Satellite Projects by **Antarikchya Pratisthan Nepal [Space Foundation Nepal]**

ANTARIKCHYA

अन्तरिक्ष प्रतिष्ठान नेपाल

Eliza Sapkota
Satellite Research Fellow
Antarikchya Pratisthan Nepal

Antarikchya Pratisthan Nepal [APN]

“Vision 2050: a vision to launch Nepal’s First Astronaut in Space by 2050”

“Train space engineers and R&D in space technology in Nepal”

Next Generation Space Tech Engagement Program

ANTARIKCHYA

SASTOCUBE

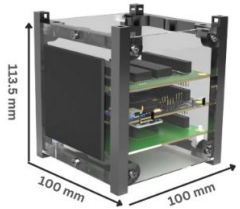
TINKER LAB

NepaliSat-1 BIRDS-3

Grade 3-7

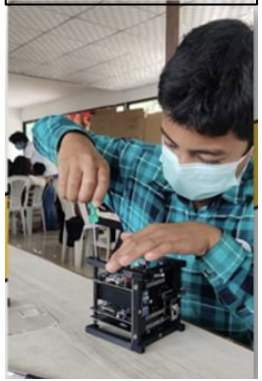
PaperSat Art Program

Grade 6-10



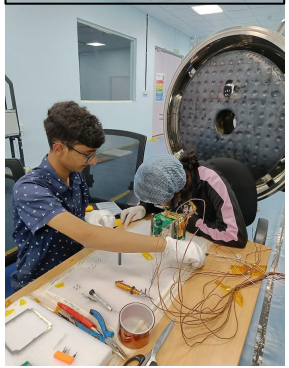
ECube

Grade 7-12



SastoCube Satellite Program

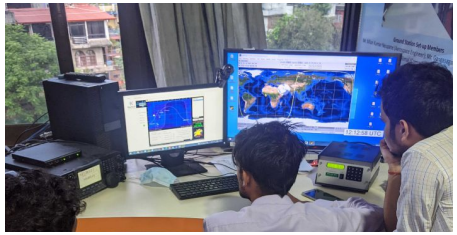
Grade 11-12



1st High School CubeSat

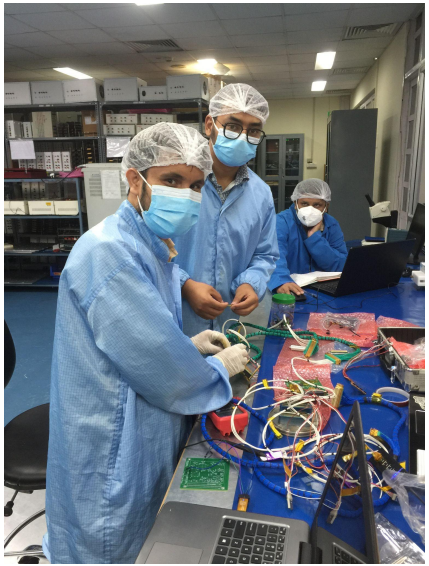
Science, Technology, Innovation and Capacity-Building in Nepal through PHI

"Train and develop space engineers and in house space facilities in Nepal"



Ground Station Operation at NAST

Antenna Lab Development at Khwopa Eng. College



Satellite Research Fellow at Satellite Testing Lab at India

GS antenna maintenance at NAST

Antarikchya Pratisthan Nepal

Space Projects

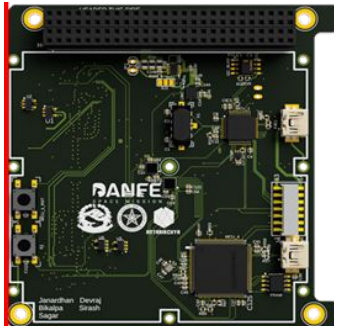
- Danfe
- Munal
- Danfe-II [PHI-1]

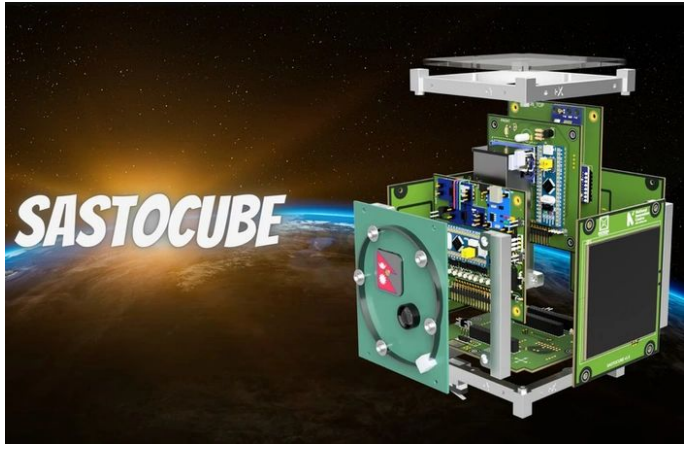
Education Programs

- PaperSat
- E-Cube
- SastoCube

DANFE
SPACE MISSION

MUNAL
SPACE MISSION





MUNAL

High School Satellite Consortium

High School Satellite: MUNAL

- 9 High School Students (KUHS and Government School)
- To be launched on August 2023

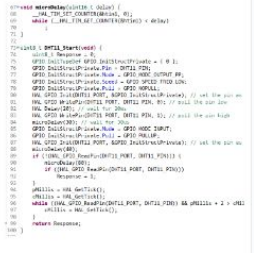
Computer Aided Design (CAD)

Electronics

BOOTCAMP

Programming

Printed Circuit Boards(PCBs) fabrication



9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

4 QUALITY EDUCATION

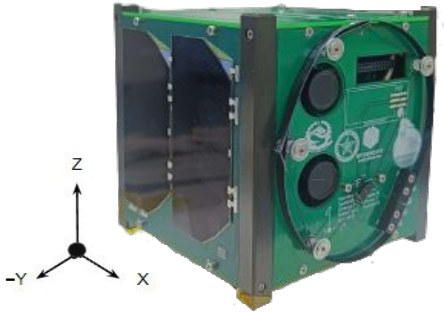
5 GENDER EQUALITY

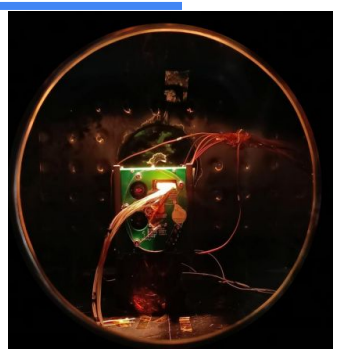
17 PARTNERSHIPS FOR THE GOALS

Project MUNAL

Objectives:

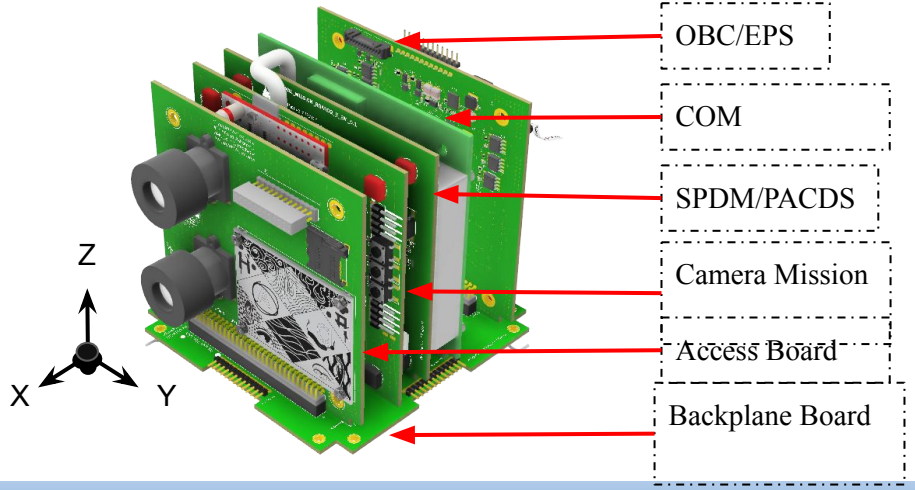
- In house design, build, test and launch of Nepal's first High School CubeSat
- To demonstrate novel SPDM based COM/OBC designed in-house
- To give continuity and improvement to two Missions of NepaliSat-1: Store & Forward (S&F) and Imaging Mission





Specifications	
Dimension	1U (100X100X113.5) mm
Weight	1.051 kg
Harness	Backplane Board
Missions	Camera, PACDS, SPDM, Art mission

OBC : On-Board Computer
EPS : Electrical Power Supply
SPDM : Satellite System on Chip Payload Demonstration Mission
PACDS : Passive Attitude Control and Determination System

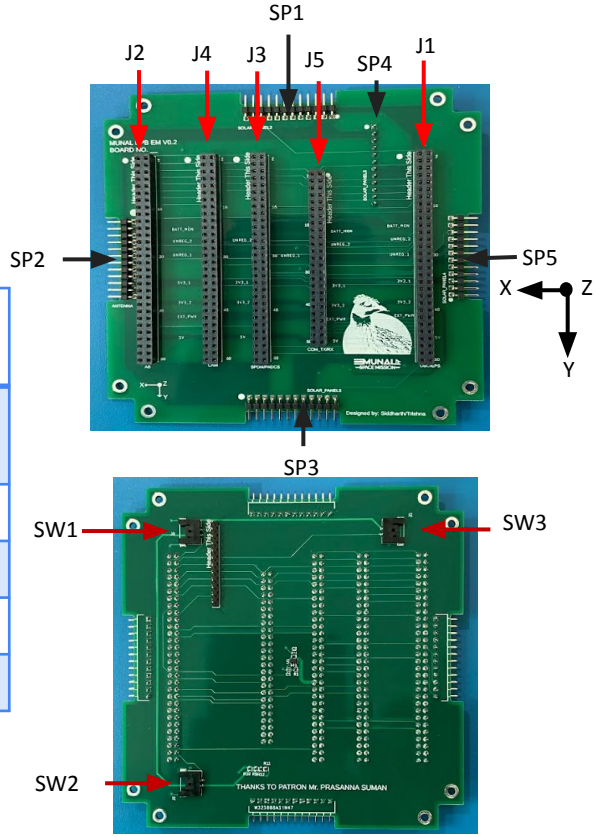


BPB: Backplane Board

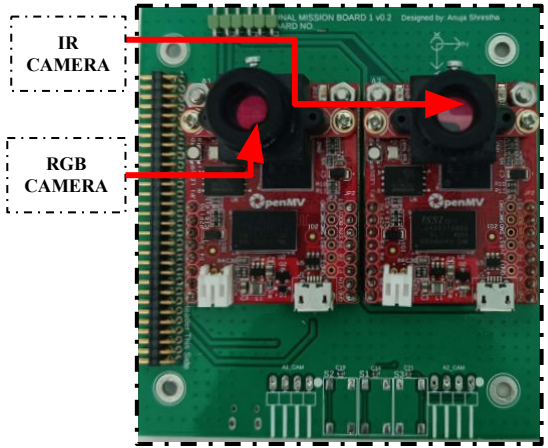
- 60 pin connectors are used for all the mission boards and EPS/OBC.
- 50 pin connector for COM board (Reference: Addnics COM board ICD)

Boards placement on BPB

Connector Name	No. of Pins	Description
J1-J4	60	OBC/EPS, AB, SPDM/PACDS, CAM
J5	50	COM Board
SP1-SP4	12	Solar Panels
SP5	12	Antenna Panel
SW1-SW3	2	Deployment switch



CAM: Camera Mission



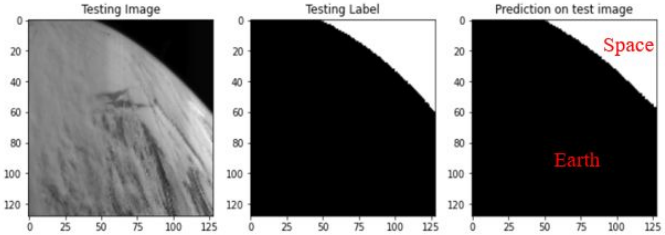
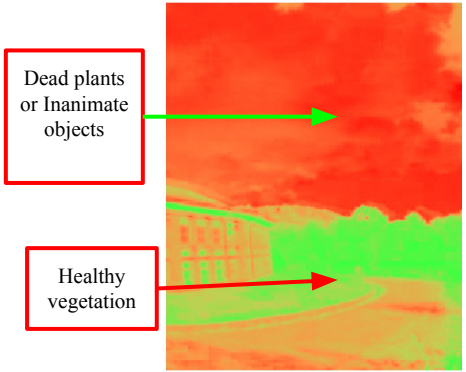


Image Classification

Image Segmentation

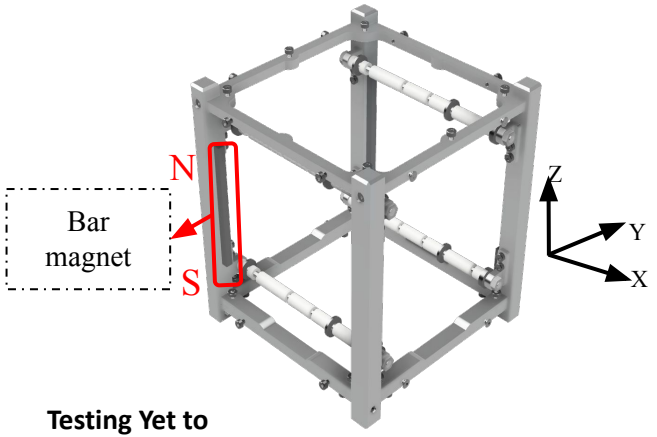
Feature	Specification
Cameras	OpenMV H7 Plus (RGB & NIR)
Ground Swath	168*95 km (550km orbit)
Ground Sampling Distance	131m
Resolution	1280x720

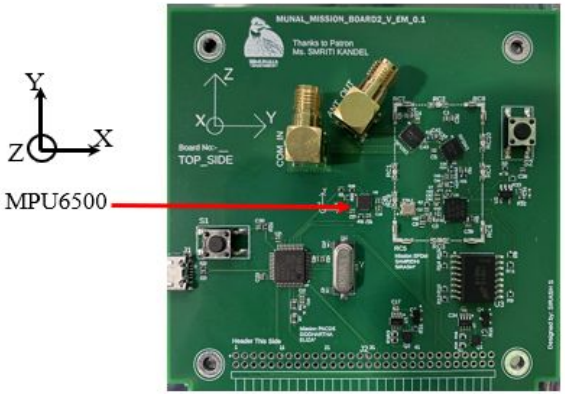


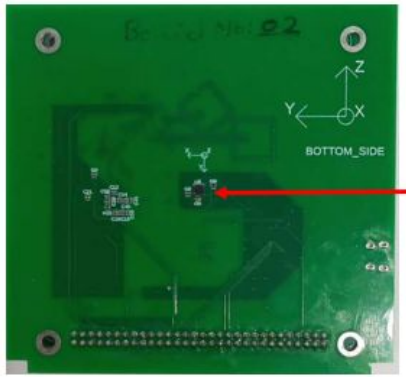
RGB Image

IR-Image

PACDS:
Passive Attitude Control and Determination



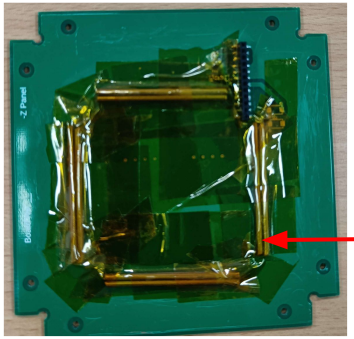




Top

Bottom

Testing Yet to be done



*Reference: BIRDS-5 ADCS Design

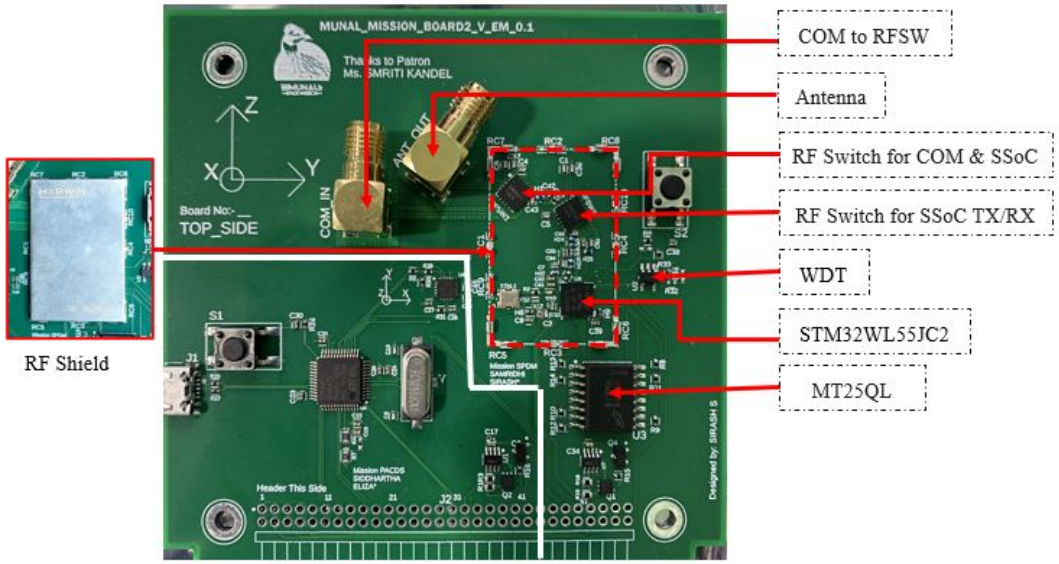
BIRDS Open-Source

Hysteresis Rod (on Bottom Solar Panel on Bottom Surface)

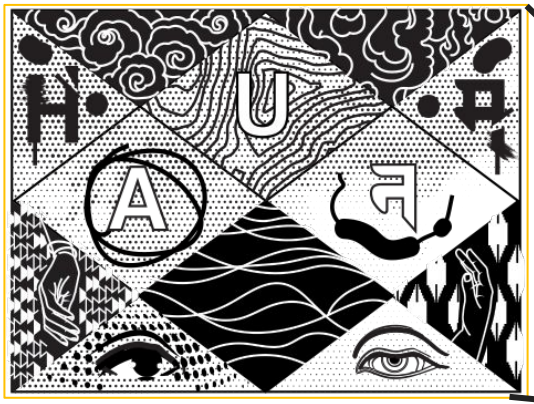
Bar Magnet	4*4(each rail)	AlNiCo 5
Hysteresis Rod	8	HyMu80

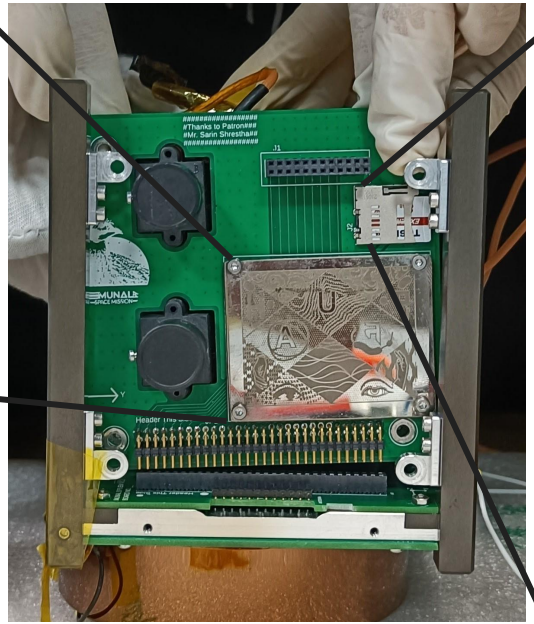
SPDM:
Satellite System-on-Chip Payload Demo

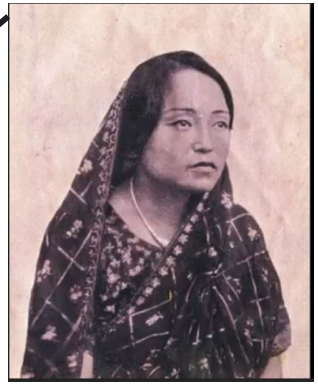
- Demonstrate the use of integrated Communication(COM) and On-Board Computer(OBC) subsystem based on novel SSoC for future cubesat missions using LoRa(Long Range) Modulation.
- ARM based Dual Core Processor with Radio
- +22 dBm Transmitting power
- -148 dBm Receiving sensitivity

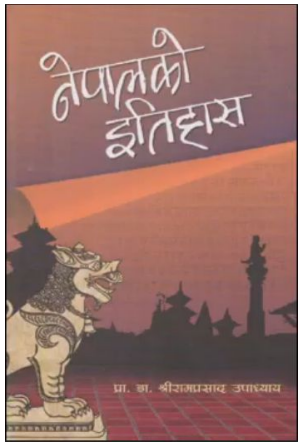


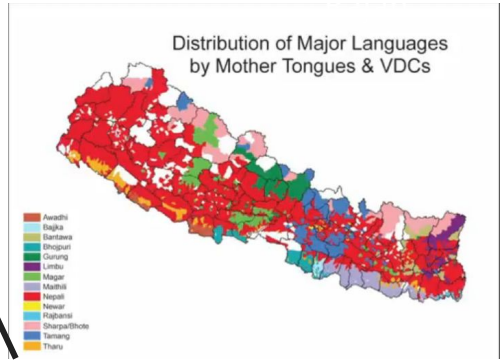
Art and Culture Mission











PROJECT TIMELINE

Danfe Space Mission

Multi Payload CubeSat Platform (MPCP)

DANFE
SPACE MISSION

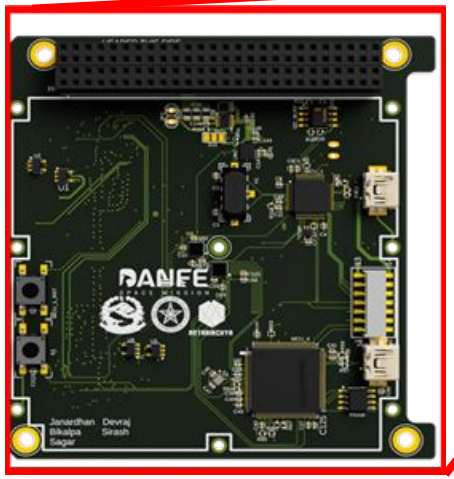
สถาบันเทคโนโลยีอวกาศนานาชาติเพื่อการพัฒนาเศรษฐกิจ (สทอศ.)
INSTED
International Institute of Space Technology for Economic Development

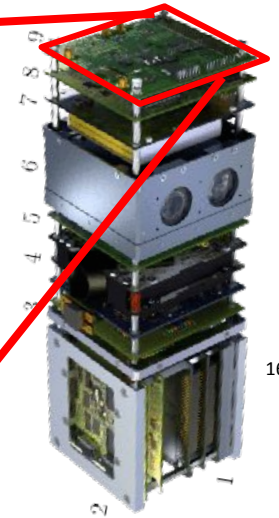
NBSPACE

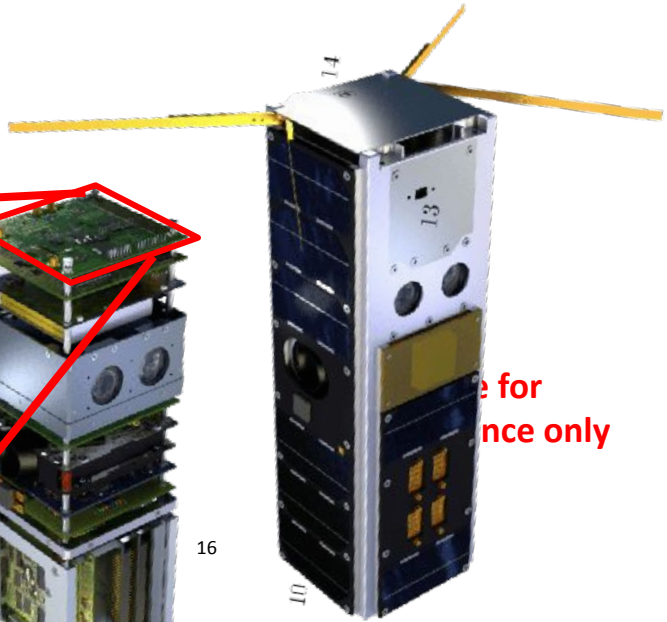
Overview

- MCPC 3U Satellite for Mission Demonstration
- PX4 Demonstration Mission
- Satellite System-on-Chip Demonstration Mission
- Also Ground Sensor Terminal Design for KITSUNE

Pictured: GST installed in Melamchi River originates from the Jugal Himal at an elevation of about 5,875 m







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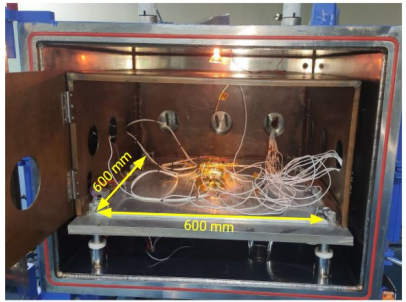
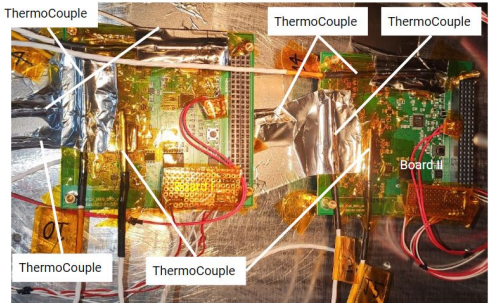
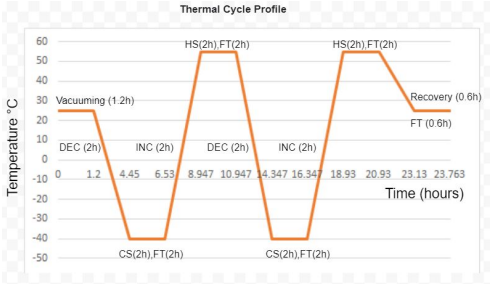
nce only

Source: Aalto-1, multi-payload CubeSat: Design, integration and launch

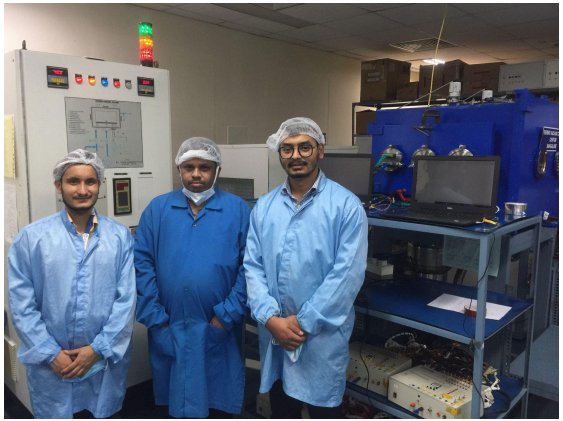
Space Qualification Test







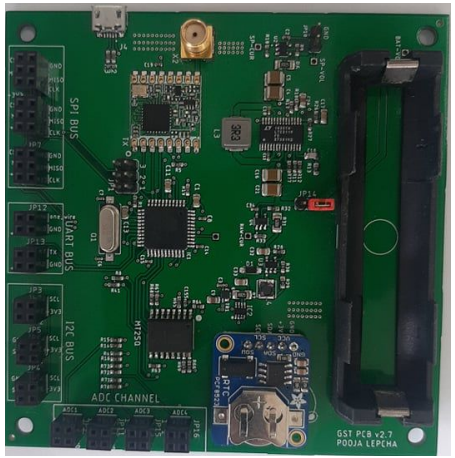
Thermal Vacuum Test at Centum Electronics, Bangalore, India



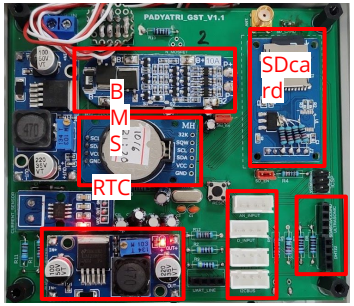
Thermal Vacuum Test at Centum Electronics, Bangalore, India

Electromagnetic Compatibility Test at Khwopa Engineering College, Bhaktapur, Nepal

GST Design and Uplink Test

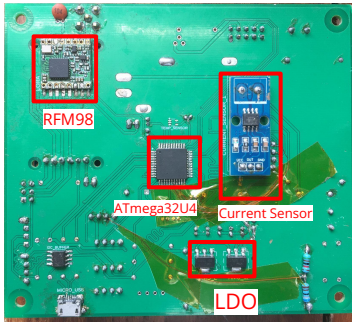


GST from Kyutech



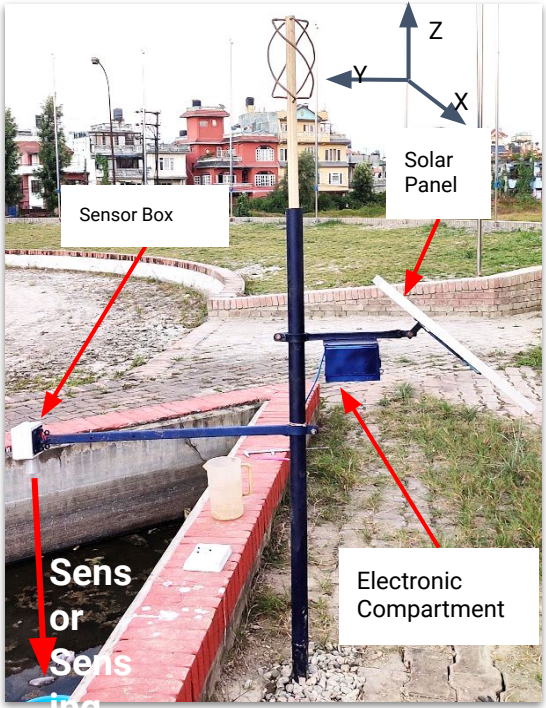
Pictured: GST PCB top side

Pictured: GST battery pack



Pictured: GST PCB bottom side

Pictured: Temperature humidity sensor and ultrasonic sensor

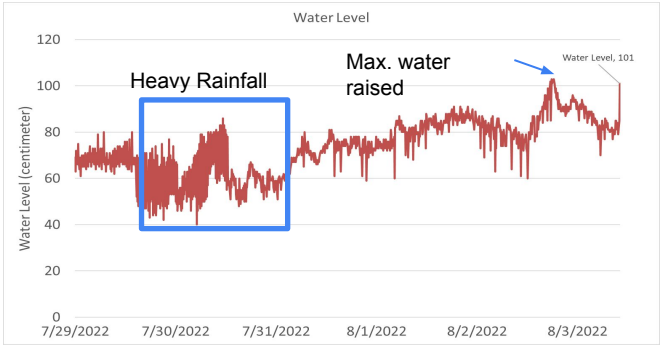


Long Duration test of GST installed at NAST

In house Design of GST for Flood Early warning System

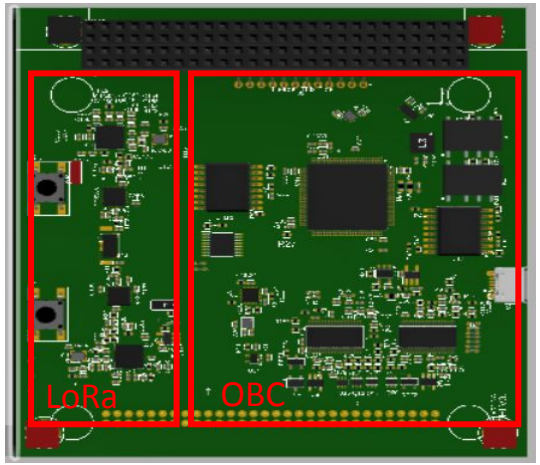
KITSUNE GST Installation for Flood Warning in Melamchi Municipality [Rural area]

GST Melamchi River Data



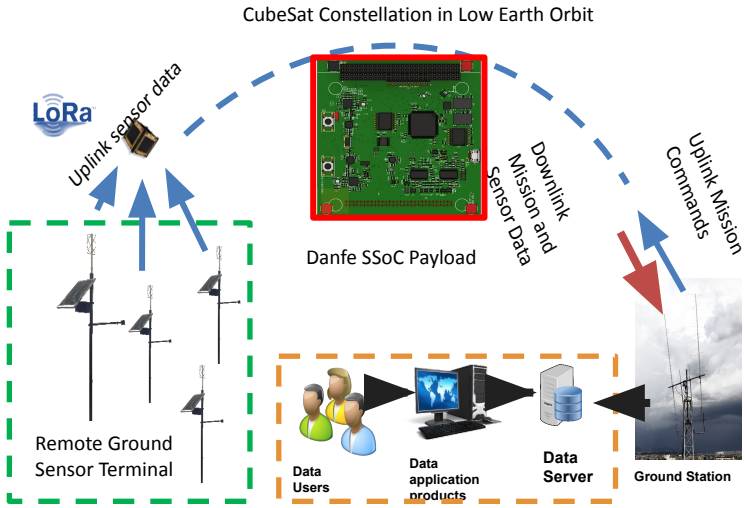
Danfe-2

- **UNOOSA's Access to Space for all: Payload Hosting Initiative project.**
- **MBRSC'S 12U satellite: (PHISat)**
- **Munal's OBC/EPS and Danfe Space Mission in a single board. (Modular Design)**
- **Integrated OBC, EPS and Communication system (Bus system in a single board)**
- **PDR completed on May 9**



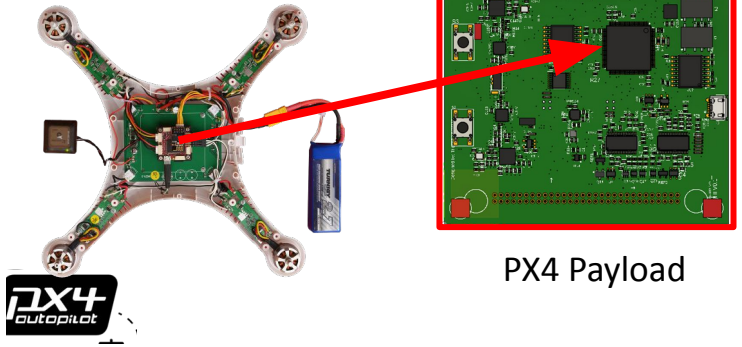
PHI-I APN LoRa Payload [Danfe-2)

- Nepal's Payload hosted by 12U MBRSC Satellite PHISat



❑ **Satellite System-on-Chip Demonstration Mission**

Drone Hardware and Software

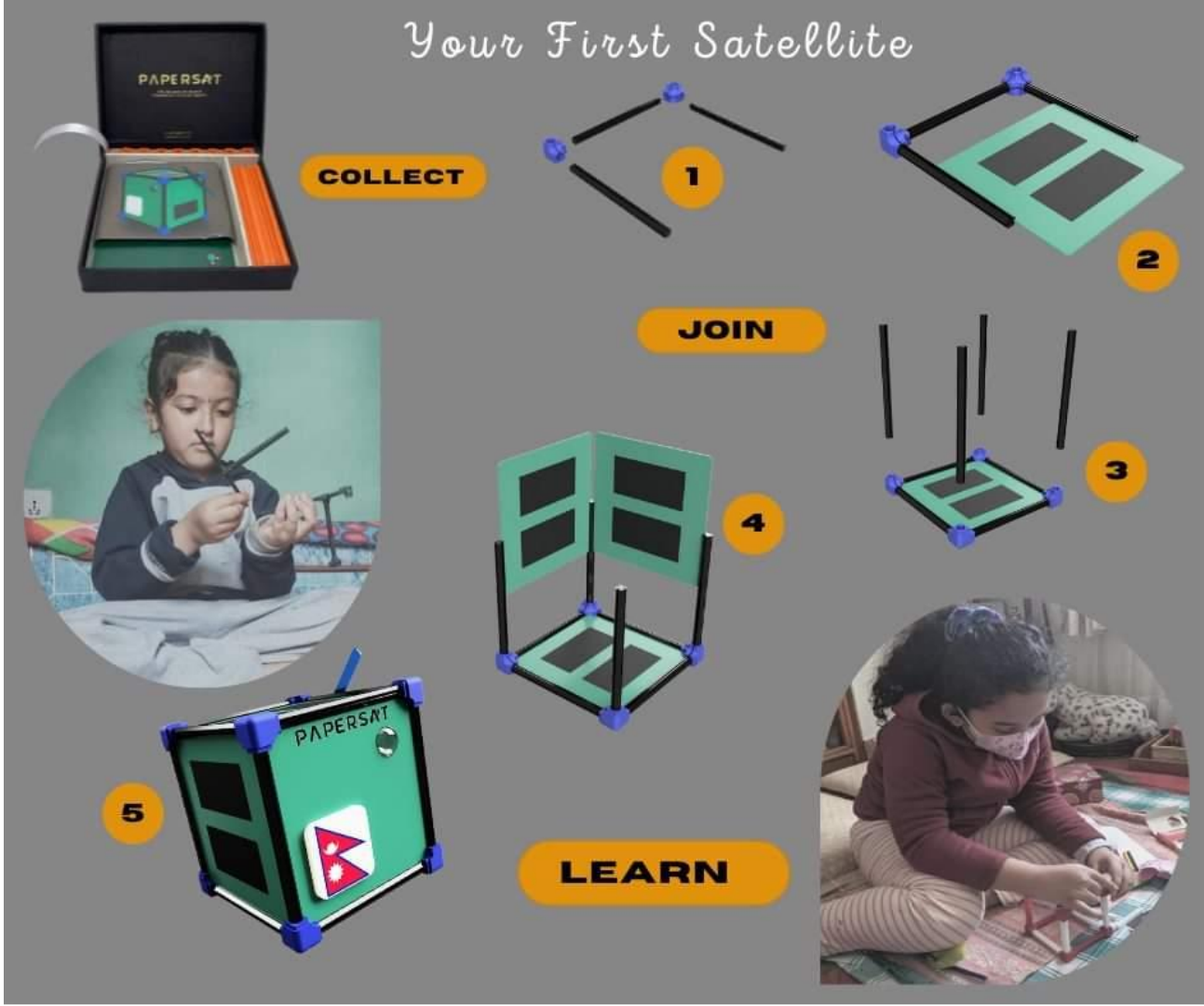


❑ **PX4 Demonstration Mission**

"Design a payload for CubeSat which contributes in next-generation capacity building for in-house satellite development in Nepal"

Antarikchya Educational Programs

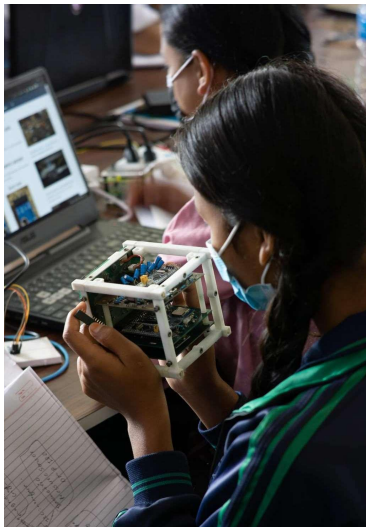
PaperSat

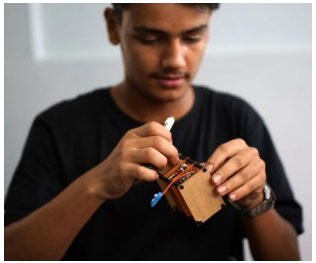

Your First Satellite
PAPERSAT
COLLECT
1
2
JOIN
3
4
PAPERSAT
5
LEARN

Satellite Bootcamp

PaperSat Space Art Comp

Localized CanSat Training
(UNISEC Derived Concept)

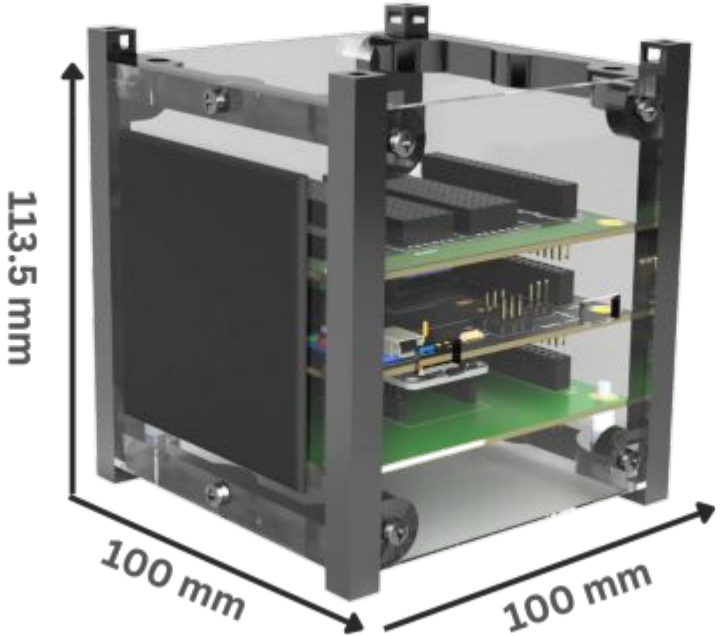


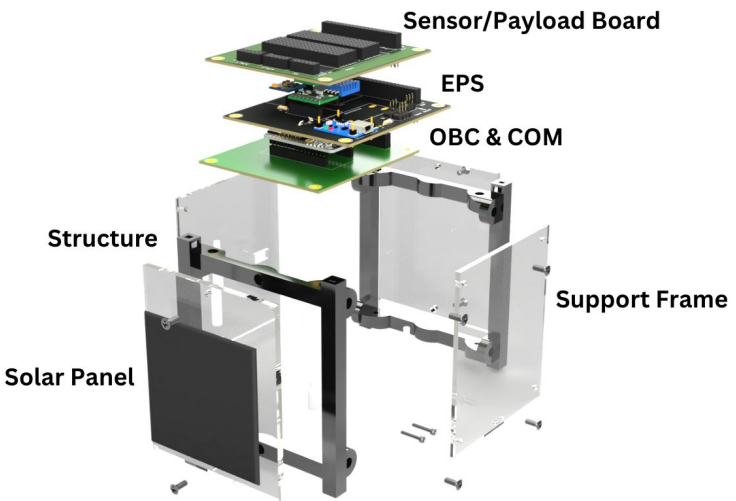


CanSat training provided at Budhanilkantha School

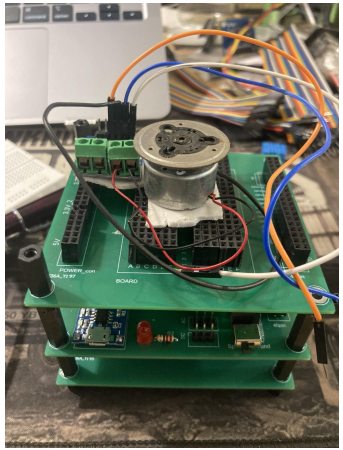
E-Cube

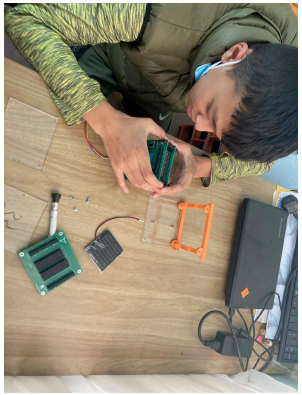
Educational Kit to educate young students about Satellite Systems





Educational Training Program



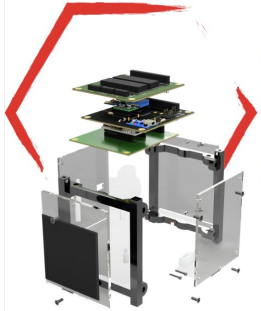


E-Cube An Educational Satellite

E-Cube

Capacity Building Activities
IMPACT
ANTARIKCHYA IS TRAINING NEXT GENERATION SPACE LEADERS

SATELLITE BOOTCAMP (TRAINING)**

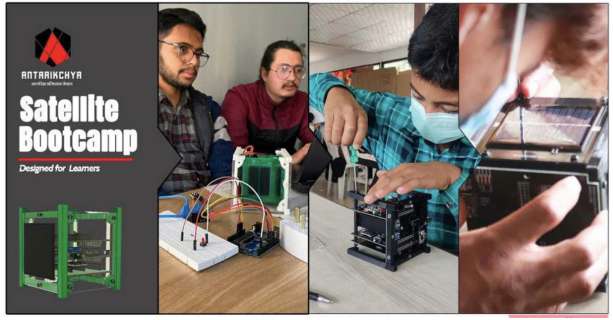


Satellite technology has revolutionized the way we live, work, and communicate. From weather forecasting to navigation, from communication to disaster management, satellites have become an indispensable part of our daily lives. However, despite their ubiquitous presence, the technology behind these satellites remains a mystery to most people. To address this knowledge gap and inspire the next generation of innovators, we propose the Satellite BootCamp, a comprehensive hands-on training program that provides participants with a thorough understanding of small satellite design and system engineering. Through intensive practical lessons, participants will learn the skills and knowledge necessary to design, develop, and test their own functional small satellites.

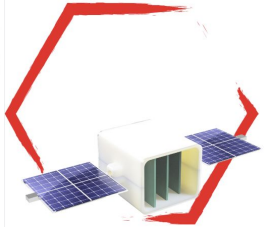
Design · Coding · Electronics · Soldering

3D Printing · Wireless · Hardware · Analytics/ Presentation

CLASS 8 AND ABOVE · 10 TRAINEES · 6 Days · ONE-TO-ONE SATELLITE KIT



CANSAT BOOTCAMP (TRAINING)**



A CanSat Bootcamp is a hands-on educational program that offers students the opportunity to design, build, and launch their own miniature satellite, known as an Idolsat. The program typically includes classroom instruction in the technical requirements of building a functioning CanSat, as well as hands-on work in designing and building the device. Students will learn about the key components of a CanSat, including sensors, communication systems, and data processing capabilities, and will gain valuable skills in electronics, programming, and engineering. CanSat Bootcamp is an exciting and educational experience that promotes skills development, teamwork, and creativity, and inspires students to pursue careers in STEM fields, including space-related disciplines.

Coding · Electronics · Soldering

Wireless · Hardware · Analytics/ Presentation

CLASS 7 AND ABOVE · 20 TRAINEES · 4 Days · ONE-TO-ONE SATELLITE KIT

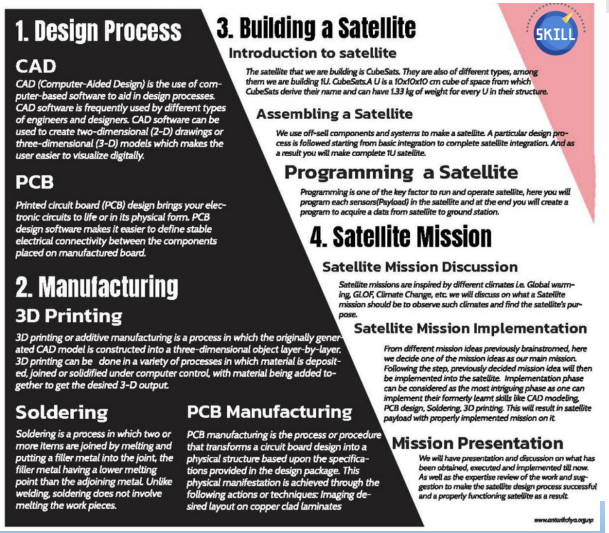
BRIHASPATI '17

IMPACT

"I HAD TAKEN TRAININGS FROM OTHER ORGANIZATIONS BUT NOTHING CAME CLOSE TO ANTARIKCHYA'S PROGRAMS WHICH USES SPACE TECHNOLOGY AS A TOOL TO TEACH CIRCUITRY, ELECTRONICS, PROGRAMMING AND DESIGN IN A MORE HANDS-ON METHOD. VERY UNIQUE."

NABIN KANDEL
SATELLITE BOOTCAMP BATCH I

50+ SCHOOLS · 700+ STUDENTS · >33% WOMEN



ANTARIKCHYA IS TRAINING NEXT GENERATION SPACE LEADERS

MELAMCHI '22