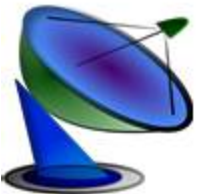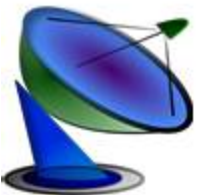# DEVELOPMENT OF TELEMETRY CANSAT IN MONGOLIA

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National University of Mongolia

Presentation outline

- Introduction
- Team management
- Structure of CanSat
  - Data handling Software on Windows OS
  - Communication
 - Power supply
- Conclusion

Introduction

- The first CanSat competition in Mongolia organized 19th May, 2013

- **G-Satellite** team of NUM participated to introduce a new design of nano satellite and build up CanSat of a wide range communicating ground station, which mixed telemetry one with scientific.

- Our CanSat showed all performances and we developed software for CanSat.

- The purpose of software is to be easy to illustrate experiments of our sensors during the flight.
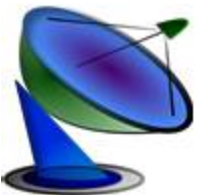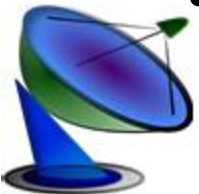
Team management

- G-Satellite team is composed of one teacher and 5 electronic engineering students under the department of Applied Physics of SPE.

- Every member had personal responsibilities.

- Our CanSat horizontal design changed a full of round shaped overlapping design or CanSat to add new sensors and action camera.
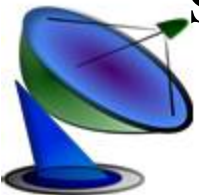
Structure of CanSat
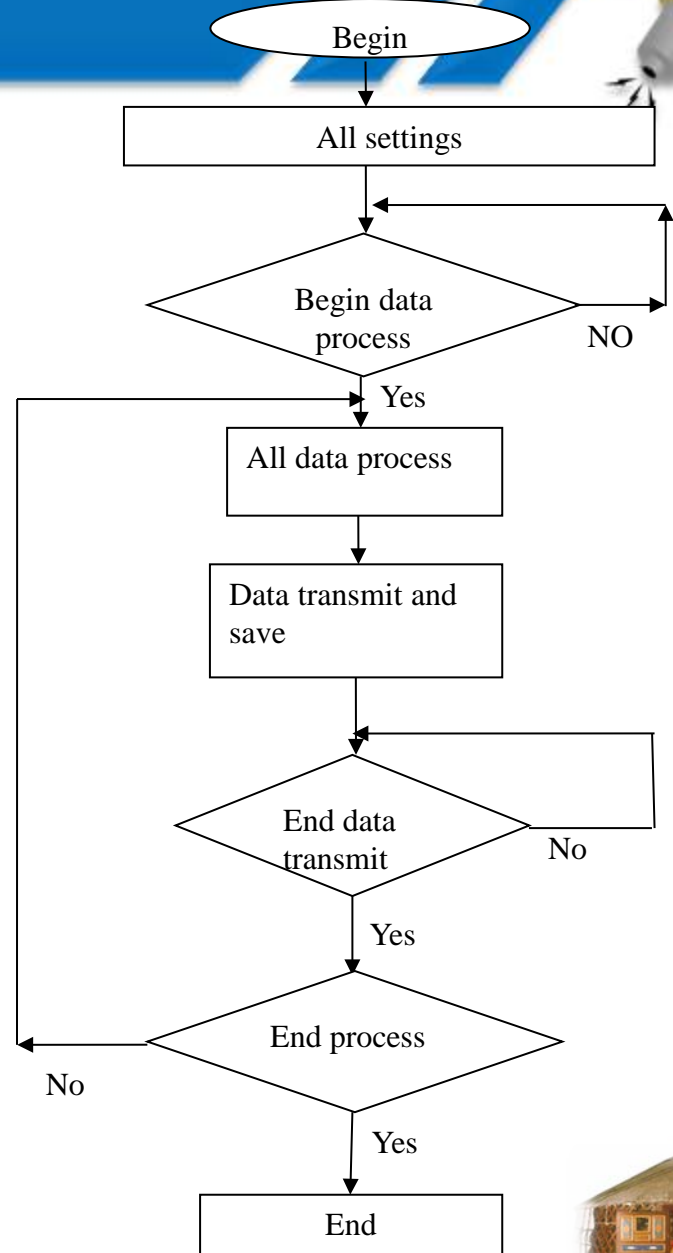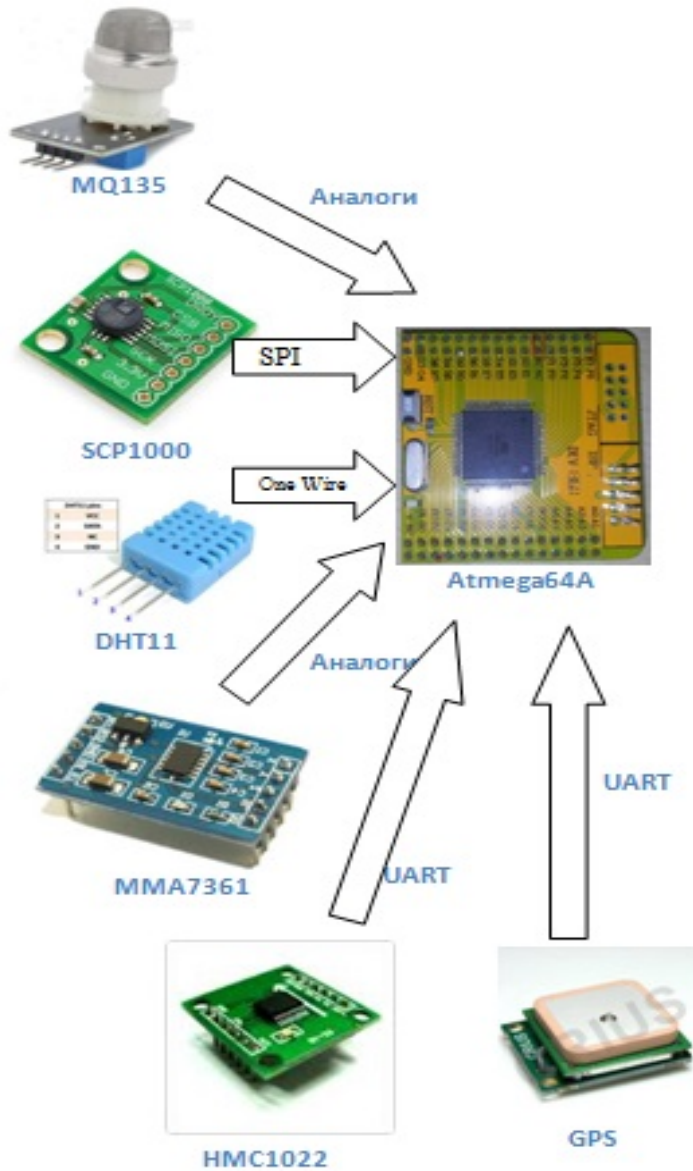
- **Programming (Software)**

  On flight operation, CanSat has to transmit flawlessly its data pack to the ground station in right one second.

- **Electronic circuit (Hardware)**

  The electronic circuit of the centralized one microcontroller (Atmega 64, 8 bit) consists of central controller, the power control, and sensors such as; atmospheric, scientific, and motion etc.
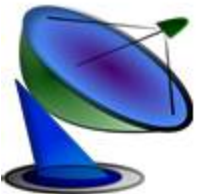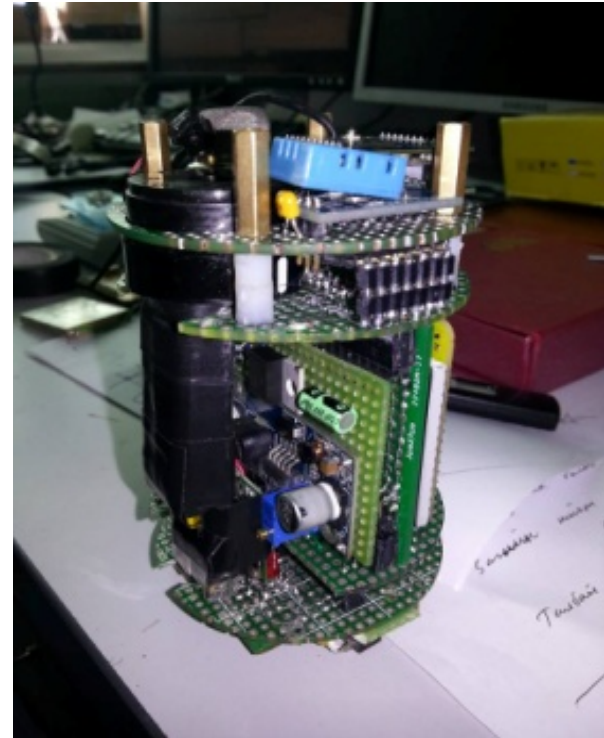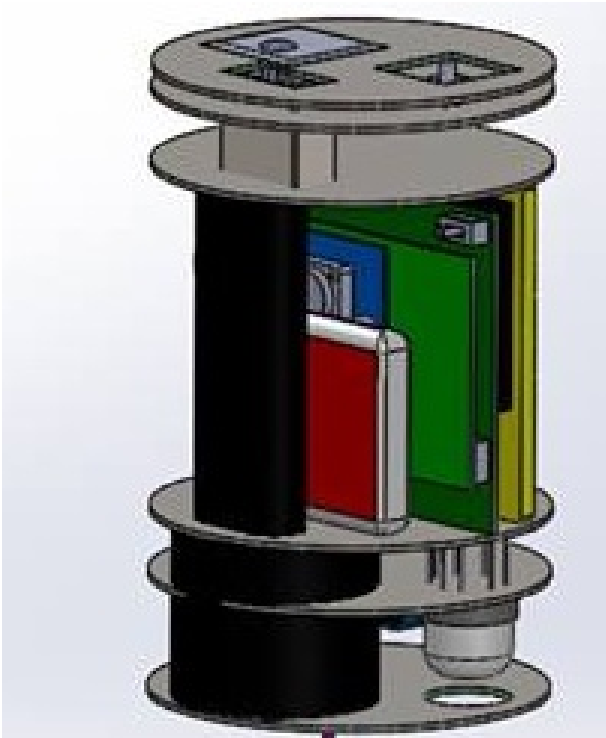
Structure of CanSat

MQ135

Аналоги

SCP1000

SPI

DHT11

One Wire

Аналоги

MMA7361

UART

HMC1022

GPS

UART

Atmega64A

Begin

All settings

Begin data process — NO

Yes

All data process

Data transmit and save

End data transmit — No

Yes

End process — No

Yes

End

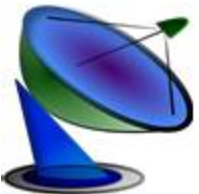# Structure of CanSat

- **Mechanical structure (3D vision and CanSat)**

- **Photo/ Video Subsystem**

  Action camera: This camera has automatic focusing system during any motions. When CanSat with the action camera is in abrupt movement, this camera is focusing automatically and recording in memory SD card. We eliminated waterproof case to install consistently in CanSat.

Structure of CanSat
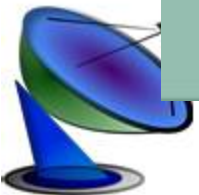
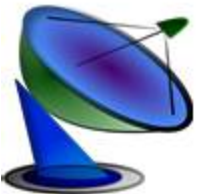**Data handling Software on Windows OS**

Structure of CanSat

Communication

XBEE S3B 902 MHz to 928 MHz, 10 Kbps or 20 Kbps Data Rate, Up to 2000 ft (610 m)

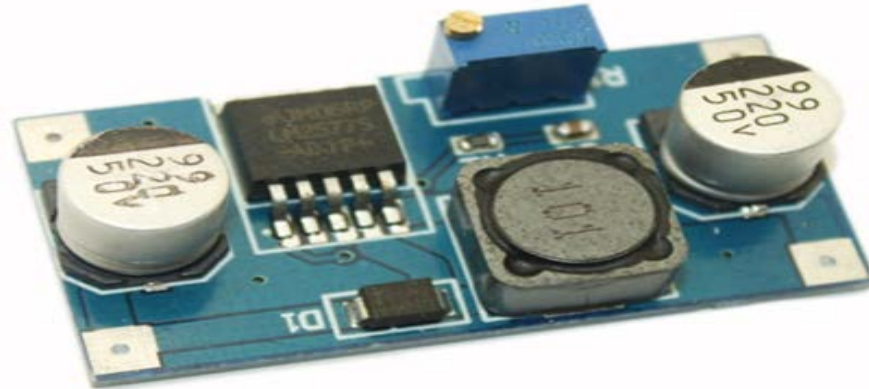Yagi-Uda antenna: 920 MHZ, antenna with 7 elements consisted of driven, director, and reflector
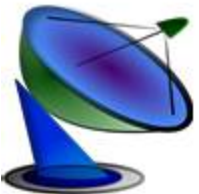
Structure of CanSat

Power supply

- 3,7V Li-ion battery 1800mA
- Boost converter using LM2577 integral circuit. Converts 3.7V to 5V with max 2A
- Adjustable low dropout linear regulator UZ1086. Output of 5V converts to 3.3V.

Data logger

This component is used for storing data as a ".txt" file on the SD card. It was built with an 8 bit Atmega64 microcontroller.
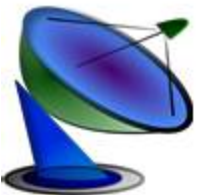
19 May 2013

Conclusion

The first CanSat Competition in Mongolia teaches us teamwork and handling a small space project in short run.

CanSat was a simple project in which students may develop space system specifications.

CanSat project has given us of electronic engineering more chance to learn microcontroller and work with digital sensors than academic subject to study theories.
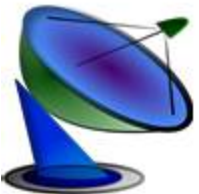
Conclusion

We learned from this competition:

- Sensor and their data processing with dedicated purpose.

- How to reduce measurement error and used digital filter to comply it.

- How to improve data transmisiion and their relation and used it.

- FAT 32 file system and made data saver using SD card.

- Related software using Phyton.

- 3D modelling software using Phyton.

- On Java, developed data handling software, which works for showing table and figure of the test result.

- On LabView, developed data handling software, which works for showing table and figure of the test result.
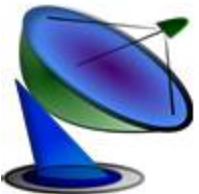
THANKS VERY MUCH FOR

YOUR ATTENTION ☺
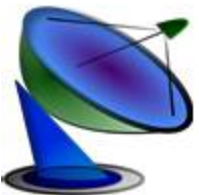
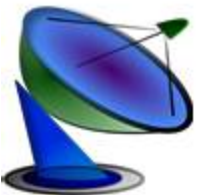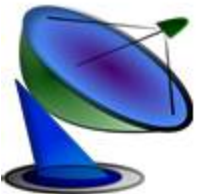Gas sensor MQ135: This module expresses an air pollution rate in unit (per part million).

Air pressure, temperature: SCP1000 using SPI protocol is made for measuring both pressure and temperature.

Temperature and Humidity rate DHT 11
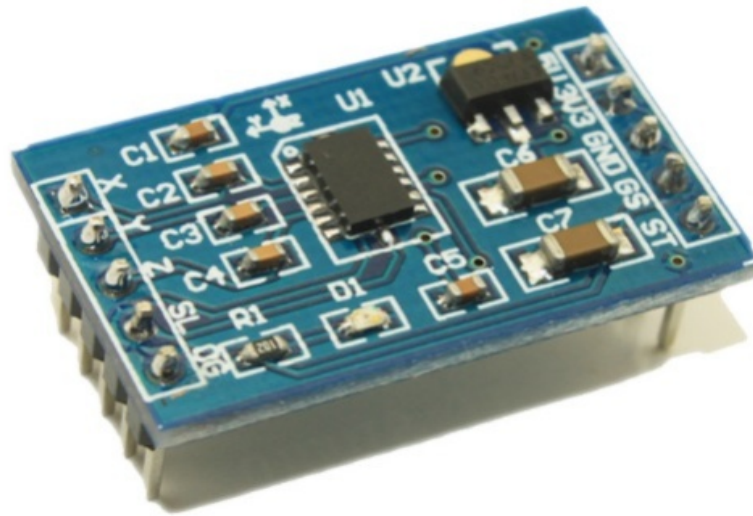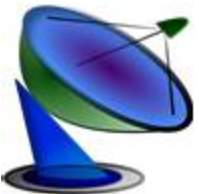
Gyroscope using accelerometer MMA7361

Digital compass using HMC1022

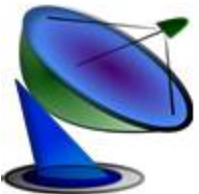GPS - ME2530: Transmitting data with level of RS232 and UART TTL

Atmega64A

Atmega64A