



ARLISS 2010 ~falco~

**Tokyo University of Science Kimura Laboratory
Kakizakai Takehiko**



0. Agenda

1. Member

2. Mission

3. CANSAT

4. Result





1.Member

- **Takehiko Kakizakai(B4)**
PM , C&DH , Power supply
 - **Takayuki Doi(M1)**
Communication
 - **Moe Warasawa(M1)**
Solar cell
 - **Jun Tsukahara(M1)**
Supervisor
 - **Hajime Kasahara(B4)**
Structure
 - **Takehiro Matsunaga(B4)**
Communication
 - **Takumi Murakami(B4)**
Fly back
-



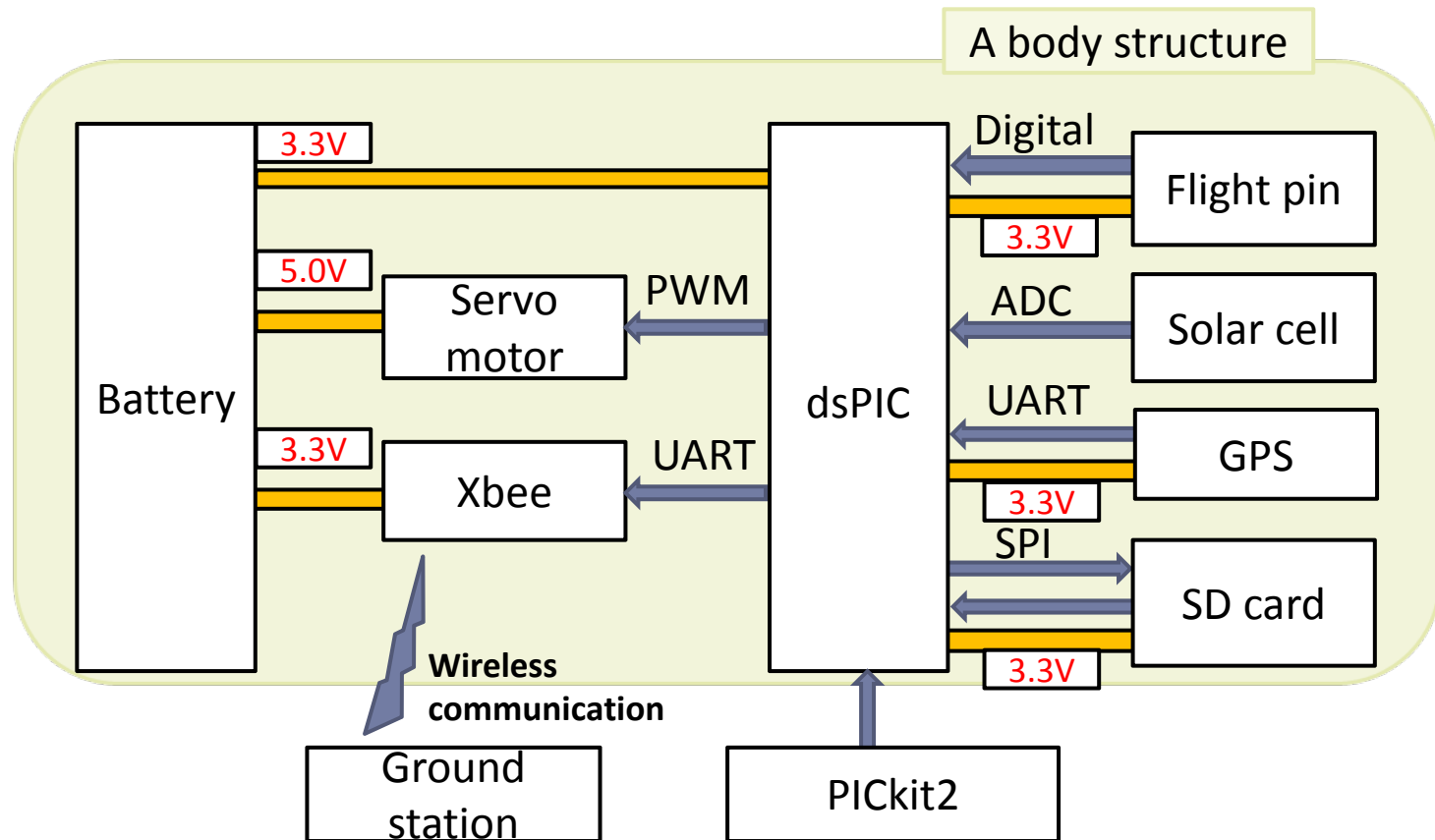
2.MISSION

- Main Mission
Fly Back with the parafoil
- Sub Mission
Measuring electric generation of the solar cell



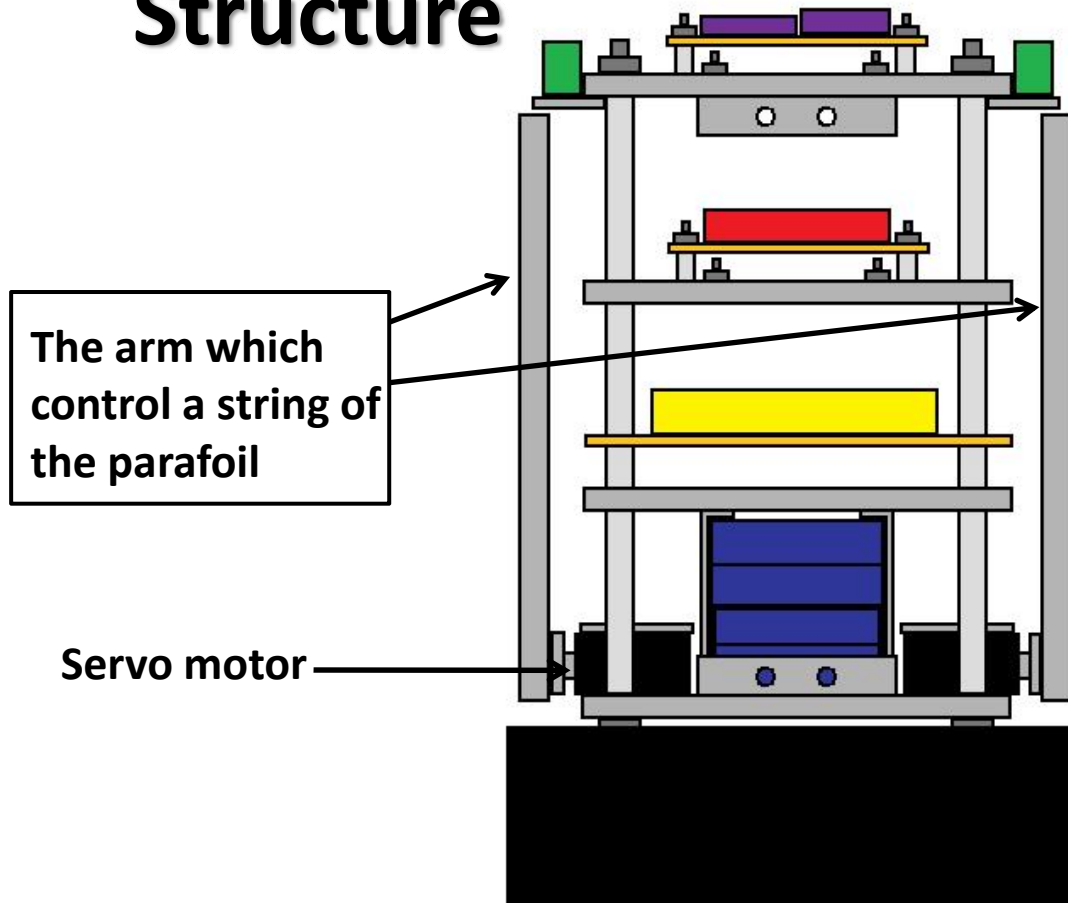
3.CANSAT

SYSTEM



3.CANSAT

Structure



The arm which control a string of the parafoil

Servo motor

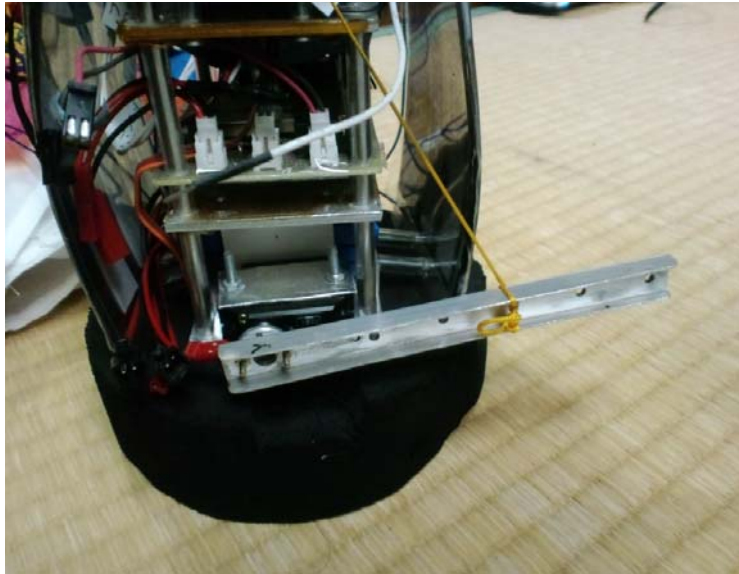
- Weight:921 g
- Communicaion(Xbee),GPS
- Flight pin
- Micro controller,SDcard
- DC-DC converter
- Li-ion battery

A buffer material(Sponge Rubber)



3.CANSAT

Mechanism of Flyback



Spec of motor and parafoil

- Servomotor torque: 5.4kgcm (4.8V)
weight: 28g
Speed: 0.17 seconds /60 degrees (4.8V)
size: 28 × 14 × 29.8mm
- parafoil
weight: 214g
An area: 1.3m²

- It goes down and controls a string of the parafoil by an arm installed to a servomotor of right and left.
- We perform navigation to the target with GPS data.
- The servomotor performs angle control by the duty ratio of the PWM signal.

3.CANSAT

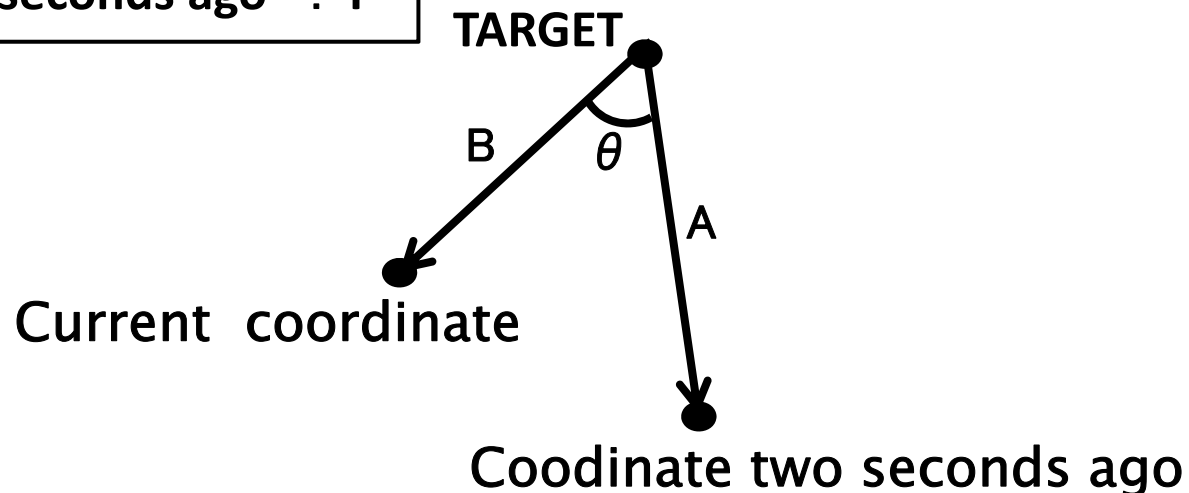
Algorithm of Flyback

GPSdata

The latitude of the target : X_t
 The longitude of the target : Y_t
 Current latitude : X
 Current longitude : Y
 Latitude two seconds ago : X'
 Longitude two seconds ago : Y'

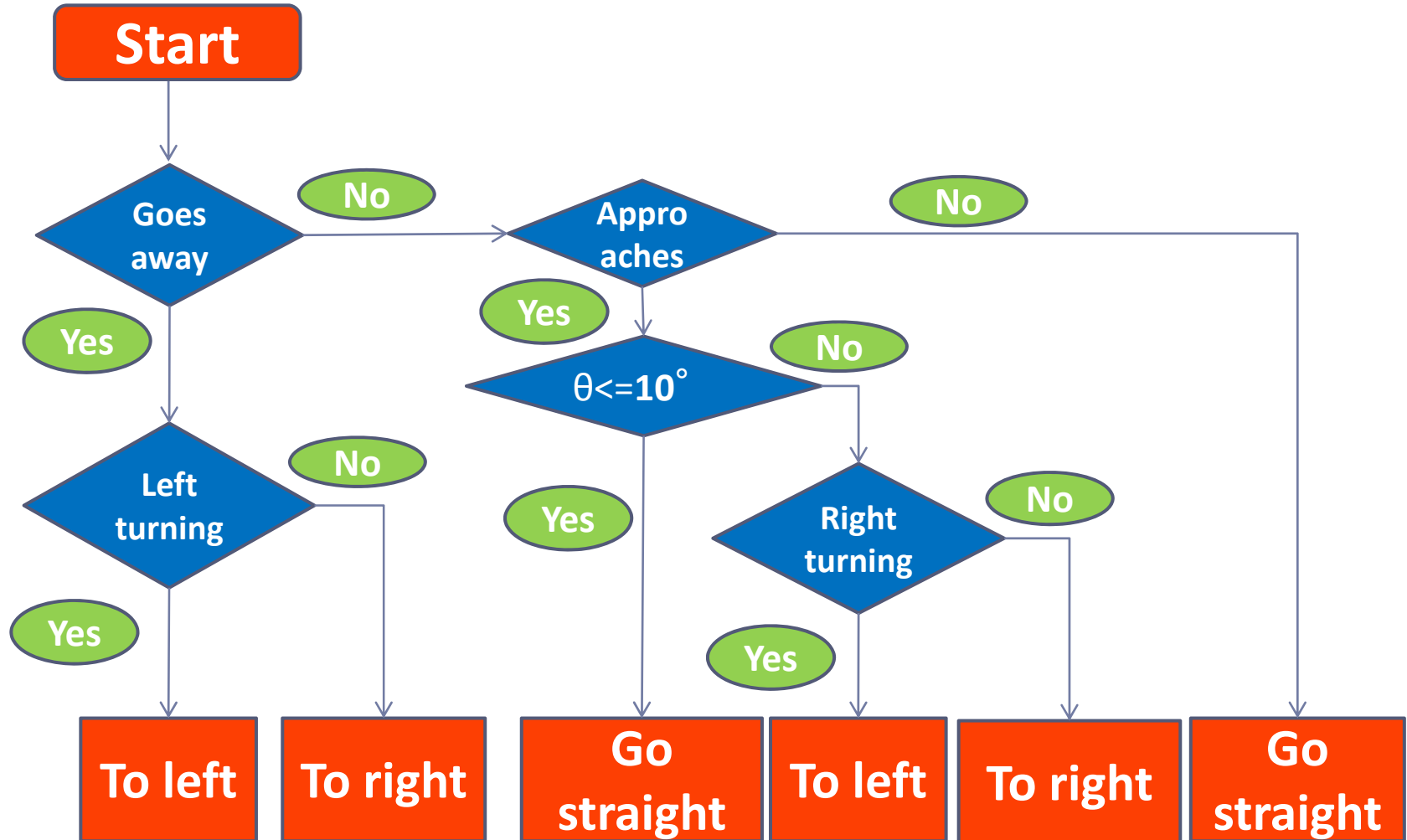
Calculate a vector and a cross product

$$\begin{aligned} A_x &= X' - X_t \\ A_y &= Y' - Y_t \\ B_x &= X - X_t \\ B_y &= Y - Y_t \\ (A \times B)_z &= (A_x * B_y) - (A_y * B_x) \end{aligned}$$



3.CANSAT

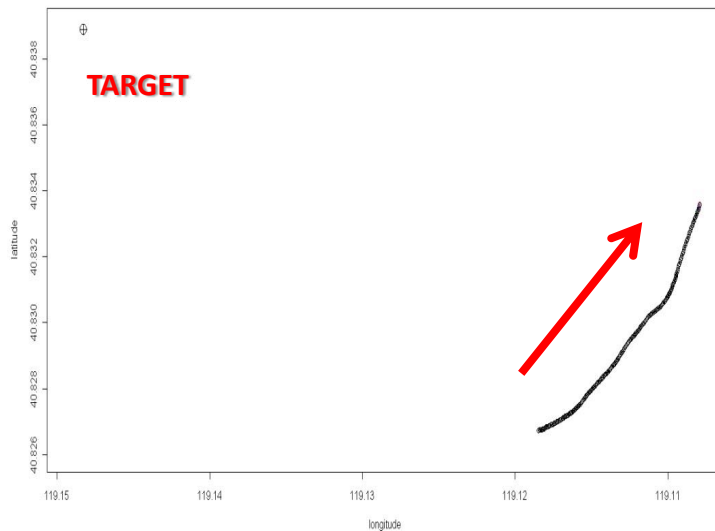
Flowchart



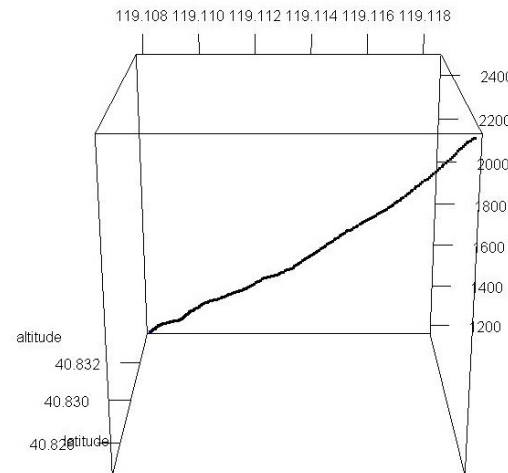
4.Result

1st Fright(3.45km/Control ×)

Neutral/Right/Left



Flight Record (2D)



Flight Record (3D)



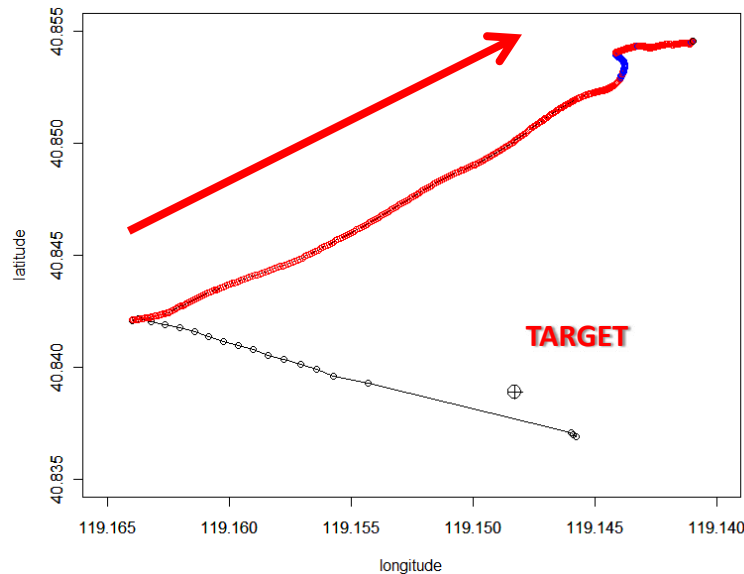
The string of the parafoil got entangled in the antenna.

⇒ CANSAT did not shift to the flight mode.

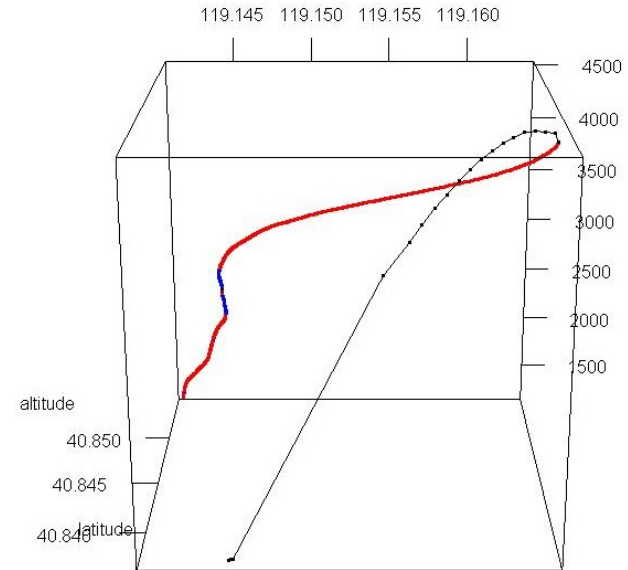
4.Result

2nd Fright(1.85km/Control X)

Neutral/Right/Left



Flight Record (2D)



Flight Record (3D)

The control line at the right of the parafoil cut by the impact of an opening parafoil

⇒CANSAT was not possible to turn right





Thank you !!