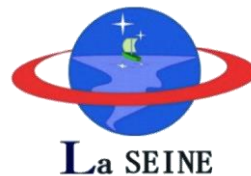


The pioneering properties of UN/Japan PNST Fellowship Program and of Kyutech's BIRDS Program

G. Maeda, M. Cho,
Laboratory of Spacecraft Environment Interaction Engineering (LaSEINE),
Kyushu Institute of Technology, Kitakyushu, Japan.
前田丈二、趙孟佑、宇宙環境技術ラボラトリー、九州工業大学、北九州。

Presented on 15 February 2019, during STSC-COPUOS in Vienna, Austria



Outline of this talk

◆ Discussion of PNST

Post-graduate study on

Nano

Satellite

Technologies



In collaboration with

UNITED NATIONS

Office for Outer Space Affairs

◆ Discussion of the BIRDS Project



PNST SYMPOSIUM OF 2017

**held on the Tobata
Campus of Kyutech in
Japan – many PNST
graduates attended**

PNST in the context of capacity building is significant because it is one of only two post-graduate engineering degree scholarships being offered through the United Nations.

**For each year since 2013, PNST has provided six full scholarships
– three for masters degree and three for Phd.**

The purpose of PNST is to help non-space-faring nations become space-faring nations by developing human resources.

UNOOSA Programme Mandate and Activities

(United Nations Office for Outer Space Affairs)

Mandate

- A. International Cooperation
- B. Capacity Building
- C. Dissemination of Information
- D. Technical Advisory Services

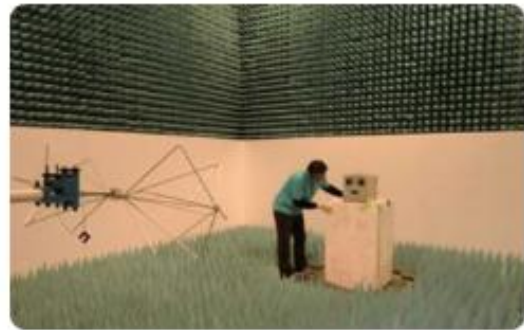


UNOOSA Programme Mandate and Activities

Fellowship Programmes

<http://www.unoosa.org/oosa/en/ourwork/psa/fellowships.html>

Today's
talk is
about
this



UN/JAPAN LONG-TERM
FELLOWSHIP
PROGRAMME ON NANO-
SATELLITE
TECHNOLOGIES

Kitakyushu, Japan



UN/ITALY LONG-TERM
FELLOWSHIP
PROGRAMME ON GNSS
AND RELATED
APPLICATIONS

Torino, Italy



FELLOWSHIP
PROGRAMME FOR THE
DROP TOWER
EXPERIMENT SERIES
(DROPTES)

Bremen, Germany

Kyushu Institute of Technology (“Kyutech”)

- **Founded in 1909**
 - 4,400 Undergraduate students
 - 1,700 Graduate students
 - 370 Academic staff
 - Engineering, Computer science, Life-sciences



**The Main Gate
for the Tobata Campus**

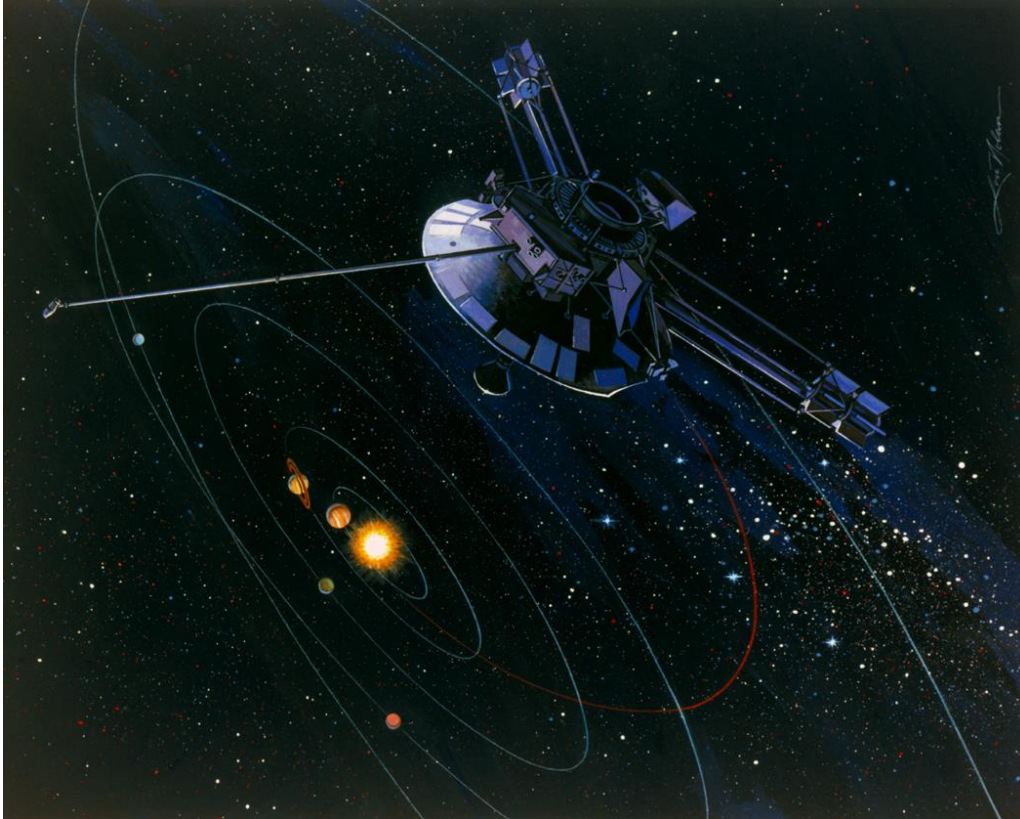


**Our laboratory
(LaSEINE) is in this building.**

Our logo



Pioneer 10 exiting the solar system



https://planetary.s3.amazonaws.com/assets/images/z_changeover/pioneer10_exiting_solar_system.jpg

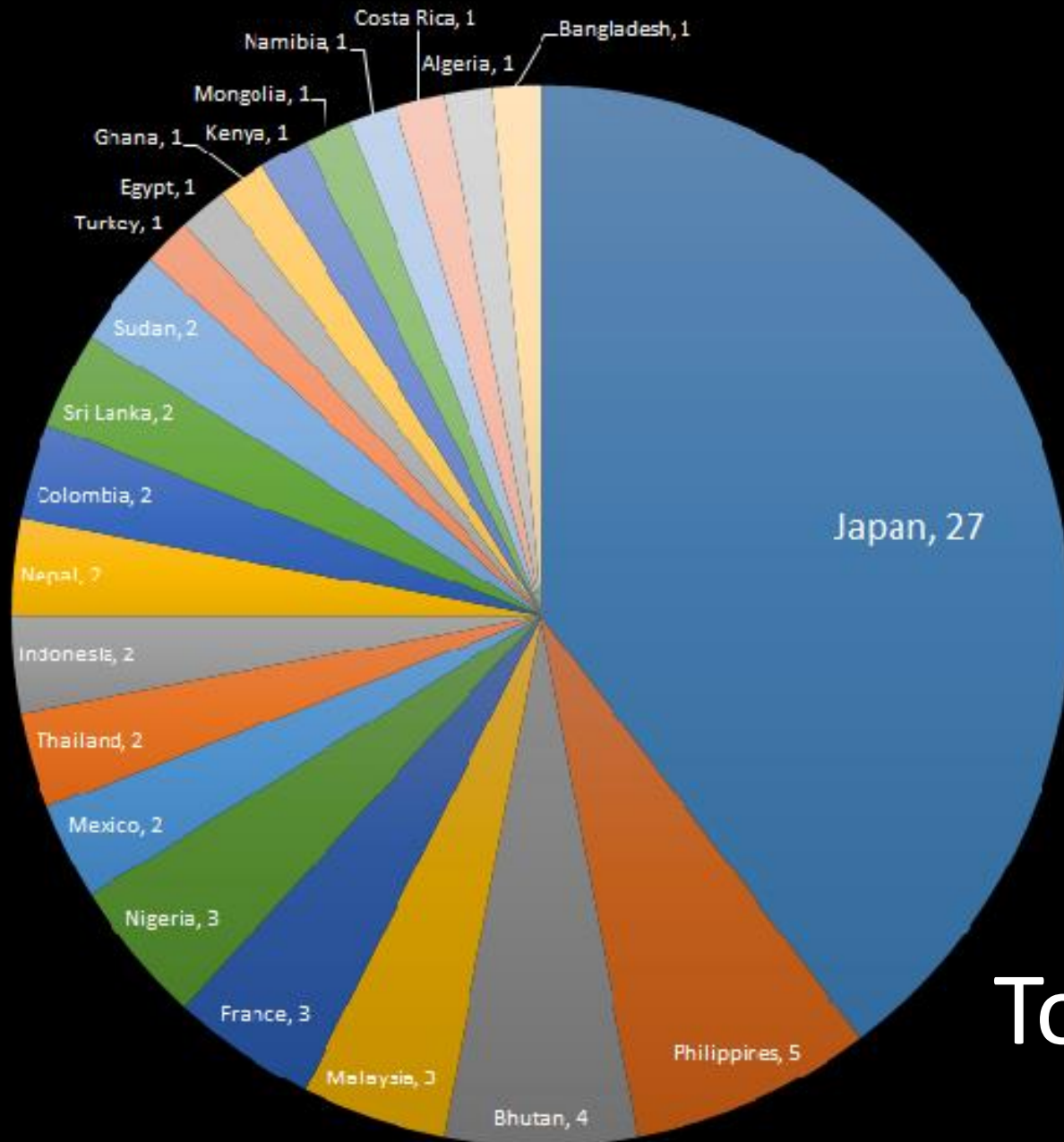
What is
pioneering
about
PNST ?

Our Motto

You cannot learn how to build a satellite by reading books. You must physically use your own hands to build one from A to Z. That is the only realistic way to master the necessary skills for this job.

PNST is pioneering because it seeks to help non-space-faring nations join the space age by teaching their engineers how to build satellites. Significantly, many PNST students build their nations' first satellites through the **BIRDS Project**, which will be discussed later.

PNST makes an impact because of its size. **Since 2013, PNST has been offered to six graduate students per year without exception.**

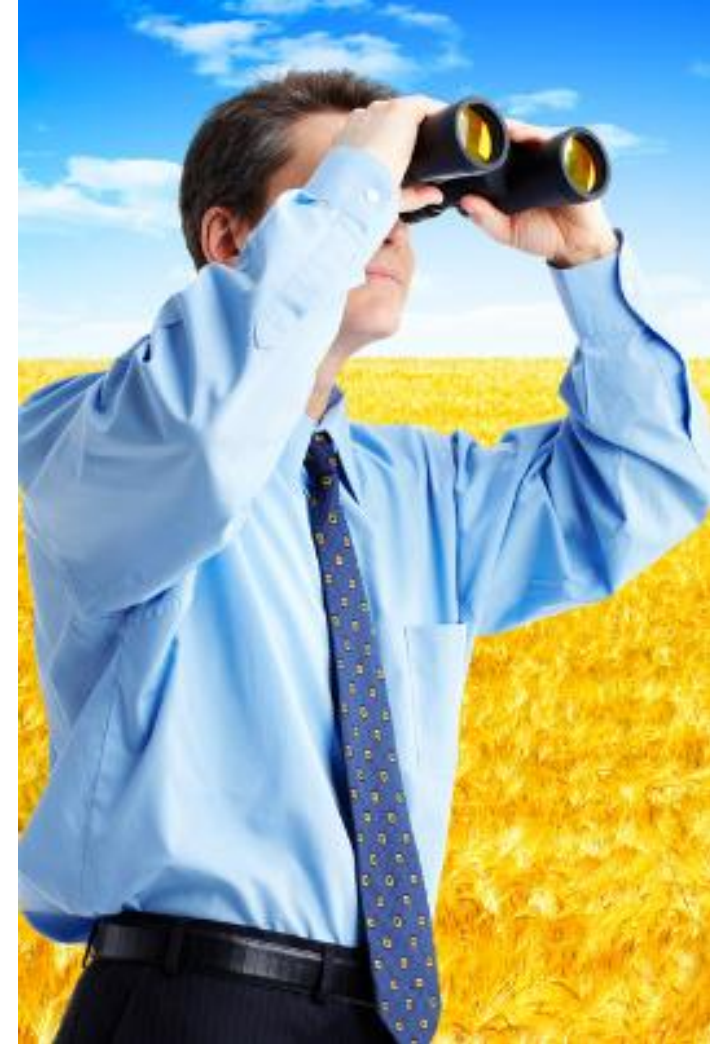


Our international
make-up for the
**Space Engineering
International Course
(SEIC)** as of today.

Total: 68 students

**Any engineering student
residing in a non-space-
faring nation can apply for
PNST.**

***How do
we find them?***



https://img.wikinut.com/img/38sb76544a47m_/jpeg/0/Searching-for-something.jpeg

1st, we make a call at the UNOOSA website:



The screenshot shows the UNOOSA website header with the United Nations logo and the text "UNITED NATIONS Office for Outer Space Affairs". Below the header is a navigation menu with items: "About Us", "Our Work", "Benefits of Space", "Information for...", "Events", and "Space Object Register". The main content area displays the breadcrumb "Our Work > Programme on Space Applications > Basic Space Technology Initiative (BSTI) > Fellowship Programme" and the title "Basic Space Technology Initiative Fellowship Programme". Below the title, it reads "United Nations/Japan Long-term Fellowship Programme 2019 Post-graduate study on Nano-Satellite Technologies (PNST) (Kitakyushu, Japan)".

Generally, applications are taken from August to January – the call window is open for several months!

<http://www.unoosa.org/oosa/en/ourwork/psa/bsti/fellowships.html>

2nd, we make a data base of all the received applications. The data is analyzed. Twenty (20) persons are selected for interviewing.



<https://mystaffingpro.files.wordpress.com/2017/12/look-beyond-keywords-when-reviewing-resumes.jpg?w=725>

**MAINLY WE ARE LOOKING FOR YOUNG ENGINEERS
WHO ARE *PASSIONATE ABOUT SPACE***

**3rd, on a single day
(9:00 AM to 10:00 PM),
all 20 are interviewed**

via 

**From this half-a-year
selection process, 6 *PNST
Fellows* are selected.**



Interviewing 20 semi-finalists
via Skype on 10 February 2016

Since the start of the PNST program in 2013, **34** (thirty four) international students have enrolled in PNST at Kyutech.

Fiscal Year	PNST Enrolment
2013	5
2014	6
2015	6
2016	6
2017	6
2018	5
TOTAL	34

December 2017 PNST Symposium at Kyutech



PNST in Conclusion

The 2019 intake of PNST applications has just ended. The “2019 PNST Interviews” of 20 candidates occurred on 12 February – just a few days ago.

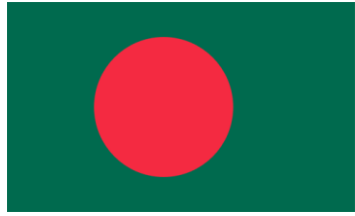
Applications for 2020 PNST will be opened this year in August. To apply, visit the web site below at that time.

<http://www.unoosa.org/oosa/en/ourwork/psa/bsti/fellowships.html>



**The second half of this Technical Presentation
is about Kyutech's **BIRDS Projects****

Bangladesh



Nigeria



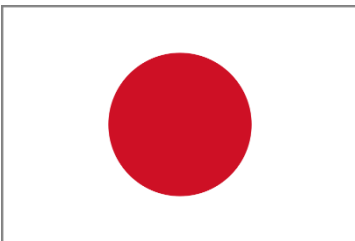
Mongolia



Ghana



Japan



The BIRDS Projects

The world's first constellation of multi-national university CubeSats

Main purpose: To train engineering graduate students of non-space-faring nations to design, build, test, launch, and operate, the first space-borne satellites of their respective countries. Then, to build the second one at home.

<<<<<< **The original BIRDS nations**

The BIRDS Projects – Key Traits

- Kick-off to On-orbit operation must be under 2 years (to fit into the two-year program of a Master's degree)
- Very low-cost launch (via International Space Station)
- The students come up with a common design, which is confirmed at the project's **Critical Design Review**
- With the common design, each national team builds their own CubeSat
- Their respective home universities install and operate a BIRDS ground station

This is the essence: Learn the *entire* satellite development process from start to finish

Flight Model

Deploy in space

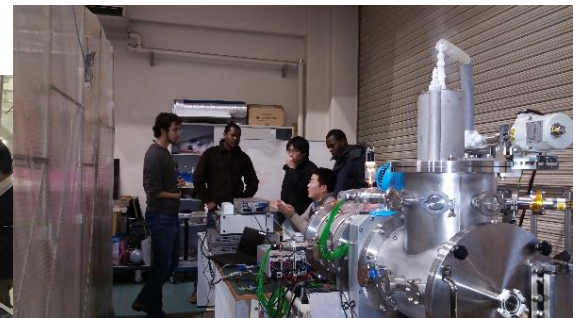
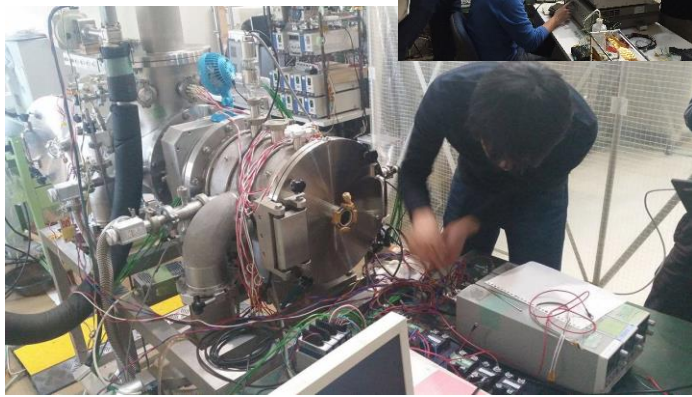
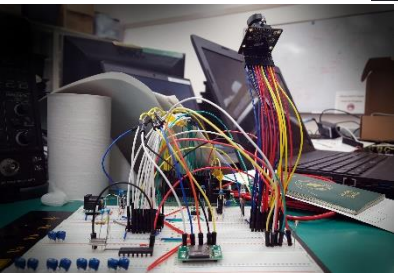
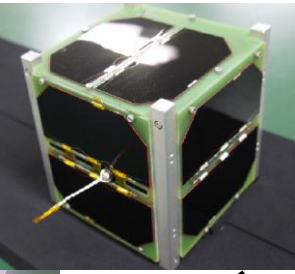
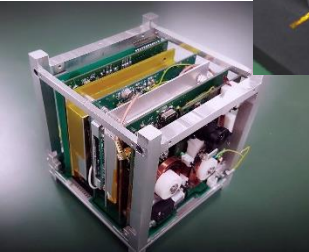
Engineering Model

End

Breadboard

Design

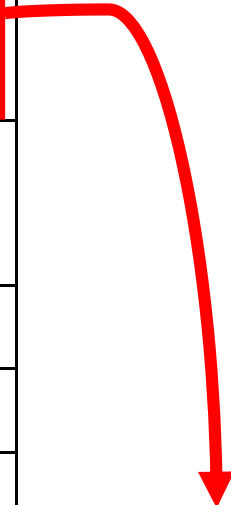
Start



Extensive environmental testing

Where BIRDS nations come from (up til now)

Project	Members with satellites	Kick Off	Satellite release	Color in map
BIRDS-1	Japan, <u>Ghana*</u> , <u>Bangladesh*</u> , Nigeria, <u>Mongolia*</u>	Fall of 2015	July 7, 2017	Red
BIRDS-2	<u>Bhutan*</u> , Malaysia, Philippines	Fall of 2016	August 10, 2018	Purple
BIRDS-3	Japan, <u>Nepal*</u> , <u>Sri Lank*</u>	Fall of 2017	Spring 2019	Green
BIRDS-4	Japan, <u>Paraguay*</u> , Philippines	Fall of 2018	Spring 2020	Yellow



The underlined nations did (or are doing) their first satellite by participating in BIRDS.



Projects overlap by one year

BIRDS-1 (duration of 2 years)



Finished

BIRDS-2 (duration of 2 years)



Nearly finished

BIRDS-3 (duration of 2 years)



Will launch soon

BIRDS-4 (duration of 2 years)

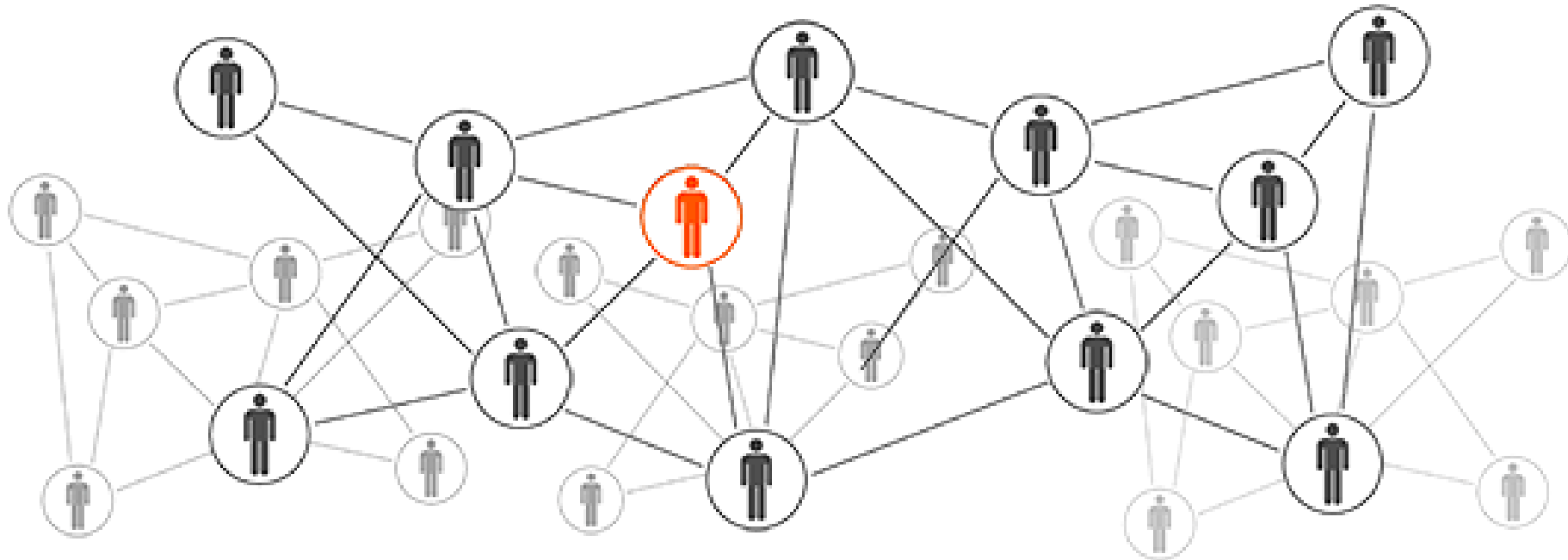


Started Nov. of 2018

These are the multi-nation engineering students of the BIRDS Project ...



Building CubeSats and establishing ground stations are just part of the equation – we also build alumni networks



https://askabiologist.asu.edu/sites/default/files/resources/plosable/Basketball_networks/human_network_540.gif

For example, each year, one BIRDS members hosts the Annual BIRDS International Workshop



1BIW – First BIRDS International Workshop, 2016, Japan



2BIW – 2nd BIRDS International Workshop, 2017, Ghana



3BIW – 3rd BIRDS International Workshop, 2018, Mongolia



4BIW – 4th BIRDS International Workshop

To be held in Bangladesh in November 2019

GEDC Airbus Diversity Award

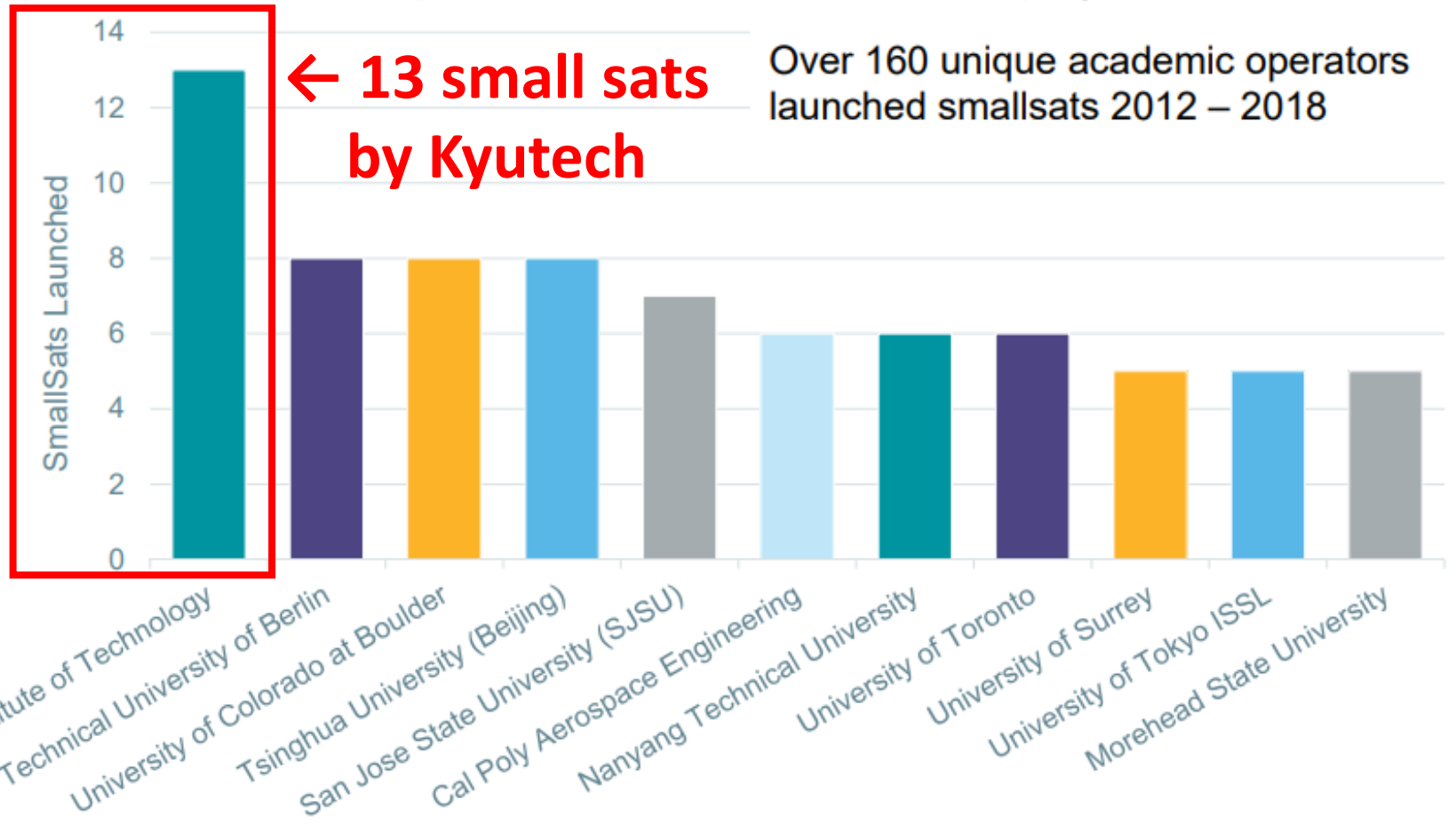


The **BIRDS Project** won the 2017 GEDC (Global Engineering Deans Council) Airbus Diversity Award out of 45 entries from 18 countries.



Thanks to BIRDS, Kyutech is today the leading academic operator of small satellites – according to **BRYCE SPACE AND TECHNOLOGY** in **2019**.

Academic Operators with 5+ Smallsats Deployed



Smallsats by the Numbers 2019 | Bryce Space and Technology | DC Metro Chicago London

http://brycetek.com/downloads/Bryce_Smallsats_2019.pdf

Conclusion – what we hope to achieve

- Enable more nations to become space-faring nations – so that they can participate in the exciting world of space exploration and space exploitation
- The first essential step is **Capacity Building** (train their engineers)
- The next step is to support them when they return to their homelands
- One form of sustainable support is an *alumni network* – then, they can help each other





There is small stack of these two pamphlets on the back table. Please take one.

In addition, you can view all back issues of the BIRDS Project Newsletter at this link:
<http://birds1.birds-project.com/newsletter.html>

Thank you for
your attention
from **PNST**
Fellows and
the **BIRDS**
Family



BIRDS -1 -2 -3 and -4
Tobata Campus, Kyutech