

Education Under the United Nations/Japan (**PNST**) Program Perspectives of a Graduate

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59th session of the
Committee on the Peaceful Uses of Outer Space
Vienna, June 10th 2016



A PNST graduate

- I am Hala from Sudan.
- Electrical and Electronic Engineer.
- Researcher at the Institute of Space Research and Aerospace (ISRA), Sudan.



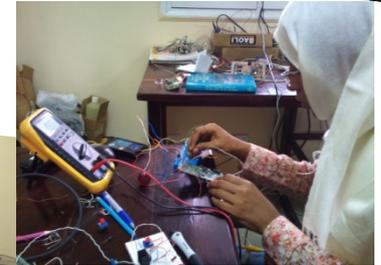
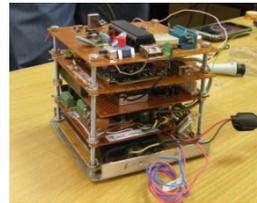
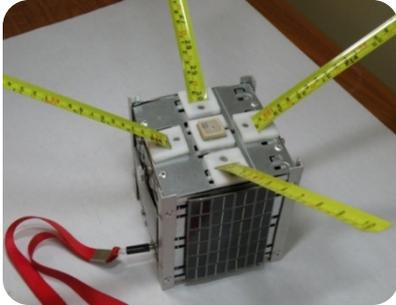
**My dream was to build a satellite that
orbit into space**



Sudan – [KN-sat1]

2010: Cubesat

- Development
- local means

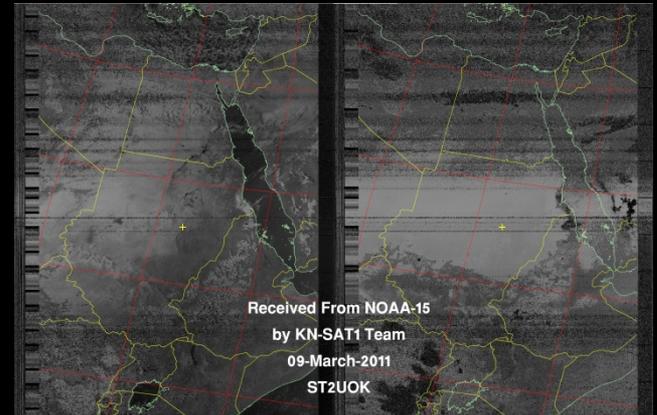


ST2UOK Ground Station

Ground Station



- University Ground Station
- 30 m above sea level
- VHF /UHF



I wish it can be
launched into
space

at1 Impact

Workshops



- Cubesat project was a great start.
- KN-Sat1 is a prototype with **no opportunity for launch.**
- No space or satellite technology education in my country at that time.
- Need for **more education!**

PNST



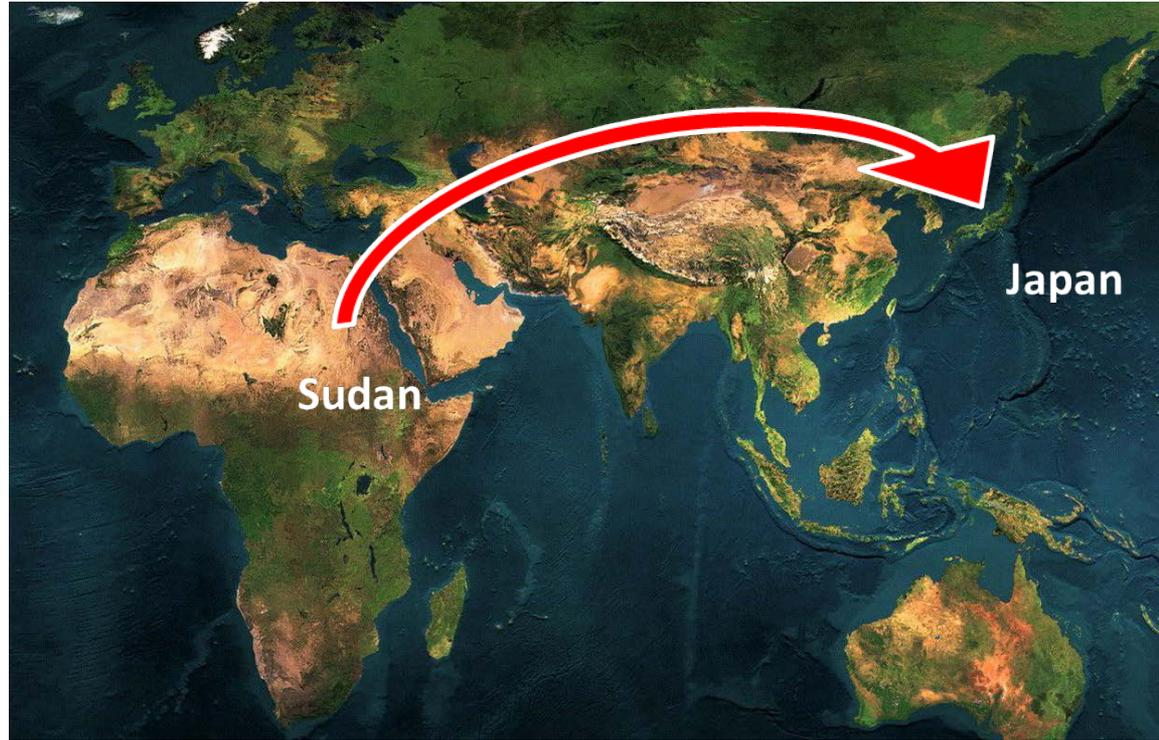
Post-graduate Study on Nano-Satellite Technologies (PNST)

Goal: Back home with the know-how that will push the peaceful uses of outer space in my country.

I applied, I got selected!



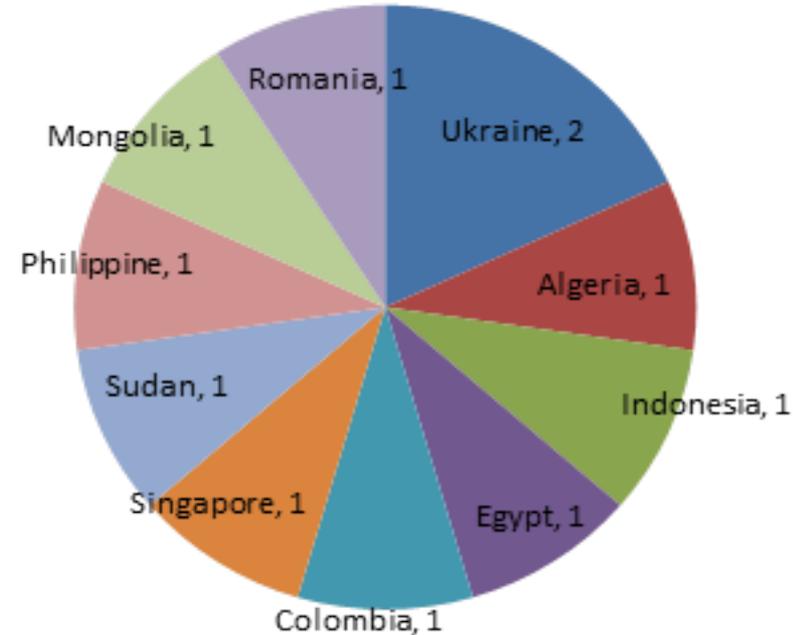
Post-graduate Study on Nano-Satellite Technologies (PNST)



PNST

- Special Satellite courses
- Research and development
- Real satellite project (Horyu-4)
- Tools and facilities
- Experience
- Life lessons
- Cultural and social activities

PNST students (as of March 2015)



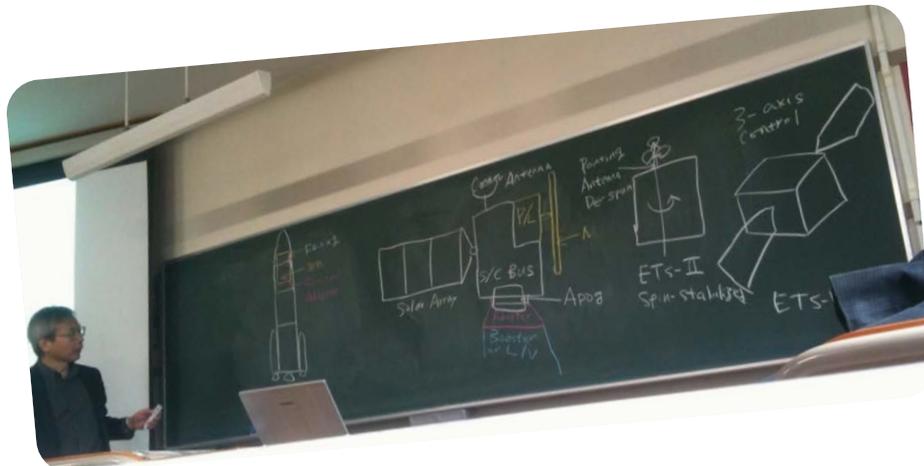
Advanced Courses and R&D

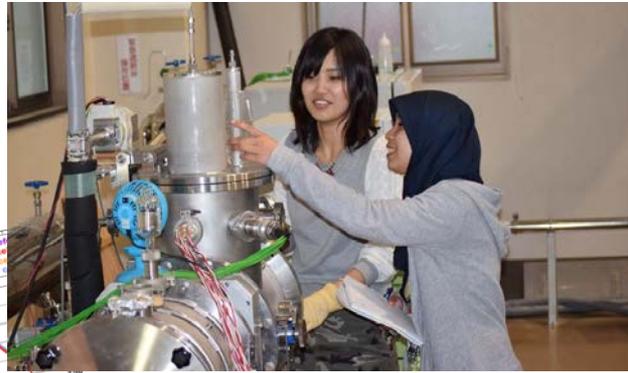
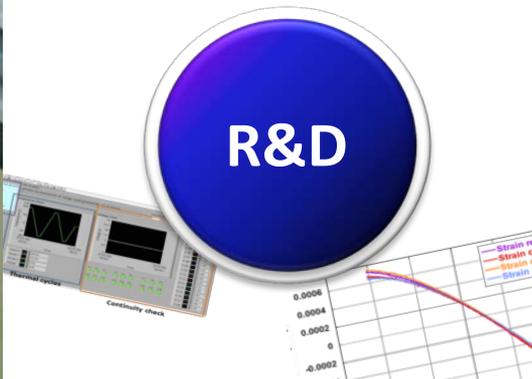
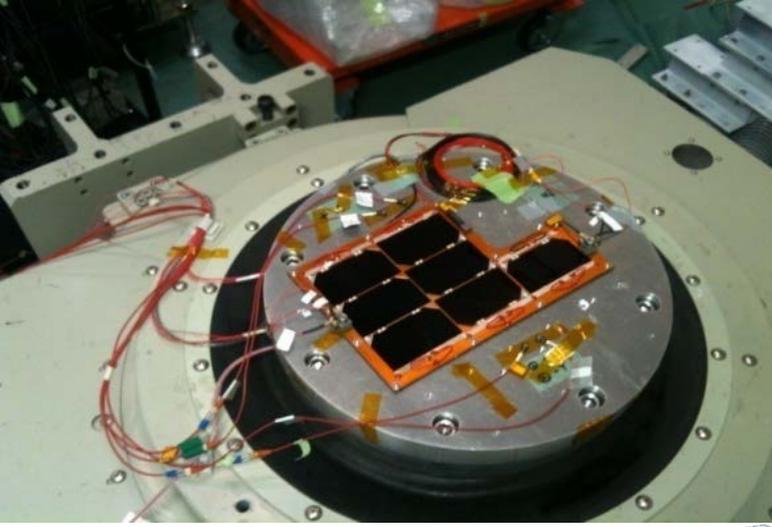


Courses and research

- Special Oriented Courses

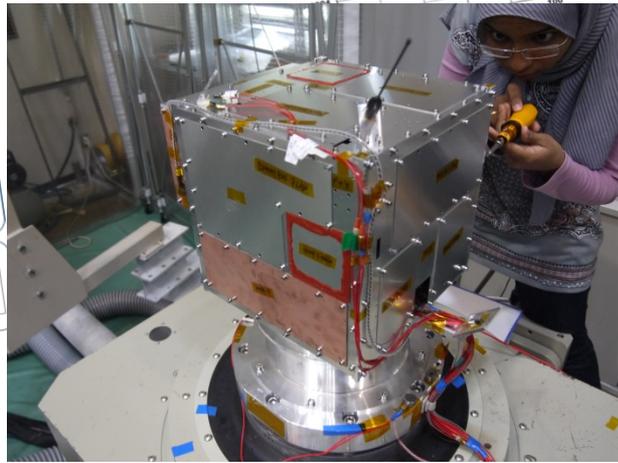
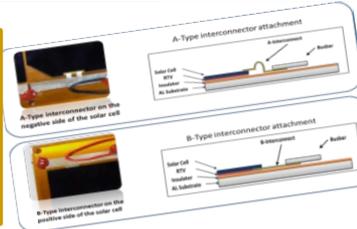
Satellite Engineering International Course (SEIC)





Supervision

Testing Facilities



Designing experiments



Research and Thesis

My research topic

“Environment Test Campaign of Aluminium Substrate Solar Panel for Lean-satellites”

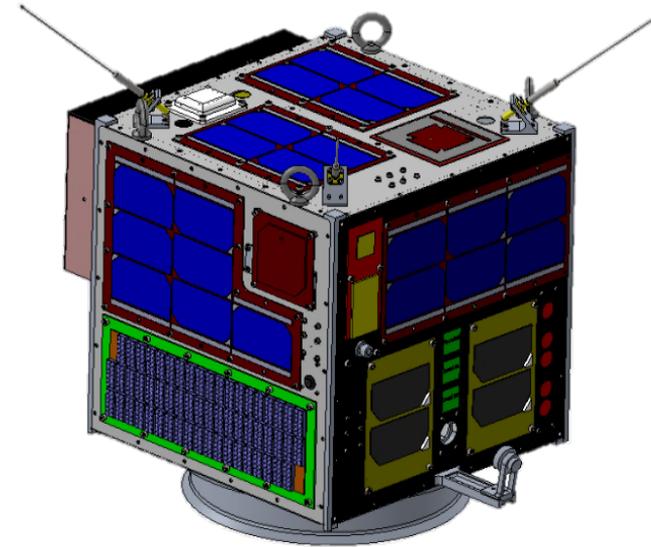


Satellite Project



Horyu-4

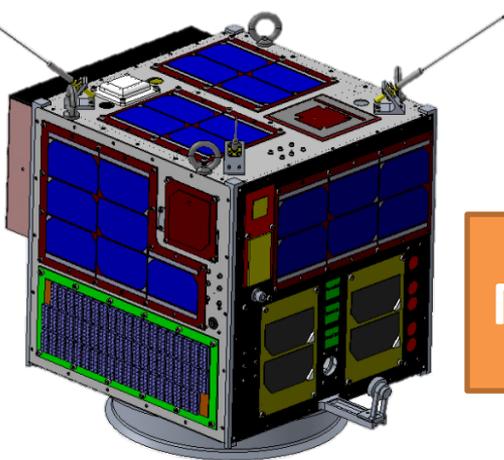
- Arc Event Generator and Investigation Satellite
- Nano-satellite.
- Main mission.
- Launched on Feb 2016.



Horyu-4 satellite, Kyutech

<http://kitsat.ele.kyutech.ac.jp/horyu4WEB/horyu4.html>

Horyu-4



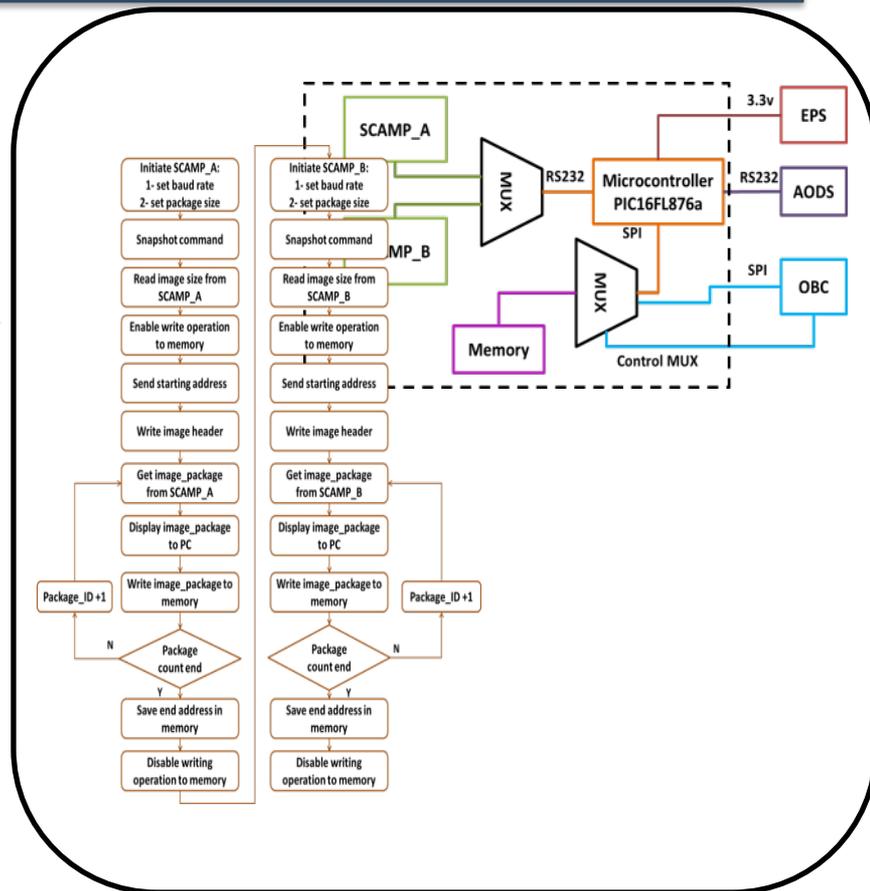
Horyu-4, Kyutech

Missions design

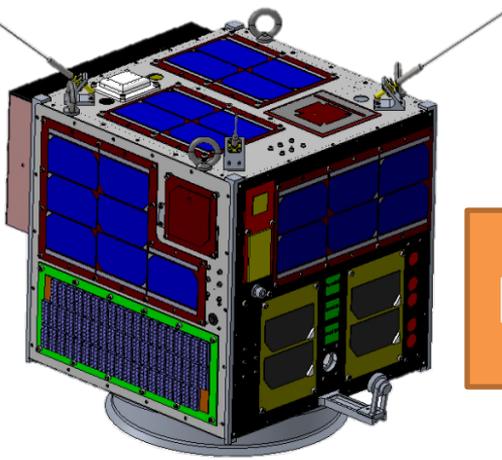
BBM

EM

FM



Horyu-4



Horyu-4, Kyutech

Bread boards

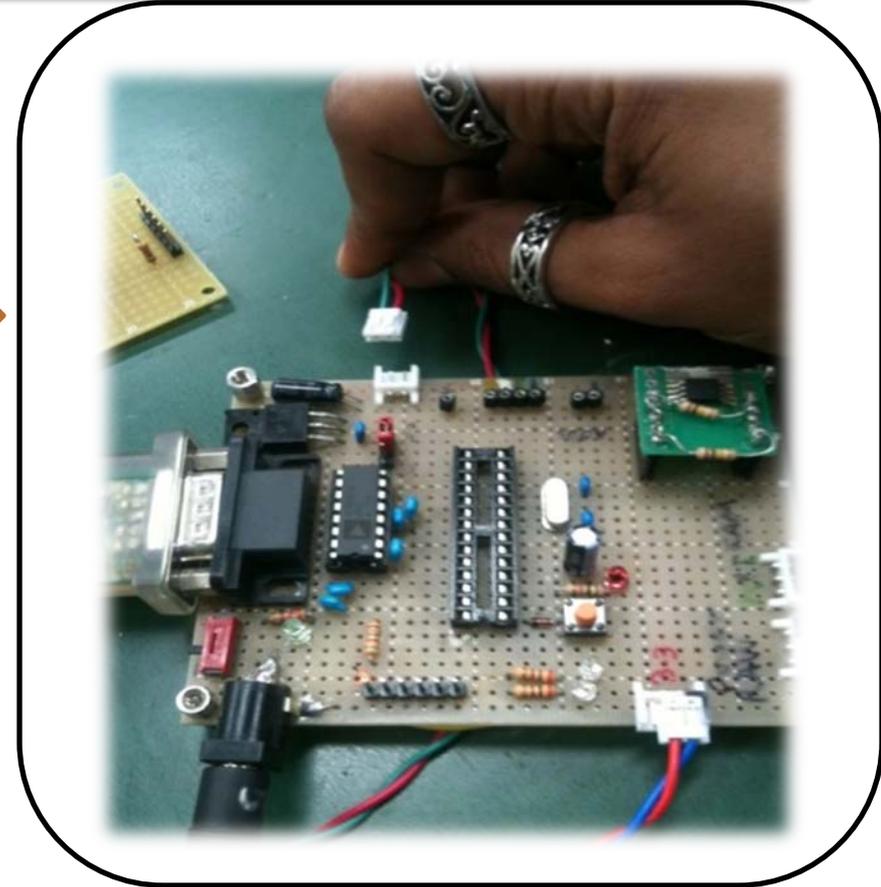
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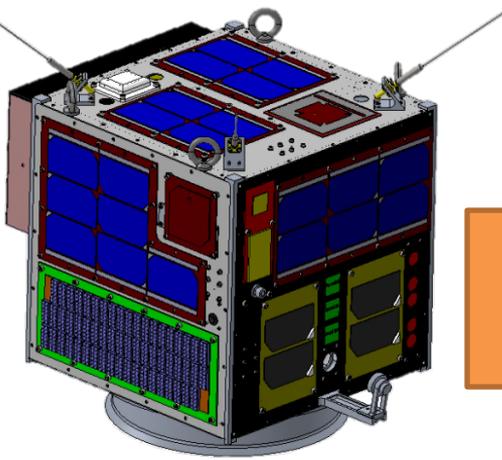
EM



FM

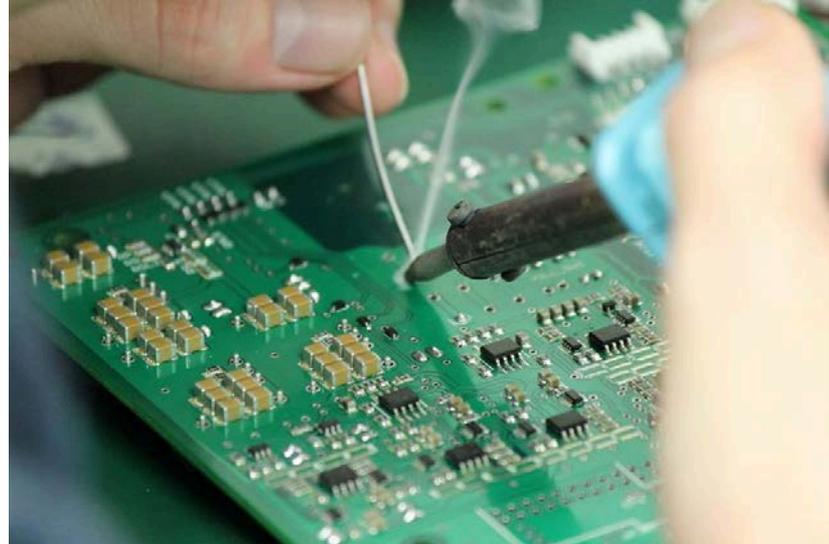


Horyu-4



Horyu-4, Kyutech

Into Printed Boards



BBM

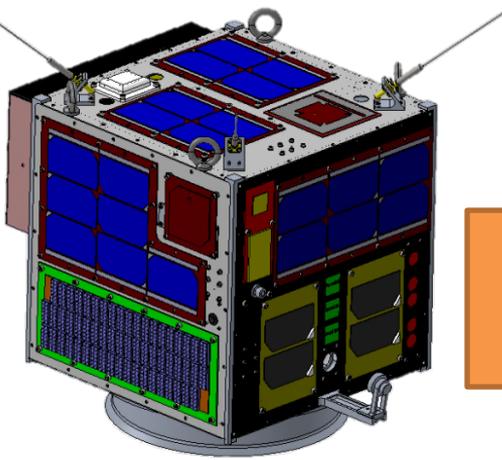


EM



FM

Horyu-4



Horyu-4, Kyutech

Parts
manufacturing

BBM



EM

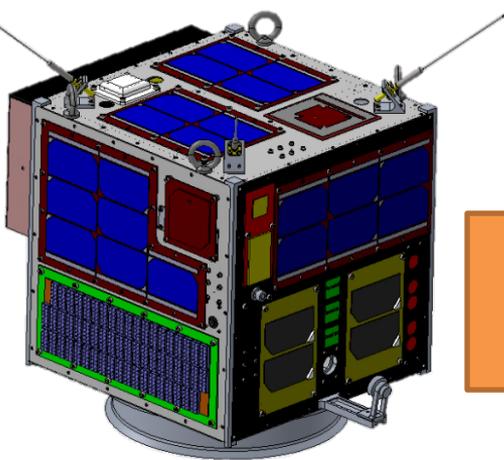


FM



Horyu-4

Functional



Horyu-4, Kyutech

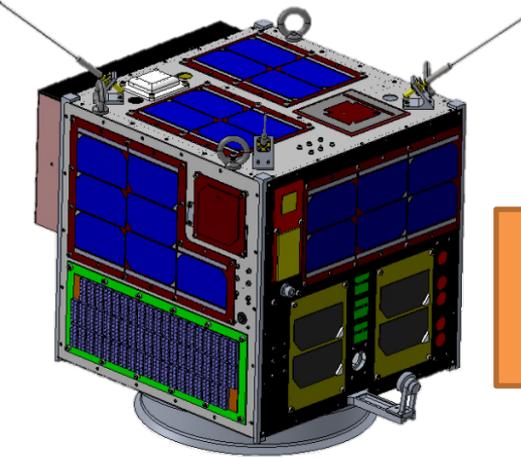
Systems Testing



Environmental



Horyu-4



Integration

Horyu-4, Kyutech

BBM



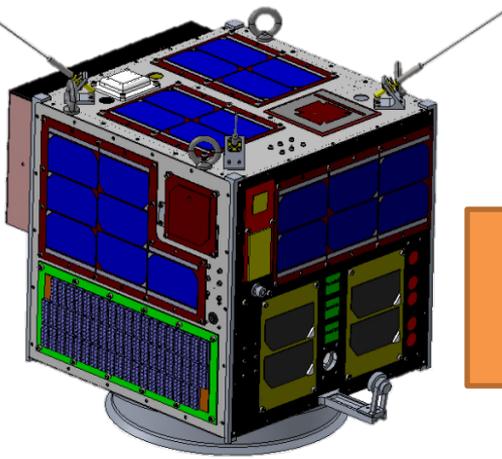
EM



FM



Horyu-4



Horyu-4, Kyutech

EM/FM Testing

BBM



EM

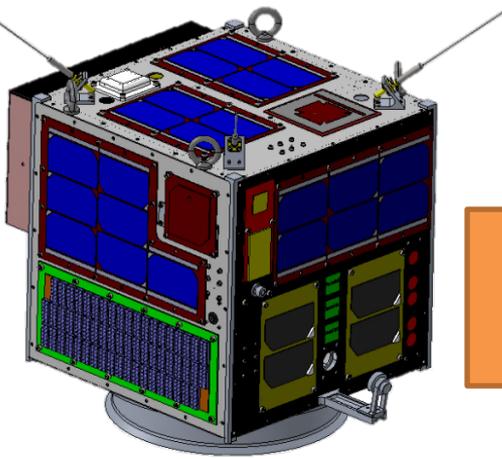


FM



End-to-End test

Horyu-4



Horyu-4, Kyutech

EM/FM Testing

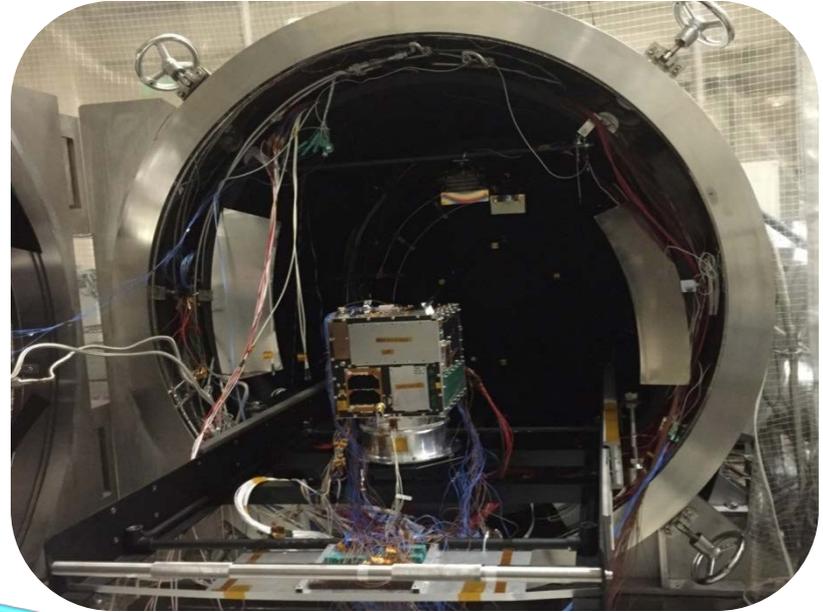
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EM

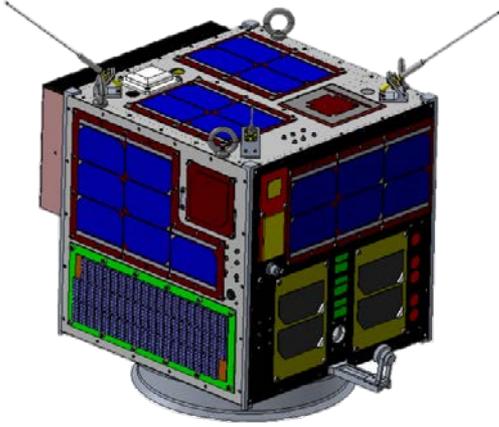


FM



at CeNT, Kyutech

My role in Horyu-4

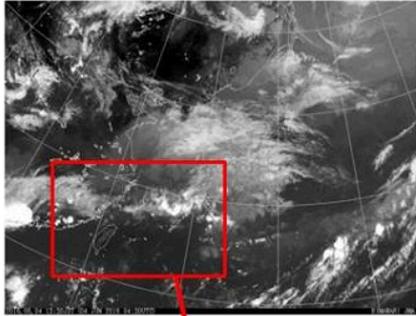


- **Solar Panels** Design and manufacturing
- Qualification through testing

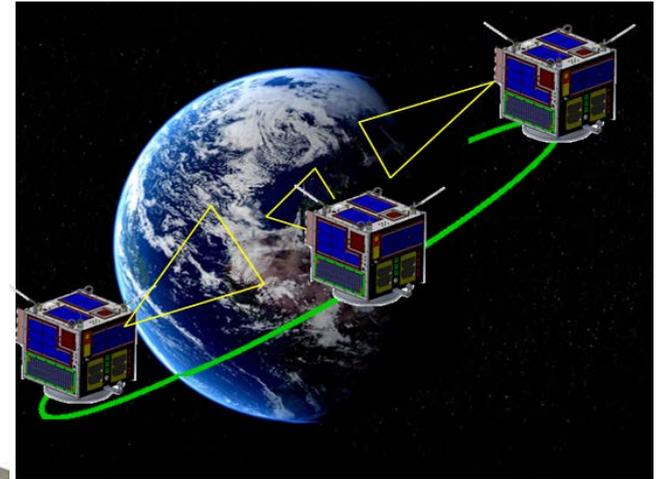
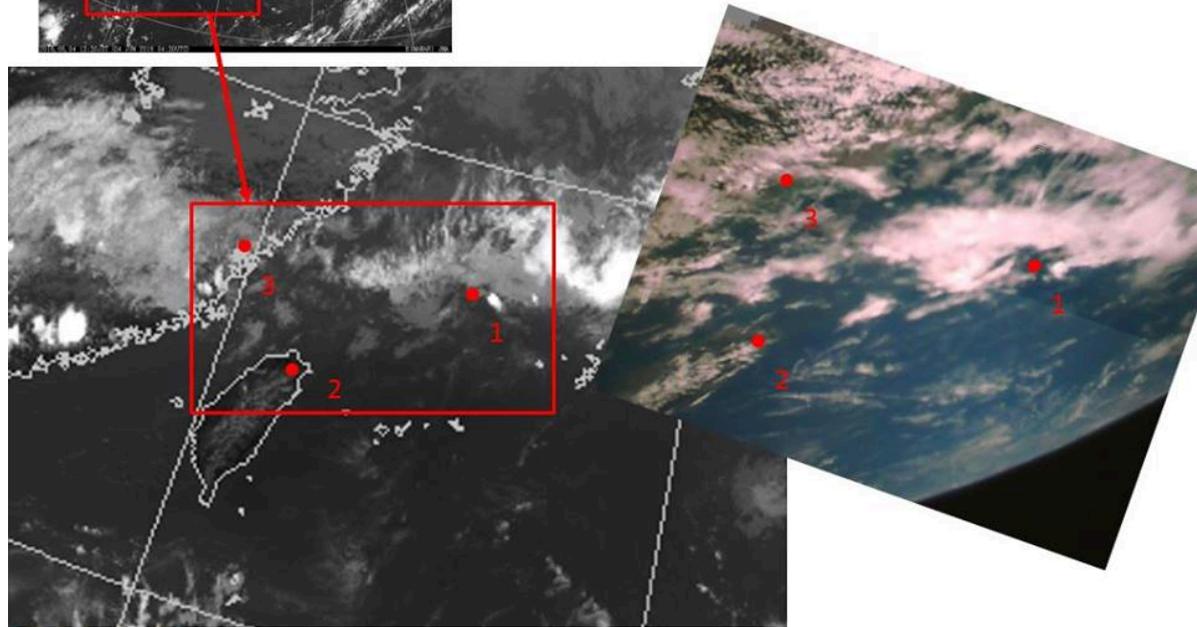


Horyu-4 solar panels

My role in Horyu-4



Comparison between
images of Himawari (13:30)
and HORYU-IV

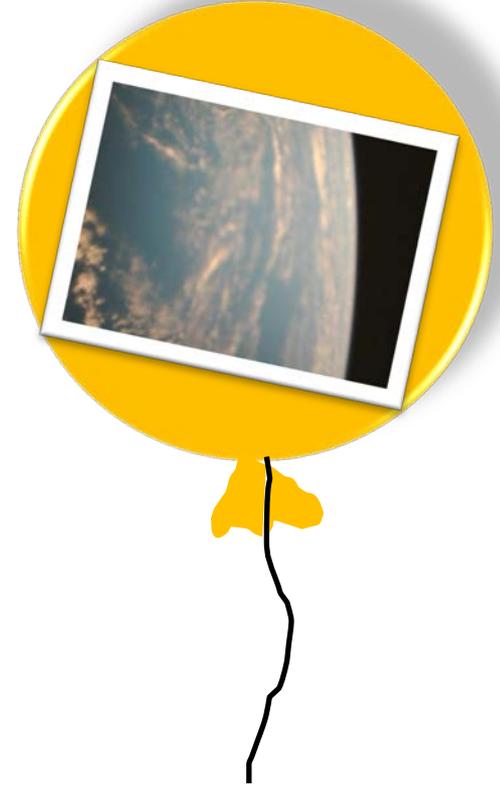


Horyu-4 EM



My role in Horyu-4

Value: Outreach

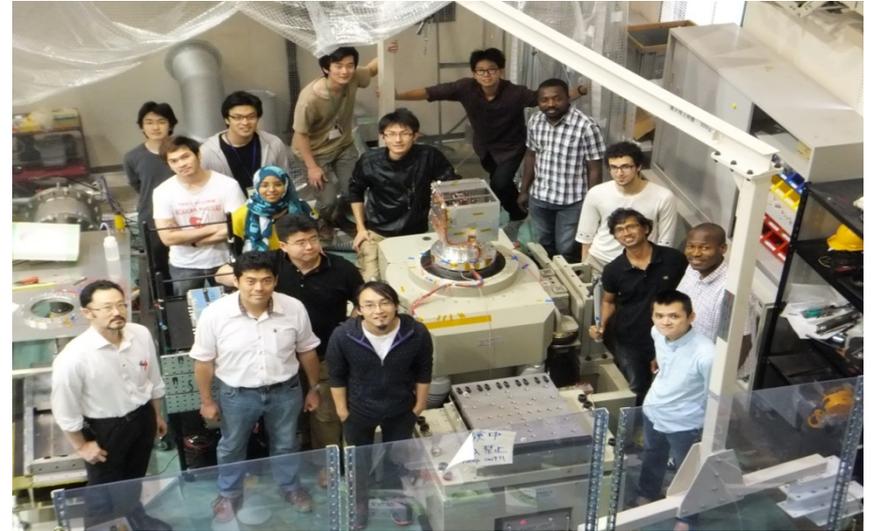


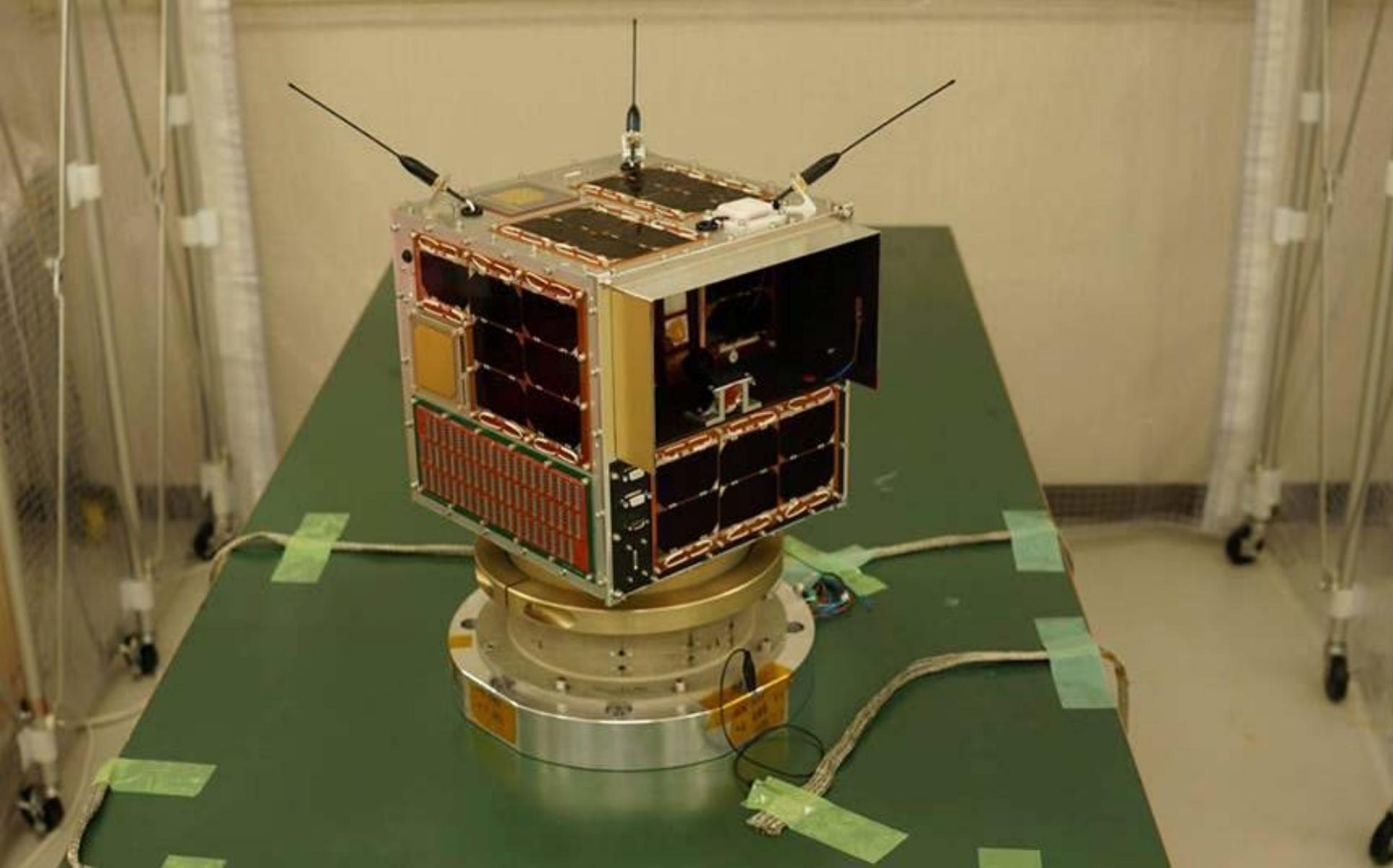
Source: Internet



Values in Horyu-4

- Team work
- Exchange experiences
- Handling space grade materials





Activities

Learning activities

- Orientations in visits



Learning activities

- Project Based Learning
- Proposal of ‘moon sighting satellite’



UNISEC-MIC IAA prize

Learning activities

- International and local Conferences NSAT/JSASS.



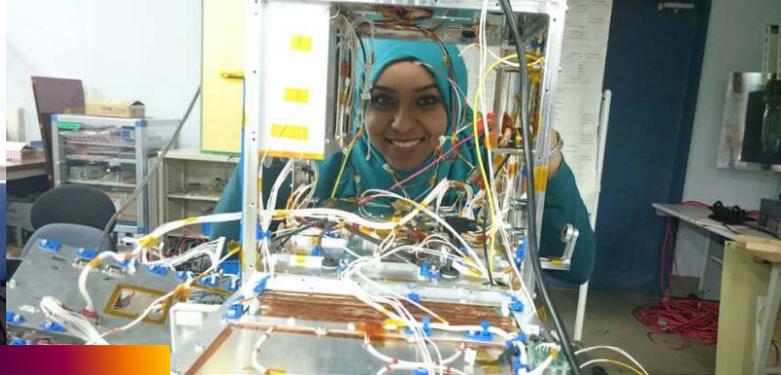
Visits and conferences

- Exhibitions
- Networking



Life in Kyutech





Learn with Fun !



After Graduation

Posts
Activities

Keep in touch!
[Kyutech SEIC Alumni](#)
page!



Discussions



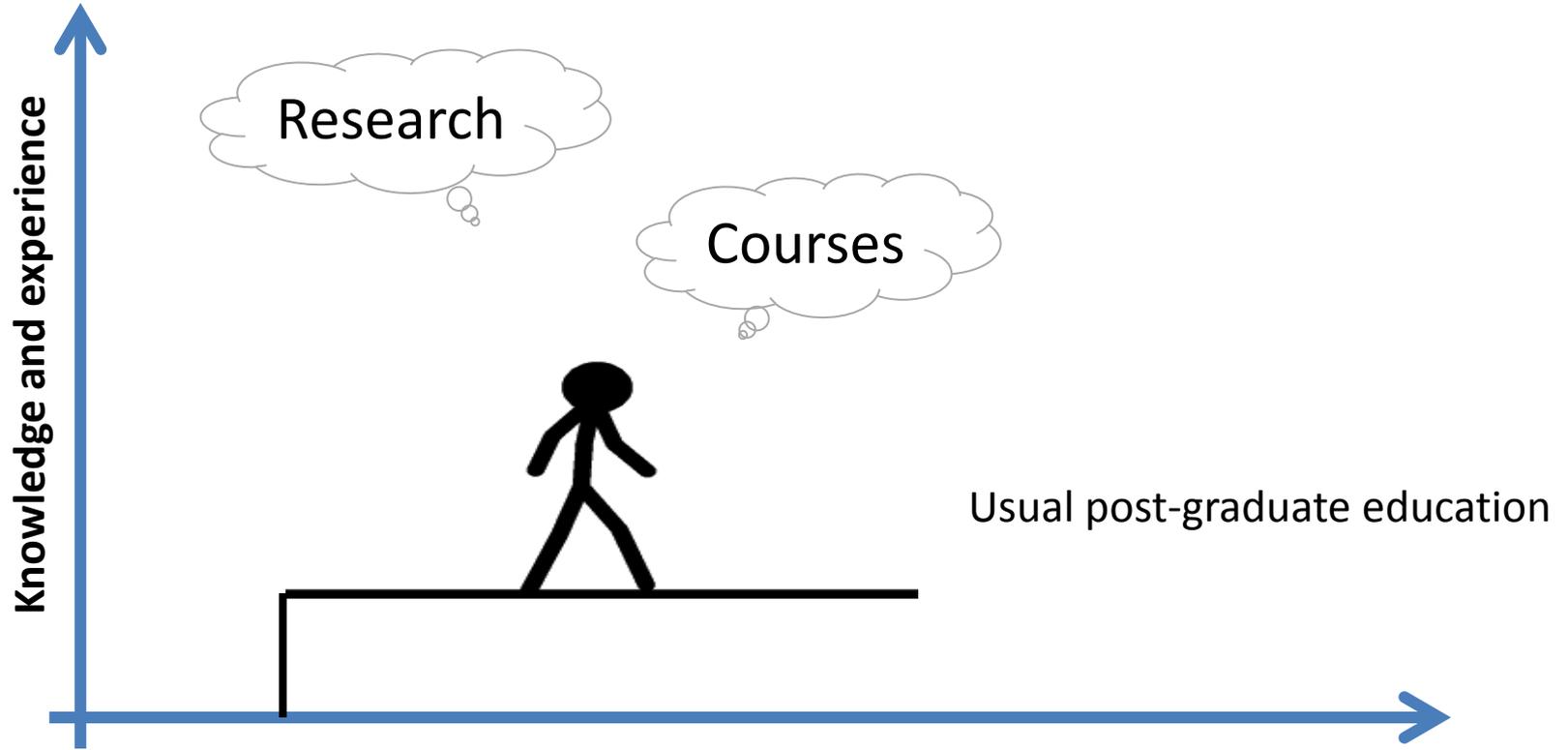
Why PNST is Special?

- Young researchers and engineers return home in short time with great knowledge.
- PNST exposes students to an advanced theoretical and practical level of education.
- PNST encourages graduates to return back and maintain a solid and sustainable peaceful use of space and space technology.

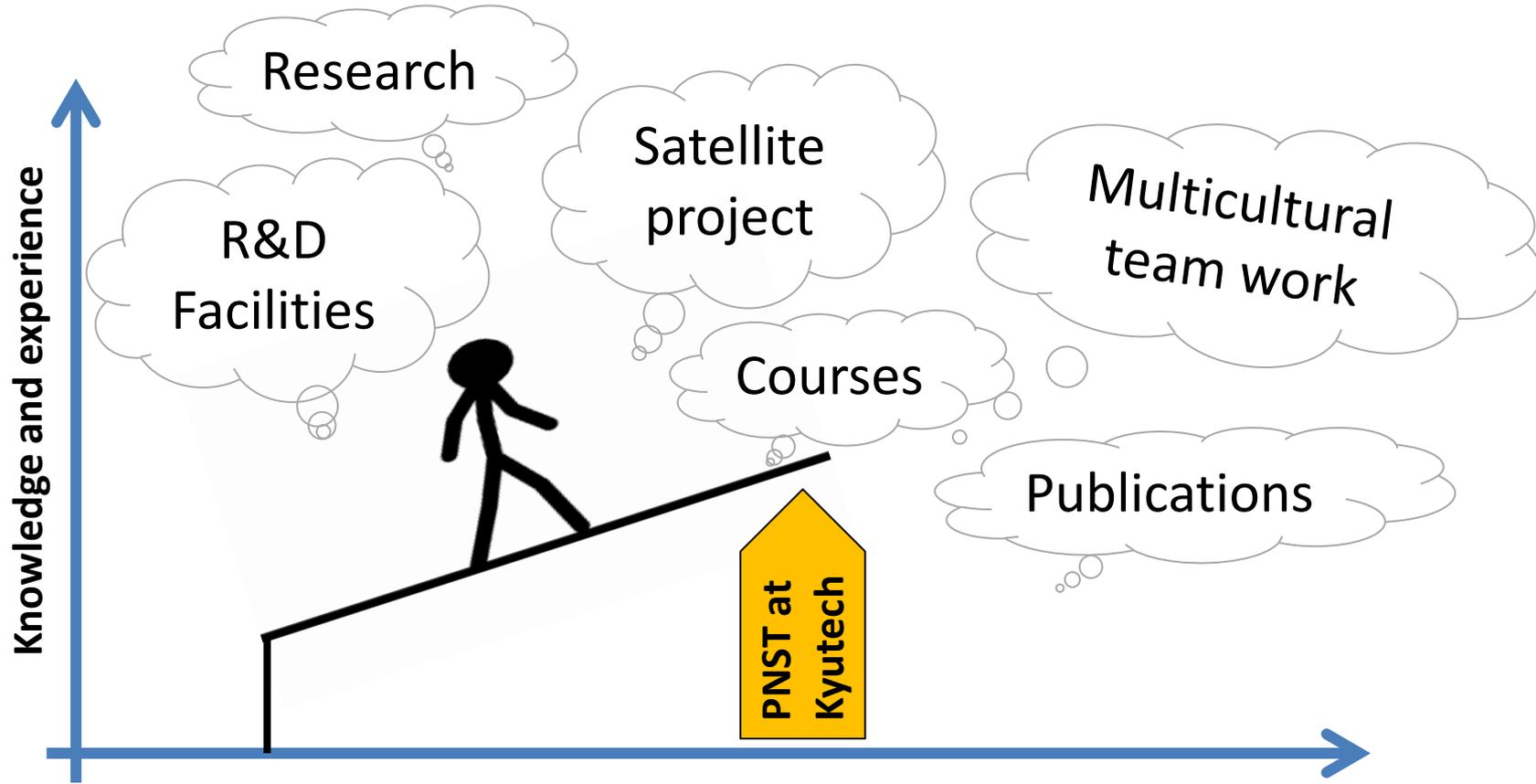
Why PNST is Important?

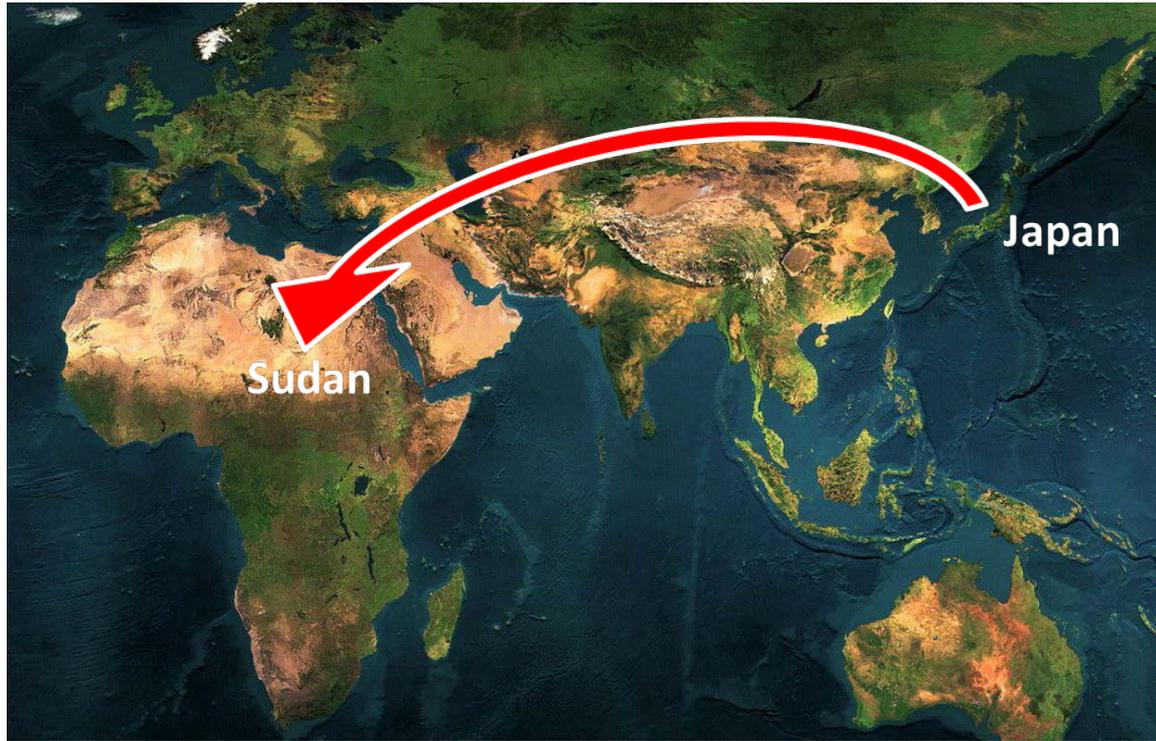
- Graduates are connected to keep in update with the cutting edge technologies worldwide.
- This reflects on the awareness, education, utilization, cooperation between developing countries.

Why PNST is Important?



Why PNST is Important?





Back to Sudan

Institute of **S**pace **R**esearch and **A**erospace (**ISRA**)



Sudan is member of
UNOOSA since 1973



Sudan's
Representative body
on space matters
Established 2013

I Joined as project manager of ISRASAT1



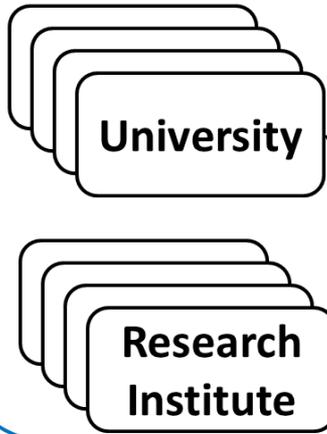
ISRA Vision

- **Awareness** of space science and engineering in Sudan.
- Involves in Space activities in more practical way.
- Capacity building.
- Establishing **small satellites projects**.
- Promotes the peaceful uses of the outer space.
- Focuses on the economical and social **benefits** of outer space.
- Strengthens **connections** with other research entities.



- Departments

Ministry of Higher Education and Scientific Research



Satellite Projects

Ground Stations

Aeronautics and Aerospace

Astronomy and Astrophysics

Applied Programming

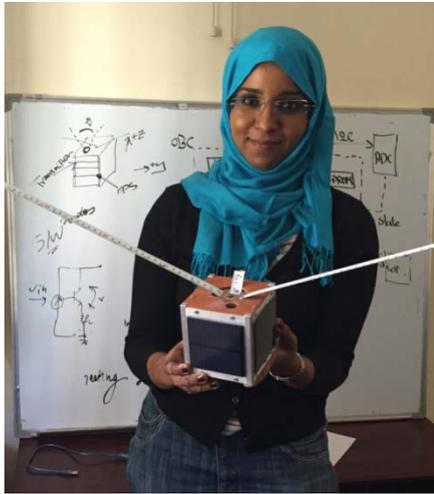
Activities at ISRA



Astronomical Observation



High Altitude Balloon



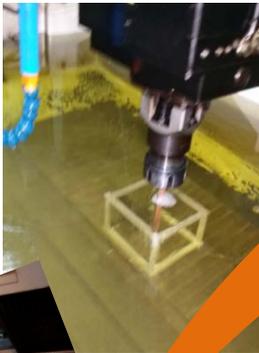
ISRASAT1 Prototype



ISRASAT1 Project

- Attitude determination and VGA camera mission.
- Next → EM/FM.
- Looking forward for a launch opportunity.

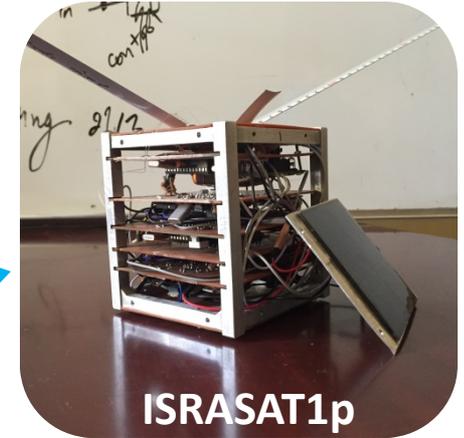
Knowledge transfer



Structure



Assembly



ISRASAT1p



Camera Test

Conclusion

- **Space education and research** in developing countries is the first step towards utilizing space for their **economical** and **social development**.
- Researchers will help raising the awareness of the useful uses of space and satellite technologies.
- Building capacity and reducing **brain drain** will encourage and strengthen the **cooperation** between countries in space projects.
- PNST program is a successful example of UNOOSA and Kyutech, Japan, efforts on establishing indigenous **capacities** in basic and advanced space technology.



I achieved one dream at
Kyutech. **Launching**
ISRASAT1 is my next
dream!



A great experience for all of us !

