39th VIRTUAL UNISEC-GLOBAL MEETING

CLTP12 EXPERIENCE

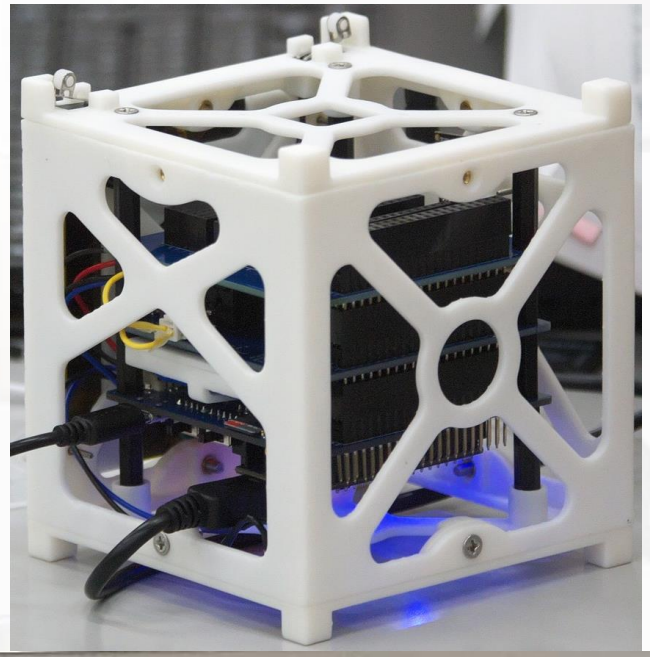
Presenter: Ramson Munyaradzi Nyamukondiwa

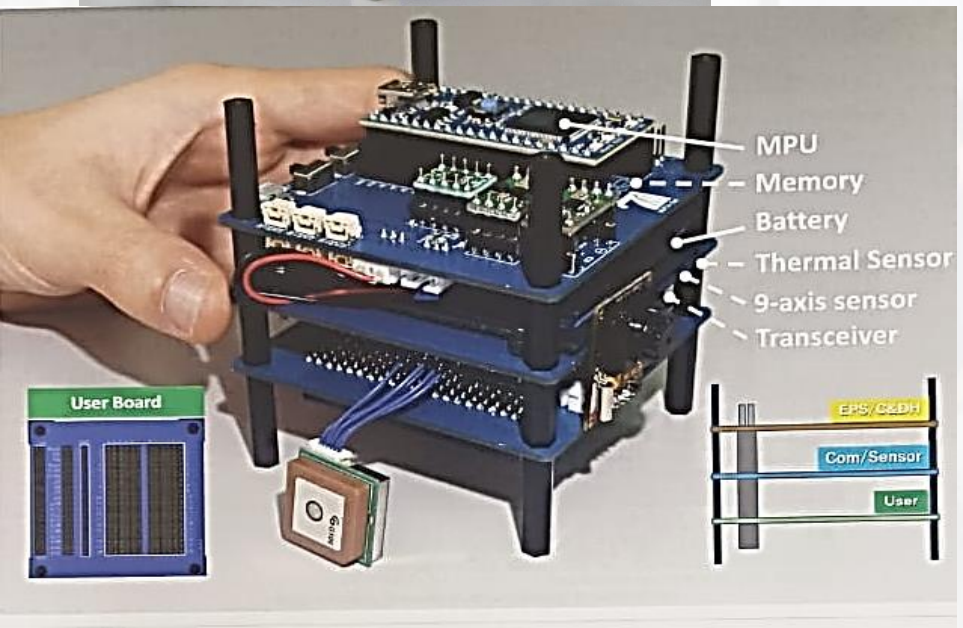
Date: 16 December 2023

Self Introduction

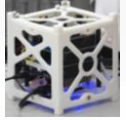
- **Present Status:**
  - PhD Student @ Kyutech
- **Present positions:**
  - 2020-Present: Space Systems Engineer @ ZINGSA
  - 2017-2020: Former Lecturer @ University of Zimbabwe
- **Field of specialization:**
  - Electrical and Space Systems Engineering, Software defined radio, Electronics and Communication Engineering & IT.
- **Research Interests:**
  - Small satellite development, satellite communication, deep space studies, and software defined radio.

Overview of the CPLT Program





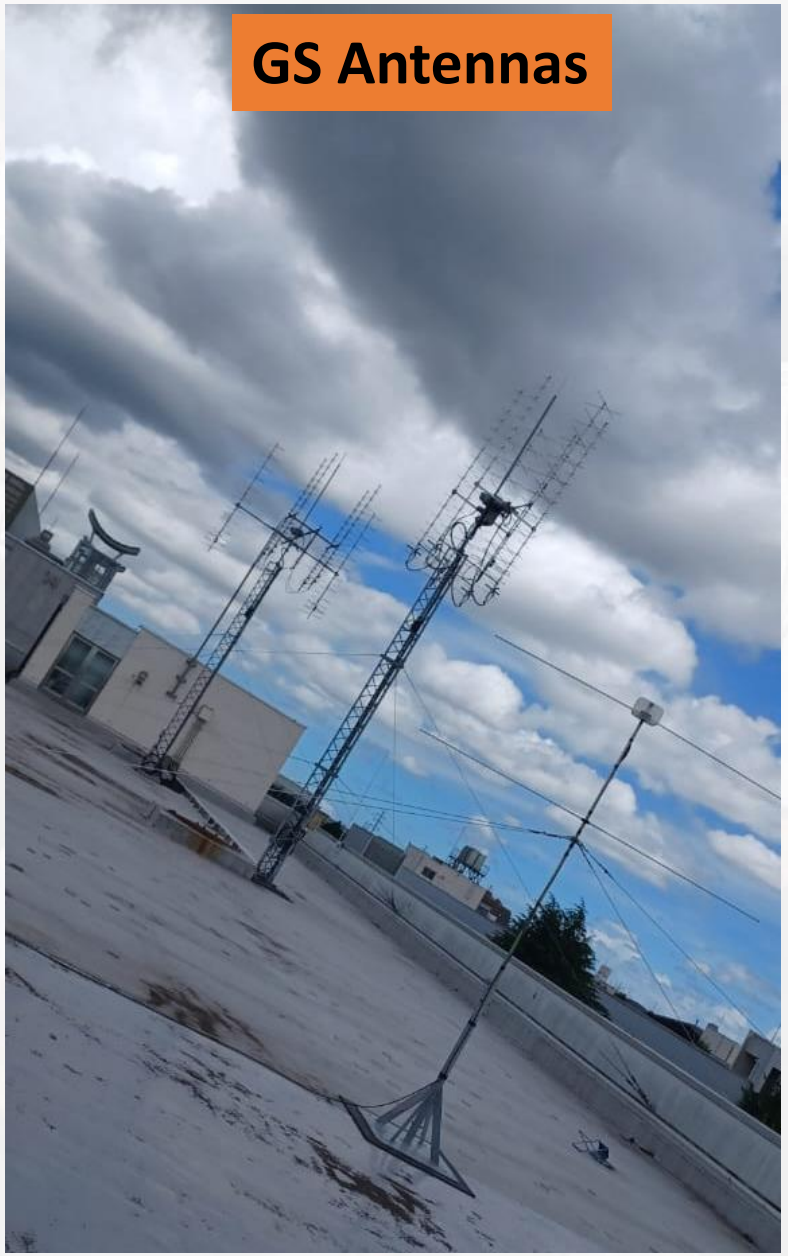
- A capacity building program in space technology
- Learn entire satellite development process
  - Systems engineering
  - Project management
  - Experience a new training tool: HEPTA-Sat
- Best teaching methods utilised in space engineering

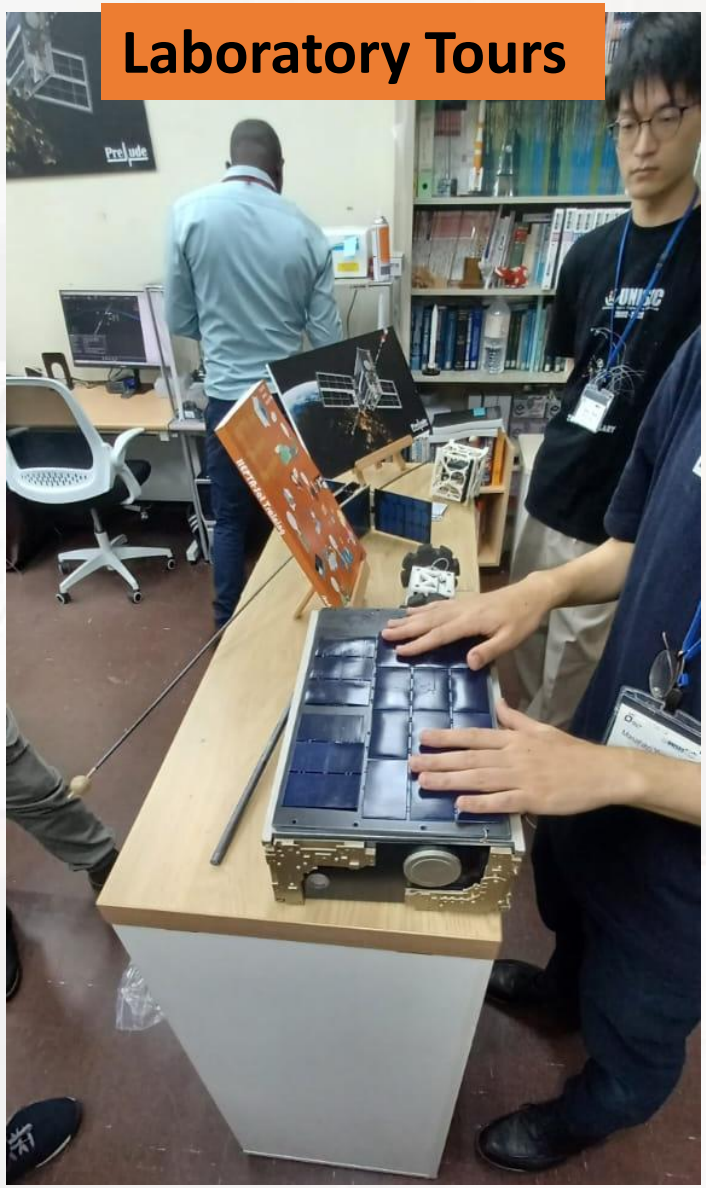


Statements of Purpose

1. To apply my knowledge and advance my engineering skills in satellite development projects.
2. To learn and understand the entire satellite subsystems.
3. To learn project management of satellites.
4. To learn from other accomplished professionals.
5. To learn teaching skills on knowledge transfer to people with different professional backgrounds.
6. To expand my network and collaborate with like-minded individuals.

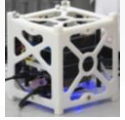
Activities 1: Nihon University Tours





Activities 2: Lectures

- ❑Introduction: Overview of the HEPTA-Sat training
- ❑Development environment & programming
- ❑Electrical Power Supply (EPS) Subsystem,
- ❑Command and Data Handling (C & DH) Subsystem
- ❑Sensor Subsystem (e.g. Camera & GPS, ADC 9 axis sensors (Gyro, Magnetometer and Accelerometer), Temperature sensors etc)
- ❑Communication and Ground Station Subsystem,
- ❑Using CubeSat Development Platforms (e.g. Fusion 360)
- ❑Effective teaching methods



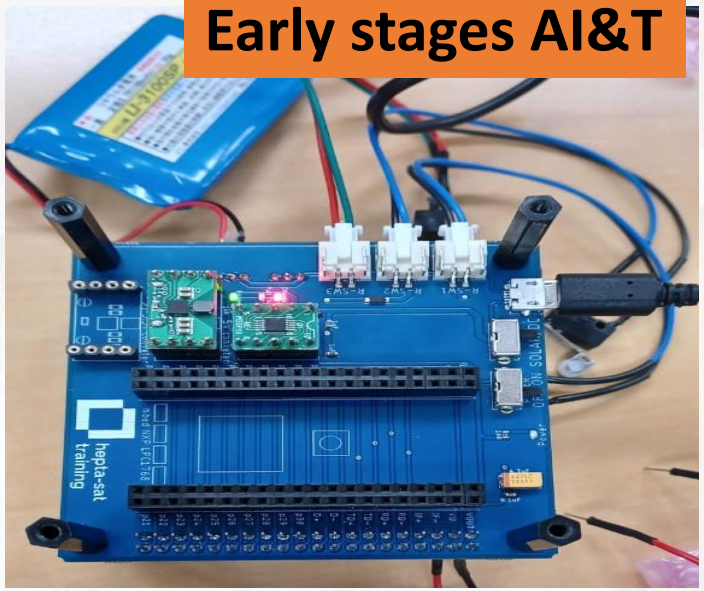
Activities 3: Satellite Bus Labs

UNISEC GLOBAL
University Space Engineering Consortium

Component Checking

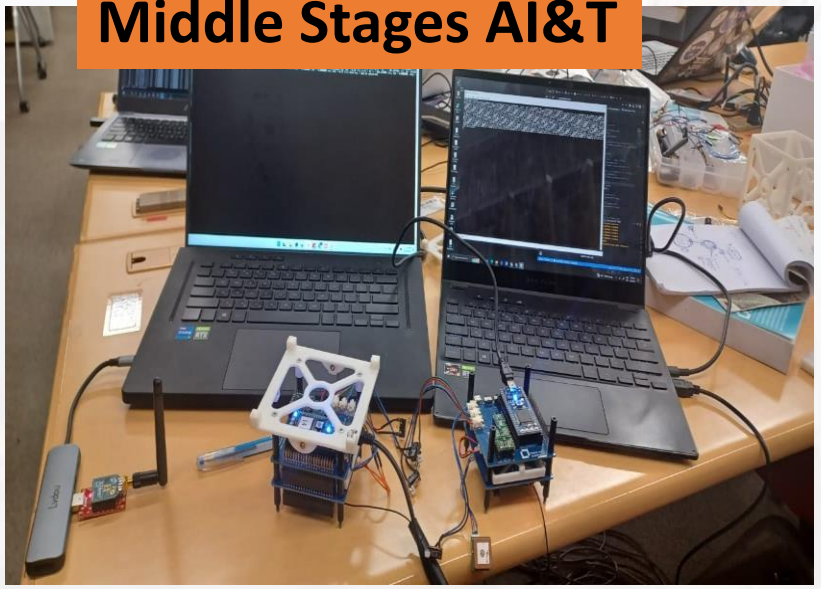
Programming with Mbed

Early stages AI&T



Outdoor Tests

Middle Stages AI&T



Final Product

Activities 4: Satellite Mission Design and Implementation

Mission Planning

Components Procurement

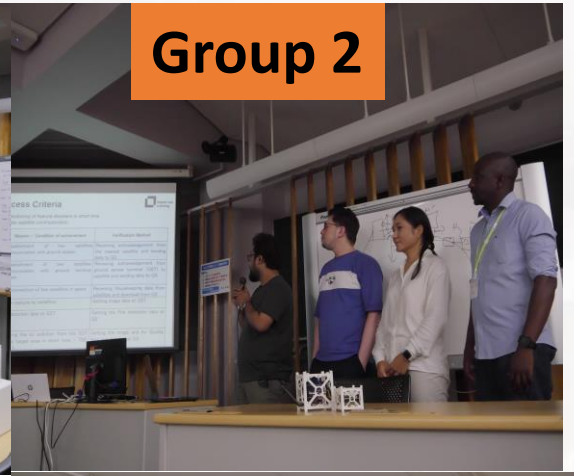
Mission AI&T

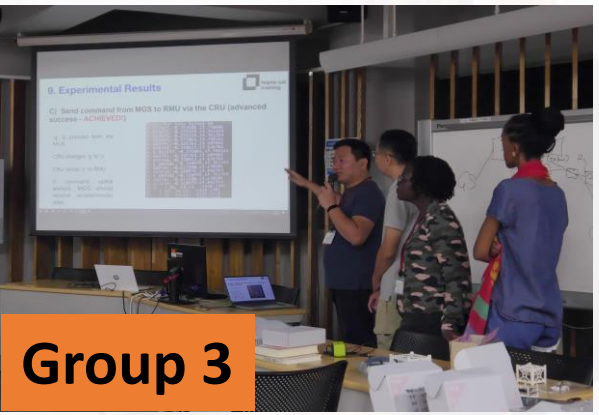
Mission Tests: Phase 1

Mission Tests: Phase 2

Presentations

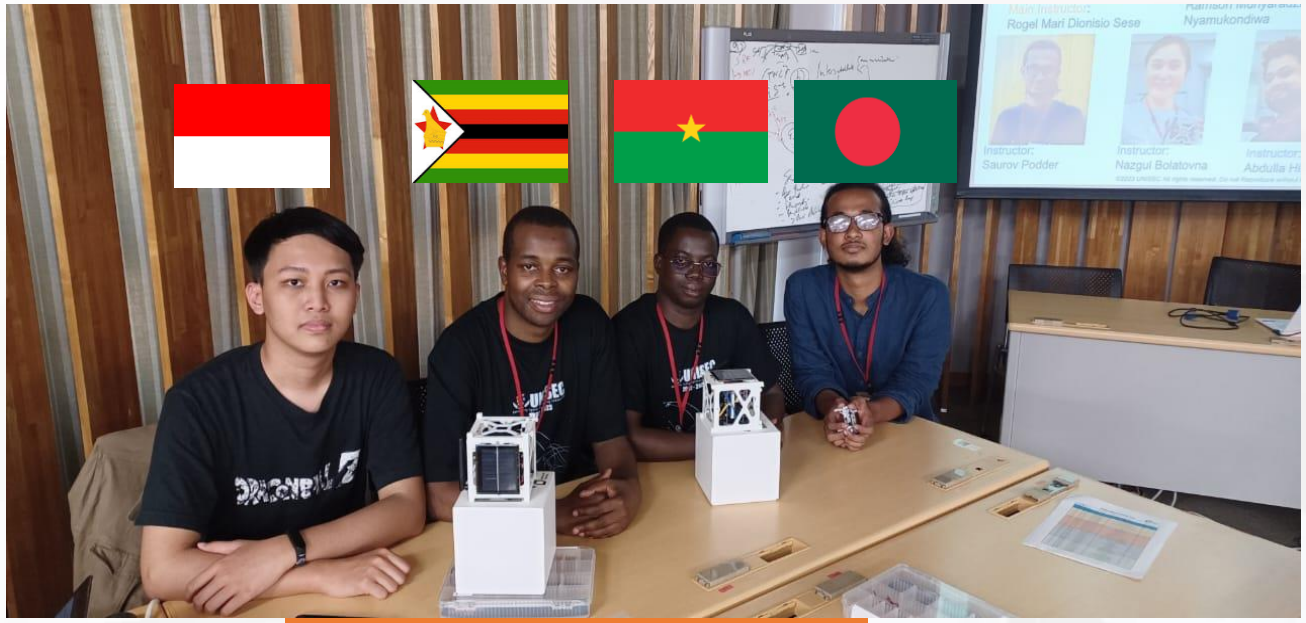
Activities 5: Team Presentations



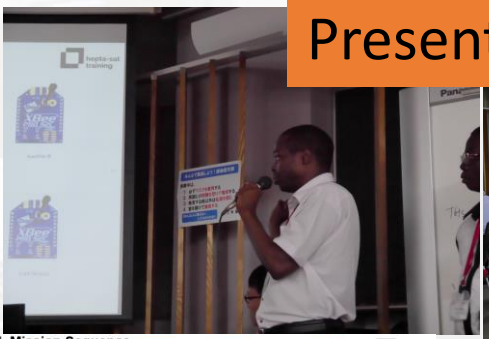


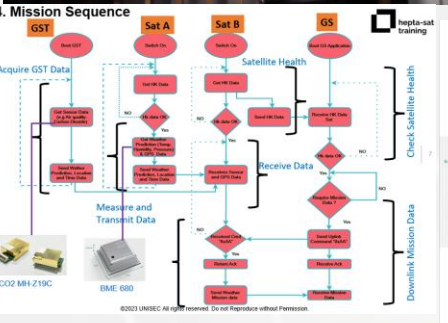
- Presentation Details
  - Mission definition, requirements and specification
  - Mission success criteria's
  - Component selection and procurement
  - Cost and schedule management
  - System block diagrams and interface management
  - Sensor/mission system design and development
  - Systems assembly, integration and testing
  - Experimental results (End to End Test)

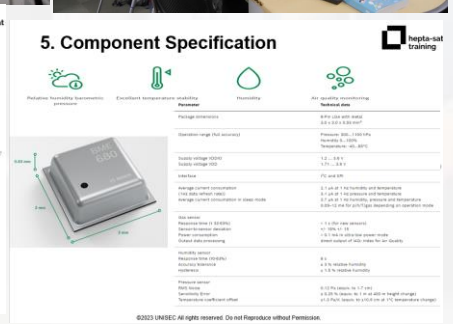
Activities 6: My Team Presentation Overview

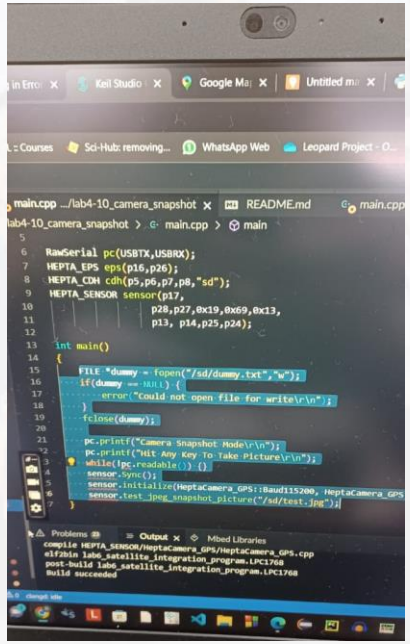


Presentation Session









- Team Members: Faizal: Indonesia, Ramson: Zimbabwe, Sidiki: Burkina Faso, Saurov Bangladesh
- Application: Weather parameter detection (Humidity, Temperature, Pressure)
- Effects: Climate and weather changes; humans, other living species & infrastructure destruction
- Users: Meteorological sectors, disaster & environmental management departments etc.
- System design: Include satellite to satellite &ground to satellite networks based on Xbees
- Result: Intended full success mission criteria achieved

Activities 7: Graduation

Certificate: CanSat/CubeSat Leader Training

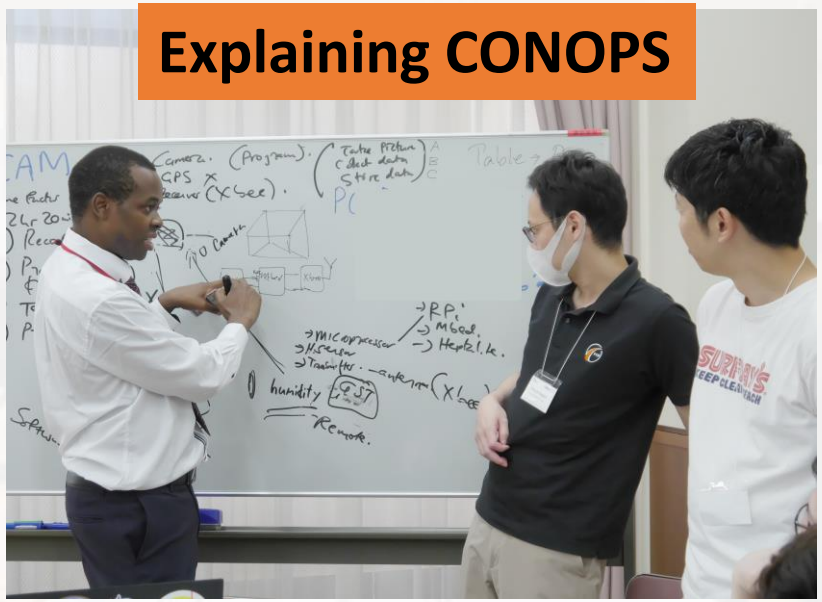
Certificate: Space Engineering Education Methods

Activities 8: Teaching Practices

Instructors Selected

Instructor's Lectures

Explaining CONOPS



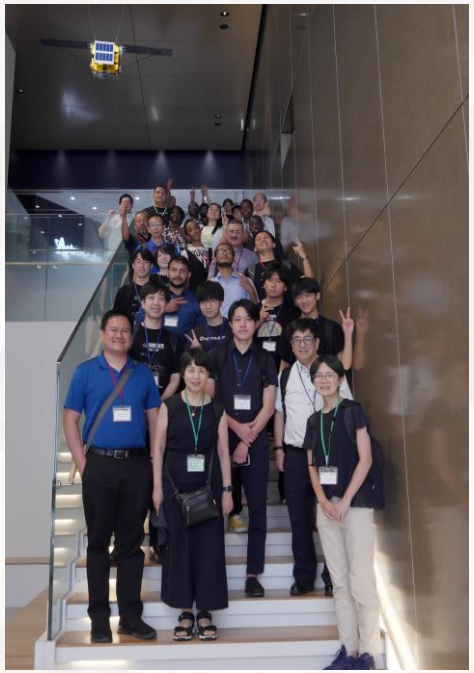
Assisting Labs

Mission Successful

Handing over Certificates

Activities 9: Field Trips, Food, and Networking Sessions (Gallery)

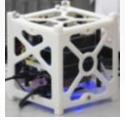






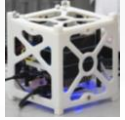




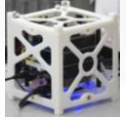
Program Evaluations

- Depth of the program,
  - Enriching and educational experience of satellite technology and its applications.
  - Knowledge on satellite subsystems design, integration, tests, data collection, and interpretation.
  - Content was delivered in a logical sequence, starting with the basics and progressively delving into more advanced concept
- Conduct
  - Well-structured curriculum.
  - Very organized and well managed
- Professors, Instructors and Staff
  - Helpful, highly knowledgeable, and experienced in the field.
- Practical hands on sessions
  - Work directly with satellite hardware, data, software tools, and simulations.
  - Instrumental in solidifying the theoretical concepts we had learned and provided a glimpse into the real-world applications of satellite technology.
- Environment
  - Fun and engaging
  - Promotes Interactions with fellow participants during group discussions
  - Networking opportunities provided by the program have opened up possibilities for future collaborations and partnerships.



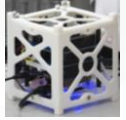
Vision for the Future

- Capacity building programs in Zimbabwe.
  - Start HEPTA/CanSat training programs in Zimbabwe targeting middle school, high school and university students.
  - Training space agency engineers.
  - Outreach programs.
- Advance satellite projects and space activities in Zimbabwe
  - Develop satellites to address the needs of Zimbabwe
    - ✓ Agriculture and resource management.
    - ✓ Weather, disaster management and resilience.
    - ✓ Educational and scientific studies.
    - ✓ Telecommunication, internet, IoT and broadcasting.
    - ✓ Astronomy and space exploration.
- Collaborate
  - Engage neighboring countries, regional and International partners to collaborate on space programs.
- Space policy
  - Assist in the development of national space policy.
  - Ratification of space treaties .
- Research
  - Utilize research hubs for space programs.
  - High Performance Computing



Message for Future CTLP Participants

- I encourage aspiring space engineers to participate in the CTLP programs.
- CLTP programs will immensely improve your understanding of space, satellite design, integration and testing, launching requirements and operations.
- CLTP promotes collaboration and is multinational programs which is beneficial in expanding your network and opportunities.
- You enjoy some tours in the Tokyo City including places like Roppongi, Shibuya, Tokyo Tower, Sky Tree, Ueno Zoo , Empires Palace and some temples together with friends.



Appreciation

- AOTS: Association for Overseas Technical Cooperation and Sustainable Partnerships, Japan
- UNISEC Global
- Rei Kawashima Sensei
- Nihon University
- Yamazaki Sensei
- Teaching Assistants
- All Participants

Q & A Session