SCIENCE MUSEUM

Science Museum Space Seminar
Season 2 Episode 4

JAXA SPACE EDUCATION CENTER 宇宙教育センター

Lessons Learned from Coordinating a Small Satellite Project in Cambodia

Morokot Sakal

January 31, 2023

AMERICAN UNIVERSITY OF PHNOM PENH
STUDY LOCALLY. LIVE GLOBALLY.

東京大学
THE UNIVERSITY OF TOKYO

About the Speaker

Born in Siem Reap, Cambodia

Education, Japan (2012 – 2020)

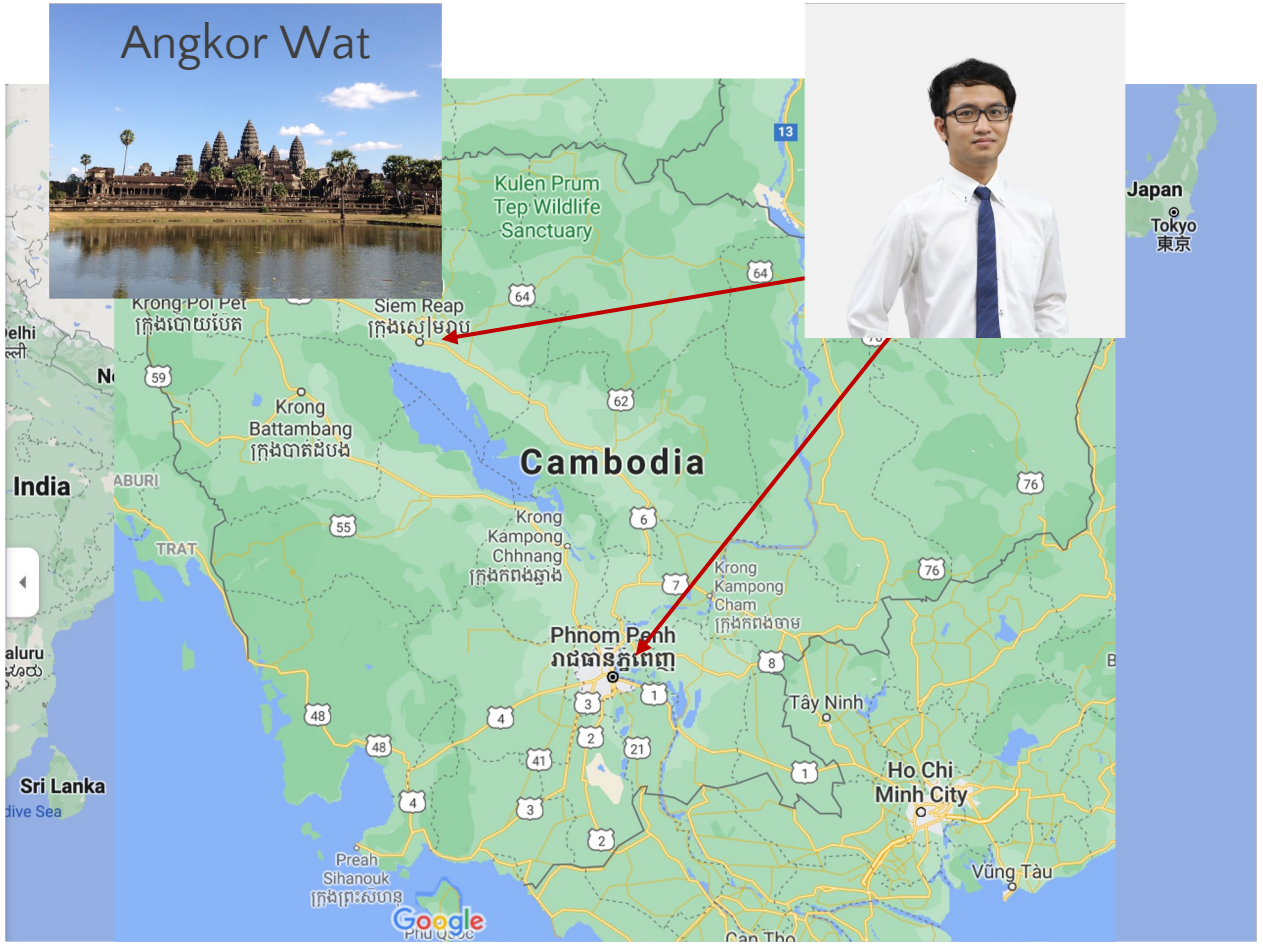
- 2020: M.Eng in Aerospace Engineering, Tohoku University, Japan

Career

- 2020 – 2021: Project Coordinator of Apsara-1 CubeSat
- 2021 – Present: Lecturer, IT Faculty, American University of Phnom Penh

Volunteering

- 2022 – Present : Director of Kampuchea Aerospace eXploration Aspiration (KAXA)



Space Activities in Cambodia

--- Space treaties
--- Government
--- Education
--- Commercial

Status: no satellite, no course in universities related to space, no domestic space policies or agencies.

Source: ITU


Source: CGWIC

1972 — The 1972 Liability Convention: Cambodia has signed (but not ratified)

1993 — International Telecommunication Constitution and Convention: Cambodia has signed and ratified

2011 — Satellite project proposed by Royal Blue Skies
Status: no update

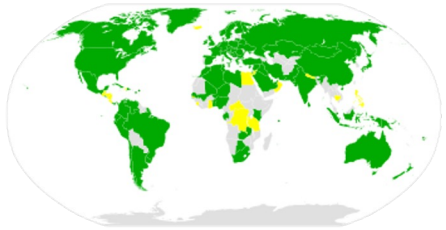
2018 — "Techo-1" satellite, by China Great Wall Industry Corporation
Status: no update

2019 — LigerSat, by the Liger Leadership Academy (2022 launch planned)
Status: no update

2020 — Apsara-1, by ITC-UTokyo-NPIC
Status: stalled

2021 — Project Cosmos (High Altitude Balloon), by high school students of E2STEM

2022 — Beer to space, by Hanuman Beer
STRIKE (Amateur Solid Rocket), by DCLab-ITC
Status: on-going


Source: Wikipedia

Source: Royal Group Cambodia


Source: Liger Leadership Academy


Source: E2STEM


Source: Hanuman Beer

About this talk

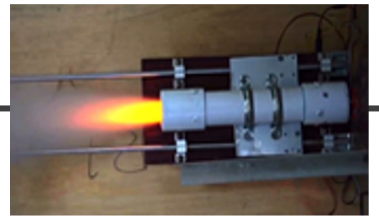
Lessons learnt from coordinating a small satellite project in Cambodia

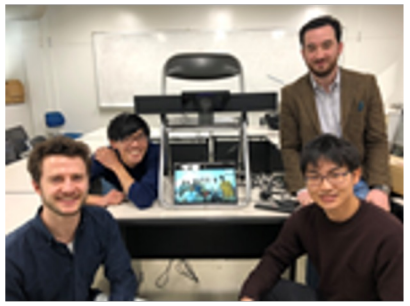
(2019 - 2020) (2020 - 2021) (2022 - Present)

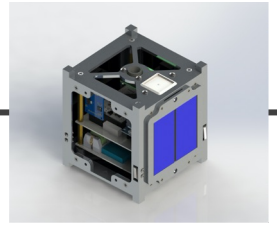
Inspire

Knowledge Transfer

Local Space Community







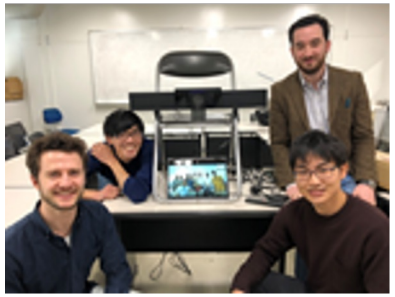
Phase I: Inspire

Space workshops

Initiated by UTokyo, at ITC

Aim:
Gauge interest and sow seeds for Cambodia to build capacity in space engineering, design, policy, and development.

Feb. 2019 workshop
(Phnom Penh)



March 2020 workshop
(online: Tokyo / Phnom Penh)

Activities:
- Feb. 2019: 2-day hands-on activities in space engineering and policy.
- March 2020: 4-day course on CubeSat development.

Follow-on activities

Satellite team
Led by Morokot

"Apsara-1" CubeSat Project
(a.k.a. UT-ITC Cube)

Rocket team

"STRIKE"
Rocket Project

KAXA

Rocket Club

Apsara-1 CubeSat Project

Aim:
Develop Cambodia's first small satellite education program.

Organization:
6 participants + 4 mentors from 3 laboratories (Japan and Cambodia).

Apsara dancing

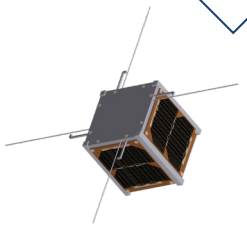
Mission statement:
To develop the capability of solving social issues using space technology and to promote STEM education through the development of Cambodia's first CubeSat.

Dec. 2020:
Kick-off

May 2021:
KiboCube submission

Apr. 2021:
PDR

June 2021:
Closing



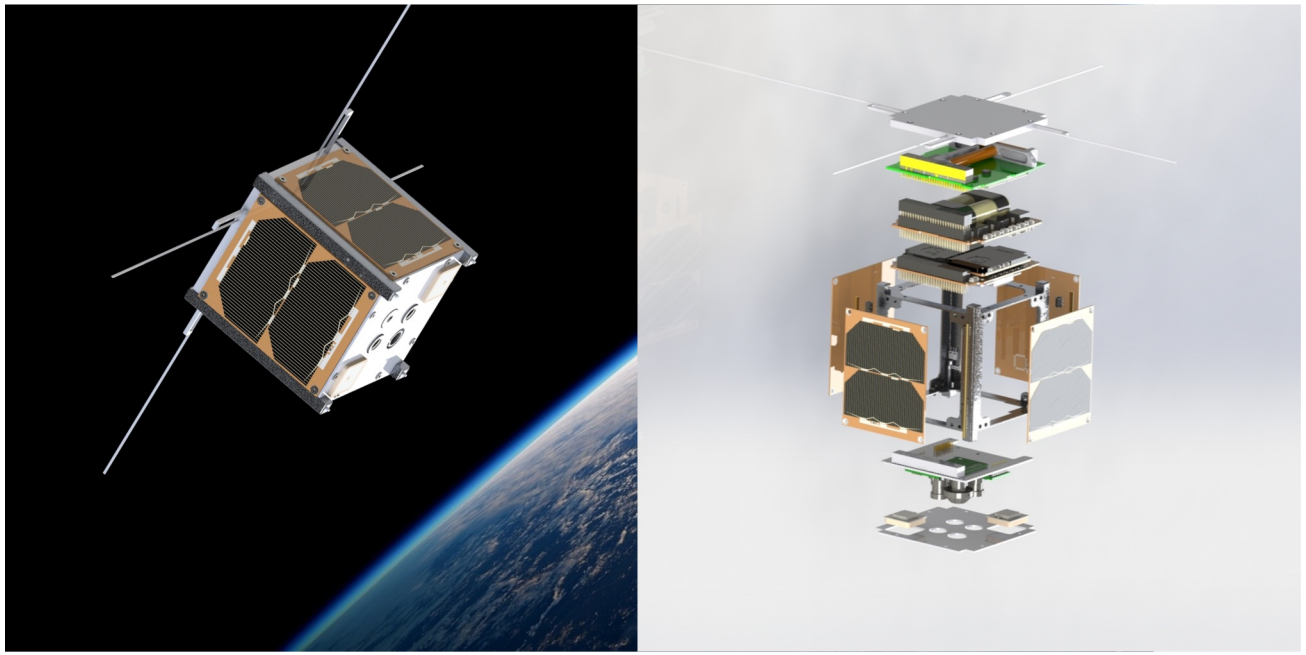
Apsara-1

Phase II: Tacit Knowledge Transfer

Achievements (1 of 3)

Technical

- Concept design of 1U CubeSat Apsara-1
- KiboCube application submission to the UNOOSA (status: not successful)



United Nations/Japan

KiboCUBE Application Form

Technology demonstration CubeSat
using multispectral camera
for drought monitoring in Cambodia

Proposal in the framework of:
United Nations/Japan Cooperation Programme on
CubeSat Deployment from the International Space Station (ISS)
Japanese Experiment Module (Kibo) "KiboCUBE"

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277-8568. Chiba Prefecture. Japan

Date:

30 May 2021, Phnom Penh, Tokyo

Achievements (2 of 3)

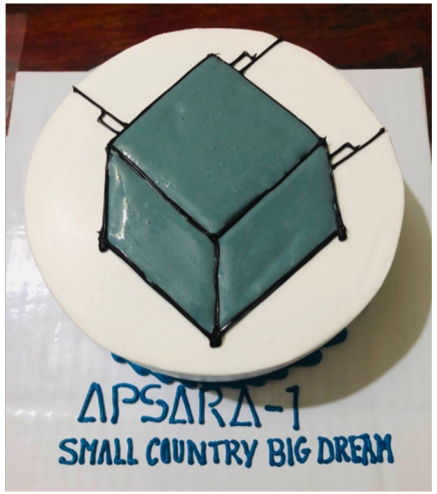
Education

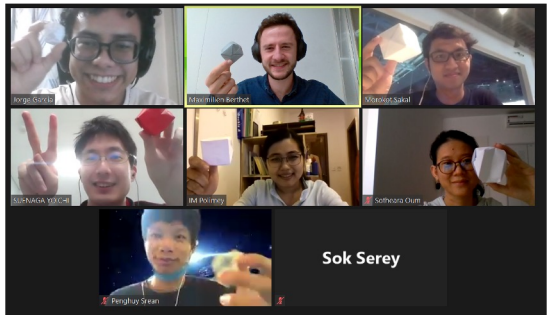
- Presented our work at the Small Satellite Conference (2021)
- Participant received PNST fellowship to pursue master's degree in **Japan** (2021)
- Participant received scholarship to pursue master's degree in **Germany** (2022)
- Participant got a job offer from an aerospace company thanks to the experience from the project (2022)

Achievements (3 of 3)

Awareness raising

- Networking with the Cambodian ministries (MPTC, MoE, and MISTI)
- Partnership/collaboration with a local university (NPIC)
- Funds from the Ministry of Education (MoEYS)





Challenges & Lessons Learned (1 of 3)

Program

1. Funding
   - Stakeholders prefer step-by-step spending

2. Gaining trust from Stakeholders: "**Are you sure Cambodian engineers can build a satellite?**"
   - It takes time to build credibility

3. Convincing other faculty members into the project/getting their full support
   - Space is new, they prefer to try first without making a full commitment

Source: irasutoya

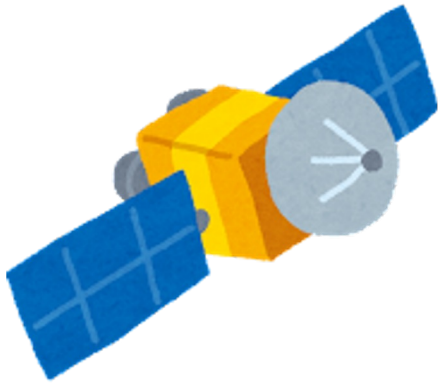
Challenges & Lessons Learned (2 of 3)

Technical

1. Student knowledge: work on the project while upgrading students' skills

2. Lacking facilities: build the infrastructures along the way

3. Research vs. development: which one to follow?



Source: irasutoya

Challenges & Lessons Learned (3 of 3)

Regulations

1. Explored the registration process and found nothing
   - Exciting for team members
2. Government officer is not familiar with space technology
   - Concerns for them

Source: irasutoya

Summary

We started by thinking we were building a CubeSat ...

... we ended by realising we needed to build more than that:

- to build collaborations
- to gain support from the government
- to raise awareness about space
- etc.

ចង្កឹះមួយបាច់កាច់មិនបាក់

chang-kuah-muoy-bach-kach-min-bak

= "A bunch of chopsticks is unbreakable."

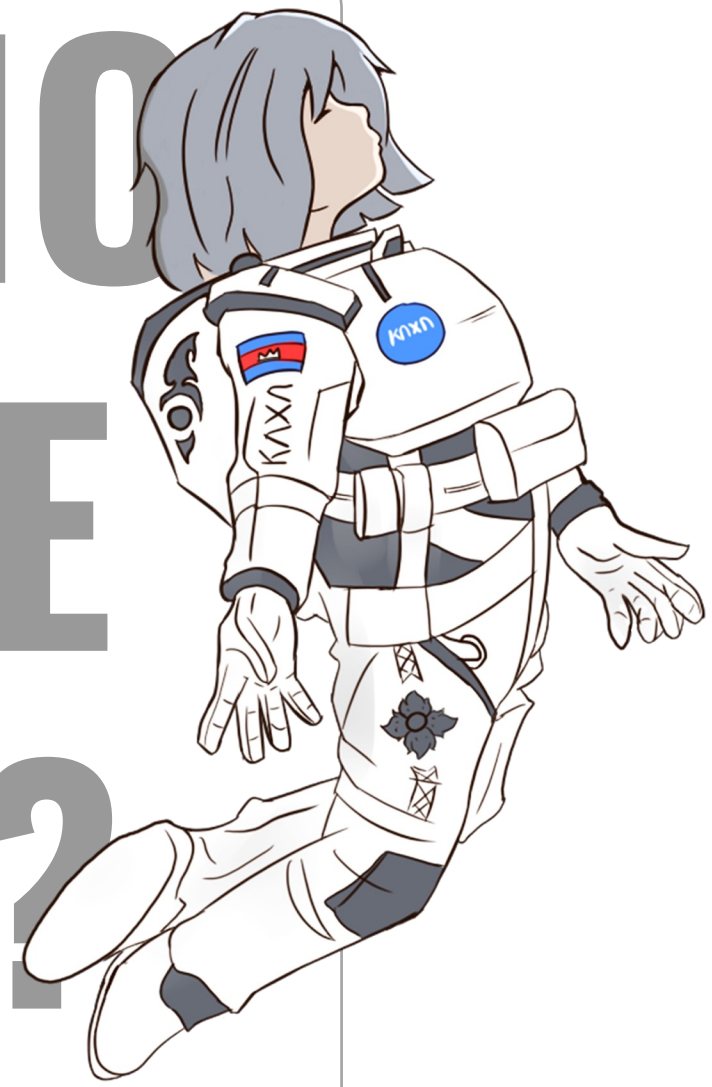
= Unity is strength.

– *Khmer Proverb*

The Apsara-1 project latest update: **discontinued**.

Phase III: Local space community

WHO ARE WE?



KAXA stands for **Kampuchea Aerospace Exploration Aspiration**.

We are the community of space enthusiasts in Cambodia.

History

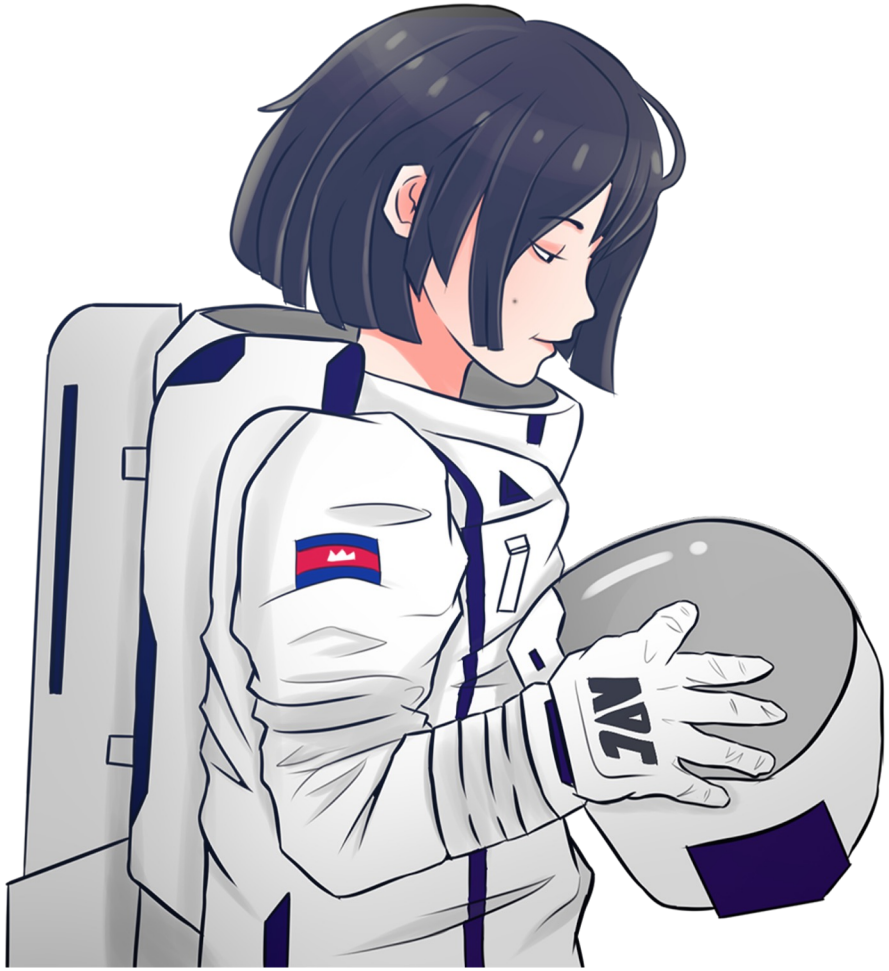
KAXA (Genesis)
Rocket club
2020 – 2021

3 members

KAXA New Chapter
Space community
2022 – Present

6 members (current)

Our Mission



To build foundations for Cambodia to become a space-faring nation.

Our Goals

1: Inspire and teach

· Activity: Space education & outreach

2: Mentor and nurture

· Activity: Space competitions mentorship

Our Team

Director
Morokot Sakal

Advisor
Dr. Maximilien Berthet

Core Team Members

4x members

Volunteering Members

To recruit...

What's Next?

Jul. 2023 Space Engineering Webinar 2023

Sep. 2023 Space Competitions Mentorship

FIND US ON

FACEBOOK

www.facebook.com/kaxaspace

WEBSITE

Coming soon!

តក់ៗពេញបំពង់

tork-tork-penh-bampong

= Drop by drop, water fills the container.

= Be patience. You gradually will succeed.

-Khmer Proverb

Source: unsplash