DEVELOPMENT STATUS OF NEPAL-PQ1

1st Asian PocketQube Workshop

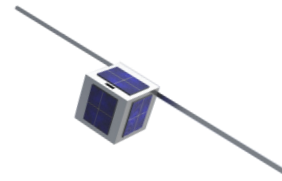### Singapore

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ORION Space Pvt. Ltd.
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NEPAL-PQ1
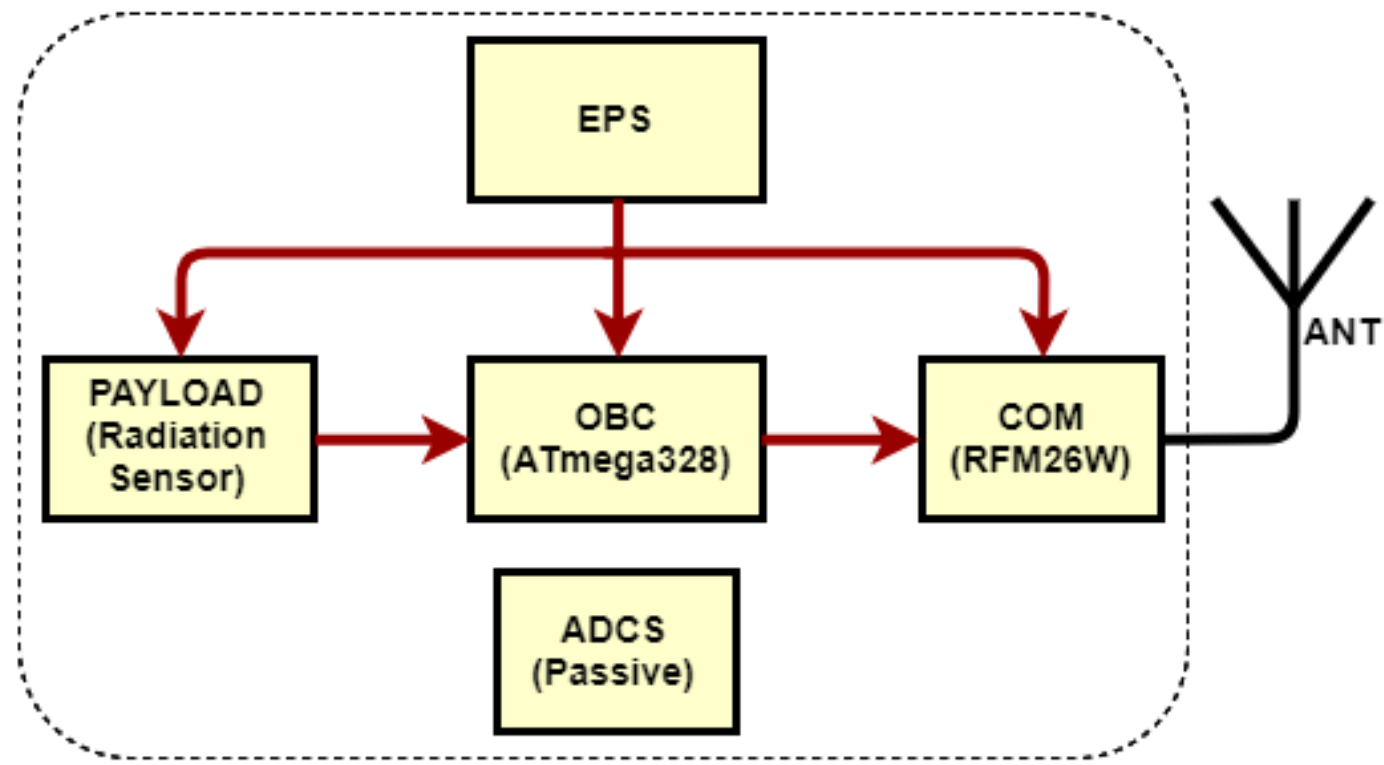
-First PocketQube of Nepal.

-Educational and Open-Source

-Primary Mission:
- Measure Space Radiation.

-Seconday Mission:
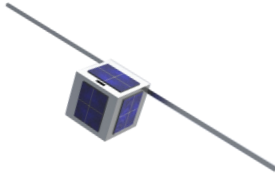- Store and Forward concept demonstration.
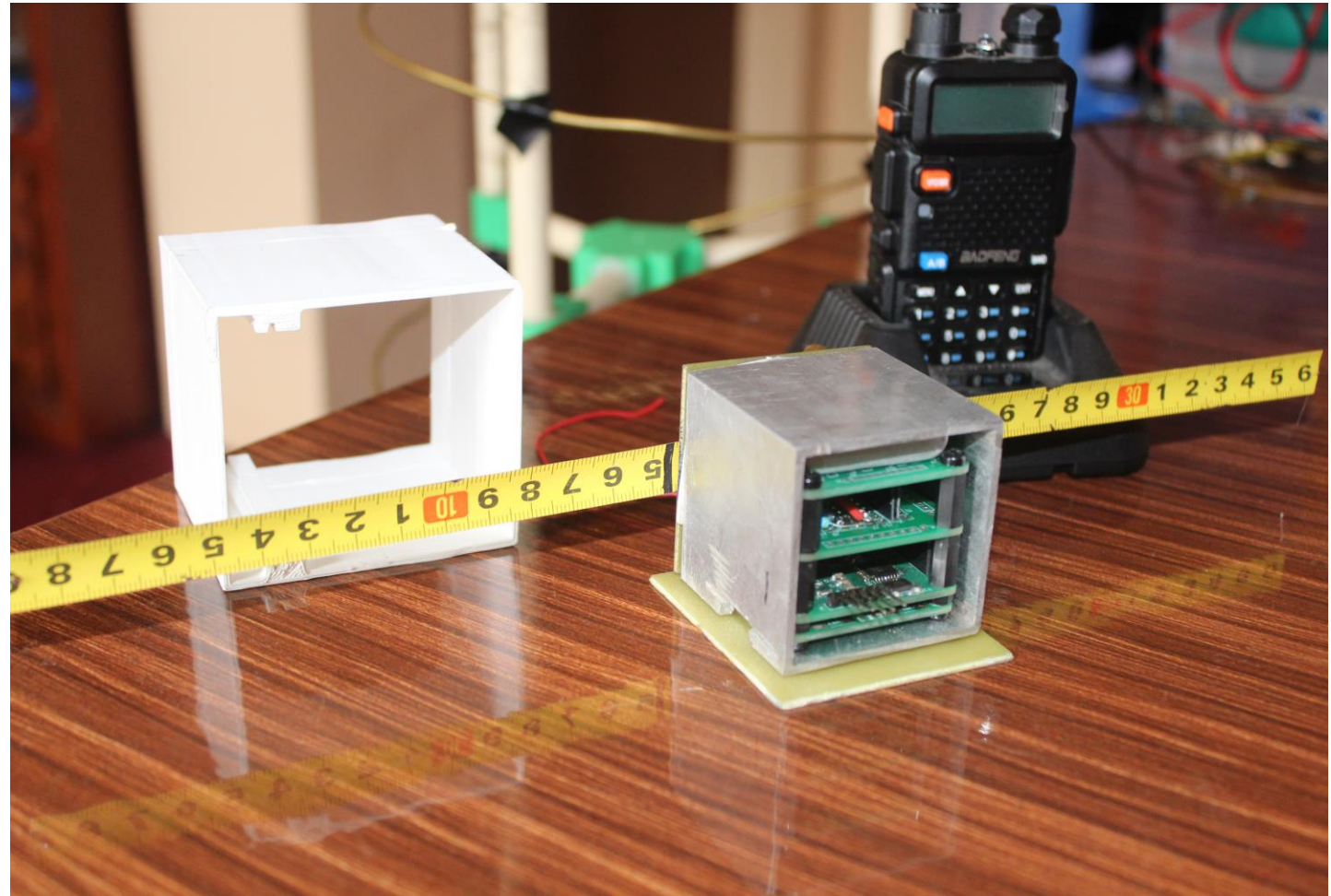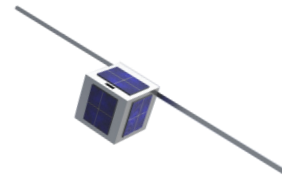
SYSTEM OVERVIEW

Block Diagram of PocketQube

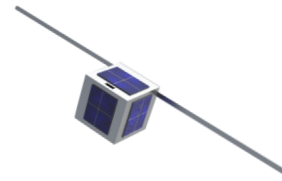# ON-BOARD COMPUTER SUBSYSTEM

Atmega328p based microcontroller.

Watchdog (MAX6369)

TPS2553 based current limiter

TMP100 Temperature Sensor

Engineering Model v1
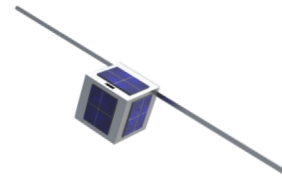
ELECTRICAL POWER SUBSYTEM

Spv1040 as MPPT IC.

Trisolx panels on 5 sides and each sides containing 8 cells.

INA219 Current Sensor

3.3V Bus.

Engineering Model v1
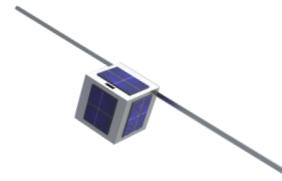
COMMUNICATION SUBSYSTEM

RFM26W transceiver.

Downlink

Uplink

RTTY FSK

GFSK

CW Morse

GFSK

COMMAND AND DATA HANDLING
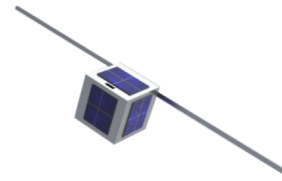
RTTY FSK and CW Morse alternates in 1 period.
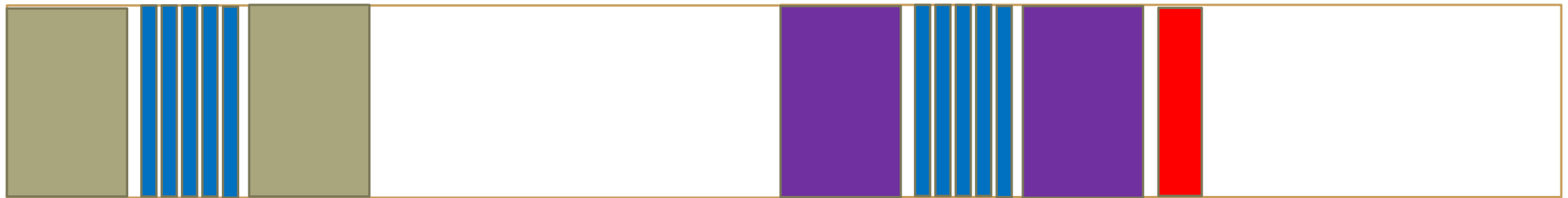
5 GFSK Transmit packets in 1 Perod

GFSK Receive for 5 seconds (Only when RTTY FSK is transmitting)

Sleep for rest of the time in 1 Period

COMMAND AND DATA HANDLING

RTTY FSK : 50 Baud, ID + Housekeeping (All Payload)

CW Morse : 20 WPM, ID + Temp + Current + Voltage

GFSK Transmit : 1200bps, RFM26 packet structure with payload

GFSK Receive : 1200 bps, RFM26 packet structure with command

GROUND STATION

-SatNOGS Based.
 ▪ Station: 176 - Nepal-PQ1 Orion Space

-RFM26W transceiver Based.
 ▪ Same transceiver as used in PocketQube

GROUND STATION CONTD.

Waterfall   Audio   Data 2

data_obs/308882/data_308882_2018-11-01T07-22-16

86 A2 40 40 40 40 60 98 AA 6E 82 82 00 E1 03 F0 FF FF F0 00 01 00 00 0F FE 5B DA A9 A7 00
06 D7 84 08 28 CD 98 01 01 00 00 6A 48 02 01 00 00 00 00 6F 03 01 00 00 2F 93 03 7F 00 15
03 44 01 CF 03 69 00 98 04 01 0B 24 01 B2 05 01 00 00 00 00 0C BB C5 38 EA 21 FB 50 03 3B
02 A1 FF FF 00 4F FF F8 FF B8 00 0D 7C 00 00 01 8B 00 00 02 94 00 00 00 00 00 00 00 00 00
06 01 03 88 02 42 00 31 00

data_obs/308882/data_308882_2018-11-01T07-22-01

86 A2 40 40 40 40 60 98 AA 6E 82 82 00 E1 03 F0 FF FF F0 00 01 00 00 0F EF 5B DA A9 98 00
06 D7 84 08 28 CD 98 01 01 00 00 6A 48 02 01 00 00 00 00 6F 03 01 00 00 2F C6 03 86 00 16
03 46 01 CF 03 68 00 99 04 01 0B 25 01 9B 05 01 00 00 00 00 0C 6E C9 93 E0 B6 FE 45 02 F4
02 0E FF F5 00 5A FF EE FF B7 00 0C AF 00 00 01 A6 00 00 01 B8 00 00 00 00 00 00 00 00 00
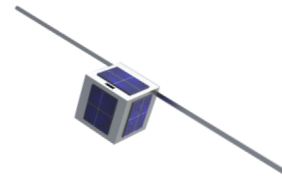06 01 03 88 02 42 00 31 00
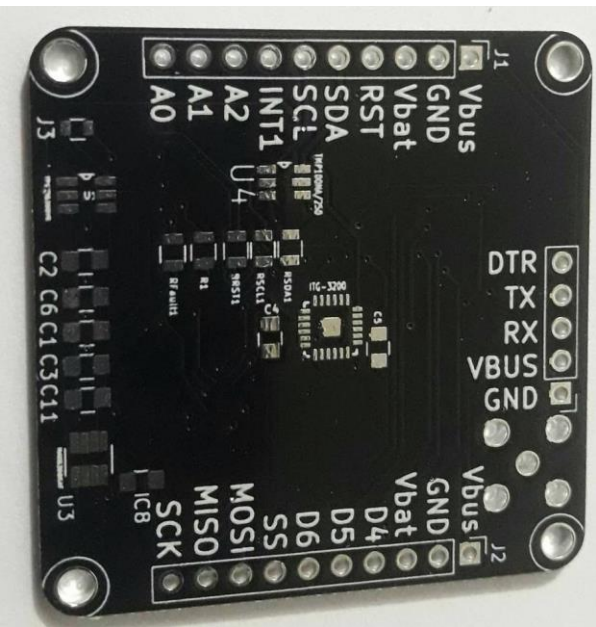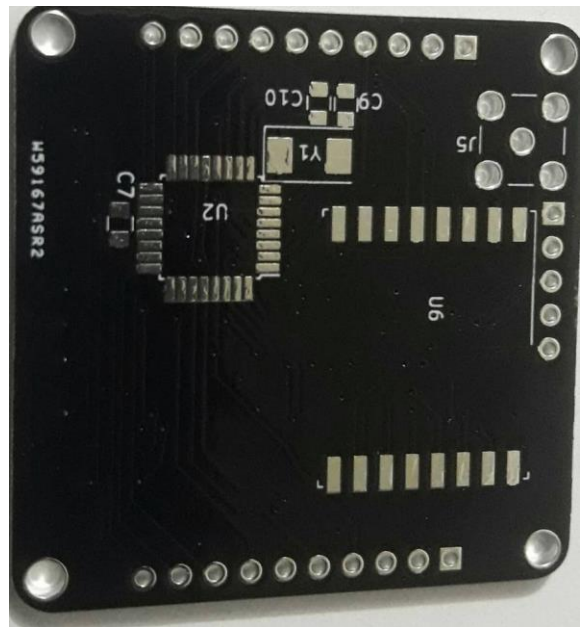
Data from BUGSAT-1
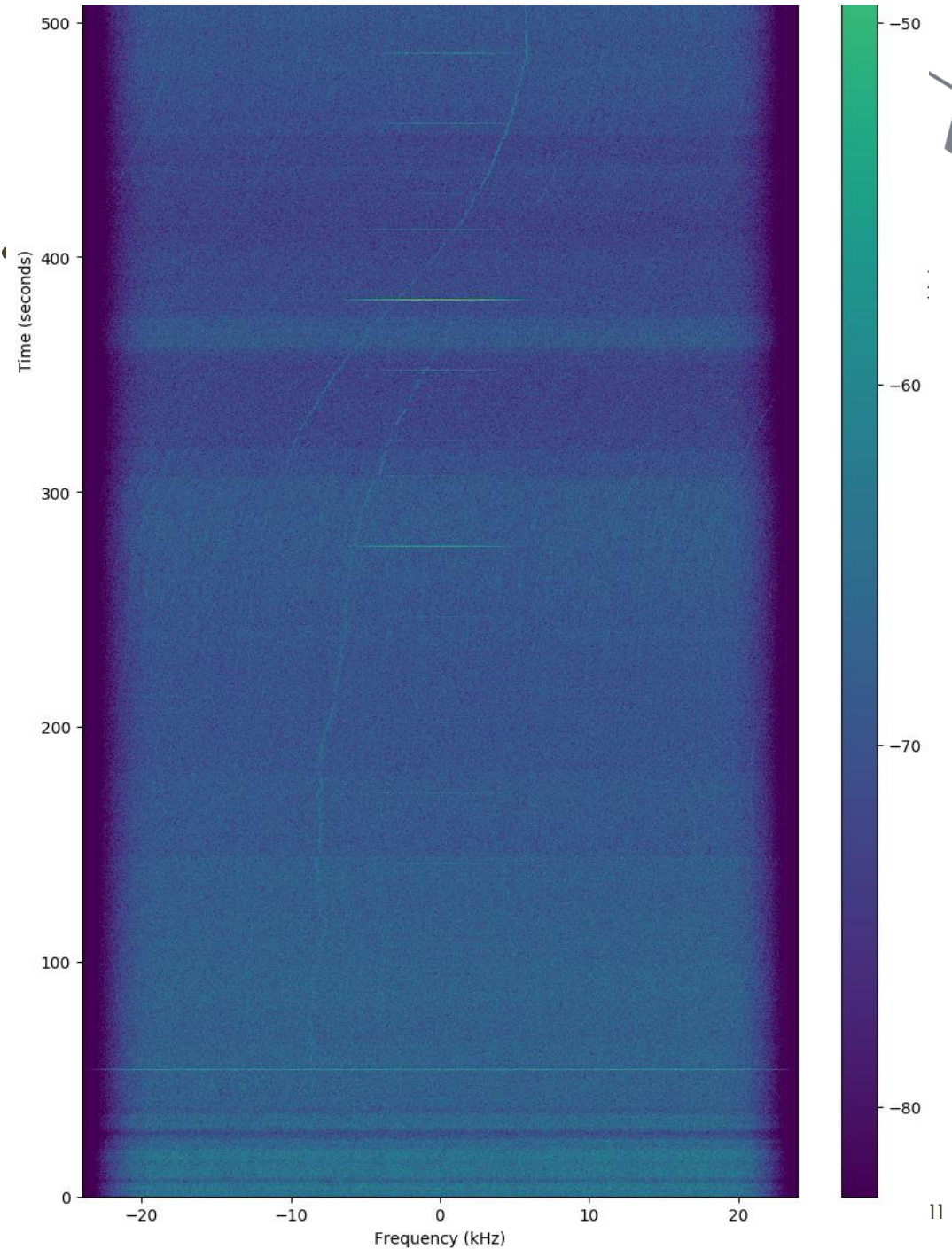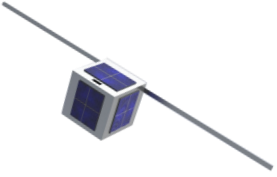
ANTENNA DEPLOYMENT

- Satellite antenna using measuring tape.

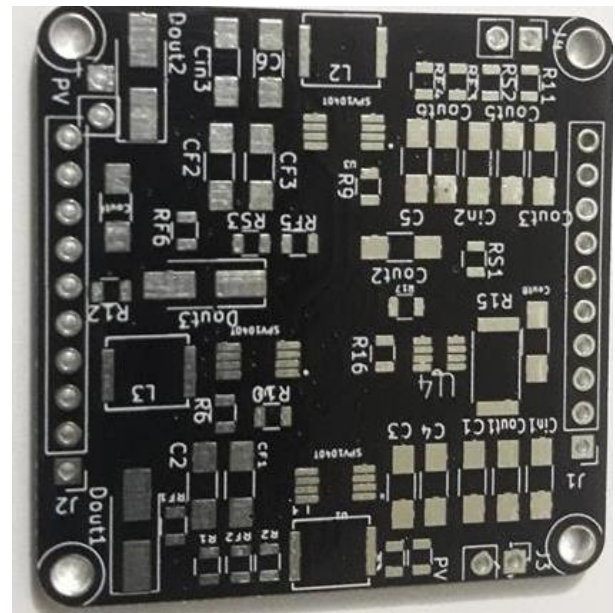- Fishing wire burning mechanism.

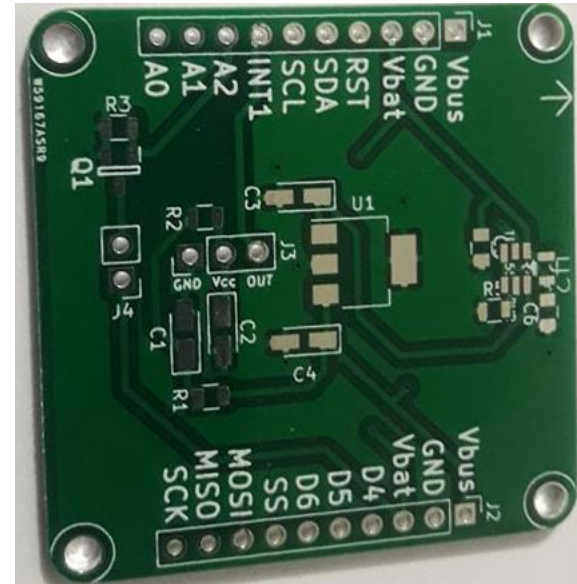- Resistor as a heater.
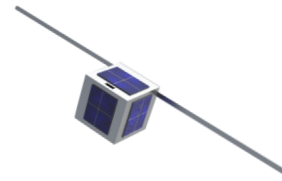
EM V1.0 PCBS

OBC and com- F

OBC and com- B

MPPT

Accessories

FUTURE WORKS

Testing of Engineering Model v1 and improvising.

Improvisation of Software.

Assembling.

Environmental Testing.

THANK YOU