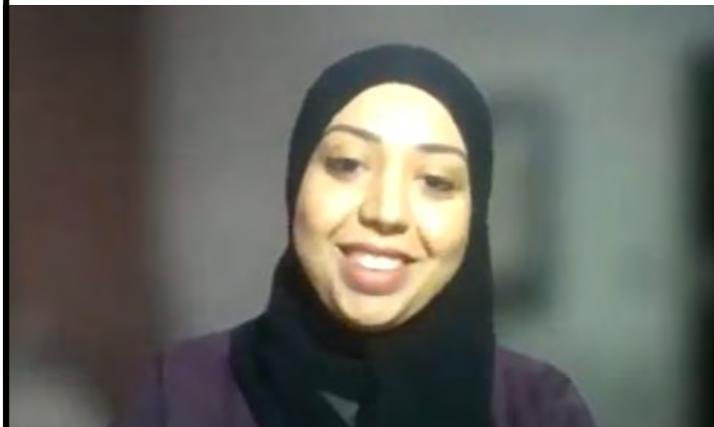
**Pooja (Bhutan)**



**Kate (Ukraine--alumnus)**



**Fatima (El Salvador)**



**Hoda (Egypt--alumnus)**



**Makiko (Japan)**



**Syazana (Malaysia--alumnus)**

Timothy (member of BIRDS-5 Project) organized this fascinating video production with some current and former students of SEIC.

----- *Great job, Timothy!*

**Check out the entire video**

<https://www.youtube.com/watch?v=0d3htPyJp-c>

# World Space Week

World Space Week 2021 celebrates “Women in Space”!

Join thousands of participants in over 90 countries celebrating accomplishments and contributions of women to the space sector and sciences.

In 2020, more than 6,500 events were organized in over 60 countries under the theme “Satellites Improve Life”.



**The official WSW website:**  
<https://www.worldspaceweek.org/>

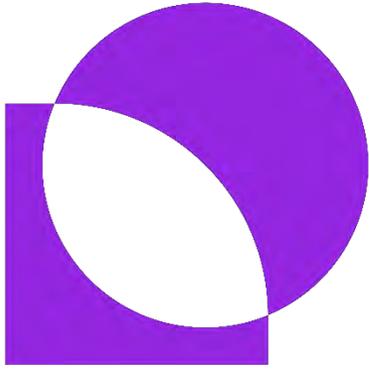
# World Space Week Highlights 2021

World Space Week is an UN-declared celebration of space held annually, every October 4 to 10. It is the largest space event on Earth, with over 8,000 events reported in 2019 and held in 96 countries. These events are organized by thousands of organizations, including space agencies, aerospace companies, astronomy clubs and museums. In 2021, World Space Week is dedicated to the theme of “Women in Space”.

The number of women employed in the international space industry represents just 20-22 percent of the workforce, according to figures released by the UN; roughly the same proportion as 30 years ago.

Despite the global pandemic, there are safe and exciting ways to participate and celebrate World Space Week. The Highlights section showcases some of the creative, innovative and popular events bringing people together to celebrate space.

- Space.com provides a list of events being organized to celebrate World Space Week 2021.
- A Fortune.com article on women in the space sector mentions World Space Week 2021 and profiles Candace Johnson, a member of the advisory board.
- NASA special feature for World Space Week with astronaut Shane Kimbrough on the International Space Station and US Vice President Kamala Harris, head of the US Space Council.
- World Space Week 2021 Honorary Chair and VP at Lockheed Martin Corporation, Lisa Callahan, chats with the Executive Director of the World Space Week Association, Maruska Strah, in this short interview.
- Space Foundation in the United States will organize “Space Is Better Together”, a weeklong event on the incredible impact of women on the space sector.
- Philippine Space Agency will hold a “Build Your Own Model Satellite” lecture and competition during World Space Week.



## World Space Week

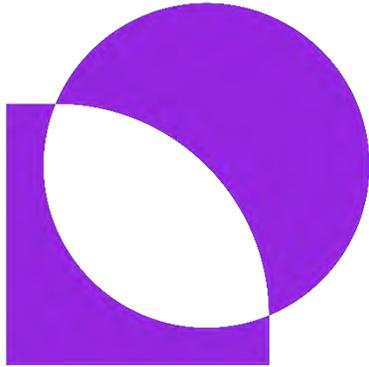
OCTOBER 4-10

**The official WSW website:**

<https://www.worldspaceweek.org/>



- The SETI Institute, Unistellar, and The Planetary Society will organize virtual events, observation challenges, contests and more to help inspire a new generation of female space explorers.
- Oceaneering will have panelists who work in the space industry and can share what their day-to-day is like, how they got into STEM and their favourite work experiences.
- Women in Aerospace- Europe will be organizing several events during World Space Week 2021, on STEM education in Europe, Skills gap in the aerospace industry, Women in the C Suite, and more.
- The International Astronomical Union will celebrate 100 Hours of Astronomy around the world with a broad range of activities involving the public.
- Fisher-Prices's new Little People Collector "Inspiring Women" figure set, which includes astronaut Sally Ride and aviator Amelia Earhart, will be launched during World Space Week.
- The U.S. Space & Rocket Center will have activities, programs and giveaways every day, starting off with "Blast off with Janet's Planet" on October 4.
- Phoenix Space, a nonprofit which offers space-science-focused STEM education programs to refugee and disadvantaged students in the Middle East, will conclude their LaunchPad Challenge academic competition, during World Space Week.
- Galaxonata, the world premiere of a new composition by Yury Revich will be broadcasted during the Women in Space gala on Oct.6th in Beer-Sheva, Israel.
- ***Russian actress Yulia Peresild, producer Klim Shipenko and cosmonaut Anton Shkaplerov launched to the space station on a mission to film the first feature-length movie in space.***



**World Space  
Week** OCTOBER 4-10

**The official WSW website:**

<https://www.worldspaceweek.org/>

- SSERD in India will organize a 2-week Outreach Program with webinars, workshops, and competitions for all age groups across the world.
- On October 01, the upgraded and newly installed Short-Arm Human Centrifuge in the Nordic Centre Planica in Slovenia was successfully launched. Planica thereby became one of the three ESA's research centres conducting studies for long-term space missions with a crew.
- ESERO (European Space Education Resource Office) will organize several events during World Space Week, in Portugal, Ireland, Spain, UK, Norway.
- A new space room will be inaugurated at the Aeronautical Museum in Uruguay during World Space Week, with information panels, historical pieces and models.
- Kenya Space Agency will host an online forum bringing together students, youth and professionals interested in space-related subjects, applications, services and technologies.
- United Nations Office for Outer Space Affairs (UNOOSA) will coordinate a social media campaign to celebrate World Space Week with the overarching theme 'Women in Space'.
- A full week of events in Osimo, Italy to increase STEM awareness among students, with particular attention to gender equality and create a space ecosystem linking universities and businesses in the region
- BBC Teach has published teaching resources for World Space Week, suitable for both primary and secondary schools, from KS1 to GCSE in England, Wales and Northern Ireland, and First Level to Higher in Scotland.
- In honour of World Space Week, the New Space journal is providing complimentary access to one of their top-read articles on the commercial spaceflight initiative to send the first female, German astronaut to space.

**World Space Week** OCTOBER 4-10 **2020**  
 www.worldspaceweek.org @worldspaceweek #wsw2020

**#SATELLITES IMPROVE LIFE**

世界空间周 10月4日-10日  
 Semaine mondiale de l'espace 4-10 Octobre  
 Semana mundial del espacio 4-10 Octubre  
 Всемирная неделя космоса 4-10 октября  
 الأسبوع العالمي للفضاء 10 - 4 أكتوبر

Major Sponsors: LOCKHEED MARTIN, SES, ThalesAlenia Space, NORTHROP GRUMMAN, ULA, ELON MUSK FOUNDATION, AIRSAX  
 Partners: AIA, UNITED NATIONS Office for Outer Space Affairs, SPACEREF, WIA, MOJN, ASTEROID DAY, SPACE FOUNDATION

**World Space Week** OCTOBER 4-10, 2019  
 www.worldspaceweek.org

**THE MOON: GATEWAY TO THE STARS**

Semana mundial del espacio 4-10 Octubre  
 Semaine mondiale de l'espace 4-10 Octobre  
 Всемирная неделя космоса 4-10 октября  
 世界空间周 10月4日-10日  
 الأسبوع العالمي للفضاء 10 - 4 أكتوبر

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 Artwork by Carlota Corzo Álvarez

Major Sponsor: LOCKHEED MARTIN  
 Partners: MOJN, UNITED NATIONS Office for Outer Space Affairs, SPACEREF, WIA, ASTEROID DAY, SPACE FOUNDATION

**World Space Week** OCTOBER 4-10, 2018  
 www.worldspaceweek.org

**SPACE UNITES THE WORLD**

Semana mundial del espacio 4-10 de Octubre  
 世界空间周 10月4日-10日  
 Всемирная неделя космоса 4-10 октября  
 Semaine mondiale de l'espace Octobre 4-10

Major Sponsor: LOCKHEED MARTIN  
 Partners: SPACE FOUNDATION, ASTROPHYSICISTS WITHOUT BORDERS, POLSKA AKADEMIA WIEDZY, UNITED NATIONS Office for Outer Space Affairs, SPACEREF, WIA, MOJN, ASTEROID DAY, ESU

# WSW posters of prior years

# 03. UNOOSA and Kyutech conducted a Webinar about PNST on 22 Sept 2021

The banner at the top left features the text: "United Nations/Japan Long-term Fellowship Programme Post-graduate Study on Nano-Satellite Technologies (PNST)" with a logo of a satellite and a globe. To its right is the United Nations logo and the Kyutech logo (a stylized 'A' and 'K' in blue, green, and pink). Below these is the text "UNITED NATIONS Office for Outer Space Affairs".

The main part of the image is a grid of video thumbnails from the webinar. The thumbnails are arranged in three rows and three columns. The top row shows George Maeda (B), Hoda Awny (5), and Dulani Chamika (3). The middle row shows Fatima Duran (1), a central text box, and Eyodas Areda (4). The bottom row shows Minh Pham (2), Hazuki Mori (A), and a logo for "ACCESS-TO-SPACE-NAVE EDUCATION".

**Post-graduate Study on Nano-Satellite Technologies (PNST) Webinar [22 Sept 2021]**

## Agenda of the Webinar

- Introduction to PNST and other UNOOSA education activities by UNOOSA(A) ( 2:28-19:02 )
- Introduction to PNST and SEIC (Space Engineering International Course) by Kyutech(B) ( 20:23-27:55 )
- Lightning Talks from Current and Past Fellows
  - ① Fatima Duran/ El Salvador ( 28:49-38:55 )
  - ② Minh Pham/ Vietnam ( 39:36-51:18 )
  - ③ Dulani Chamika/ Sri Lanka ( 52:07-1:00:48 )
  - ④ Eyoas Ergetu/ Ethiopia ( 1:01:44-1:13:57 )
  - ⑤ Hoda Awny/ Egypt ( 1:14:18-1:21:51 )
- Q and A

(A)=Ms. H. Mori; (B)=Asst. Prof. G. Maeda

**YOU CAN VIEW THE ENTIRE WEBINAR**

[https://www.youtube.com/watch?v=61mfM4tsn94&list=PLaOqa4cng0GHkleb-XMAHZ\\_zdosjSSmWu](https://www.youtube.com/watch?v=61mfM4tsn94&list=PLaOqa4cng0GHkleb-XMAHZ_zdosjSSmWu)



## 04. Laboratory Fall Semester Kick Off (Cho Lab—all staff and all students)

# Japan Fall Foliage Forecast 2021



\*Forecast based on Japan Meteorological Corporation data ([www.n-kishou.com](http://www.n-kishou.com))

The laboratory conducted its **Fall Semester Kick Off** via ZOOM on 4 October 2021 at 15:00.

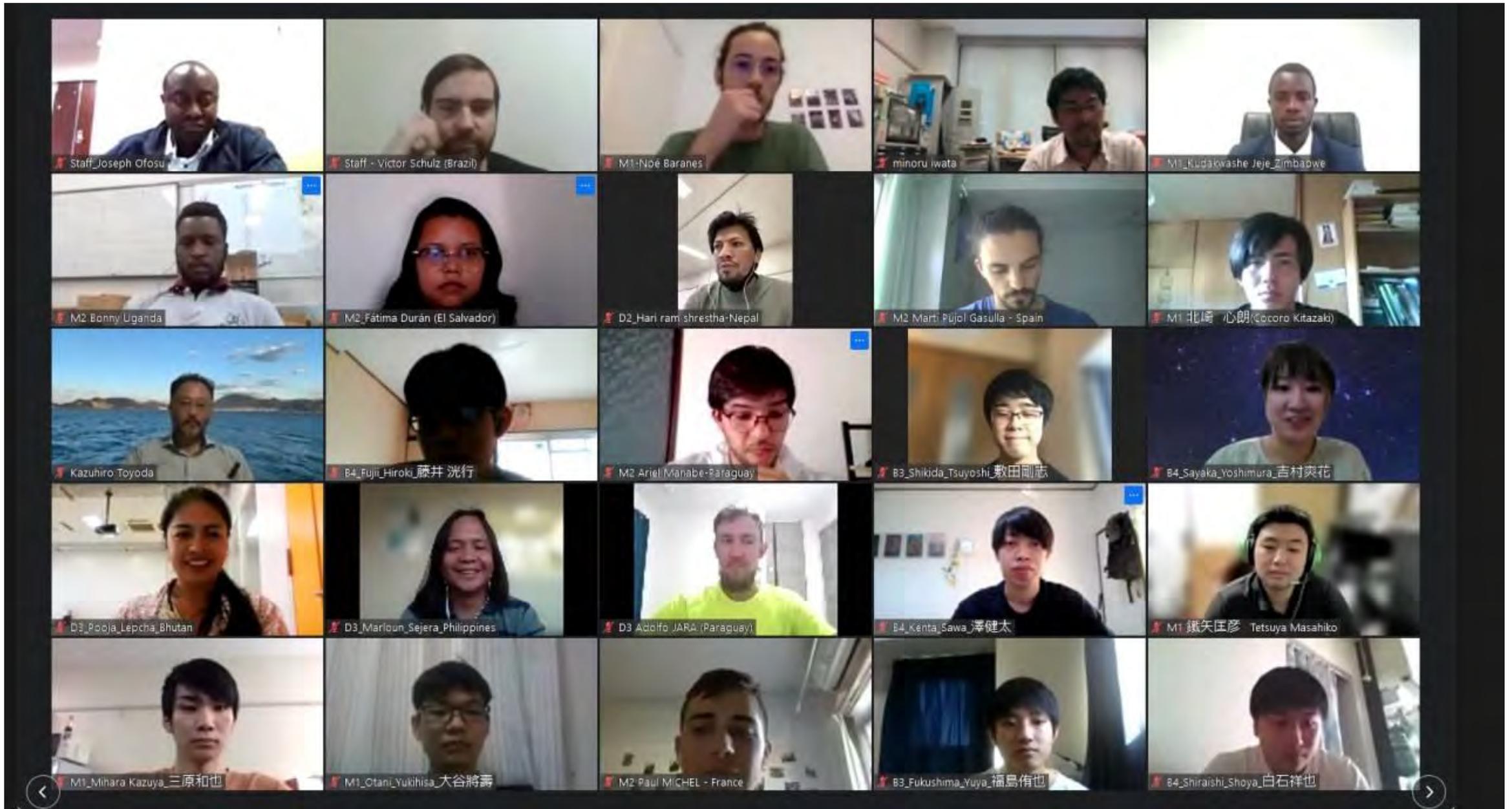
All lab members attended. See the next four pages.



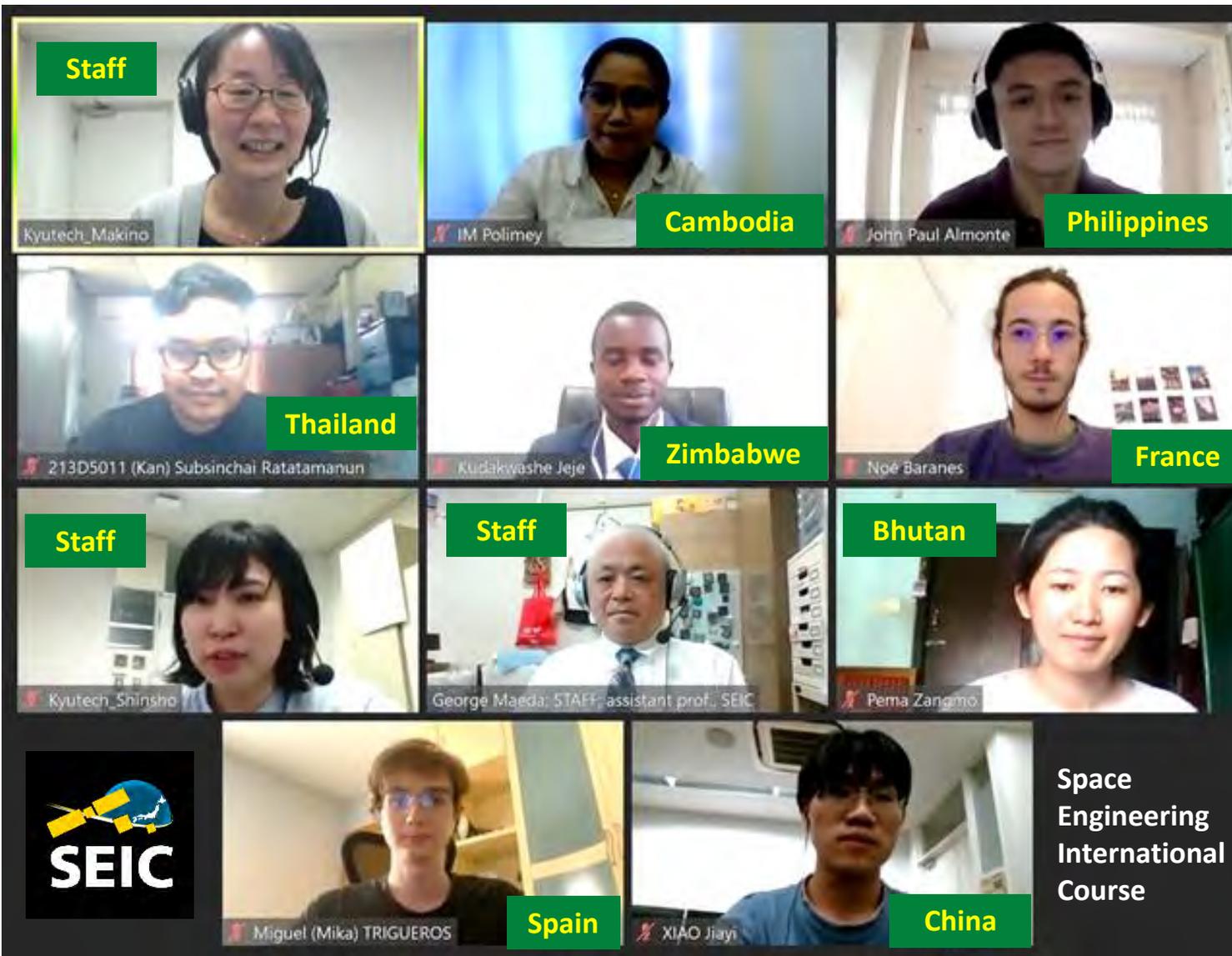




**Max (above) is a visiting research intern student from the Univ. of Tokyo**



## 05. SEIC Orientation for incoming new students



On 4 October 2021 (right after the Cho Lab Kick Off meeting), an orientation session was conducted via ZOOM for the incoming SEIC students – some are in Japan and some are not (waiting for visa issuance). The session speakers were:

- Prof Mengu Cho, Program Director of SEIC
- Ms. Miwa Makino, Graduate School Office
- Asst. Prof. George Maeda, SEIC coordinator



## 06. Prototype of a coarse analog sun sensor



Republic of Paraguay

*(Obverse and reverse sides differs, they show the two national seals)*

Ariel Manabe

SEIC master's student (M2)

### Abstract:

Nowdays the use of *comercial off-the-shelf (COTS) components* allows designing hardware and experimental payloads for space applications with minimal cost, yet with a certain level of risk. After a mission analysis, you may decide to deploy together with your satellite an in-house developed sensor, with the objective of promoting the practice of technology development and increasing the database of COTS suitable for space applications. Considering these reasons, the basic design of a low-cost coarse sun sensor is presented.

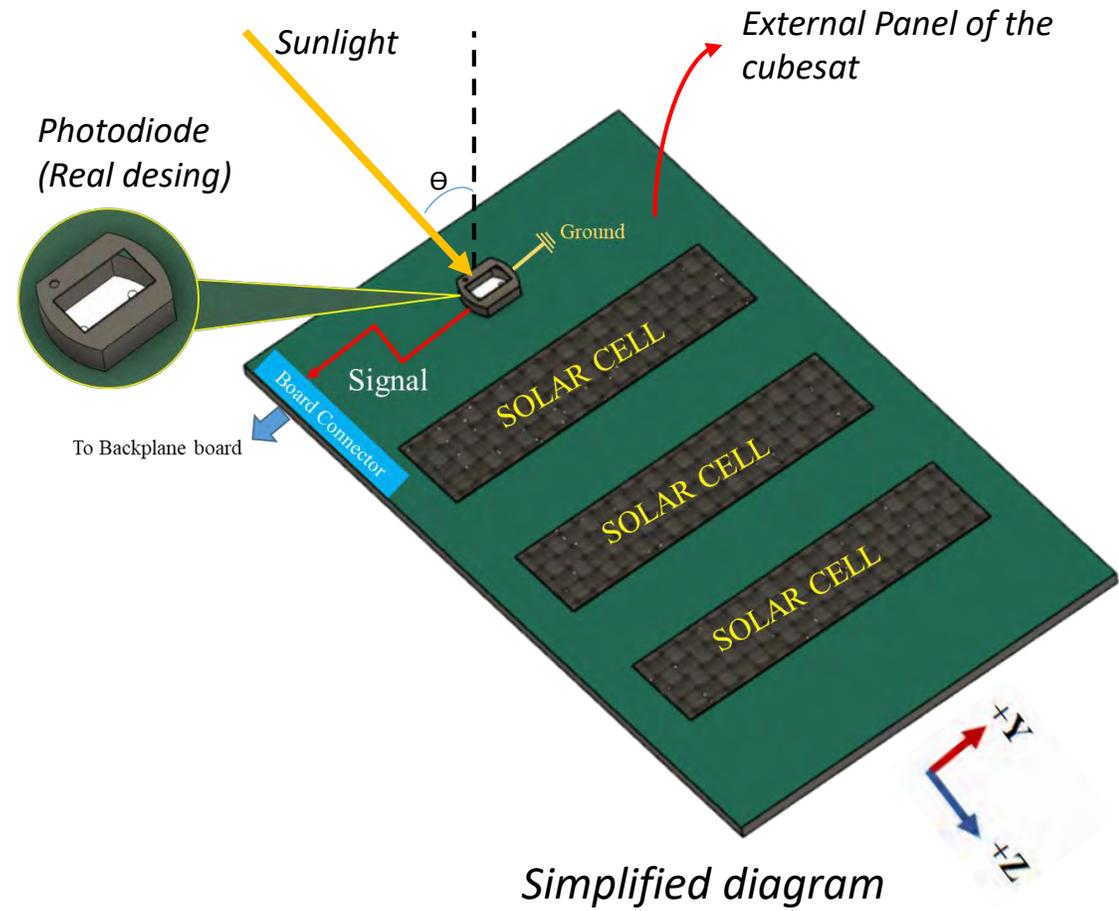
# Prototype of a coarse analog sun sensor

In the next slides we'll present a simple methodology for designing a low-cost *coarse analog sun sensor* (hereafter just sun sensor ) for attitude and heading determination of cubesats.

The principle of operation of sun sensors consist on measuring the angle of the incident sunlight with respect to an inertial body frame.

A simple method for measuring the incident light consist on the current readout of photodiodes, which are placed in each face of the cubesat. Having the six measurements, the sun vector in the body frame is obtained.

Photodiodes generates a low current when the light strikes on them. Then, a transimpedance amplifier could be designed to adequate the generated signal. Let's start the design!



The first thing you need to look at is the **sensitivity of the photodiode**

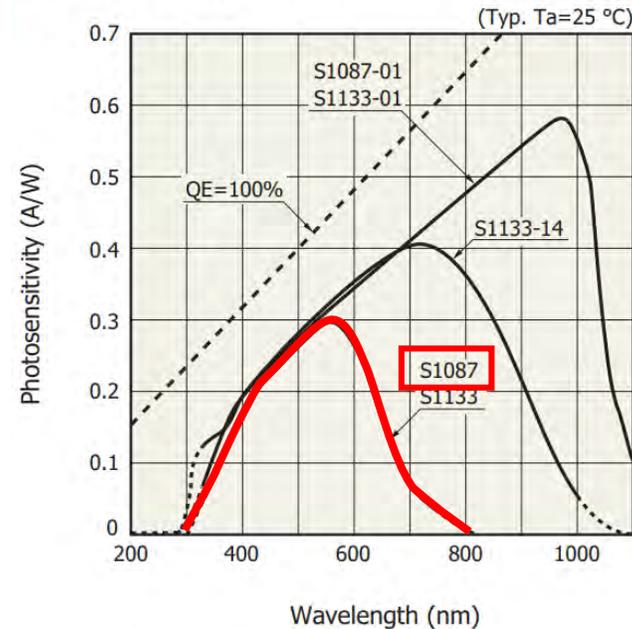
## Photodiode sensitivity (usually denoted by $S$ )

It expresses the ratio of the generated photocurrent (A) when the photodiode is exposed to the light (radiant energy in Watts). In the datasheets, you can find this data in the **spectral response** chart.

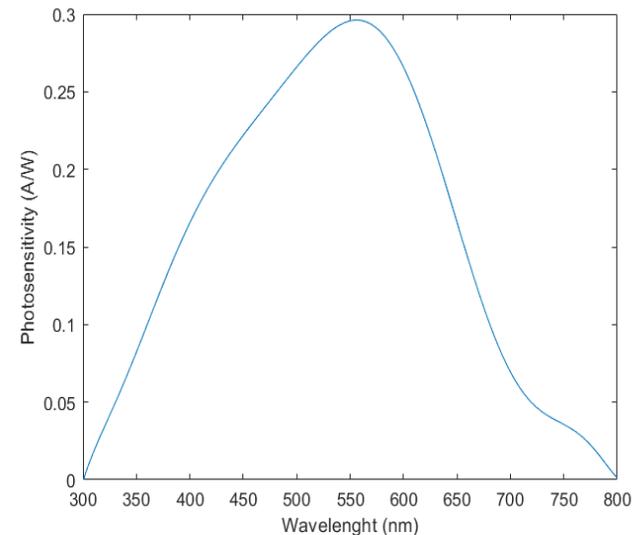
It is necessary to model the spectral response of the photodiode you've select in order to estimate how much current it will generated in a particular scenario.

Now, it is necessary to characterize the sunlight.

### Spectral response



Photodiode S1087 – Datasheet  
[www.Hamamatsu.com](http://www.Hamamatsu.com)



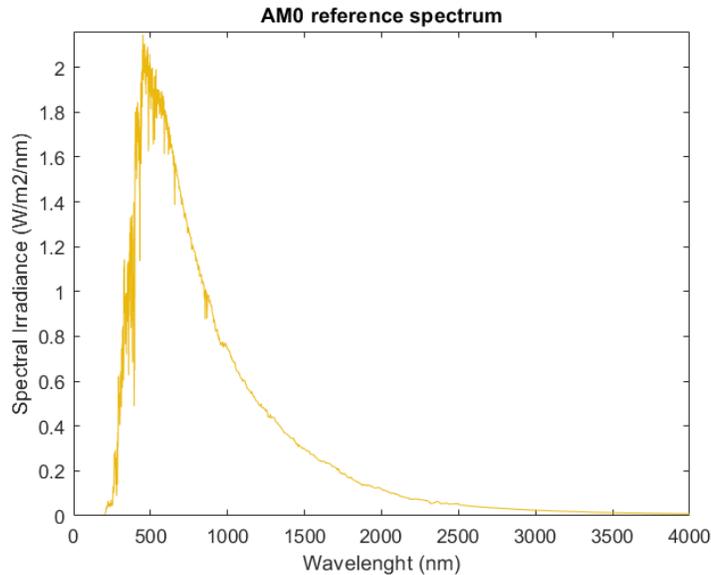
**Photodiode S1087**  
**Spectral response approximation**

(Reproduced manually in  
*Matlab, The MathWorks Inc.*)

In a previous work did by a former student of Kyutech we find how to characterize the sunlight.

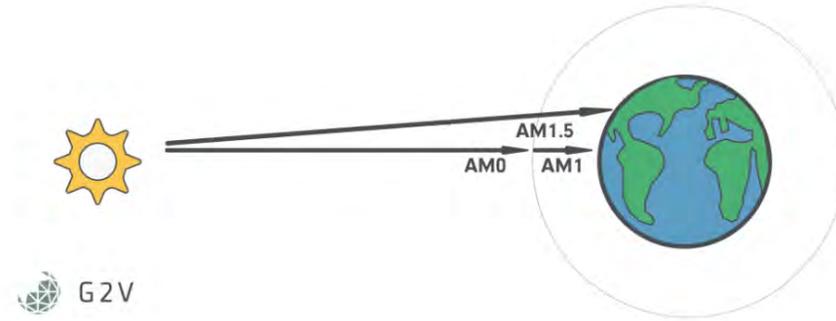
“...A sun light spectrum of a testing location should be used. It can be modeled by the Simple Model of the Atmospheric Radiative Transfer of Sunshine (SMARTS)...” (1)

“...Sun light spectrum depends on environment of its radiation. An air mass coefficient (AM) is used for characterization of a sun light radiation traveled through atmosphere. The American Society for Testing and Materials (ASTM) developed an air mass zero (AM0) reference spectrum (ASTM-E-490)...” (1)



(Reproduced in *Matlab*, The MathWorks Inc. With data from [2000 ASTM Standard Extraterrestrial Spectrum Reference E-490-00](#) | [Grid Modernization](#) | [NREL](#))

→ AM0 spectrum to characterize Solar irradiance



[Solar Simulation - Sun Simulators: AM0-AM40 | AM1.5G Standards \(g2voptics.com\)](#)

(1)2017, Faizullin, D. *Improvement of Analog Sun Sensor Accuracy and Data Processing for Sun Vector Determination*. Kyushu Institute of technology

Having the photosensitivity equation (approximation) of the photodiode and the AM0 as a reference, an expected **distribution of generated current** by the photodiode within its spectral response **range (320-730nm for the selected photodiode)** can be obtained.

$$I_{\lambda} = E_{e,\lambda} * A * S$$

Where:

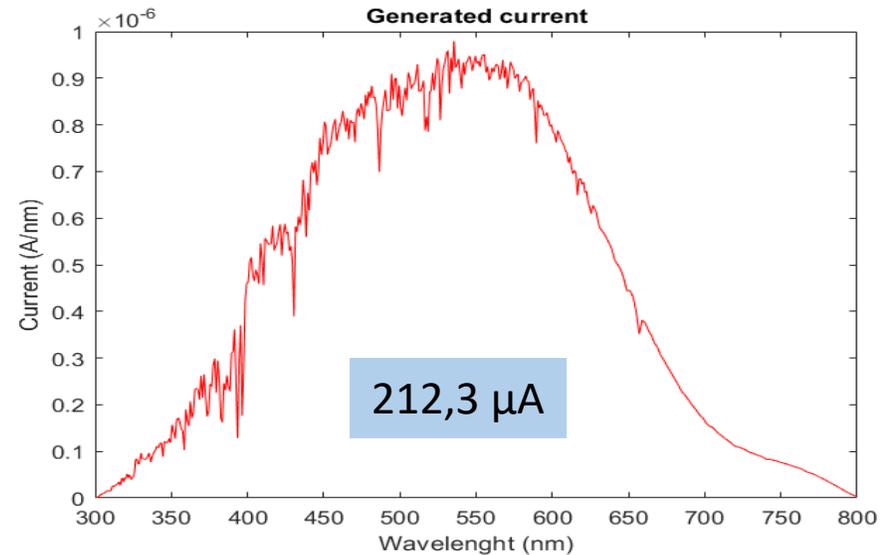
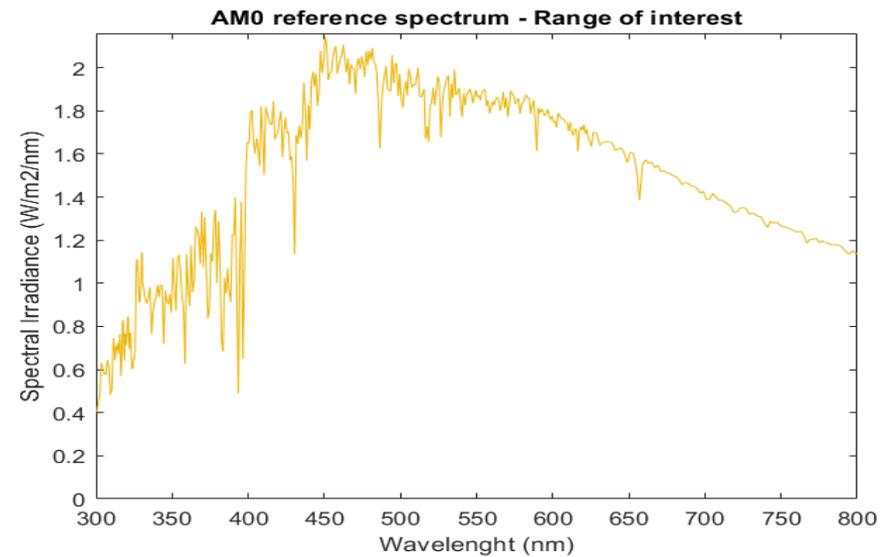
$I_{\lambda}$  = current generated by a photodiode with respect to light spectrum [A/nm]

$E_{e,\lambda}$  = spectral irradiance [W/m<sup>2</sup>/nm]

$A$  = area of a photodiode irradiated by light [m<sup>2</sup>]

$S$  = photosensitivity of a photodiode [A/W]

2017, Faizullin, D. *Improvement of Analog Sun Sensor Accuracy and Data Processing for Sun Vector Determination.* Kyushu Institute of Technology

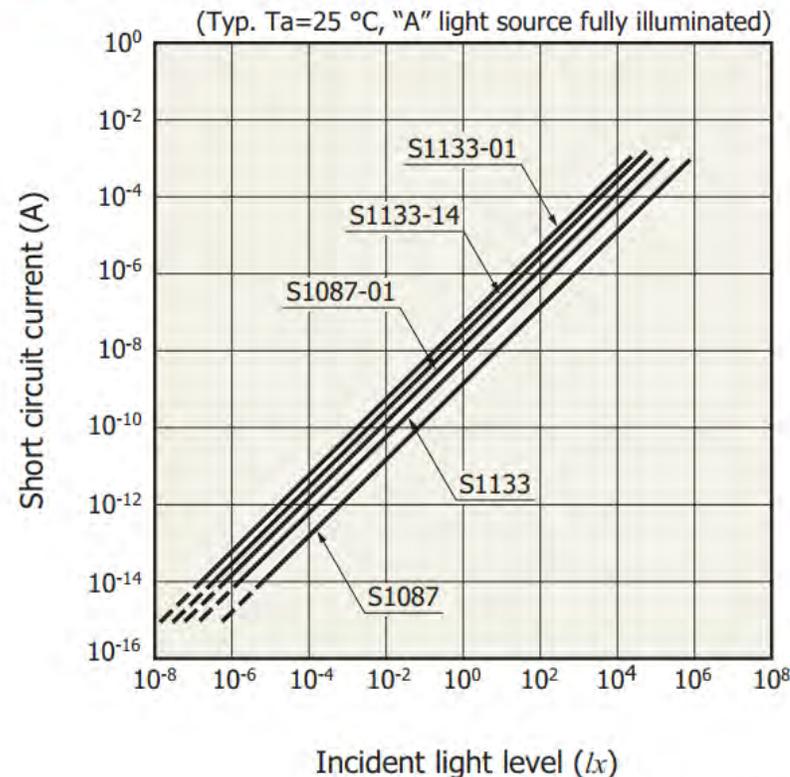


Expected **distribution of generated current** by the photodiode within the spectral response **Range of 300-800nm** and **1,3 mm x 1,3 mm** of Area

Another approach to estimate a maximum expected current generated is using the response of the photodiode to the incident light level (lux - lx). Knowing one condition, e.g. at 100 lx the photodiode generates 100  $\mu$ A, and the light level in the corresponded orbit (LEO  $\sim$  135000 lx) <sup>(1)</sup>. As the response is quite linear a simple rule of three can be used.

Photodiode S1087 – Datasheet  
www.Hamamatsu.com

**Short circuit current linearity**



Type no.	Spectral response range $\lambda$ (nm)	Peak sensitivity wavelength $\lambda_p$ (nm)	Photosensitivity S (A/W)			Infrared sensitivity ratio (%)	Short circuit current I <sub>sc</sub> 100 lx ( $\mu$ A)	Temp. coefficient of I <sub>sc</sub> (%/°C)	Dark current I <sub>D</sub> V <sub>R</sub> =1 V max. (pA)
			$\lambda_p$	GaP LED 560 nm	He-Ne laser 633 nm				
S1087	320 to 730	560	0.3	0.3	0.19	10	0.16	-0.01	10
S1087-01	320 to 1100	960	0.58	0.33	0.38	-	1.3	0.1	
S1133	320 to 730	560	0.3	0.3	0.19	10	0.61	-0.01	20
S1133-01	320 to 1100	960	0.58	0.33	0.38	-	5.4	0.1	
S1133-14	320 to 1000	720	0.4		0.37	-	3.1		

Simply rule of three

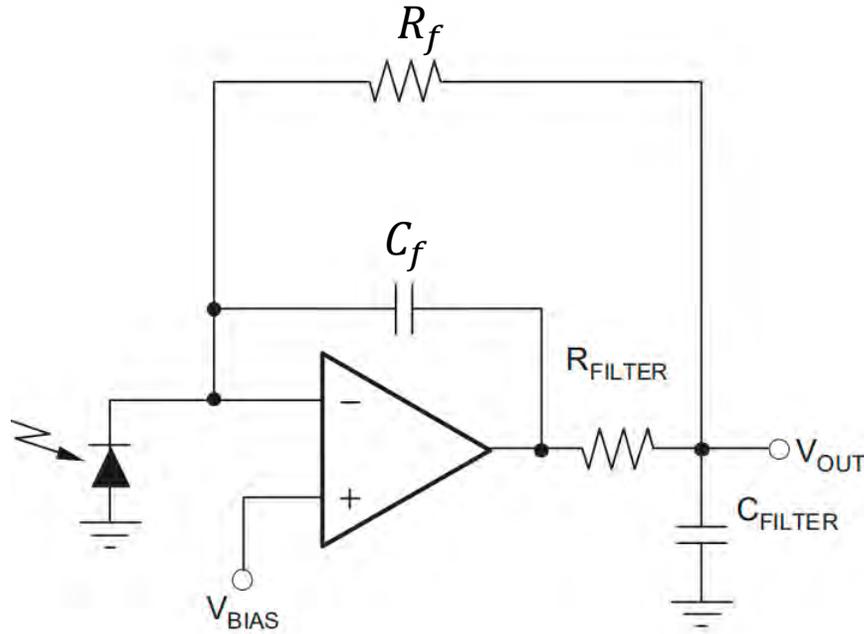
$$\begin{array}{l}
 100 \text{ lx} \text{ -----} 0,16 \mu\text{A} \\
 135000 \text{ lx} \text{ -----} x \mu\text{A} \quad \rightarrow x = 216 \mu\text{A}
 \end{array}$$

(1) 2017, Faizullin, D. *Improvement of Analog Sun Sensor Accuracy and Data Processing for Sun Vector Determination*. Kyushu Institute of Technology

KSPDB0123EA



Once determined the expected current generated by the photodiode, the transimpedance circuit can be designed.



$$R_f = \frac{V_{out} - V_{bias}}{I_{max}}$$

$$C_f = \frac{1}{4\pi R_f GBW} \left[ 1 + \sqrt{1 + 8\pi R_f C_D GBW} \right]$$

Where:

$GBW$  = OP AMP gain bandwidth

$C_D = C_{Photodiode} + C_{CM} + C_{DM}$

$C_{CM}$  = Parasitic Common mode capacitance of the OP AMP

$C_{DM}$  = Differential mode capacitance input of the OP AMP

#### References

=> OPA380 Datasheet. Texas Instruments SBOS291G - NOVEMBER 2003 - REVISED SEPTEMBER 2007

=> 2005. SBOA055A Application Report, *Compensate Transimpedance Amplifiers Intuitively*. Texas Instruments

**End of this report by  
Ariel of Paraguay**



# Re-entry of BIRDS-3 CubeSats

By: Makiko Kishimoto of the BIRDS-3 team

14 October 2021

# BIRDS-3 Project

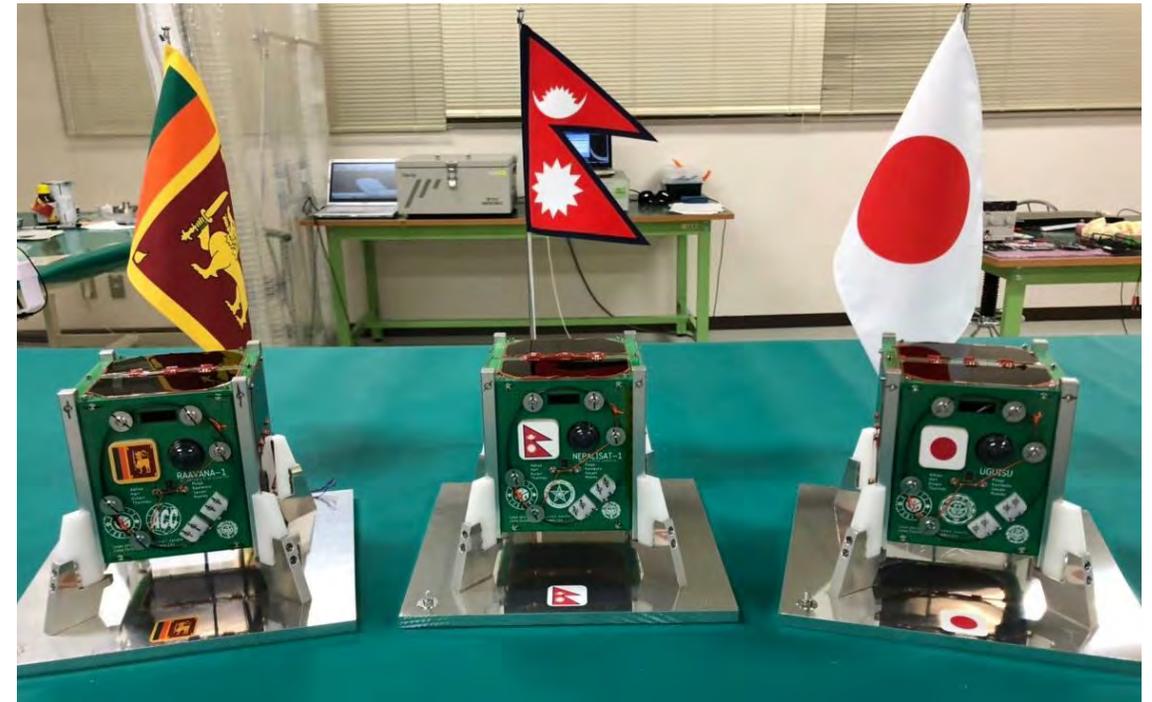


BIRDS-3 Project started on 4th October 2017.

There are eight members in BIRDS-3, and they are from Nepal, Sri Lanka, Japan and Bhutan.



The team photo during press conference



BIRDS-3 1U CubeSats Flight Model

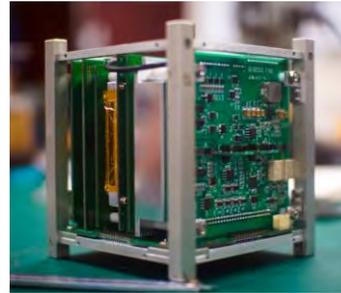
# BIRDS-3 Project Timeline



**Mission Definition Review**  
[Post-MDR Modification 1.1]

BIRDS-3 Team  
28<sup>th</sup> Dec, 2017  
Modification: 13<sup>th</sup> January, 2018

Engineering model



Delivery to JAXA  
(2019.)



Kick-off meeting  
(2017.10.04)

Preliminary Design Review  
(2018.04.24)

Launch CubeSats  
(2019.04.18)

Release from ISS

Mission Defined Review  
(2017.12.28)

Critical Design Review  
(2018.09.01)

Release from ISS, Operation  
(2019.06.17- **2021.10.07**)



Bread board model



Flight model



©NASA



# Re-entered BIRDS-3 CubeSats



BIRDS-3 CubeSats have re-entered to the atmosphere. BIRDS-3 CubeSats were released from ISS on 17th June 2019. All three CubeSats worked impeccably while in orbit, and they were in good health until their reentry to the atmosphere. We operated them for two years and four months.

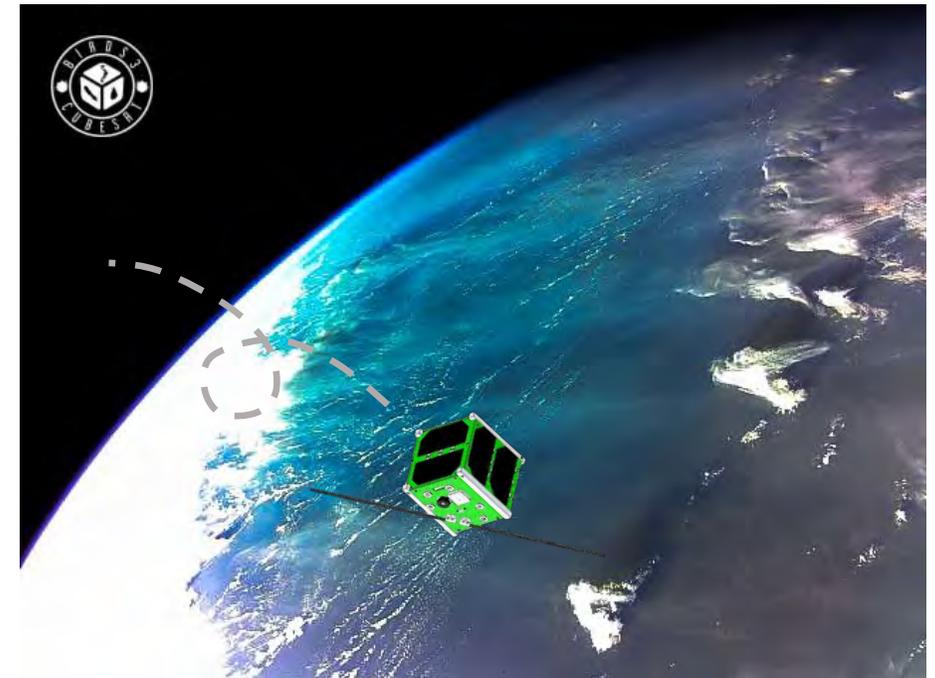
## Re-entry date and time

Raavana-1: on 3rd October 2021 at 16:09 UTC

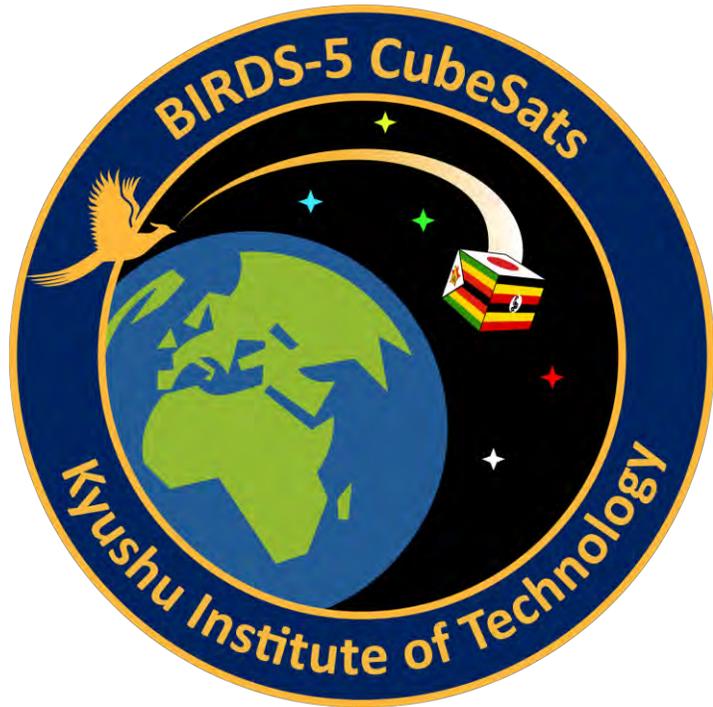
NepaliSat-1: on 4th October 2021 at 12:39 UTC

Uguisu: on 7th October 2021 at 12:19 UTC

***Thank you very much for  
your cooperation during operation !!***



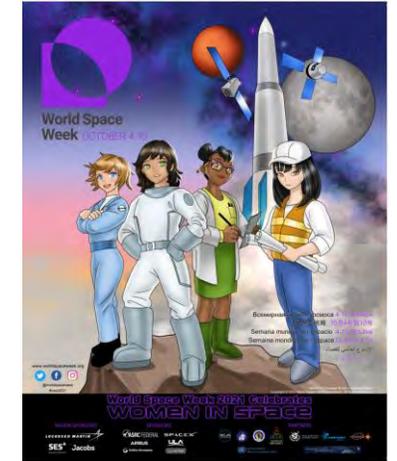
**END OF THIS REPORT**



# **The following sections are the BIRDS-5 articles for October 2021**

**(compiled by Timothy of Zimbabwe)**

## 08. BIRDS-5: Kyutech celebrates WSW with Women in Space Theme

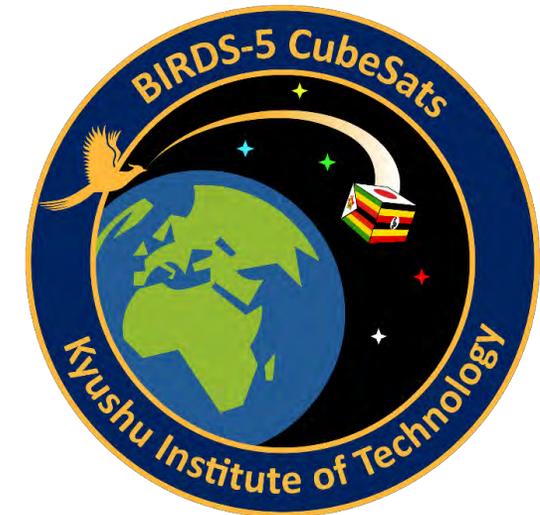


# Kyushu Institute of Technology Celebrates World Space Week



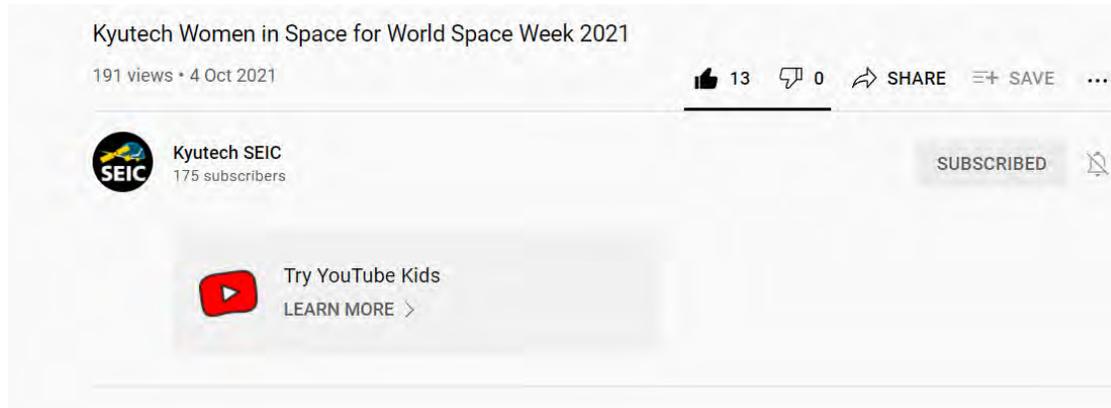
By : Timothy Kudzanayi Kuhamba

Date 12 October 2021



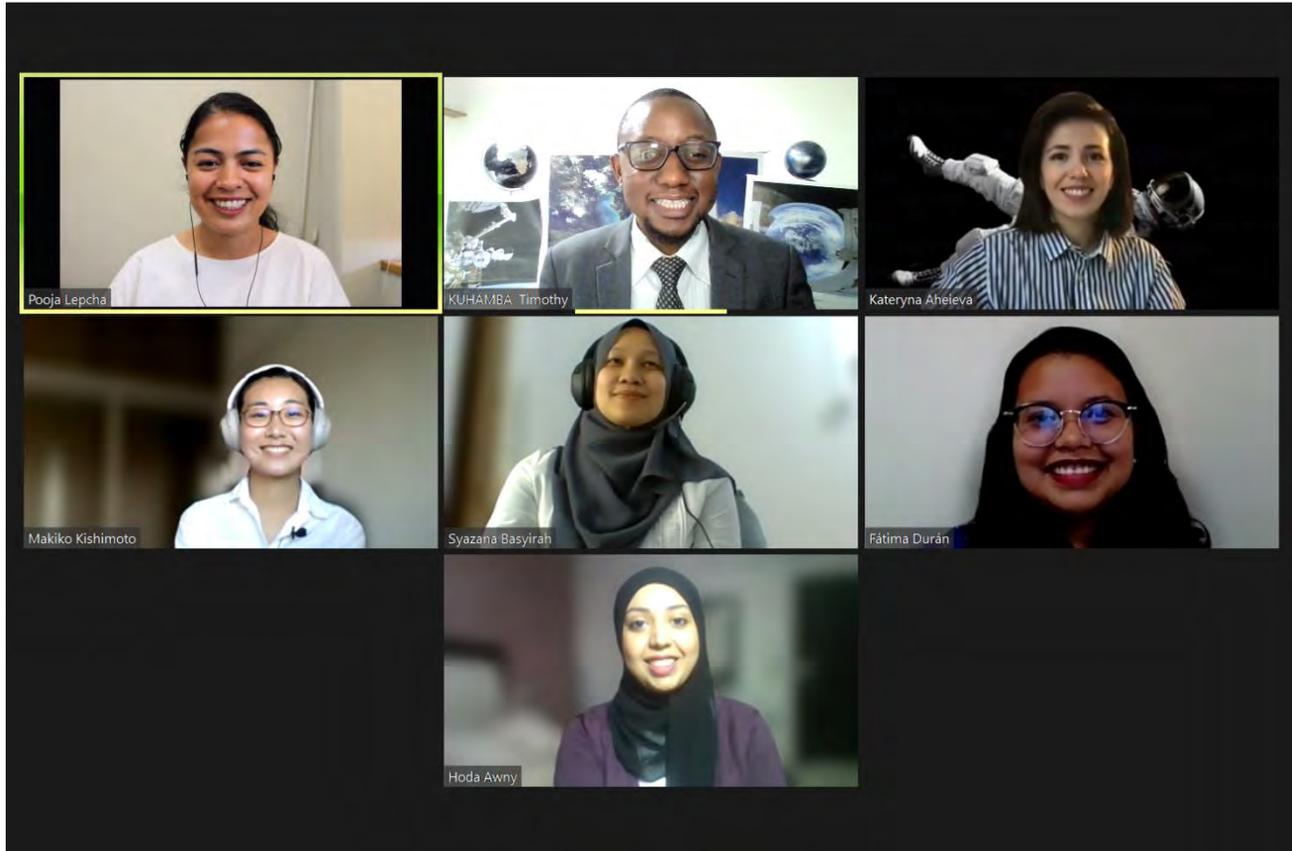
# Women in Space at Kyutech

- Kyutech celebrated the World Space Week
- The program comprises 6 panelists, 3 currently at the university and 3 alumni who share their experiences in satellite development also in the space industry.



- This is a must watch see the link below.
- <https://www.youtube.com/watch?v=0d3htPyJp-c&t=2626slumni>

# Kyutech Celebrates World Space Week 2021



Panellists of the World Space Week



4000 events celebrated across the world

# World Space Week Media Coverage



**Birds-5 Project**

October 4 at 11:09 PM · 🌐

Kyushu Institute of Technology (Kyutech) is the leading university in the development of small satellites in the World according to the Bryce Space and Technology 2021 report. The university joins the rest of the world in the World Space Week Celebration 2021 through a program titled Kyushu Institute of Technology Women in Space. The program comprises 6 panelists, 3 currently at the university, and 3 alumni who share their experiences in satellite development also in the space industry. This is a must-watch as many exciting stories are shared.

<https://www.youtube.com/watch?v=0d3htPyJp-c>



**BIRDS 4 Satellite Project - KyuTech**

October 4 at 3:25 PM · 🌐

Kyushu Institute of Technology (Kyutech) is the leading university in the development of small satellites in the World according to the Bryce Space and Technology 2021 report.

The university joins the rest of the world in the World Space Week Celebration 2021 through a program titled Kyushu Institute of Technology Women in Space. The program comprises 6 panelists, 3 currently at the university, and 3 alumni who share their experiences in satellite development also in the spa... See More



YOUTUBE.COM

Kyutech Women in Space for World Space Week 2021

# World Space Week Media Coverage

 World Space Week Association  
1,844 followers  
now • 🌐

♥️ WSW EVENT ANNOUNCEMENT ♥️

In a series of interviews, **Timothy K Kuhamba** WSW National Coordinator for Zimbabwe zw presents several of the Influential Women in Space in Africa 🌍. Amongst them are:

- **Susan Murabana**, co-founder and the CEO of **The Travelling Telescope** and WSWA Executive Board Member (<https://lnkd.in/eiRdedDV>)
- **Rania Toukebri**, Spacecrafts Architect, Space Strategy Consultant and Regional Coordinator for Africa in the **Space Generation Advisory Council** (<https://lnkd.in/efP8EWqX>)
- **Vangiliya Pereira**, Assistant Director General Angola Space Program Management Office ([https://lnkd.in/eJV4nG\\_q](https://lnkd.in/eJV4nG_q))
- **Dr. Electdom Matandirotya**, Lecturer at University of Zimbabwe (<https://lnkd.in/eESd9HtC>)
- **Chidinma Iroka**, Chief Engineer in the Engineering and Space System Division of the National Space Research and Development Agency ([https://lnkd.in/e\\_xDK2Rw](https://lnkd.in/e_xDK2Rw))
- **Basuti Gerty Bolo**, Endowed Chair Educational Technologies at Africa University in Zimbabwe, an Advisory Council member for Online Learning of Africa University, an International Academy of Space Law ambassador to Botswana, ([https://lnkd.in/en\\_fU7nw](https://lnkd.in/en_fU7nw))

Check out the interviews with the influential African women who are helping to bring space closer to the people. 📺 📱

#wsw2021 #womeninspacewsw #worldspaceweek #wswa



← Thread

 World Space Week  
@WorldSpaceWeek

♥️ WSW EVENT ANNOUNCEMENT ♥️

In a series of interviews, **Timothy Kuhamba** WSW National Coordinator for Zimbabwe 🇿🇼 presents several Influential Women in Space in Africa 🌍. Amongst them are:

18:38 · 2021/10/06 · Twitter Web App

World Shared videos programs on their social media platforms

# Influential African Women in Space

**Timothy K Kuhamba**  
Senior Space Engineer at Zimbabwe National Geospatial Agency  
1w · 🌐

The program profiles Susan Murabana who is famous for the traveling telescope as part of the World Space Week 2021 celebration. Susan is a board member of the World Space Week Association. She is one of the most Influential African Women in Space who has done very in Africa and beyond. Susan shares stories on how she viewed space when she was 10years and also now when she is using the traveling telescope. Susan also explained how she has managed to succeed within the Space Industry and also give the girl child tips on how to choose a space career path.

<https://lnkd.in/dwj3wAKH> ##### #africa #career #wsw2021 UNOOSA United Nations Office for Outer Space Affairs Susan Murabana



**Influential African Women in Space\_Susan Murabana**  
youtube.com

👍 Like    💬 Comment    ➦ Share    ✉ Send

📊 191 views of your post in the feed

**Neema Young** · 1st  
Infection Prevention and Control Nurse at Cambridgehire and Peterbor...  
5d · 🌐

This is a fantastic interview **Susan Murabana** 🌟 - you are a absolutely a star. Looking back to our Cosmos Education days - I am so proud of you and what you are doing to continuously share your passion and enthusiasm of Space and engaging with African children to encourage STEM 🚀. Looking forward to catching up with you soon.

Like · 🌐 1 | Reply · 1 Reply

**Susan Murabana** · 1st  
Managing Director at The Travelling Telescope Africa Ltd.  
5d · 🌐

Thank you Neema. Cosmos Education was an important part of my life, and am so glad we met through it.

Like | Reply

**Rania Toukebri** · 1st  
Space Engineer | Top 10 under 30 space in Africa | UNOOSA Space For...  
5d · 🌐

Thank you **Timothy K Kuhamba** for the interview 🙏

Like · 🌐 1 | Reply

**Susan Murabana** · 1st  
Managing Director at The Travelling Telescope Africa Ltd.  
5d · 🌐

Thanks Timothy for the interview

Like · 🌐 2 | Reply

**Irmin Durand** · 2nd  
Communication | Meaning, Ideas, Philosophy, Purpose, Knowledge, Val...  
5d · 🌐

Always love hearing you talk space, planet, science and dreams **Susan Murabana**. The sky belongs to everyone! 🌟

Like · 🌐 2 | Reply · 1 Reply

**Susan Murabana** · 1st  
Managing Director at The Travelling Telescope Africa Ltd.  
5d · 🌐

Thank you Irmin

Like | Reply

<https://www.youtube.com/watch?v=K53JtPNzC44>

# Influential African Women in Space

 **Rania Toukebri** · 1st  
Space Engineer | Top 10 under 30 space in Africa | UNOOSA Space for women Mentor | Space Strate...  
13h · 🌐

Influential women in Space in Africa by World Space Week 2021 🚀

Thank you for having me 🙏

A big thanks to [Timothy K Kuhamba](#) for the interview

[#tunisian](#) [#africa](#) [#space](#) [#wsw2021](#) [#womeninspace](#)

 **World Space Week Association**  
1,861 followers  
14h · Edited · 🌐

💖 WSW EVENT ANNOUNCEMENT 💖

In a series of interviews, [Timothy K](#) ...see more



[https://www.youtube.com/watch?v=Fm\\_HOkzSdss](https://www.youtube.com/watch?v=Fm_HOkzSdss)

 **Timothy K Kuhamba**  
Senior Space Engineer at Zimbabwe National Geospatial Agency  
1w · 🌐

The program profiles Rania Toukebri, as part of the World Space Week 2021 celebration. Rania is the African Regional Coordinator for Space Generation Advisory Council (SGAC). She is one of the most Influential African Women in Space who has done very in Africa and beyond. Rania shares her experiences in different satellites projects also how she has managed to bridge from space engineering to space policy. This is a must-watch as she articulates the importance of Engineers in understanding space policy. [#wsw2021](#) [Rania ToukebriSpace Generation Advisory Council](#)[UNOOSA](#) [United Nations Office for Outer Space Affairs](#)



Rania Toukebri

Influential African Women in Space\_ Rania Toukebri  
youtube.com

# Influential African Women in Space

**Vangiliya Pereira** • 1st  
Deputy General Director of Angolan Management Office for the National Sp...  
1m • 🌐

Thank you so much Mr. **Timothy K Kuhamba** for this great interview. What a honour to be part of the world Space Week 2021! 😊  
#worldspaceweek2021#, #womeninspace#, #ggpen#

**Timothy K Kuhamba**  
Senior Space Engineer at Zimbabwe National Geospatial Agency  
3h • 🌐

The program profiles Vangiliya Pereira, as part of the World Space Week 2021 celebration. Vangiliya Pereira is the Deputy Director-General Angola Space Program Management Office. She is one of the most Influential African Women in Space who has done very in Africa and beyond. She shares experience in the design, architecture, and operation principles of satellite. She has also been actively engaged in the SADC satellite shared network committee.

#wsw2021 UNOOSA United Nations Office for Outer Space AffairsMTTI ANGOLA



Vangiliya Pereira

**Timiebi U. Aganaba, DCL** • 1st  
Talk to me about Thought Leadership as Strategy!  
5d • 🌐

Enjoyed your interview **Vangiliya Pereira!** Congrats on the series **Timothy K Kuhamba**

**Vangiliya Pereira** • 1st  
Deputy General Director of Angolan Management Office for the Nation...  
2d • 🌐

Than you so much Dr. **Timiebi U. Aganaba, DCL!** It is indeed an honour to have such an esteemed compliment! I really admire you and all your achievements! 😊😊

Like - 🗨️ | Reply



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

# Influential African Women in Space

The program profiles Dr. Electdom Matandirotya, as part of the World Space Week 2021 celebration. She is a senior Lecturer and the Current Chairperson of the Space Science and Applied Physics at the University of Zimbabwe. She is one of the most Influential African Women in Space who has done very in Africa and beyond. Dr. Electdom Matandirotya is a dedicated scientist who is always ready to meet daily challenges. Throughout her academic life, she has not only shown a commitment to achieving excellency but also actively participated in knowledge transfer through awareness and role modelling activities.

#wsw2021 Electdom Matandirotya Zimbabwe National Geospatial and Space Agency



Influential African Women in Space\_Electdom Matandirotya  
youtube.com

28 • 8 comments

**Electdom Matandirotya** • 1st  
Lecturer at University of Zimbabwe

Thank you so much **Timothy K Kuhamba** for profiling the African Women in the Space Industry. Its really an honour to be part of the outreach programme this year. Lets keep celebrating and inspiring **#WomeninSpace #Worldspaceweek2021**

Like • 4 | Reply • 1 Reply

**Mome Roman** • 1st  
Satellite Engineer at French South African Institute of Technolo...

Congratulations **Electdom Matandirotya!**

Like • 2 | Reply

**Kelvin Gomo** • 1st  
Back End Developer

Well done **Electdom Matandirotya**

Like | Reply

**Rufai Odutayo Raji** • 2nd  
NPP-USRA Research Fellow at NASA Goddard Space Flight Center

Congratulations

Like | Reply

**Ben Opperman** • 2nd  
Senior Data Scientist at Capitec Bank and Home Craft Brewer

Congratulations Electdom! So encouraging to see your career progress from a humble and competent Sansa PhD student. You're setting a beautiful example to young researchers.

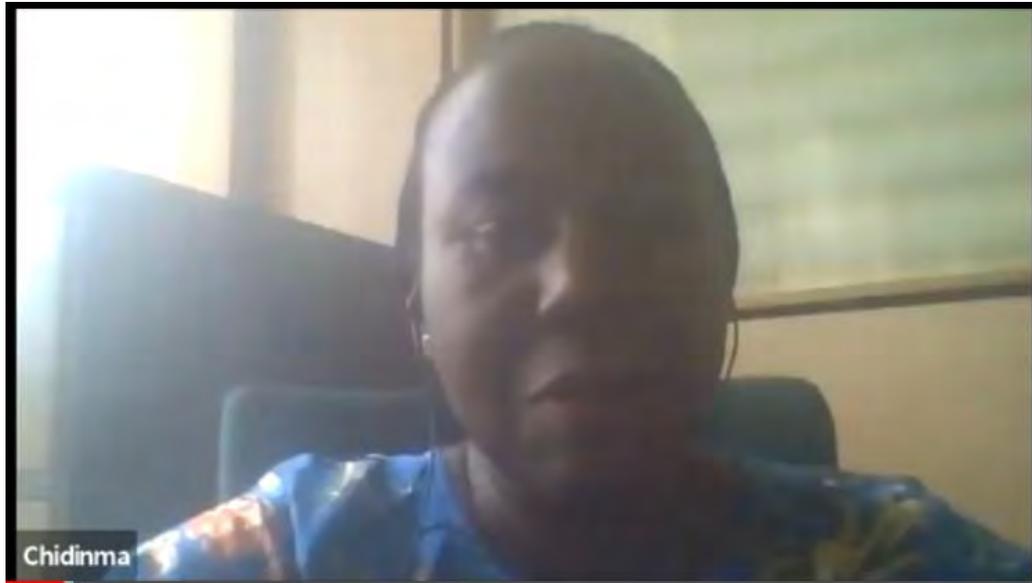
Like | Reply

**Flavien Sagoua Minko** • 2nd  
MMIC Design Engineer at Multifractal Semiconductors

Congratulations Electdom keep on the good work **Electdom Matandirotya**

<https://www.youtube.com/watch?v=zYKX-XkYc10>

# Influential African Women in Space



- Chidinma Joy Iroka is one of the four United Nations Space4women mentors from Africa.
- She is a Chief Engineer in the Engineering and Space System Division (ESS) of the National Space Research and Development Agency (NASRDA).
- She shares her experiences in the designing, building, and testing of Nigerian satellites (NigSat-2 and NigSat-X).

Influential African Women in  
Space\_Chidinma Iroka



[https://www.youtube.com/watch?v=j3\\_-RcdYCtg&t=307s](https://www.youtube.com/watch?v=j3_-RcdYCtg&t=307s)

# Influential African Women in Space



Influential African Women in Space\_Basuti Bolo

- Basuti Bolo is from Botswana, working as an Endowed Chair Educational Technologies at Africa University in Zimbabwe,
- An Advisory Council member for Online Learning of Africa University, an International Academy of Space Law ambassador to Botswana, Africa Space Tourism Society ambassador to Botswana, Space for Women Ambassador to Botswana, Advisor to SpaceconneX.

<https://www.youtube.com/watch?v=evyYn8LWbuM&t=842s>



# Total views from 4 October to 10 October 2021

Geography		Views ↓		Watch time (hours)		Average view duration	
<input type="checkbox"/>	<b>Total</b>	<b>724</b>		<b>50.9</b>		<b>4:13</b>	
<input type="checkbox"/>	Zimbabwe	195	26.9%	20.5	40.2%	6:18	
<input type="checkbox"/>	Japan	139	19.2%	6.3	12.4%	2:42	
<input type="checkbox"/>	Tunisia	13	1.8%	0.2	0.4%	0:57	
<input type="checkbox"/>	France	11	1.5%	0.2	0.3%	0:55	

Traffic source ▲		Views ↓		Watch time (hours)		Average view duration		Impressions	Impressions click-through rate
<input type="checkbox"/>	<b>Total</b>	<b>724</b>		<b>50.9</b>		<b>4:13</b>		<b>1,039</b>	<b>6.3%</b>
<input type="checkbox"/>	External	410	56.6%	27.8	54.7%	4:04		—	—
<input type="checkbox"/>	YouTube search	100	13.8%	9.0	17.6%	5:22		725	6.1%
<input type="checkbox"/>	Direct or unknown	83	11.5%	7.6	14.9%	5:29		—	—
<input type="checkbox"/>	Channel pages	51	7.0%	1.4	2.7%	1:37		73	11.0%
<input type="checkbox"/>	Browse features	41	5.7%	1.4	2.7%	2:00		73	6.8%
<input type="checkbox"/>	Suggested videos	21	2.9%	1.0	1.9%	2:49		134	4.5%
<input type="checkbox"/>	Other YouTube features	13	1.8%	2.0	4.0%	9:16		—	—
<input type="checkbox"/>	Playlists	4	0.6%	0.7	1.4%	10:56		32	6.3%
<input type="checkbox"/>	Playlist page	1	0.1%	0.1	0.1%	3:13		2	0%

Influential African in Space Women

# Zimbabwean Women In Space

Zimbabwean Women in Space featured in Zimbabwe National Television main news



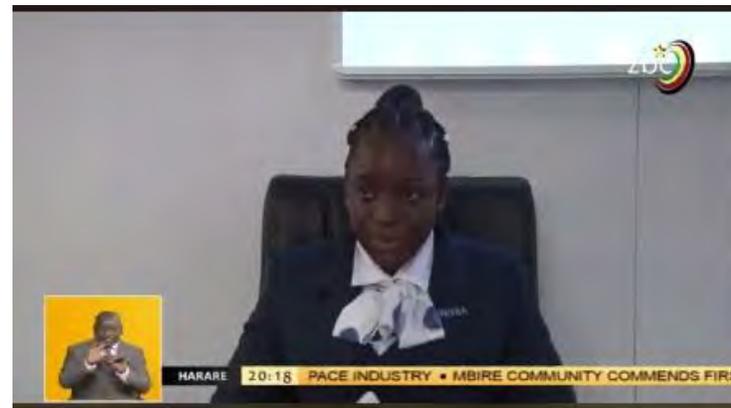
Ruvimbo Samanga



Netsai Sadza



Marie-ann Maringapasi



Patience Muchini

**END OF THIS SECTION**

## ZIMBABWE NATIONAL GEOSPATIAL AND SPACE AGENCY OFFICIAL OPENING



By: Marie-Ann  
Outreach Officer  
12 Oct 2021



# ZIMBABWE SCIENCE PARK 1



The Zimbabwe Science Park 1 is located at the university of Zimbabwe in Harare.

A science park houses complimentary and reinforcing science capabilities for industrialization and modernization

It is where Zimbabwe National Geospatial and Space Agency and Zimbabwe Center for Higher Performance Computing are located.

<https://zwnews.com/pictures-president-mnangagwa-launches-zim-science-park-zim-space-agency-at-uz/>

# ZIMBABWE SCIENCE PARK 1 OFFICIAL OPENING



The Zimbabwe Science Park 1 was officially opened on the 13<sup>th</sup> of September by His Excellency, the President of the Republic of Zimbabwe Dr Emmerson Dambudzo Mnangagwa

# ZIMBABWE NATIONAL GEOSPATIAL AND SPACE AGENCY OFFICIAL OPENING



On the 13<sup>th</sup> of September 2021, ZINGSA building was officially opened.

One of ZINGSA's objective is to promote the peaceful use of space and it has four technical departments to support this: Geospatial Science and Earth Observation; Space Science ; Space Operations and Launch services; Space Engineering

# THE OFFICIAL OPENING CEREMONY



**Nick Mangwana** @nickmangwana · 7h

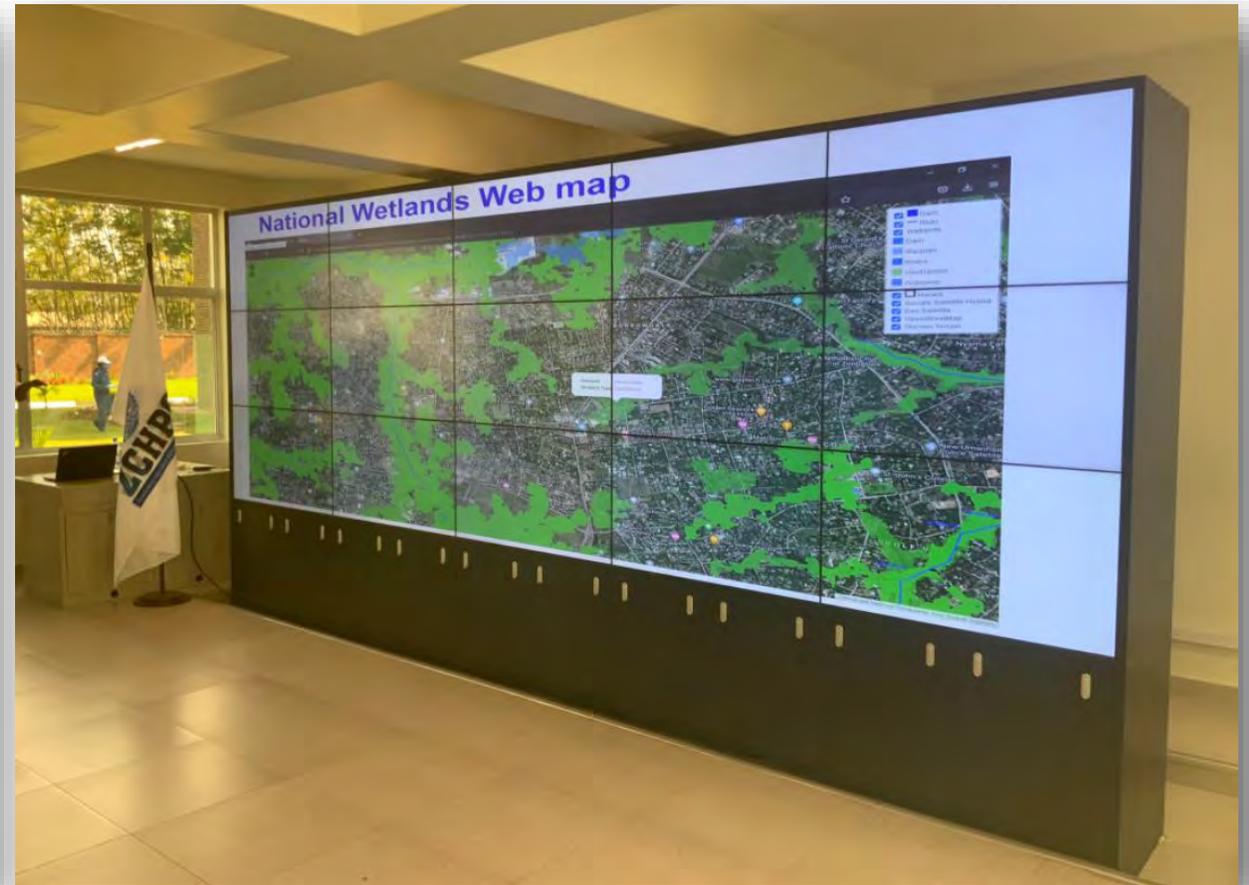
Prof Murwira said, “Excessive need for external validation of needs and aspirations every time demeans our people. #NyikalmovakwaNeveneVayo”  
President @edmnangagwa said, “The work of the ZINGSA will have a triggering effect on the country’s intellectual and human capital



President Emmerson Mnangagwa challenged scientists and technopreneurs to harness inroads made in science and innovation to address national needs for the benefit of the country.

<https://www.zbcnews.co.zw/president-mnangagwa-launches-national-geospatial-and-space-agency-science-park/>

# THE OFFICIAL OPENING CEREMONY



ZINGSA Acting Director Mr P Gweme explaining to His Excellency, the President of the Republic of Zimbabwe Dr Emmerson Mnangagwa

# THE OFFICIAL OPENING CEREMONY



Scientists in space suits ushering and on parade



Ceremony area on the ZINGSA car park



ZINGSA official opening placard

# ZINGSA OFFICIALLY OPENED



His Excellency the President of the Republic of Zimbabwe Dr E. D Mnangagwa (in space suit), (center left) Vice President of the Republic of Zimbabwe Dr C. G. D. N. Chiwenga , (center right) Ministry of Higher and Tertiary Education Innovation Science and Technology Development Prof A Murwira, (far left) Minister of Defence Hon O. C. Z. Muchinguri Kashiri

# OFFICIAL OPENING CELEBRATIONS



Meet the ZINGSA team, after the ceremony

# NEWS ON NATIONAL TELEVISION AND PRINT MEDIA

## President Mnangagwa launches the Nat. Geospatial and Space Agency and Zim Science Park Complex



<https://www.zbcnews.co.zw/president-mnangagwa-launches-national-geospatial-and-space-agency-science-park/>



## Sky is not the limit for National Space Agency



President Mnangagwa inspects a model of CubeSat he received as a token of appreciation after officiating at the Zimbabwe Science Park 1 complex and the Zimbabwe National Geospatial and Space Agency (ZINCSA) Building, at the University of Zimbabwe yesterday. CubeSat is a type of miniaturised satellite for space research that is made up of multiple cubic modules of 10cm x 10cm x 10cm size, and it was presented to the

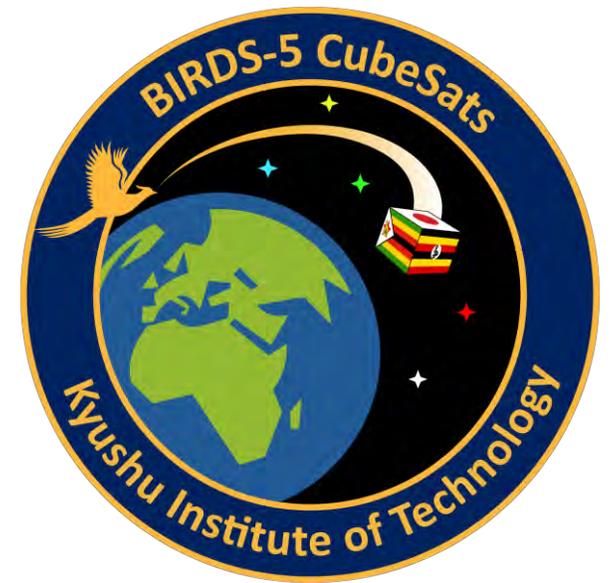
President Mnangagwa received a 1U CubeSat gift

<https://www.herald.co.zw/sky-is-not-the-limit-for-national-space-agency/>

# Gyroscope Calibration

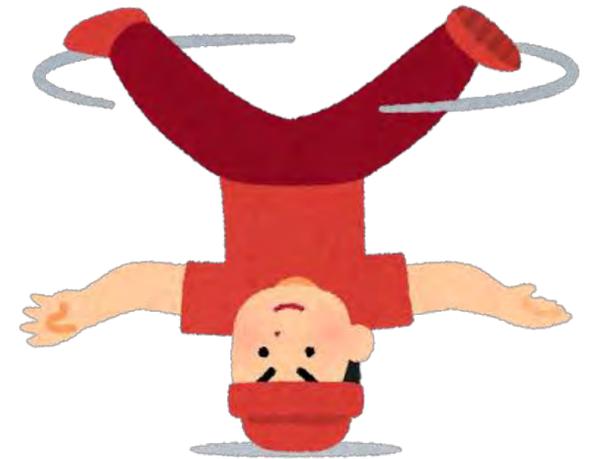


By : Fukudome Shoma  
10/13/2021



# What is a Gyroscope?

- Gyroscope is the sensor to measure angular velocity.
  - Angular velocity is the rate of velocity at which an object is rotating around a center or specific point in a given time period.
- Gyroscopes are commonly used in familiar places.  
Ex) Car , Smart phone, Camera, satellite, etc...



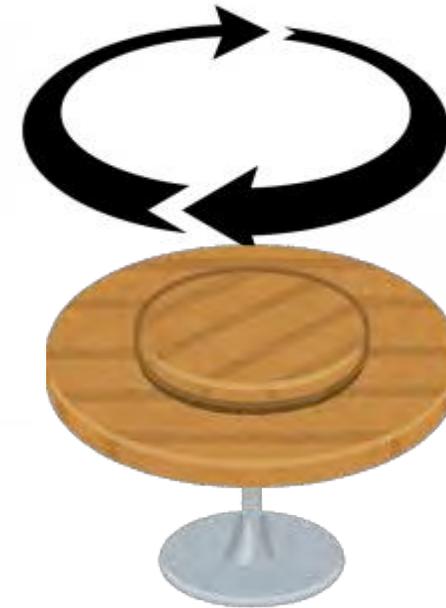
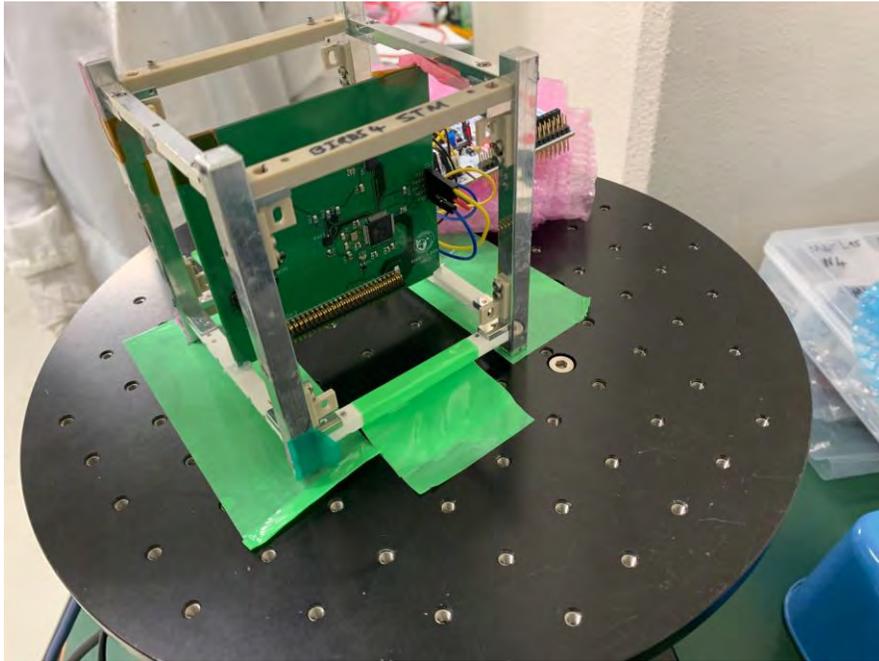
# Gyroscope Calibration

- What is calibration?
  - Calibration of a sensor refers to the process of specifying the relationship between the value of a standard (reference) and the output value of a measurement device, such as a sensor or measurement system, under specified conditions.
- How to calibrate gyroscope?
  - Usually rate tables are used for gyroscope calibration.
  - Rate table is the table which can rotate with specific angular velocity.



# BIRDS-5 gyroscope calibration

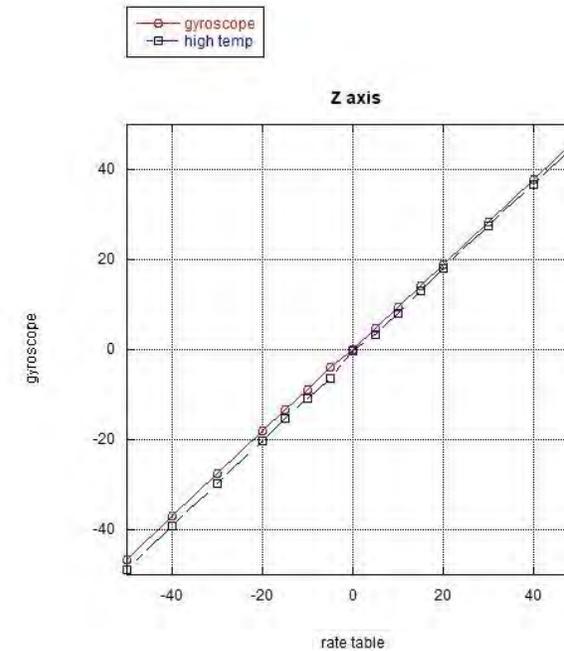
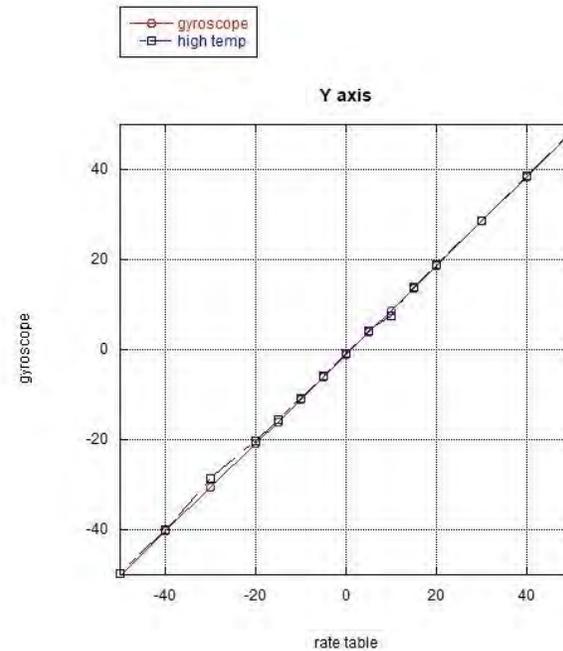
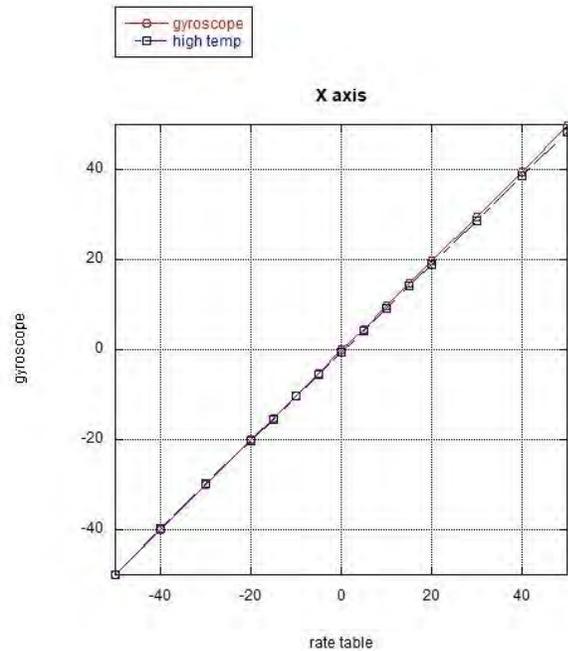
- Rate table was used for our gyroscope calibration.
- We rotated the rate table with  $-50 \sim 50$  [deg/s]



# BIRDS-5 gyroscope calibration

These are the result of calibration.

We checked the output with low temperature and high temperature !

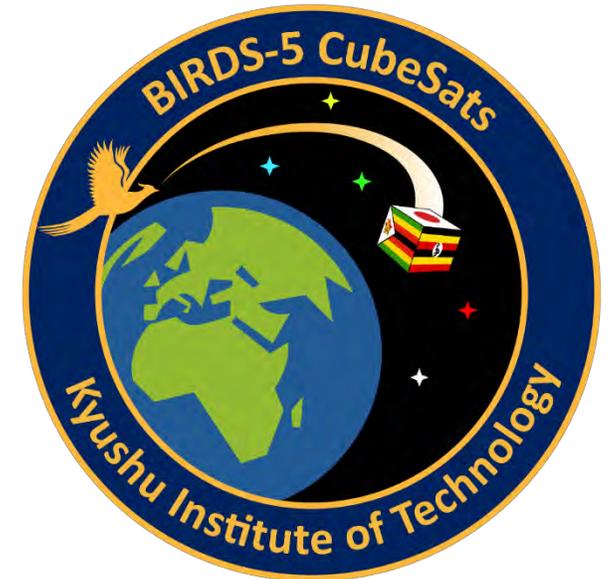


# Laboratory Test Process Flow

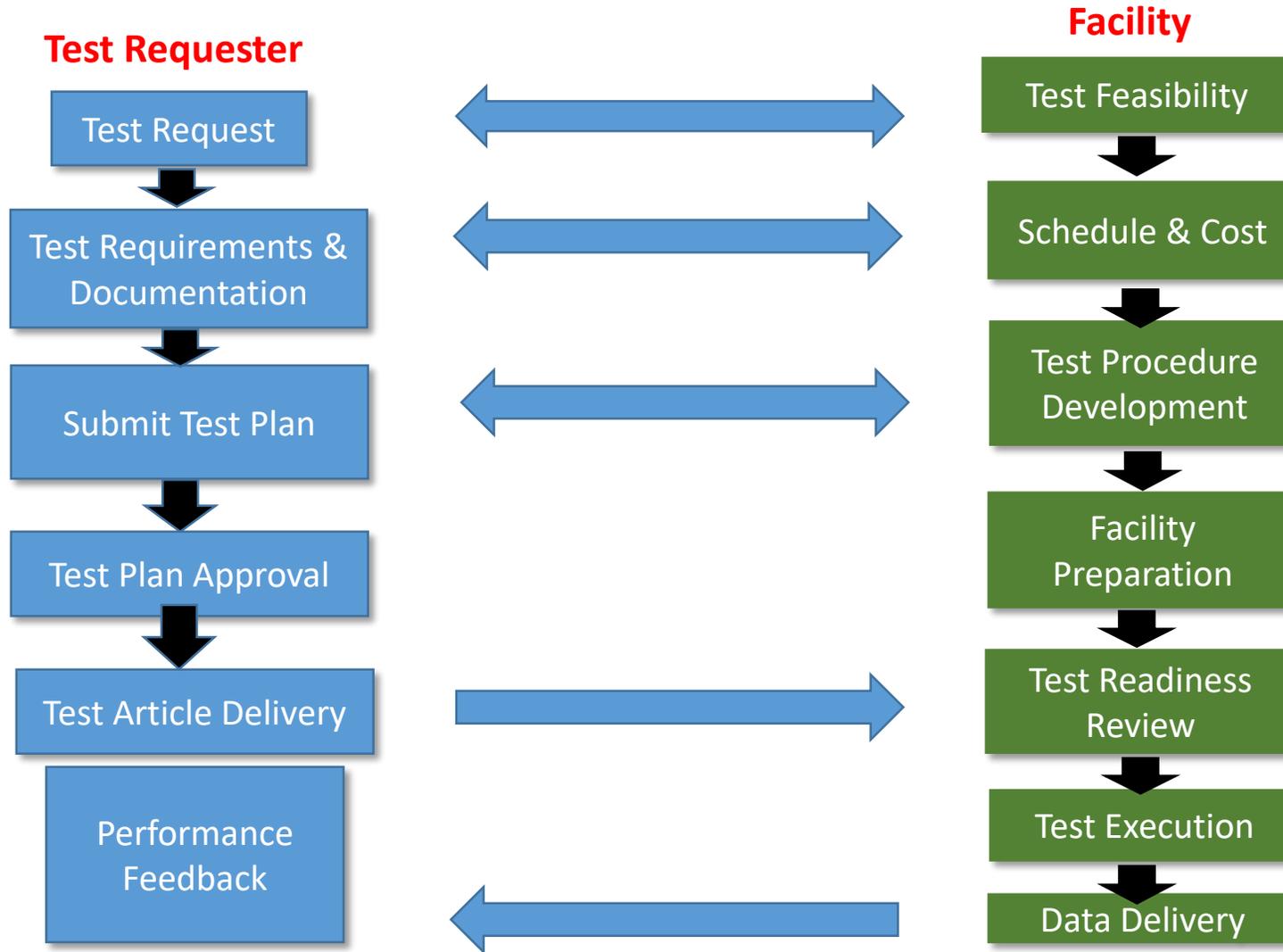


By : Derrick TEBUSWEKE  
(Uganda)

Date: 14th October, 2021



# What is Laboratory Test Process?



Source: NASA Electronic Systems Test Laboratory

At LaSEINE (Laboratory of Lean Satellite Enterprises and In-Orbit Experiment), we follow a similar process below before we conduct any test on our test articles.

# Graphical Illustration of Laboratory Test Process Flow as followed by BIRDS-5

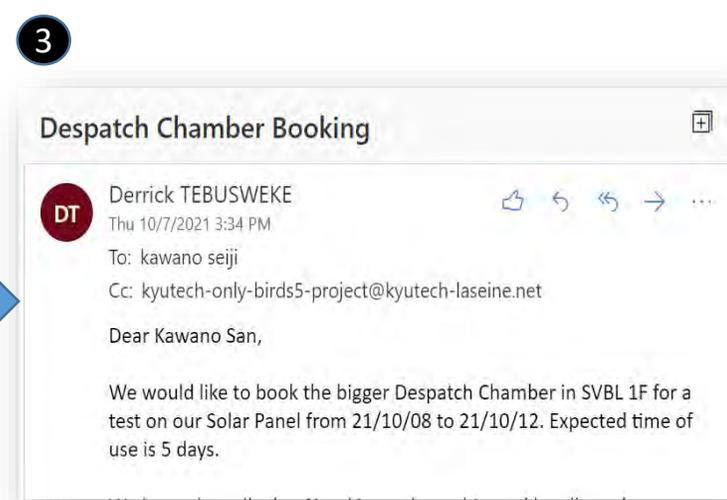


Members meet to formulate Test Requirements.

Photo: BIRDS-5 members discussing Test Requirements.



Test Plan is devised by members and discussed with the facility.



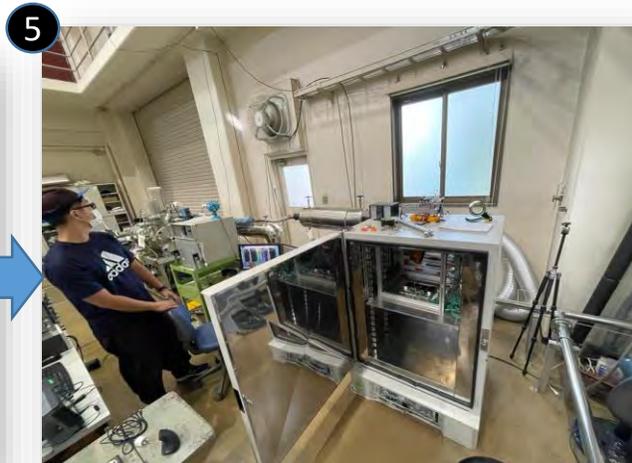
Booking is made, after Test Plan approval.

# Graphical Illustration of Laboratory Test Process Flow as Followed by BIRDS-5



If booking is approved, Facility Preparation starts.

Photo: BIRDS-5 members preparing anechoic chamber for antenna testing.



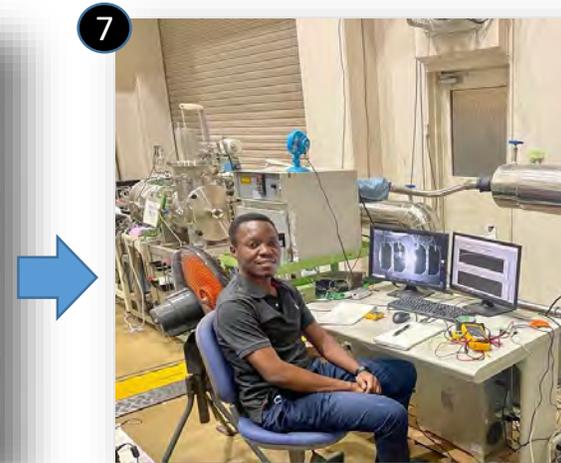
Test Readiness Review is done before the actual test commences.

Photo: BIRDS-5 members inspecting Despatch chamber for Thermal-Cycle test.



Test Execution is then done.

Photo: BIRDS-5 members conducting functionality test during EM Thermal Vacuum Test.



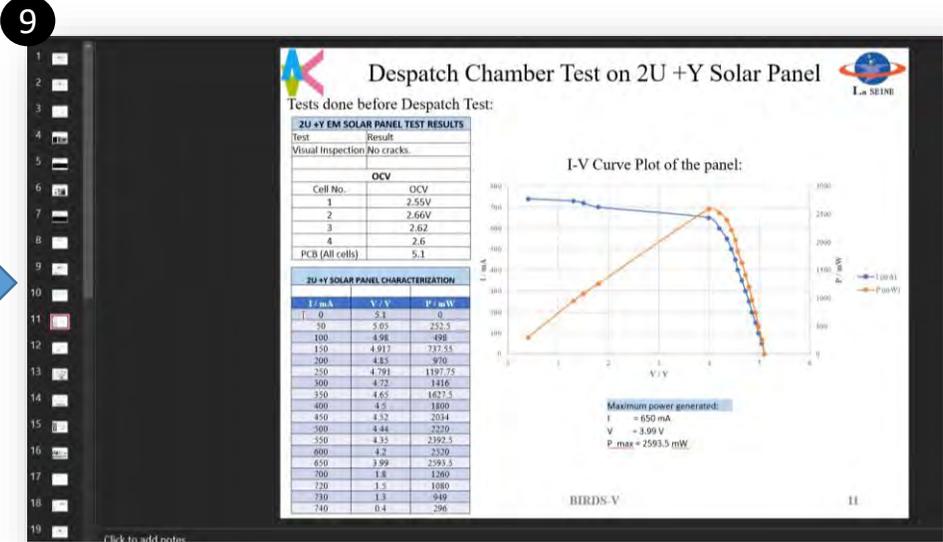
Data Delivery is then done.

Photo: BIRDS-5 members accessing the test results of Thermal-cycle test on solar panel.

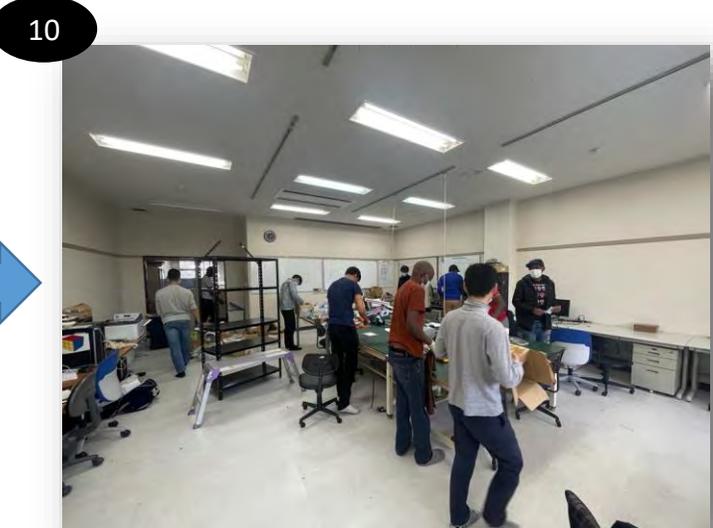
# Graphical Illustration of Laboratory Test Process Flow as Followed by BIRDS-5 Members



Performance Feedback is then done.  
Photo: Staff explaining to BIRDS-5 members about data captured and



Test Results are shared with all members during our weekly meeting.  
Photo: A BIRDS-5 member discussing results of a test to fellow members and Senseis.

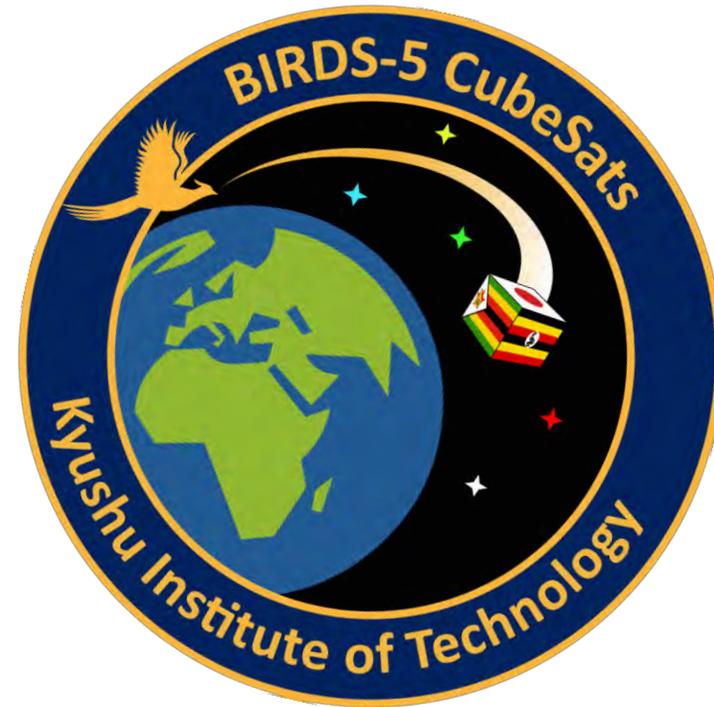


Ensuring 5S before, during and after test.  
Photo: BIRDS-5 members routinely clean their laboratory.

Note: All members should be involved in the Test Process planning, so that results are conclusive and final.

**THE END**

# End of BIRDS-5 reports for this month



# 11. 2022 UN/Kyutech PNST is now open for applications (space engineering scholarships)



UNITED NATIONS  
Office for Outer Space Affairs



**NOW ACCEPTING APPLICATIONS**

About Us ▾ Our Work ▾ Space4SDGs ▾ Information for... ▾ Events ▾ Space Object Register ▾

Our Work > Programme on Space Applications > Basic Space Technology Initiative (BSTI) > Fellowship Programme

## Basic Space Technology Initiative Fellowship Programme

United Nations/Japan Long-term Fellowship Programme 2022  
Post-graduate study on Nano-Satellite Technologies (PNST)  
(Kitakyushu, Japan)

Updated 25 August 2021

**Applications are accepted until  
10 January 2022 (Monday, 23:00 JST).**

**ALL INFO IS HERE:** <https://www.unoosa.org/oosa/en/ourwork/psa/bsti/fellowships.html>

**A full  
scholarship  
for six  
graduate  
students**

**Cont'd  
on the  
next  
page**



The United Nations Office for Outer Space Affairs and the Government of Japan in cooperation with the Kyushu Institute of Technology (Kyutech) have established a United Nations/Japan Long-term Fellowship Programme on Nano-Satellite Technologies for nationals of developing countries or non-space-faring nations. The Programme will provide extensive research opportunities in nano-satellite systems through the use of the [nano-satellite development and testing facilities](#) available at Kyutech.

Every year this "Post-graduate study on Nano-Satellite Technologies (PNST)" Fellowship Programme will accept up to three students in the Master's Program (2 years duration) and up to three students in the Doctoral Program (3 years duration). Successful participants will be awarded a master or doctoral degree after successful thesis defence. The successful candidates will enroll in the Space Engineering International Course (SEIC) after passing an official entrance examination by the Graduate School of Kyushu Institute of Technology.

The selected candidates will each receive a grant under Japanese government (Ministry of Education, Culture, Sports, Science and Technology: MEXT) scholarship (Research Students) of approximately 144,000 JPY per month for the duration of their fellowship study (2 or 3 years) to cover housing, food, local transportation, and other expenses. Each candidate will be provided, according to his/her itinerary and route as designated by MEXT, an economy class air ticket between an international airport in the country of his/her nationality and an international airport in Japan used on the normal route to the accepting university. Fees for matriculation, tuition and entrance examinations will be paid by Kyutech.

**If you are an engineer under age 35 living in a non-space-faring nation and you are *passionate* about space, then you have a good chance at PNST; you should apply.**

**How satellite technology has opened new opportunities:**

**From El Salvador to the world**

Interview conducted on 25 August 2021

**Institution:**



**Interviewee:** Fatima Duran, Master's Student at Kyushu Institute of Technology from the Republic of El Salvador

**Background:**

The [United Nations Office for Outer Space Affairs \(UNOOSA\)](https://www.unoosa.org/), in partnership with the Government of Japan and the [Kyushu Institute of Technology \(Kyutech\)](https://www.kyutech.ac.jp/) offers the [UN/Japan Long-term Fellowship Programme Post-graduate student on Nano-Satellite Technologies \(PNST\)](https://www.unoosa.org/documents/pdf/psa/bsti/fellowship/2022/Interview_Article_PNST2021_Fatima_Duran.pdf).

**READ THE ENTIRE INTERVIEW HERE:**

[https://www.unoosa.org/documents/pdf/psa/bsti/fellowship/2022/Interview\\_Article\\_PNST2021\\_Fatima\\_Duran.pdf](https://www.unoosa.org/documents/pdf/psa/bsti/fellowship/2022/Interview_Article_PNST2021_Fatima_Duran.pdf)

**To help promote the Year 2022 round of PNST, UNOOSA interviewed PNST student Fatima of El Salvador**

**Interview:**

**How did you learn about the PNST fellowship and where were you at the time in your studies and career?**



Flight Dynamics practice on a CTWS flight design training airplane ©Fatima Duran



I have always been interested in aerospace engineering. However, since there was no university that taught aerospace engineering in El Salvador at that time, I studied aeronautics first in my country, at Universidad Don Bosco. With that experience, I moved to South Korea to obtain my bachelor's degree in Pusan National University. In South Korea, not only did I have the opportunity to study aerospace engineering at university, but I had the privilege to take part in the 2017 International Space Training that was conducted by the Korean Aerospace Research Institute (KARI). KARI invites delegates from developing countries to this programme and I was very fortunate to be given this opportunity. It was a wonderful 2-week course to gain theoretical training about remote sensing and GEO satellite technology, have the chance to participate in technical visits to actual testing facilities in KARI's



## A sample from the interview



Soldering some components of the LoRa receiver ©Pooja Lepcha

### **Would you recommend PNST to other people? If so, what would be your advice to them?**

I would definitely recommend PNST. Kyutech is a leading institute in the field of nano-satellite technology. They have an organized programme where you can gain experience through hands-on opportunities and learn about the complete life cycle of the development of a satellite. Kyutech proudly holds the position as top in the number of academic small satellites by academic and non-profit institutions, according to the “Smallsats by the Numbers 2020” provided by Bryce Space and Technology. Furthermore, the prospects you gain from living in a different country, learning the culture/language and making friends from all over the world is a precious part of the experience that needs to be emphasized. Life in the lab with my international colleagues continuously brings me new findings, on how they work, approach problems and come to conclusions. Of course, with a new language and culture, life is not always easy, but Kyutech has an amazing support system from day 1, with a tutor that helps to set up necessities such as accommodation, bank accounts and so on.

## A current PNST student (Pooja Lepcha of Bhutan) appears in a new video from UNOOSA



← *“50 years of the United Nations Programme on Space Applications”*  
Aug 25, 2021



# UNOOSA

**FOUR-MINUTE VIDEO BY UNOOSA:**

<https://www.youtube.com/watch?v=lqkXg6LqocM>

# BIRDS-3 Competition

By: Pooja Lepcha for BIRDS-3

14 Oct. 2021

# BIRDS-3 Competition was announced on 10<sup>th</sup> August 2021



Dear Members of the Ground Station Network,

BIRDS-3 satellites have been operational for more than 2 years now and are rapidly decreasing in altitude. According to our recent simulations and predictions, we have less than 2 months of operation. During these last months, we would like to hold competitions within the BIRDS Ground Station Network.

We have different categories of competitions so that everyone can participate and win prizes. The last competition was about the first uplink to the satellites. This time we will have competition for:

1. Ground station with the **highest number** of CWs received from August 11th (00:00 UTC) to September 11th 00:00 UTC 2021
2. Ground station with the **maximum amount of data downlink** from August 11th (00:00 UTC) to September 11th 00:00 UTC 2021
3. Ground station with the **highest number of CWs received** from deployment to end of life of the satellites.
4. Ground station that takes the **best picture of their country**.

## Thoughtful prizes for the winners are still being discussed.



# Winners for each category

1. Ground station with the highest number of CWs received from August 11th (00:00 UTC) to September 11th 00:00 UTC 2021



**AEP GS with 401 CWs recorded**



# Winners for each category

2. Ground station with the maximum amount of data downlink from August 11th (00:00 UTC) to End of Life (EOL) of satellites



**NAST GS with 3902 packets downloaded**



# Winners for each category

3. Ground station with the highest number of CWs received from deployment to end of life of the satellites.

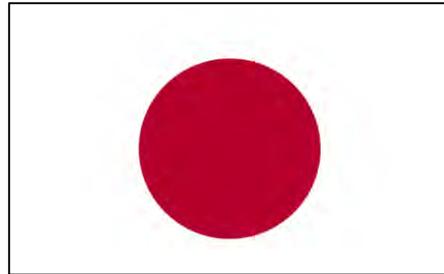


**UPD GS with 2320 CWs recorded**

# Winners for each category

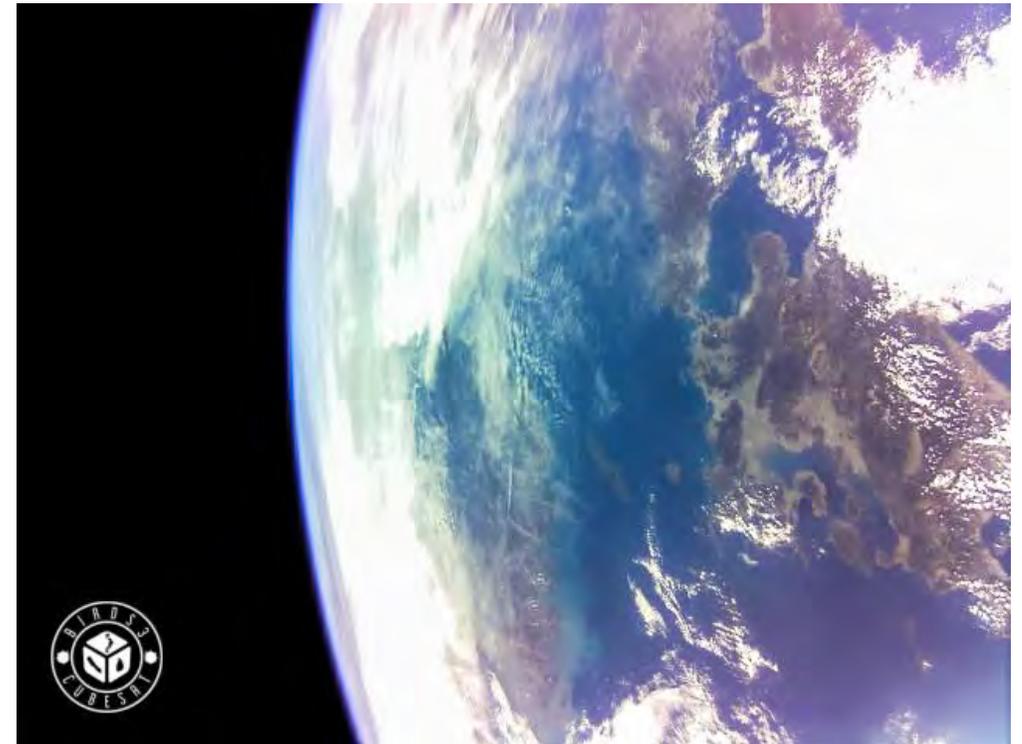


4. Ground station that takes the best picture of their country.



Kyutech GS

BIRDS-3 Members selected this photo as the best photo among the photos taken by BIRDS-3 satellites



**END OF THIS BIRDS-3 REPORT**

# Development of Simplified Thermal Analysis Tool for CubeSat Design

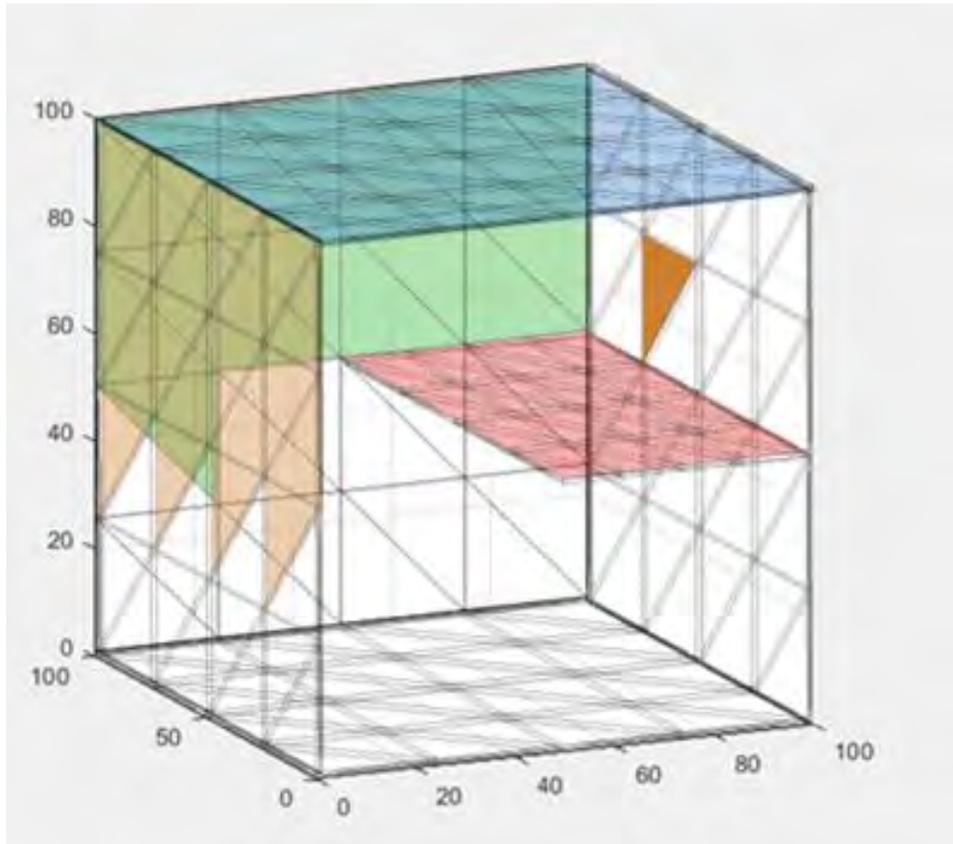
By Reynel Josué Galindo Rosales

*M2 Student*

Supervisor: Prof. Mengu Cho

Co-Supervisor: Prof. Hirokazu Masui

E-mail: [rosales.reynel-josue457@mail.kyutech.jp](mailto:rosales.reynel-josue457@mail.kyutech.jp)



# About the Author



My name is Reynel Josué Galindo, a second year Master's student from Honduras currently enrolled in SEIC. I am a member of Project Morazán, which aims to place the first Honduran satellite in space with collaboration from Guatemala and Costa Rica to develop a fast response program against natural disasters. This satellite is expected to be launched in 2022, and it is my task to ensure some of the subsystems from the satellite work as intended.

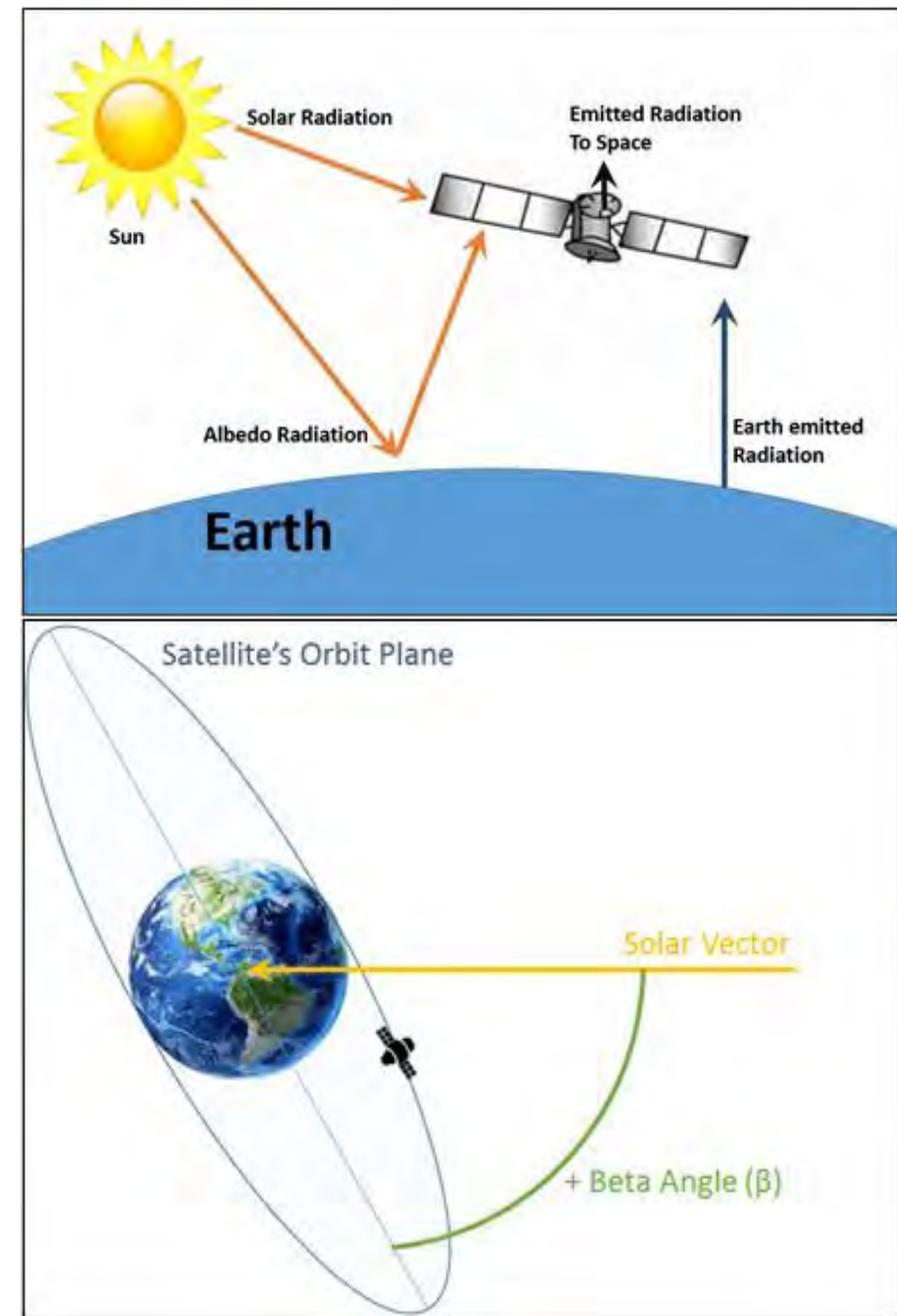
Due to COVID-19, I have been unable to travel to Japan from the beginning of the Masters program, which led me to choose a research topic that let me work from Honduras in the meantime. My research is currently focused on software development for Cubesat design, which doesn't require lab equipment until the later stages when testing is needed for results comparison. Feel free to contact me if you are interested in this topic!

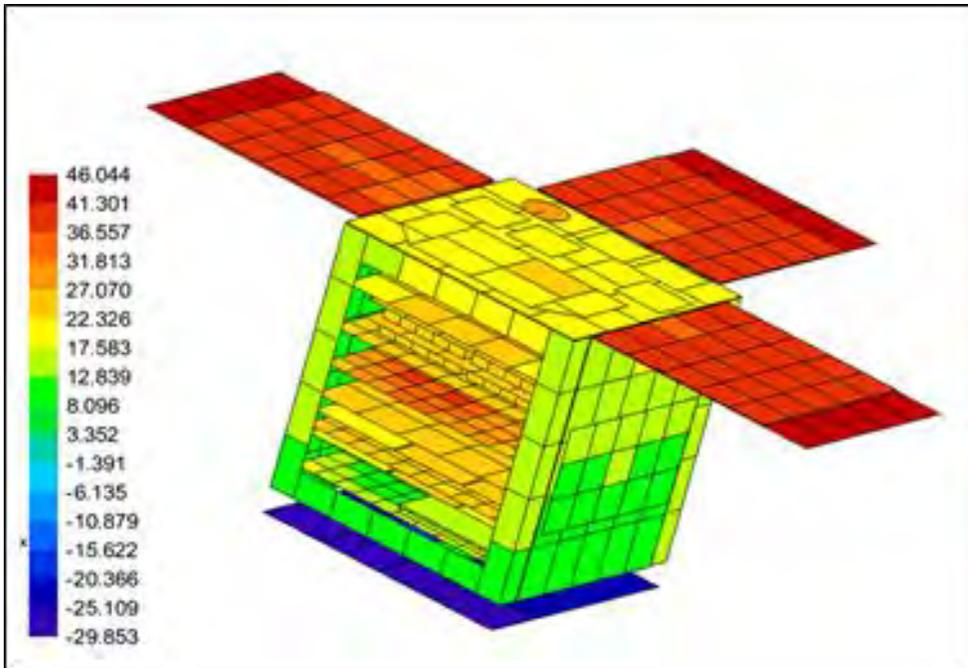
# Why do we need to perform thermal analysis?

Satellite electronics and other internal components have optimal performance in certain temperature ranges.

Space, however, has a wide range of temperatures going from near absolute zero to hundreds of degrees depending on the position of the satellite with respect to celestial objects such as the sun or a planet.

It is imperative we ensure our satellites can withstand this thermal stress before sending them to space.

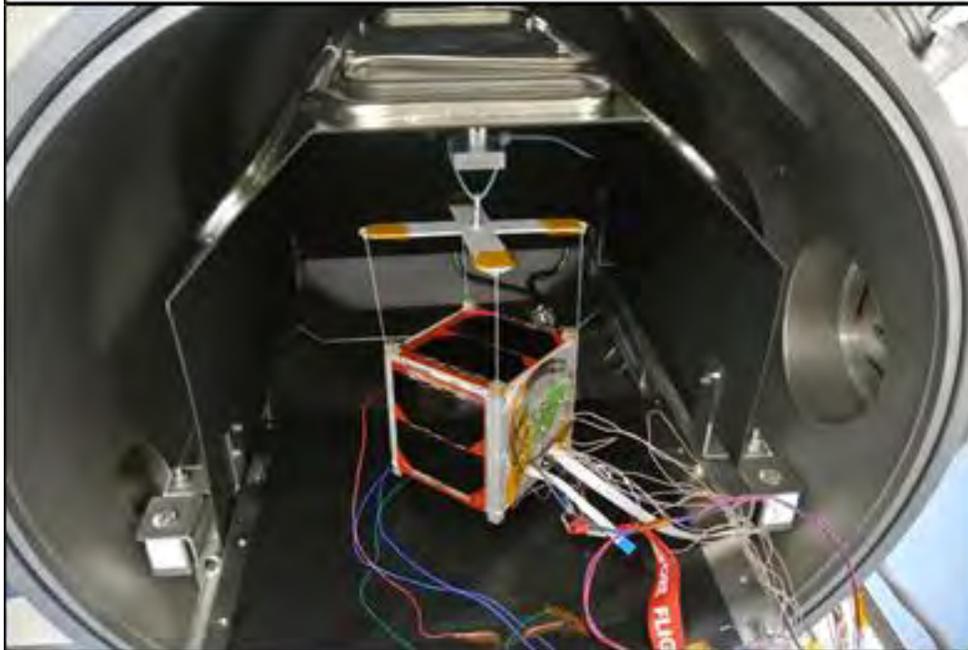




# How do we perform thermal analysis?

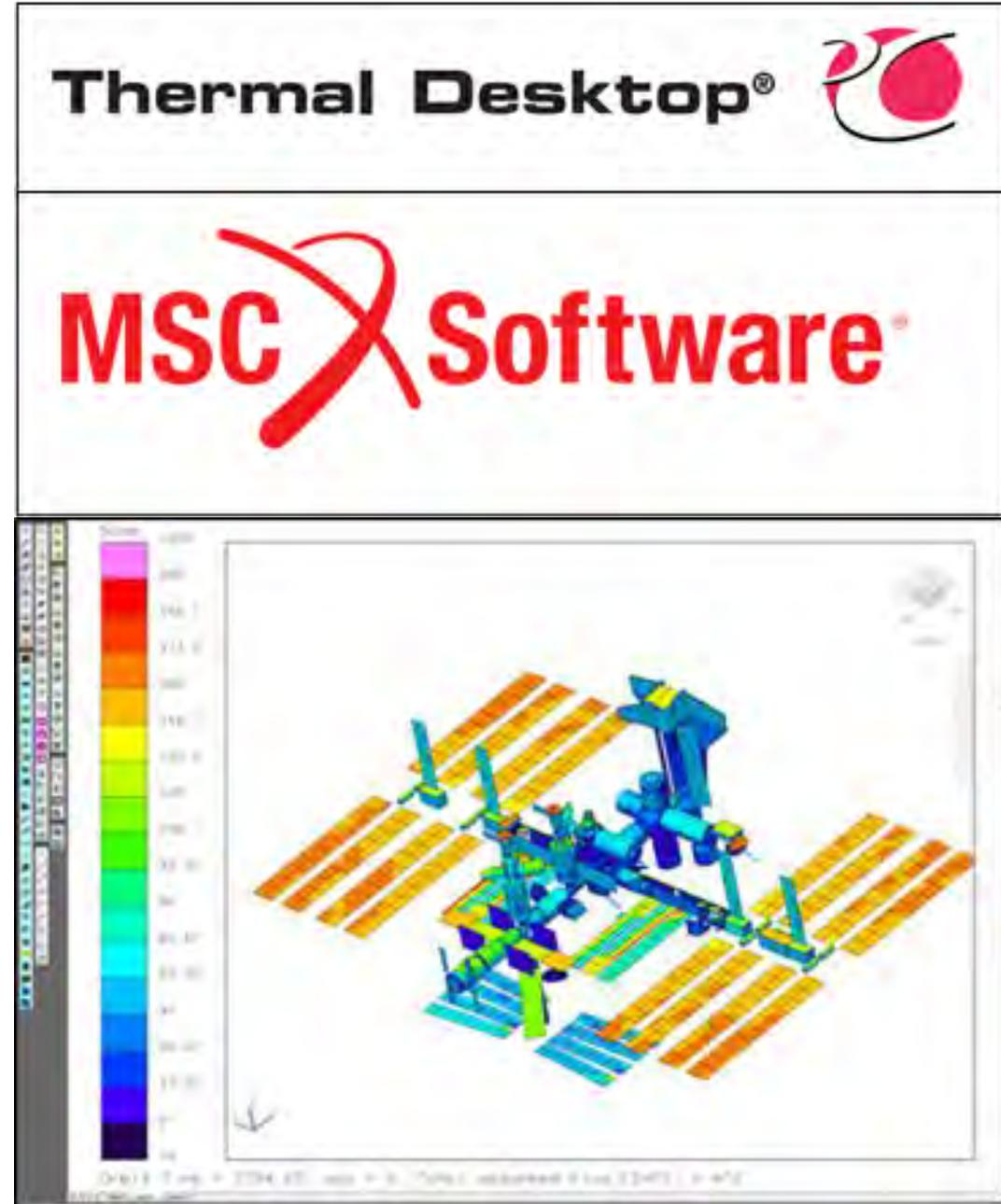
We can perform thermal analysis before a design is finished by using software for thermal modeling and check if our design works once built with thermal testing.

Both of these methods work only if we know all the conditions our satellite will be subject to, so we must ensure to get all our data beforehand and plan for possible additional scenarios.



# Is there an issue with already available tools?

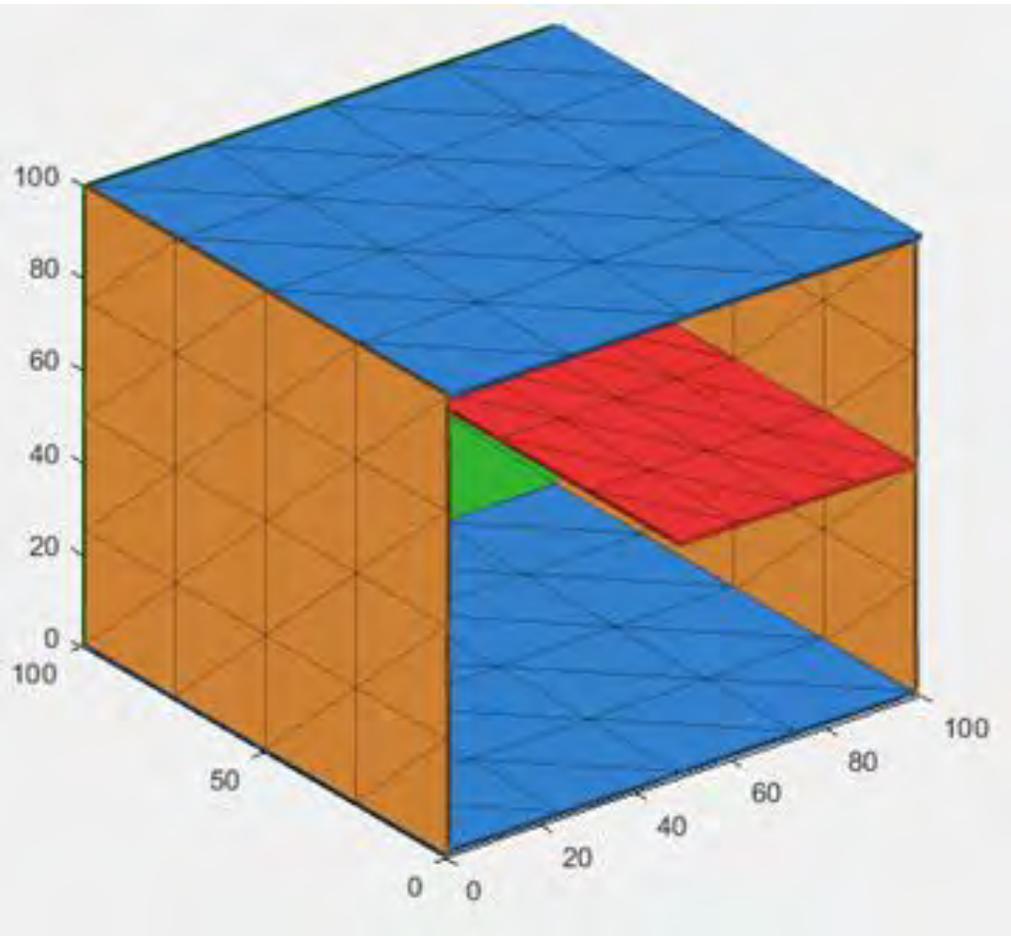
- **Tools are difficult to use for newcomers:** These tools require training on many different functions, which takes time from development. CubeSat design is usually simple, while these tools are robust to cover complete systems problems.
- **Price:** An educational CubeSat project may not justify the costs of a full software license. Software licenses may not be inside a project budget in the first place.



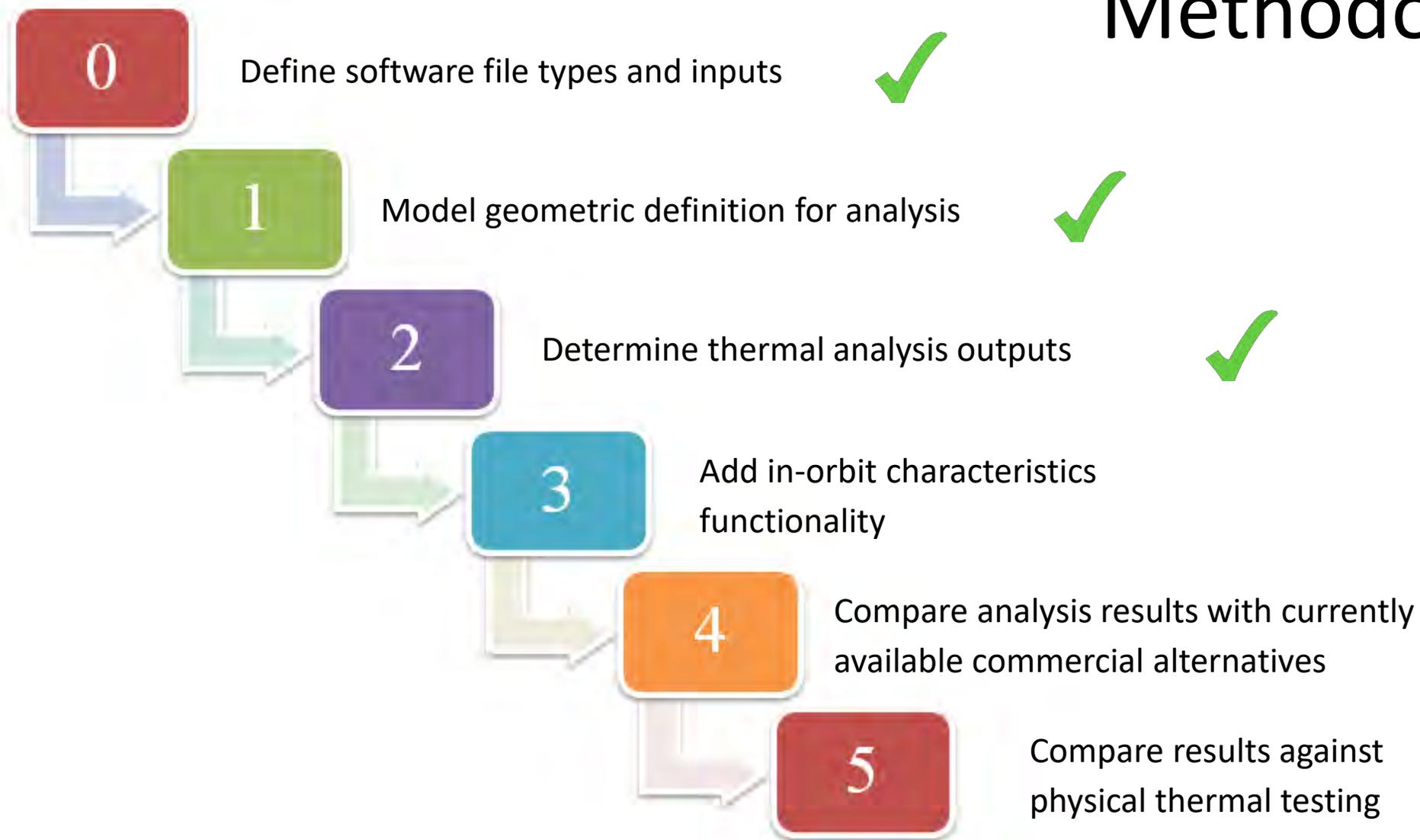
# Proposed Solution: Open-Source Thermal Analysis Tool

## Objectives:

- To develop a simplified thermal analysis tool tailored for CubeSat design.
- To make this tool compatible with other open-source programs and file formats.
- To make this tool easy to use.
- Outputs of this tool should be accurate enough to compare to commercially available software.



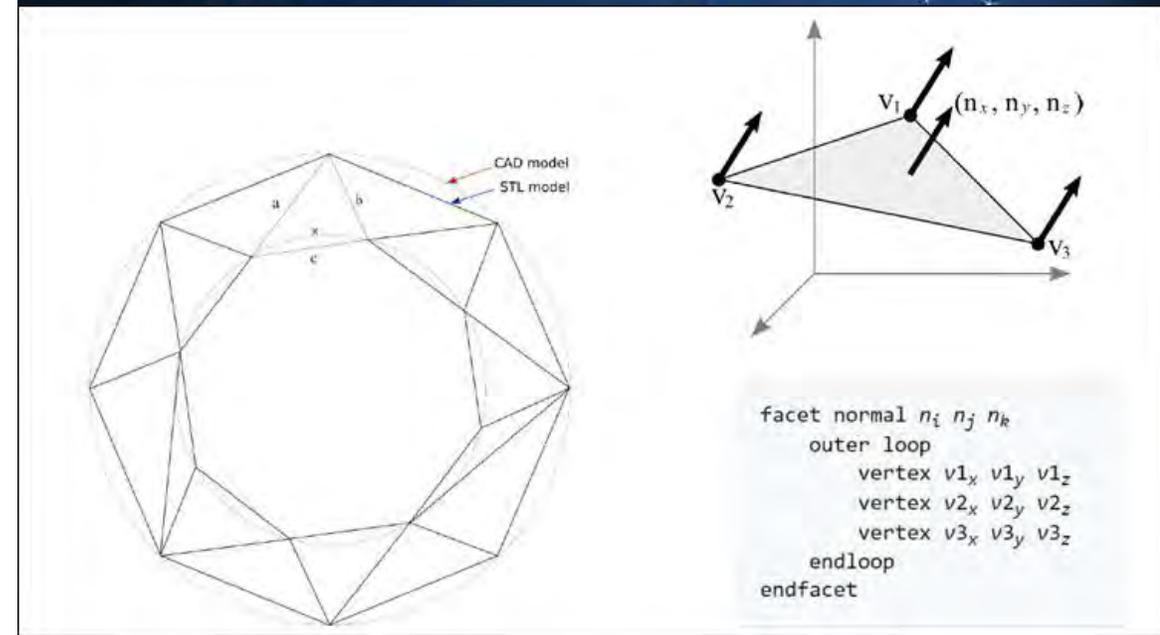
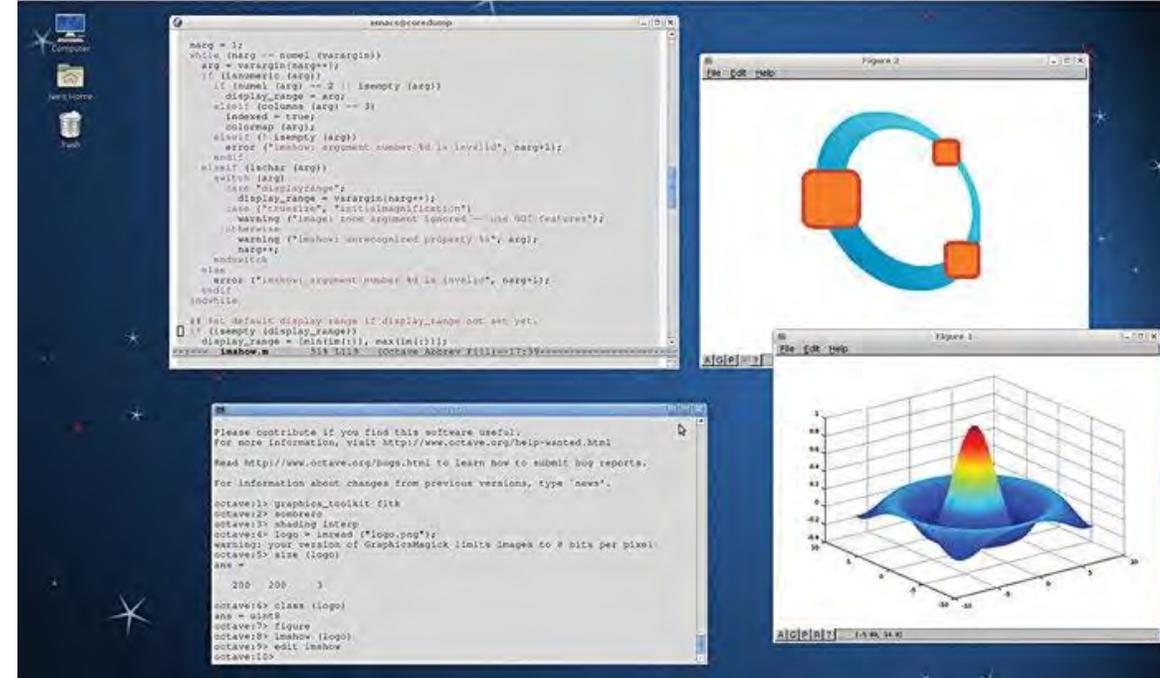
# Methodology and Progress

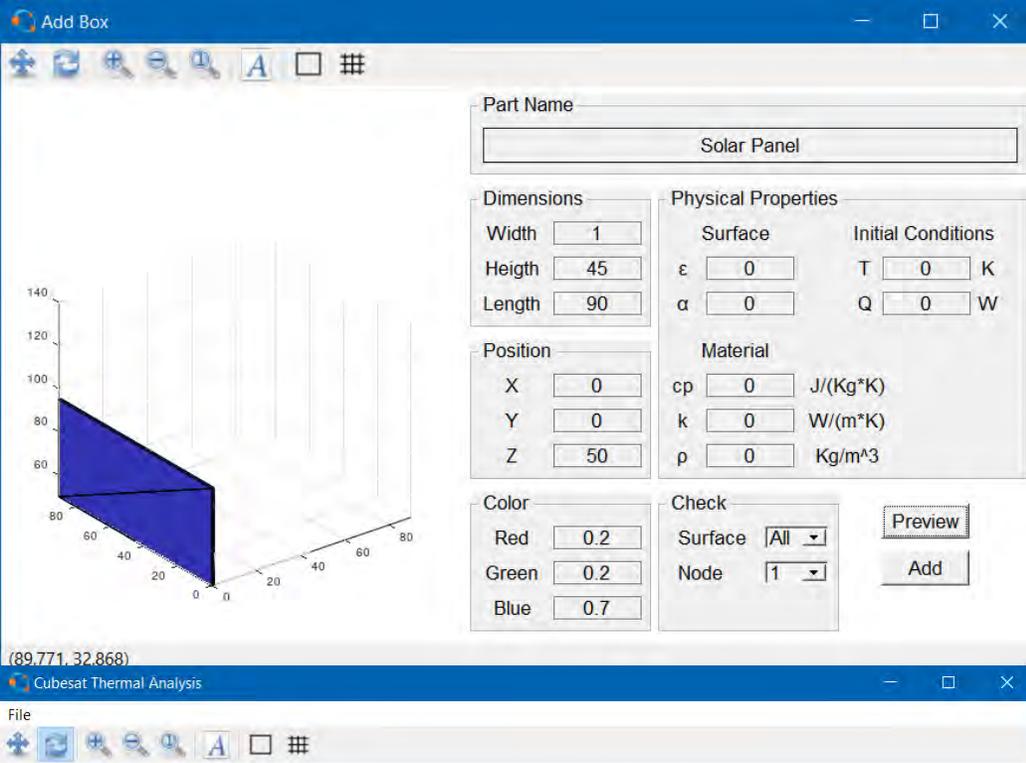


# Software file types and inputs

The software is currently being programmed in GNU Octave, a scientific programming language compatible with MATLAB code. Installing Octave is currently the only requirement to use this program.

Geometry import and analysis is based on .stl files, that model all geometry as triangles with vertex and normal vector information.

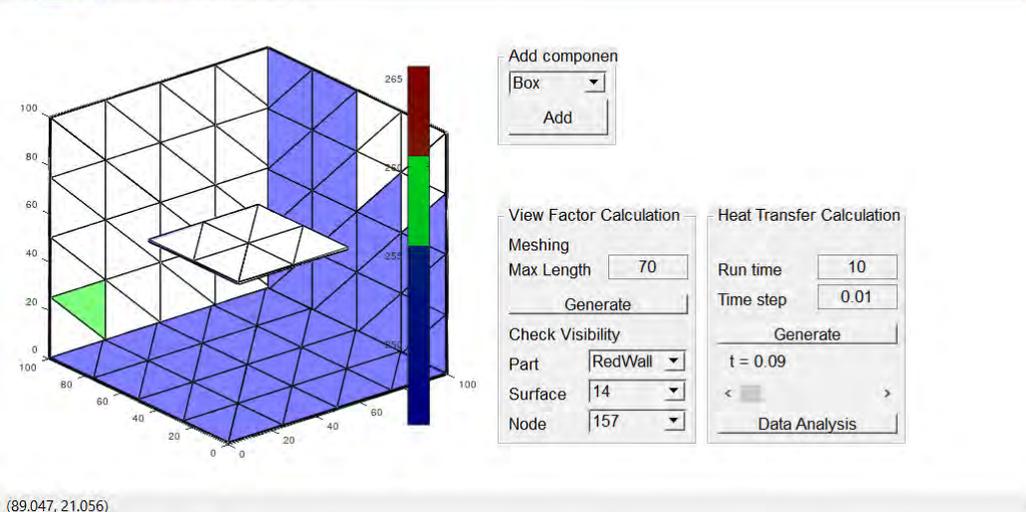




# Geometry definition and Analysis

A typical use of the software would include 4 steps for thermal modeling:

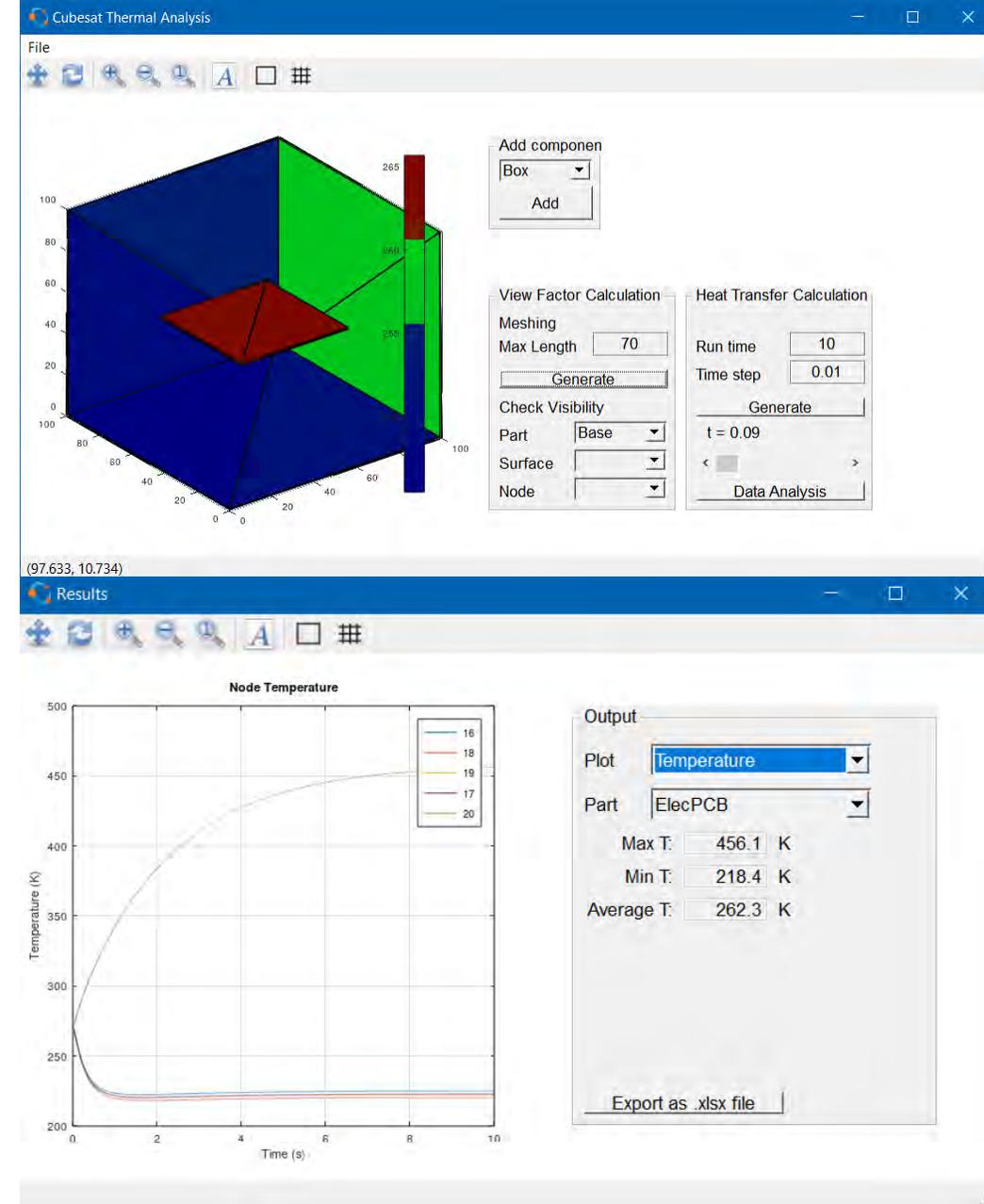
- Add geometric and physical characteristics for parts and add them to an assembly.
- Select in-orbit characteristics for assembled satellite (work in progress).
- Determine analysis accuracy by meshing geometry and checking interactions between parts (validation in progress).
- Specify run time and check thermal analysis results.



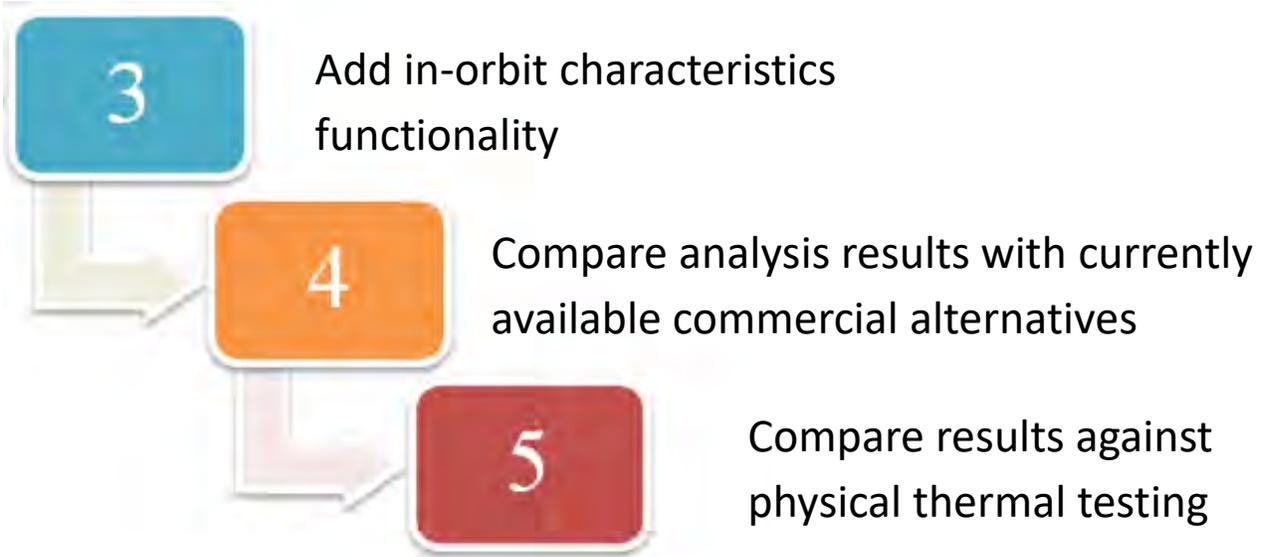
# Thermal analysis outputs

The software can show a colormap for temperature along with plots for important parameters such as temperature against time for individual parts, radiated heat, conduction, etc.

All this data can also be exported as spreadsheets for data analysis in other programs.



# Current and Future work



Aside from the steps mentioned in the methodology, I plan on improving the user interface and polishing the code for computing optimization.

**End of this section**

# UPDATES FROM THE PHILIPPINES



Philippine  
Space  
Agency

*STAMINA4SPACE*

Space Technology and Applications Mastery, Innovation and Advancement  
(STAMINA4Space) Program

Funded by:



DOST

Monitored by:



DOST-PCIEERD

Implemented by:



DOST-ASTI



September 16, 2021 - October 15, 2021

# Philippine Space Agency celebrates women in space and more during World Space Week 2021

QUEZON CITY, PHILIPPINES - The Philippine Space Agency (PhilSA) joined the rest of the world in celebrating “Women in Space” and advancing gender equity and inclusivity in the space sector during World Space Week (WSW) 2021.

The week-long celebration from October 04 to 10 also aimed to spark interest and curiosity among young minds, and showcase the achievements of our space enthusiasts in solving real-world problems using space data.

The opening ceremony “Lift Off” was organised in partnership with the US Embassy in Manila and American Spaces Philippines. The webinar highlighted the work and experiences of women scientists, engineers, astronauts, and entrepreneurs.

During the event, Japan Aerospace Exploration Agency (JAXA) former astronaut YAMAZAKI Naoko obliged to answer some of the most interesting questions from the most curious Filipino kids.

Watch the recording of the webinar here: [facebook.com/PhilSpaceAgency/videos/452451866091884](https://www.facebook.com/PhilSpaceAgency/videos/452451866091884)

**WELCOME REMARKS**

- Dr. Joel Joseph S. Marciano, Jr.**  
Director General  
Philippine Space Agency
- H.E. Heather Variava**  
Chargé d'Affaires  
US Embassy in the Philippines

**KEYNOTE SPEAKER**

- Simonetta di Pippo**  
Director  
United Nations Office for Outer Space Affairs

**SPECIAL GUEST**

- YAMAZAKI Naoko**  
Former Astronaut  
Japanese Aerospace Exploration Agency

**SPEAKERS**

- Engr. Josephine Santiago-Bond**  
Chief of the Division,  
Kennedy Space Center (KSC)  
Safety and Mission Assurance  
Institutional Division  
NASA
- Emeline Paat-Dahlstrom**  
Co-founder and CEO  
SpaceBase NZ
- Shielo Muta**  
Chief Science Research Specialist  
Space Mission Control and  
Operations Division  
Philippine Space Agency

**Logos:** World Space Week PHILIPPINES, PhilSA, United States Embassy PHILIPPINES, 75th Anniversary PH-US Diplomatic Relations, American Spaces PHILIPPINES.

**LIFT OFF!  
Women in Space**

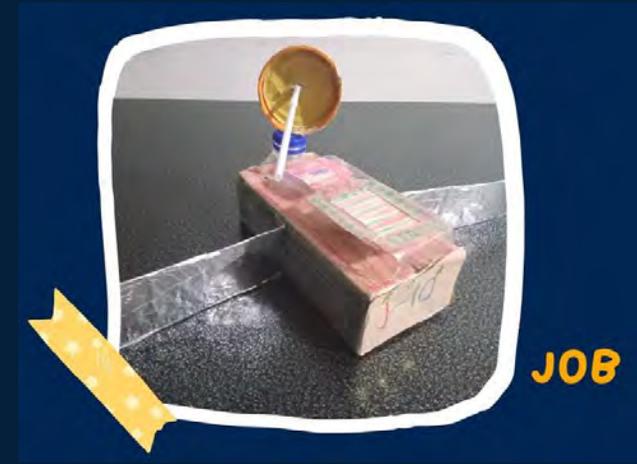
# PhilSA WSW 2021 Events



HEATHER



GAB



JOB



DAN

Filipino kids aged 09–10 years old built their own model satellites using recyclable or edible materials. Engr. Ariston N. Gonzalez of the STAMINA4Space Program gave a short lecture on building satellites to the kids.

See the winners of the Build Your Own Model Satellite contest here: [facebook.com/PhilSpaceAgency/posts/236941098479501](https://facebook.com/PhilSpaceAgency/posts/236941098479501)

## BUILD YOUR OWN MODEL SATELLITE

# PhilSA WSW 2021 Events



Students and enthusiasts interested in a career in the space sector were invited to join a webinar with speakers from the field of science, technology, engineering, and mathematics (STEM), and space law and diplomacy.

Watch the recording of the webinar here:  
[facebook.com/PhilSpaceAgency/videos/452451866091884](https://facebook.com/PhilSpaceAgency/videos/452451866091884)

## PhilSA WSW 2021 Events



Filipino journalists were invited to discover the Space Data Dashboard, a public platform utilizing Earth Observation and remote sensing data monitoring air and water quality, critical infrastructure, and economic activities.

The applicants had the opportunity to understand the foundations of the Space Data Dashboard and how to navigate it.

The workshop also included topics on space law and diplomacy, and space science communication to give them a more holistic appreciation of the data they will be handling.

The closing program recognized the creativity and accomplishments of space enthusiasts in the country.

The winners of the 2021 Earth Observing (EO) Dashboard Hackathon were recognized in this event. Team World MAQI and Team Givesight presented their projects related to solving challenges related to the COVID-19 pandemic using data from the EO Dashboard to inspire Filipinos to join hackathons.

The winners of the Build Your Own Model Satellite Competition were also announced during this event. Watch the recording of the webinar here:

[facebook.com/PhilSpaceAgency/videos/1251929075309808](https://facebook.com/PhilSpaceAgency/videos/1251929075309808)

## PhilSA WSW 2021 Events

**World Space Week Closing Program**  
 09 OCTOBER 2021 | 10:00 AM to 12:00 PM PhST

Catch the presentations of 2021 EO Dashboard Hackathon winner Team World MAQI and finalist Team GiveSight!

Announcement of winners of the Build Your Own Satellite Model Competition

**BUILD YOUR OWN MODEL SATELLITE**

World Space Week PHILIPPINES PhilSA #WomenInSpace



# Open Call for INCENTIVISE

## Introducing Non-Geostationary Satellite Constellations Test Deployments to Improve Internet Services

Operators of NGSO Satellite Internet Operators (SIOs) are invited to participate. See caption for more details.

## PhilSA invites NGSOs to participate in INCENTIVISE

The Philippine Space Agency (PhilSA) invites operators of Non-Geostationary Orbit (NGSO) Satellite Constellations to participate in INCENTIVISE: Introducing Non-Geostationary Satellite Constellations Test Deployments to Improve Internet Services.

Read more about INCENTIVISE:  
<https://philsa.gov.ph/news/incentivise-open-call/>



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## CONGRATULATIONS

Gladys Bajaro, Derick Canceran, Bryan Custodio, Lorilyn Pablo Marielle Magbanua-Gregorio, Christy Raterta, Judiel Reyes, and Renzo Wee, the first batch of STeP-UP Scholars, for the successful deployment of Maya-3 and Maya-4 to space from the International Space Station (ISS).

Philippine Space Agency

STAMINA4Space Program

STeP-UP Scholars Batch 1

STeP-UP Scholars Batch 2



# Messages on the successful deployment of Maya-3 and Maya-4 to space

Maya-3 and Maya-4 wouldn't be possible without the support of our partners and collaborators.

Read these messages from our funding/sending/implementing institutions, collaborators, as well as messages from the Maya-1 and Maya-2 engineers.

*Read more about the deployment here: <https://bit.ly/3FDADNI>*



This is a very historic and important day, because the world has witnessed the deployment of Maya-3 and Maya-4 cube satellites from the International Space Station (ISS) to outer space. These two cubesats are the first Philippine university-built cube satellites developed by Filipino scholars.

Kudos and congratulations to our Filipino scholars for making this event possible. Through the sponsorship of the Department of Science and Technology-Science Education Institute (DOST-SEI), these young and vibrant Filipino scholars are able to take up their master's degree studies at the University of the Philippines Diliman's Electrical and Electronics Engineering Institute.

**Secretary Fortunato T. de la Peña**  
Department of Science and Technology (DOST)



In behalf of the University of the Philippines Diliman, I join everyone in celebration of the launch of Maya-3 and Maya-4. We are proud of these cube satellites which were the first to be built by Philippine universities, as part of our STAMINA4Space Program. Our university has followed this pioneering journey of our faculty, students, and researchers into space. This too, is a journey of partnership between different universities, between academe and government, between Philippine and Japanese universities.

**Dr. Fidel R. Nemenzo**  
Chancellor  
University of the Philippines Diliman

# Messages on the successful deployment of Maya-3 and Maya-4 to space

Maya-3 and Maya-4 wouldn't be possible without the support of our partners and collaborators.

Read these messages from our funding/sending/implementing institutions, collaborators, as well as messages from the Maya-1 and Maya-2 engineers.

*Read more about the deployment here: <https://bit.ly/3FDADNI>*



And so it has come to pass – today we deploy Maya-3 and Maya-4 into low Earth orbit. We are happy and humbled, to say that their release into space, as the first Philippine university-built small satellites, is the culmination of our modest yet earnest attempt to take the next steps to thoroughly apply what we have learned so far. While we celebrate today's success, it is also important to not lose sight of the setbacks, difficulties, and challenges because those occasions are replete with more valuable lessons that build more robust capability and fortitude.

This will allow us to continue building better, to innovate, to add and create value, towards bridging, uplifting, and empowering our nation through space.

**Dr. Joel Joseph S. Marciano Jr.**  
Director-General  
Philippine Space Agency



Building and operating something as complex as a satellite requires meticulous planning, rigorous design and testing of systems, and lots of support. Thus, we thank the Department of Science and Technology for funding our program, the Japan Aerospace Exploration Agency, and Kyushu Institute of Technology for the Joint Global Multi-Nation Birds Satellite Project. We are immensely grateful to both our Philippine and Japanese mentors for guiding our scholars.

It is our aim at STAMINA4Space to gain mastery in building and operating satellites to spread this know-how and thereby give the very best service to our fellow Filipinos. We look forward to gaining more confidence to innovate in this field in order to support our nascent Philippine Space Agency.

Mabuhay Maya 3 and 4! Mabuhay STeP-UP Scholars!

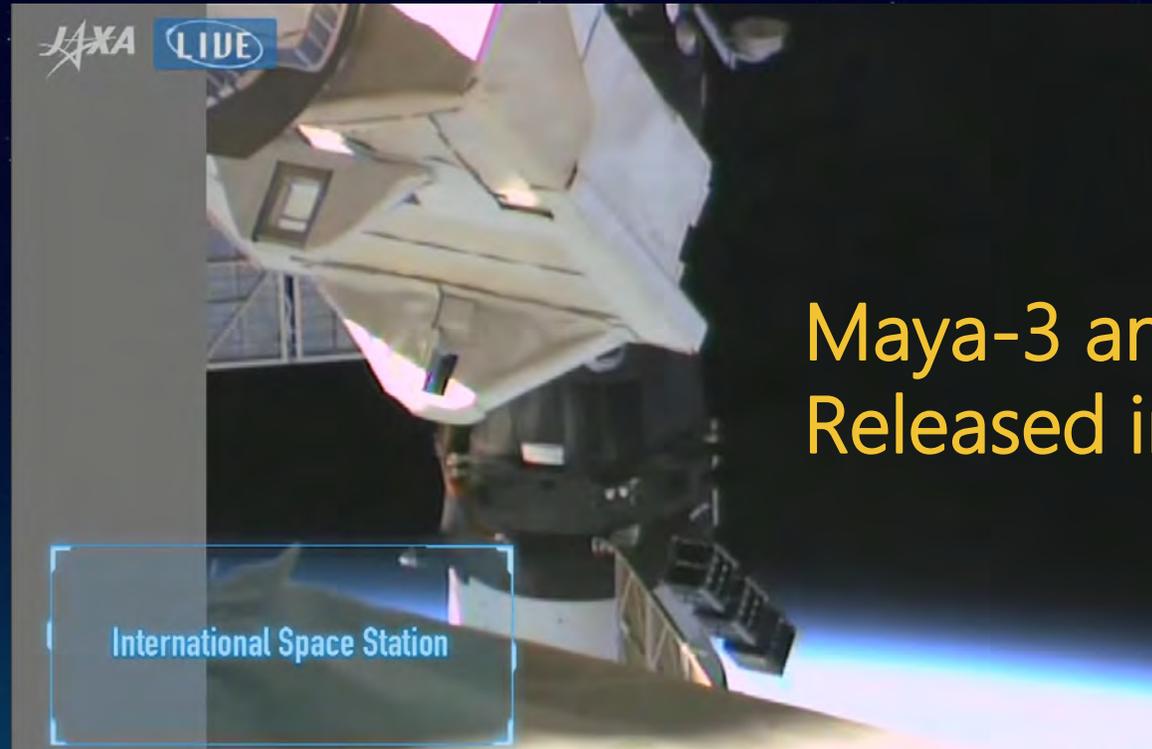
**Dr. Maricor N. Soriano**  
Program Leader  
STAMINA4Space



PREPARED BY:

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Renzo S. Wee

STeP-UP Scholars Batch 1



## Maya-3 and Maya-4 Released into Space!

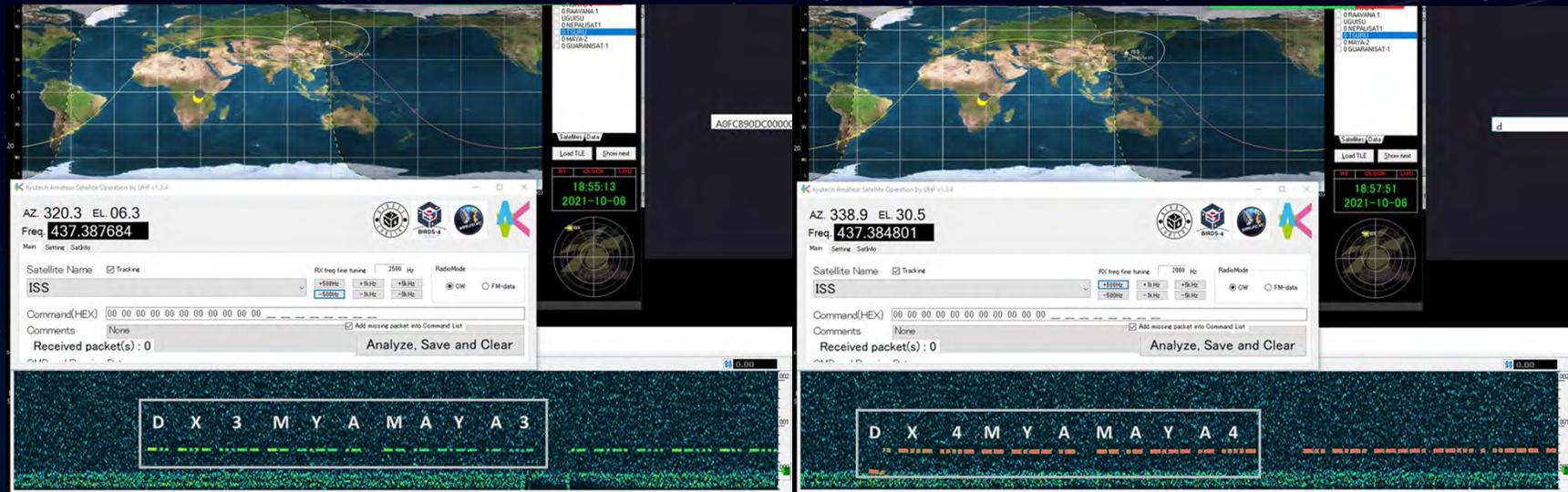
Photo captured via JAXA Youtube livestream

Coinciding with the World Space Week celebration, the Philippines' first university-built cube satellites (CubeSats), *Maya-3* and *Maya-4*, were released to space from the International Space Station (ISS) on October 6, 2021 at 5:20 p.m. PST via Japan's Japanese Experiment (JEM) or "Kibo" Laboratory Module.

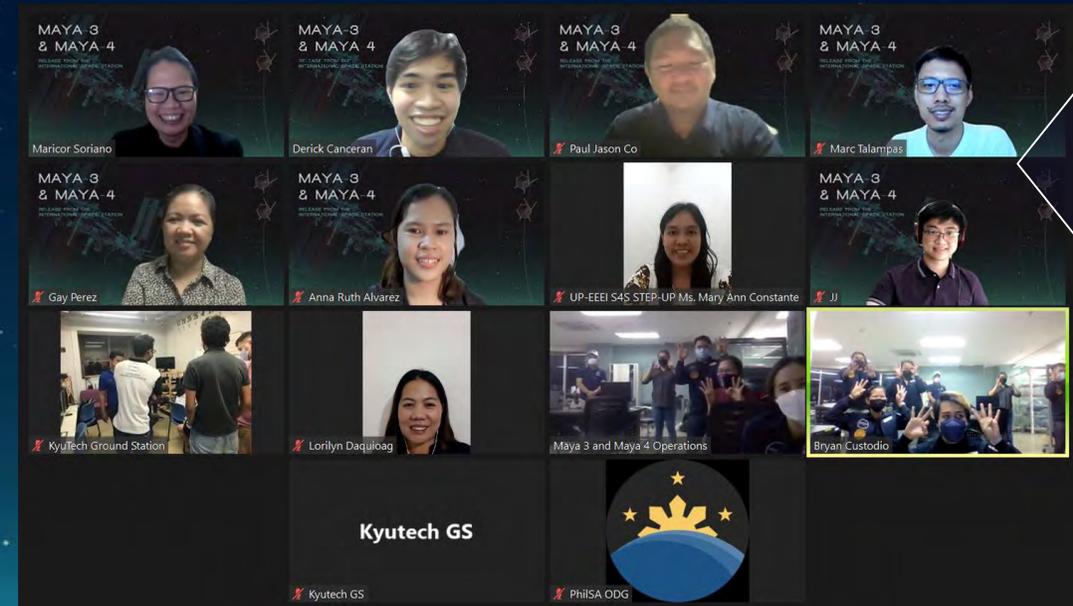
This latest development follows the CubeSats' [launch to the space station](#) on August 29, 2021 at 3:14 P.M. (PST) aboard the SpaceX Falcon 9 rocket's Dragon C208 as part of SpaceX Commercial Resupply Mission-23 (SpX-23). They have been released along with other CubeSats from Australia; namely, Biner-1 and CUAVA-1, developed by Curtin University and the University of Sydney, respectively.

Read the press release: <https://bit.ly/3FDADNI>

# LIKE A HEARTBEAT: First contact from Maya-3 and Maya-4



First contact with Maya-3 and Maya-4 was made during their first pass over the Japan-Kyutech ground station. With the help of BIRDS Project members, the beacons or “heartbeats” of both satellites were acquired and decoded, signalling that the CubeSats are in good condition. The Kyutech team was joined by the STeP-UP Batch 1 scholars, STAMINA4Space project leaders, and PhilSA officials via Zoom to witness this momentous event.



# Amateur radio community acquires beacon from Maya-3 and Maya-4



Photo: Tweet of @JA0CAW, October 6, 2021

People from the amateur radio community showed their enthusiasm in tracking the newest satellites in space! Congratulatory messages for the team are also seen in their posts.

To show our appreciation, we will be sending QSL cards!



Photo: Captured from the Youtube channel of Jharwin Barrozo, published October 6, 2021.

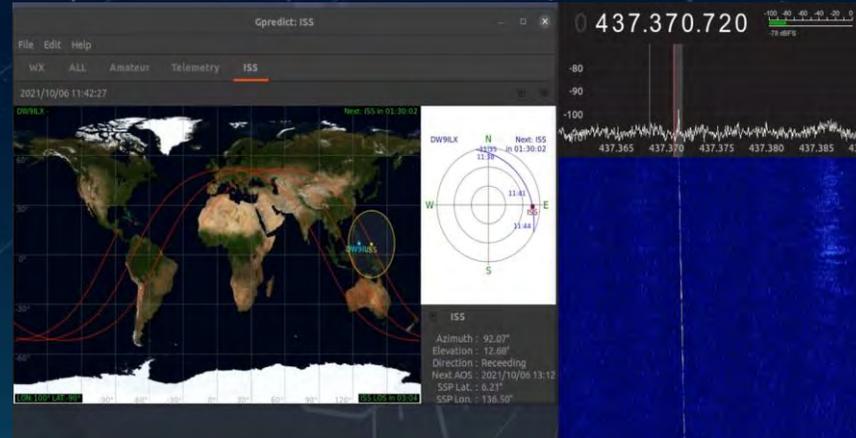


Photo: Captured from the Youtube channel of John Kyl Cortez, October 6, 2021

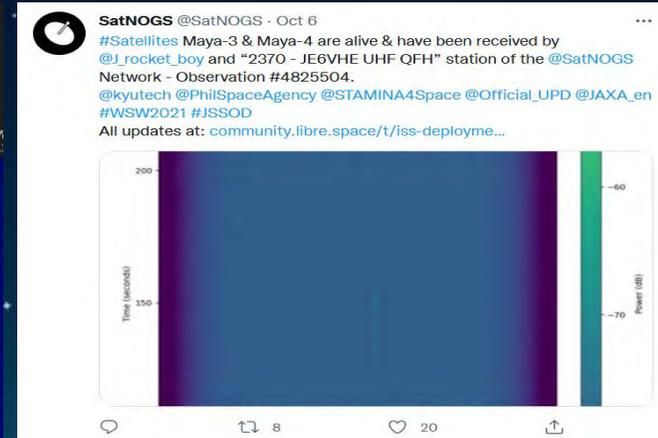


Photo: Tweet of @SatNOGS, October 6, 2021

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## 2 PH cube satellites now operational

By Ma. Cristina Arayata October 7, 2021, 8:00 pm

**MANILA** – The country's two locally made cube satellites (CubeSats) Maya-3 and Maya-4, are now operational following their release to space on October 6, Department of Science and Technology (DOST) Secretary Fortunato de la Peña said on Thursday.

"DOST) Undersecretary (Rowena Cristina) Guevara told me the two CubeSats are now up and running. Paul Jason Co (project leader of Space Science and Technology Proliferation through University Partnerships program) told her they were able to receive and decode beacons shortly after the (CubeSats) release last night," he said in a Viber message.

Based on Philippine Space Agency's Facebook post on Thursday, a "beacon" is like the satellite's heartbeat which lets the ground team know that the satellite is "alive and well" in space.

(Photo grabbed from Philippine Space Agency's Facebook page)

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**PH's Maya cube satellites deployed into space**

**National News**

Published October 9, 2021, 8:22 PM

By Dalmaria Barot

The first Philippine university-built cube satellites Maya-2 and Maya-4 were successfully deployed from the International Space Station (ISS) on Wednesday, Oct. 6.

International Space Station

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EMBASSY OF THE REPUBLIC OF THE PHILIPPINES

**WATCH: LAUNCH OF PHILIPPINES' FIRST UNIVERSITY-BUILT SATELLITES "MAYA-3" AND "MAYA-4" FROM THE INTERNATIONAL SPACE STATION**

BusinessMirror

**Maya-3, Maya-4 cubesats released to space from ISS; beacons received**

BY LYN REURECOON / OCTOBER 10, 2021 / 19 MINUTE READ

International Space Station

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# Philippine media feature Maya-3 and Maya-4 release

The country also celebrated the release of Maya-3 and Maya-4 in space together with the team. Different media networks and agencies featured the release of and beacon reception from the CubeSats.

Philippine Space Agency

STAMINA4Space Program

StP-Up Scholars Batch 1

StP-Up Scholars Batch 2



**PASASALAMAT: Tribute to the people who provided their effort and time!**  
*The Maya -3 and Maya-4 release wouldn't be successful without the help of these people*



STeP-UP Batch 1 Team together with BIRDS-4 Team and professors at KIT during the SET in Japan

We would like to extend our sincerest gratitude to LaSEINE for their help on the entire satellite development stages, especially during the Space Environment Testing at Kyushu Institute of Technology.



STAMINA4Space

Maraming salamat, STAMINA4Space! Without the program, this feat will not be possible. The project efforts are priceless, from conceptualization of STeP-UP, selection of the scholars, mentorship, training, implementation, and support down to the release of the satellites.

**PASASALAMAT:** Tribute to the people who provided their effort and time!  
*The Maya -3 and Maya-4 release wouldn't be successful without the help of these people*



Hari Ram Shrestha



Engr. Marloun  
Sejera



Engr. Izrael  
Bautista



Engr. Mark  
Angelo Purio

Thank you very much, Hari-san, for your mentorship to the team. We extend our deepest appreciation for the helping hand on the solar cell attachment, battery screening, and battery assembly. We have learned a lot from your mentorship!

**Maraming salamat!**

The BIRDS-4 Philippine Team helped the Maya-3 and Maya-4 development team during the development of the satellites, offered hands-on assistance, mentored, and accommodated us during the Space Environment Test in Kyutech, Japan.

**Thank you, BIRDS-4 PH team,  
for your efforts on Maya-3 and Maya-4 development!**

**PASASALAMAT:** Tribute to the people who provided their effort and time!  
*The Maya -3 and Maya-4 release wouldn't be successful without the help of these people*



Engr. Joven Javier and Dr. Adrian Salces

To begin is the hardest part of project development; these two amazing guys provided their efforts and time on the initial phases of the Maya-3 and Maya-4 development.

**Thank you, Joven-san & Adrian-san, for your efforts on Maya-3 and Maya-4 development and to us scholars!**



Thanks to the help and assistance of the Philippine Amateur Radio Association (PARA), National Telecommunications Commission (NTC), Department of Information and Communications Technology (DICT), and Radio Amateur Satellite Corporation-Philippines (AMSAT-PH), the frequencies of Maya-3 and Maya-4 were coordinated with the IARU and ITU.



# PASASALAMAT: Tribute to the people who provided their effort and time!

*The Maya -3 and Maya-4 release wouldn't be successful without the help of these people*

**We would like to thank the funding agencies and institutions that supported this project.**

The Space Science and Technology Proliferation through University Partnerships (STeP-UP) Project aims to proliferate small satellite technology and know-how through the creation of the university consortium, establishment of amateur radio and satellite stations, and course offerings on space science and technology applications.

The STAMINA4Space and PHL-Microsat programs are funded by the Department of Science and Technology (DOST), monitored by DOST-Philippine Council for Industry and Emerging Technology Research and Development (PCIEERD), and implemented through the collaboration between the University of the Philippines Diliman and the DOST-Advanced Science and Technology Institute (ASTI).

Funded by

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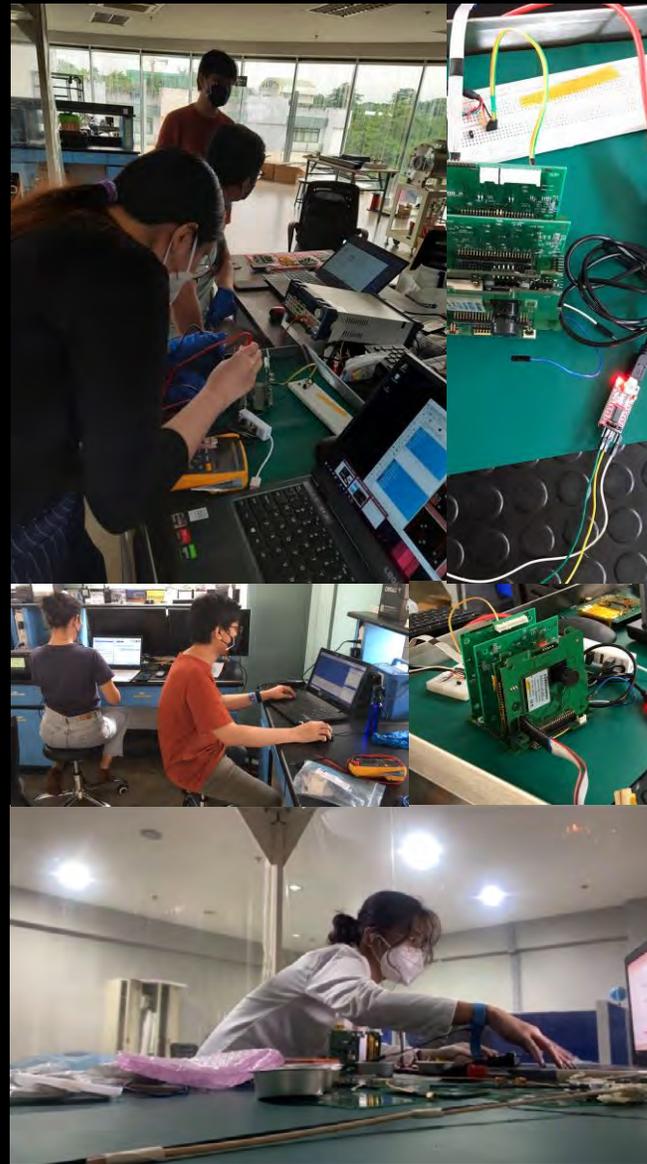
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# RESUMPTION OF TESTS

After the Enhanced Community Quarantine (ECQ) status was lifted, the scholars went back to the lab to resume tests such as interface tests, antenna measurements, and integration tests.

# HAPPY BIRTHDAY, ANNA!

We would like to greet our resident “plantita” a happy, happy birthday! Our nature-loving miss, Anna Alvarez, turned 23 last September 6!



# HAPPY BIRTHDAY, JONATHAN!

Happy birthday to the man JJ, who just turned 31 last September 14. We hope you had an otterly (ha!) happy birthday!

Cheers!

# HAPPY BIRTHDAY, AC!

When she's not working on Maya-5 and Maya-6, AC spends her time creating digital art. To wish her a happy 23rd birthday, check out her art account on instagram @\_clairerity!

Happy birthday, AC!



# HAPPY BIRTHDAY, JIM!

Kuya Jim, who celebrated his 19th (32nd, really) last October 1 is a health and fitness enthusiast

Happy birthday, kuya Jim!



# UiTMSAT COLUMN

Column No. 22

Editor: FATIMAH ZAHARAH BINTI ALI ([ali.fatimahzaharah@gmail.com](mailto:ali.fatimahzaharah@gmail.com))  
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## 15. Column #22 from Malaysia



UNIVERSITI  
TEKNOLOGI  
MARA

*UiTM Sentiasa Di Hatiku  
"UiTM Always in My Heart"*



ASEANSAT

## IR FILTER FOR CAMERA SYSTEM OF ASEANSAT PROJECT

**C**AMERA Mission is a usually a common mission for a CubeSat. Similar to other type of spacecrafts, the imaging sensor and the lens that would make up a camera system, shall be selected based on mission's objectives, and spacecraft's mechanical and electrical properties. This includes the controller unit that would control the operation of the camera mission.

Another important component in a camera system is a filter. Filter is significant for any camera system especially in space application where the distance to the Sun is closer. The usage of filter is based on the necessity of having certain channels or bands from the wide range of electromagnetic (EM) spectrums that

would propagate into the imaging sensor. The filter will cut out the unnecessary ray from specific band before it enters the imaging sensor. Thus, the filter is usually used to ensure the ray that enters the imaging sensor is having correct wavelength for the camera to process the image correctly. At the same time, it will also act as a protector to the imaging sensor from any ray that would damage the device. For such functions to work, the filter must be located before the imaging sensor in the camera architecture.

In ASEANSAT Project, a typical true colour imaging sensor will be used with a longer focal length lens for an optimization of a ground resolution. For this true colour imaging sensor, only visible (VIS) band can be accepted by the device to produce a clear and bright image. Thus, this type of imaging sensor would require an Infra-Red (IR) filter to remove the unwanted IR ray and other rays outside the range of



*Figure 1: The image difference between camera with and without IR filter.*

*Source from YouTube by furulevi.*

VIS band from entering and damaging the sensor.

Without an IR filter, the camera cannot produce an image with correct colour as all spectrums are allowed to enter the imaging sensor. The image produce will be blur with incorrect colour reflection due to the mix up to other unwanted spectrums such as IR ray. Refer Figure 1.

IR ray that comes from the Sun radiates an energy at certain degree of temperature. Other than affecting the image produced by the camera, IR ray can also inflict a defect on the imaging sensor when the camera is exposed closely or longer to the Sun. Refer Figure 2.

These are the effects that should not occur on the camera system onboard a launched satellite. Thus, the requirement of an IR filter for a camera system of ASEANSAT Project is crucial.

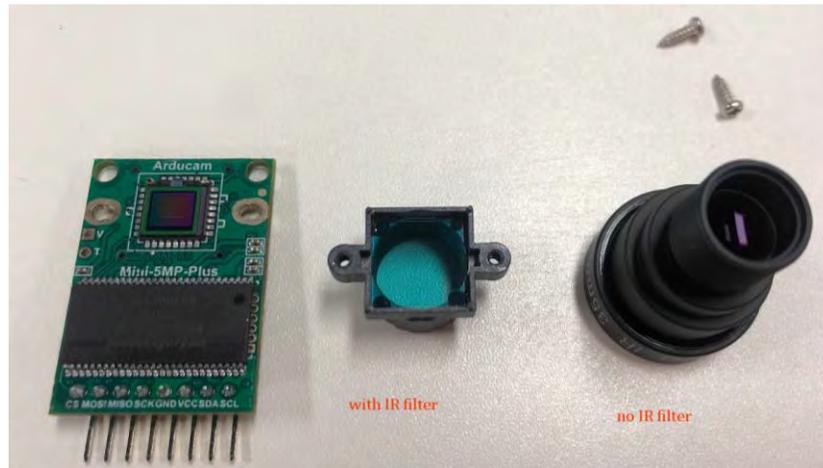


*Figure 2: The image difference between camera with and without IR filter. This is the effect of brightness from the Sun. Longer exposure to the heat of the Sun might damage the imaging sensor.*

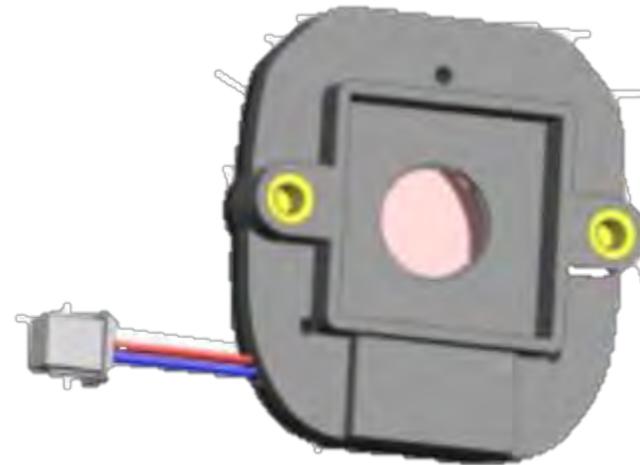
*Source from ExposureGuide.com.*

Based on the advice from the manufacturer of the lens for ASEANSAT Project, it is difficult to add IR filter in the longer focal length lens as many mechanical engineering works will involve. Normally, the IR filter for a typical true color imaging sensor is included in the lens that will be mounted on the imaging sensor.

Since the requirement of IR filter is crucial, we decided to customize the imaging sensor board to include the IR filter in it, instead of having the filter in the lens. Certain mechanical and electrical characteristics would involve to ensure the IR filter works well in blocking the propagating IR ray from entering the sensor device.



*Figure 3: From left: Imaging sensor board, lens holder that will be attached with IR filter, and lens with no IR filter.*



*Figure 4: The architecture on how the IR filter will be attached to the lens holder on the imaging sensor board.*

**End of Malaysia's  
Column**

## 16. Garvey McIntosh (NASA Asia rep) does out reach work in Nagasaki



Garvey McIntosh (based at the US Embassy in Tokyo) talked to school kids in Nagasaki, where he taught English many years ago. He taught for 4 years.



Garvey was a SEIC Guest Lecture speaker on 16 July 2020. He was the first to do Guest Lecture in this SEIC series.

**See the 1-min. video**

<https://news.yahoo.co.jp/articles/ed734190bd473efb98c556c9f8b41317da5cea31>



# End of this **BIRDS Project Newsletter**

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## Issue Number Sixty-Nine

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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.