

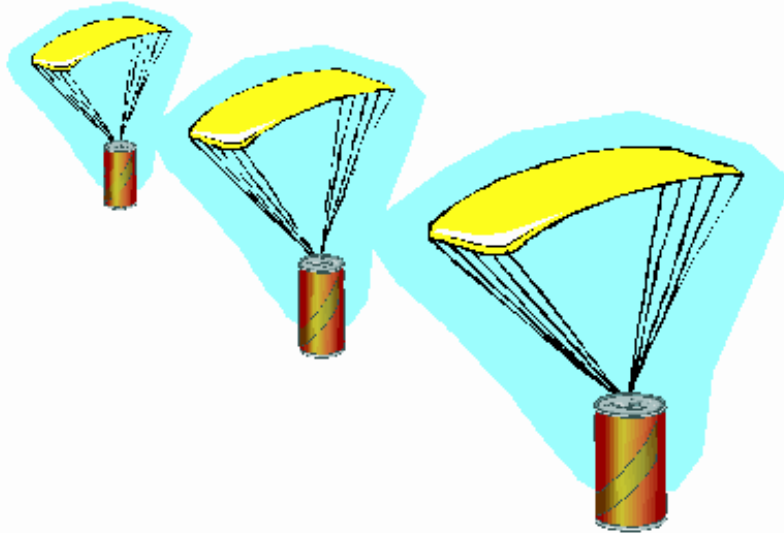
# Come-Back Competition 2008 Summary

*ARLISS 2008*

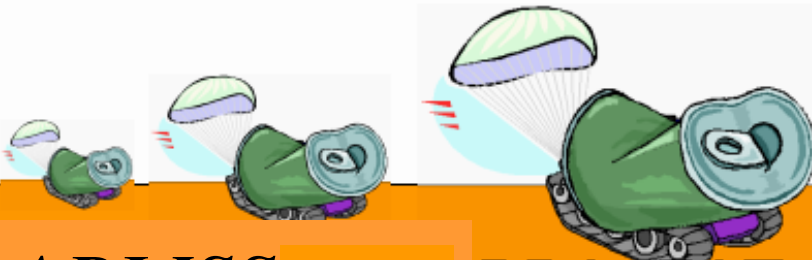
*CanSat Experiment*

*Sept. 16-19 Black Rock, Nevada*

# Competition



**Call Back Your  
CANSAT!!**



**ARLISS**

**PROJECT**



# Competition Overview 2008

- Autonomous come-back with *No Human Interaction*.
- *Evidence of control* should be submitted to be considered for ranking.
- *GPS sensing* is the major navigation source
- “*Parafoil*” or “*Fixed-wing*” flyback type, *Hybrid rover + parafoil type, Rover type* competed
- Excellent result in 2006 as “*6m to the target*” requires a new rule: 20m is a goal and the result less than 20m will be evaluated by the travel speed (the faster, the better)
- *Schlumberger kindly provided large prize money !!*



80 Students aimed for this flag !

# Briefing on Tuesday

- Comeback Competition 2008
- 1 Kyushu Tech Kings
  - 2 Titech Str. Dyna. Lab
  - 3 Univ. Tokyo Ungra.
  - 4 Univ. Tokyo Kim Team
  - 5 Kyushu Univ B
  - 6 Keio Univ
  - 8 Tohoku Univ
  - 10 Tsuyama College
  - 11 Univ. Elec. Comm.
  - 12 Kyushu Univ A
  - 13 Titech Matunaga B

- 14 Kyushu Tech Cho A
- 15 Akita Univ.
- 16 Titech Matunaga A
- 17 Soka Univ C
- 18 Kyushu Tech Cho B
- 20 Nihon Univ.
- 21 Soka Univ. B
- 22 Tsuyama College B

Insert Parachute  
First !!

Each univ. present  
CanSat model

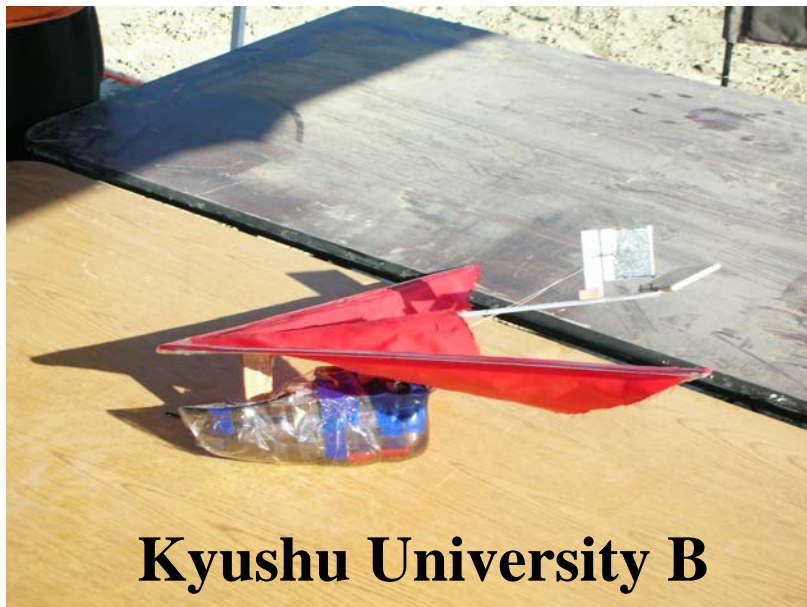
Fly-backers



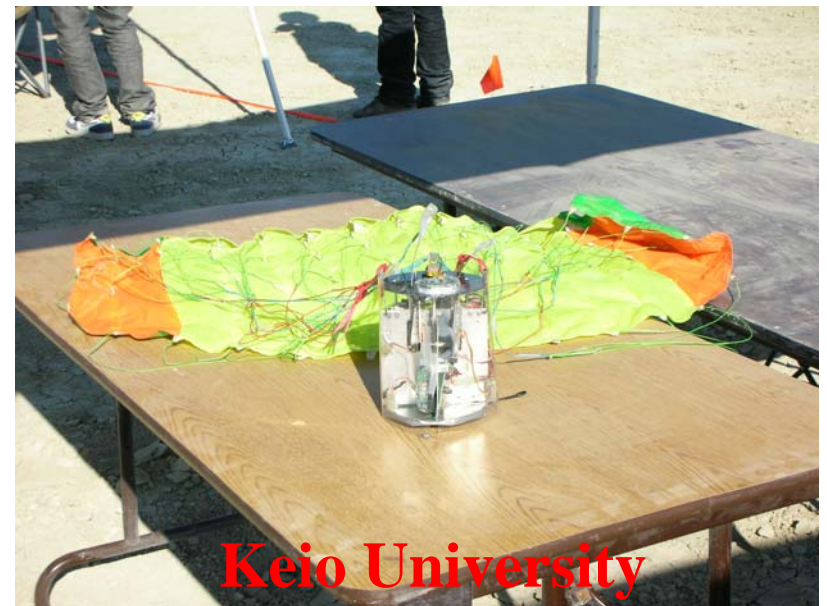
**Kyushu Tech KINGS**



**Titech Str. Dynamic Lab**

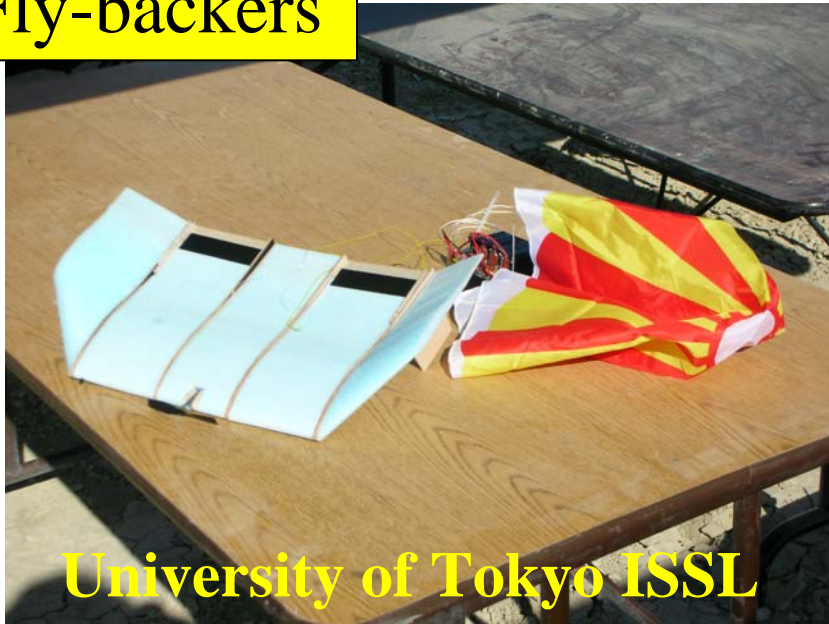


**Kyushu University B**



**Keio University**

Fly-backers



University of Tokyo ISSL



Titech Matunaga Lab B



Kyushu Tech. Cho Lab A

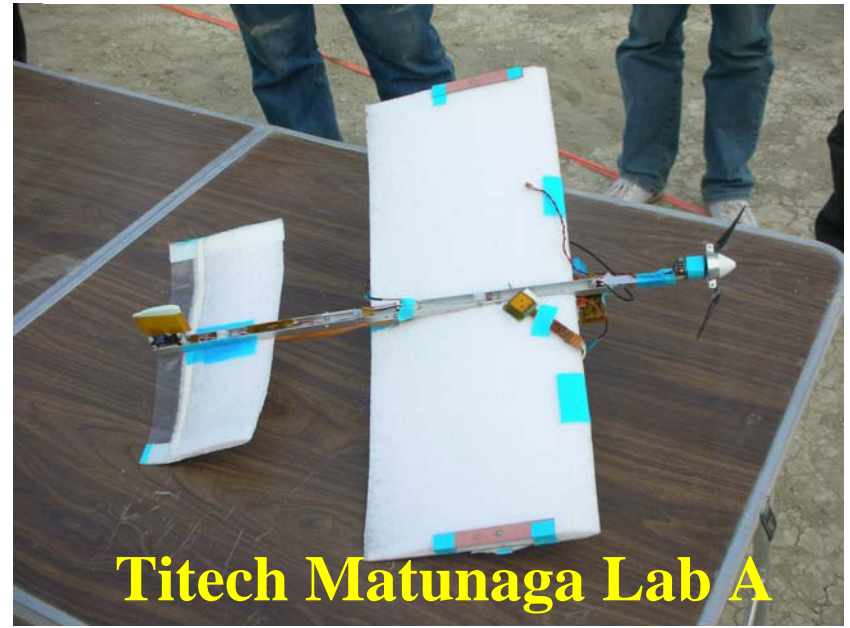


Kyushu Tech. Cho Lab B

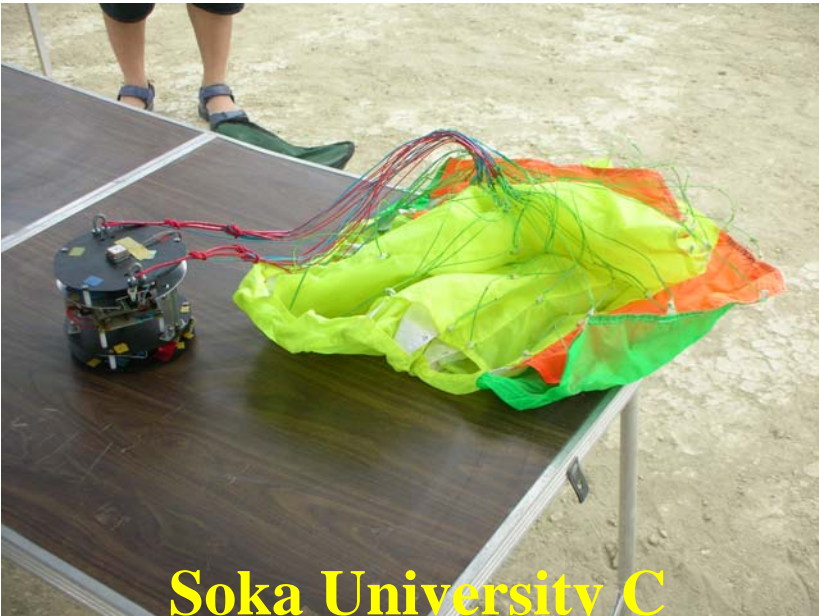
Fly-backers



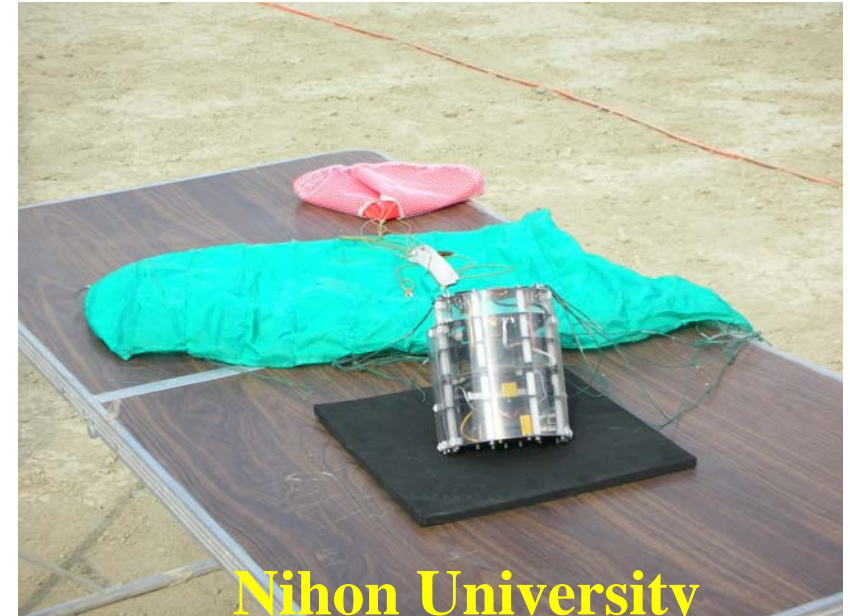
Akita University



Titech Matunaga Lab A



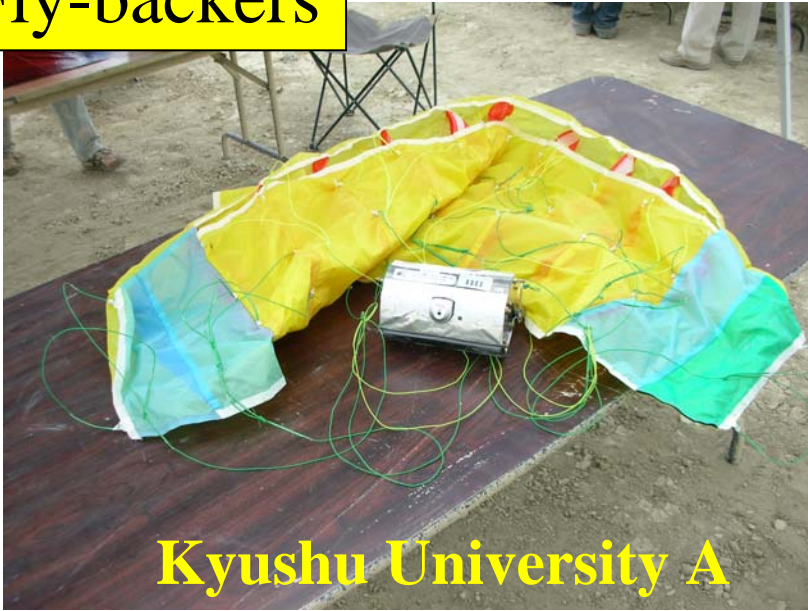
Soka University C



Nihon University



Fly-backers



**Kyushu University A**

Flyback CanSats:	12
Rover CanSats:	6
Hybrid:	1
Non-comeback:	4
Total:	23

Non-comebackers



**Keio High School**

Need photo !

**Soka University C**

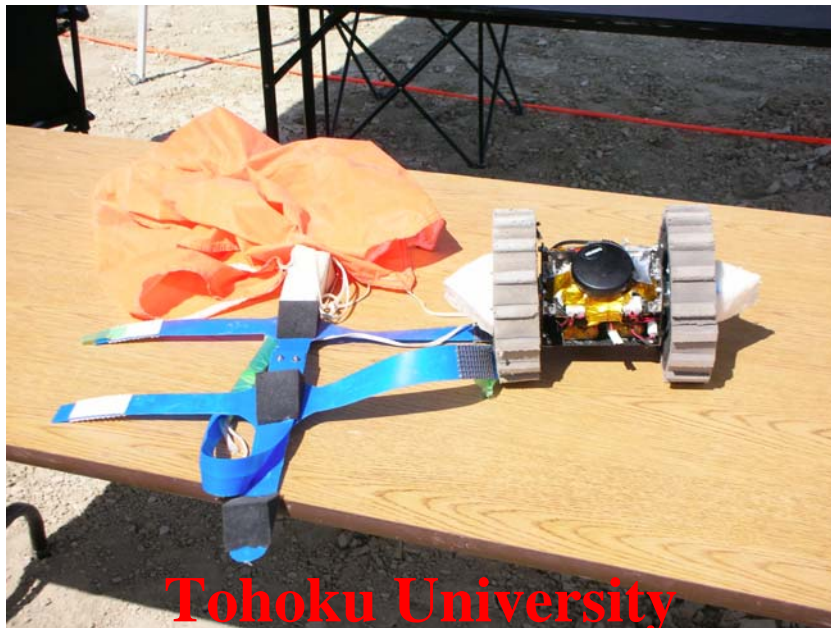
Rovers



University of Tokyo B3



Tsuyama College



Tohoku University



Univ. for Electro Comm.

Rovers



Soka University B



Seoul National Univ.

Flyback CanSats:	12
Rover CanSats:	6
Hybrid:	1
Non-comeback:	4
Total:	23

Soft land, very tough for rovers



Weak wind for three days, good for flyback

# 2008 Comeback Competition Ranking

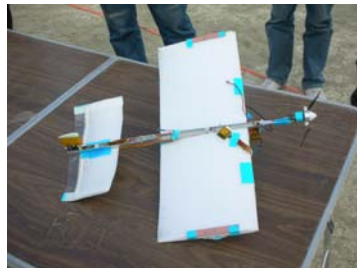
***1<sup>st</sup> Place: Tohoku University (R): 0 m***



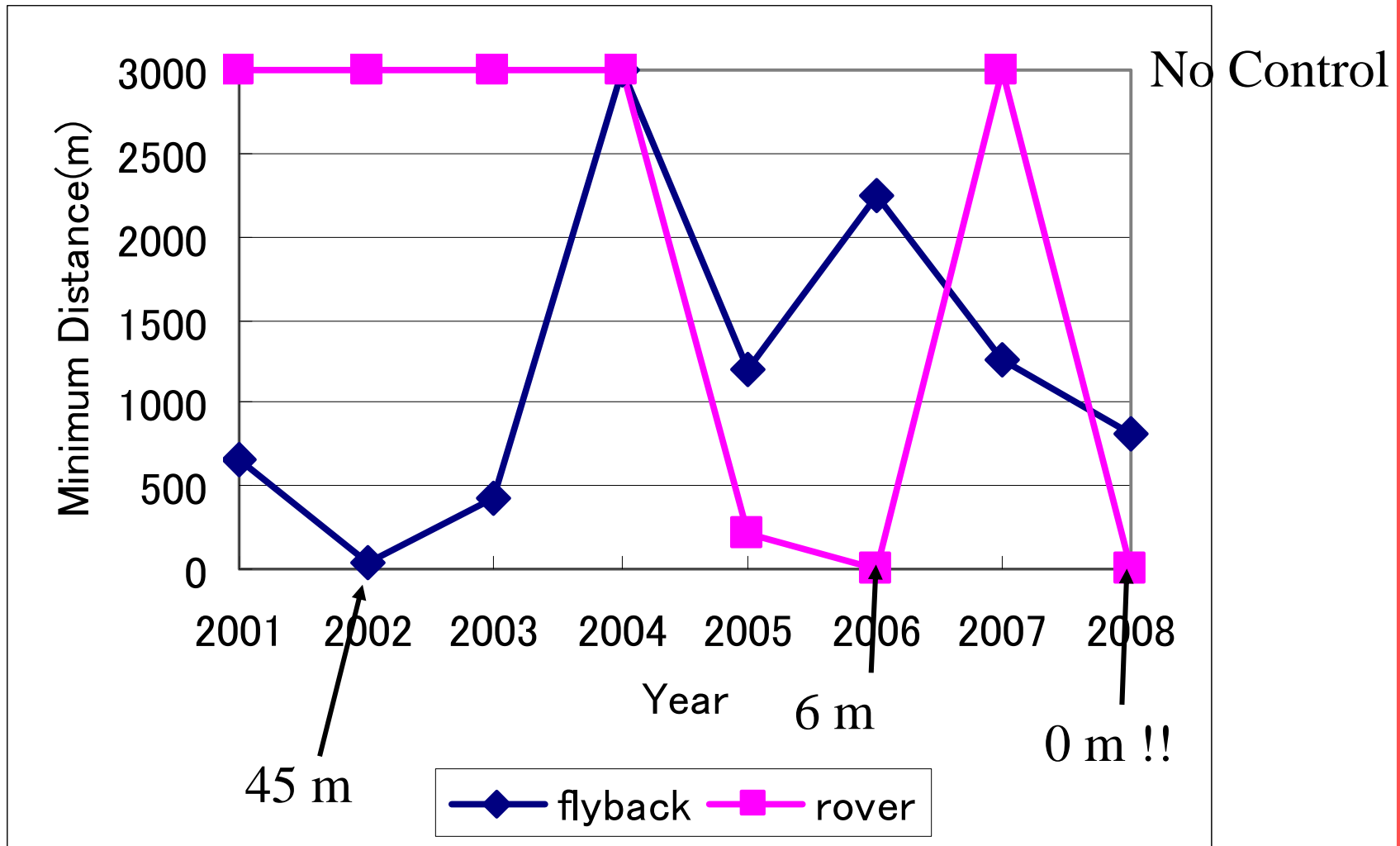
***2<sup>nd</sup> Place: Nihon University (F): 818 m***



***3<sup>rd</sup> Place: Titech Matunaga Lab (F): 903 m***



# History of Flyback vs. Rover



# More Results

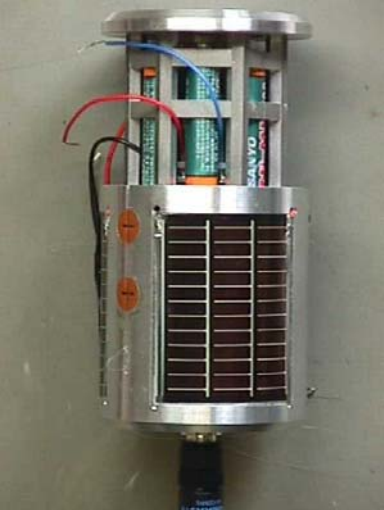
- “Without Control” Competition:
  - 1<sup>st</sup>: Titech Matunaga Lab A on Eric: 163m
  - 2<sup>nd</sup>: Univ. of Tokyo on Jonathan’s rocket: 610 m
  - This is the excellent capability of rocket owner !!
  - Comes into 2<sup>nd</sup> and 3<sup>rd</sup> places of comeback compe.
- “Long Jump” Prize: (should be retrieved)
  - 1<sup>st</sup>: Kyushu Tech Cho A: 10284
  - 2<sup>nd</sup>: Akita Univ.: 7923 m (last year)
- “Diet” Competition (least weight)
  - Kyushu Univ. B: 300 g
  - Titech Matunaga Lab A: 400 g



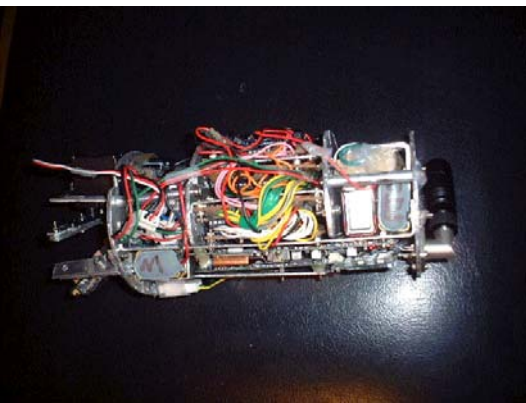
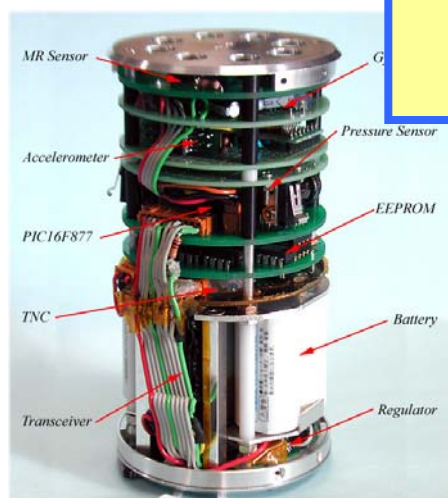
# Discussions

- **Rovers achieved “0 m distance” !**
  - Even though the land condition is tough for rovers
  - Improvement of wheel power, structure, control algorithm
- **Flyback’s result has slightly improved**
  - Parafoil’s design should be low L and low D
  - Wing types are promising in windy condition
- **Some Hints to Achieve Better Performance**
  - More aerodynamic study required about parafoil/wing so that it can fly against the strong wind ( $>10$  m/s)
  - More reliable electronics system (GPS, CPU, noise, etc.)
  - Structure strength (shock by parachute opening & landing)
  - Should first define environmental conditions for design
    - wind speed, parachute opening/landing shock, vibration, etc.





*Training step: CanSat  
1999-2008*



# ARLISS Suborbital Launch Experiment (Annual Event in USA)



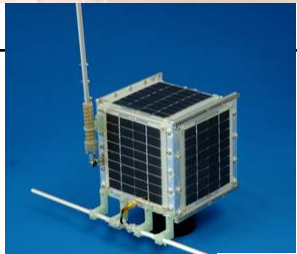

3 hours to decide the name of “ARLISS” in the first meeting at Stanford

- **ARLISS 1999**: Sept. 11 (Japan:2, USA:2)
  - Univ.of Tokyo, Titech, Arizona State, etc.
- **ARLISS 2000**: July 28-29 (Japan:4, USA:3)
- **ARLISS 2001**: August 24-25 (Japan:5, USA:2)
  - 1<sup>st</sup> Come-back competition
- **ARLISS 2002**: August 2-3 (Japan:6, USA:3)
- **ARLISS 2003**: Sept.26-27 (Japan:6, USA:3)
- **ARLISS 2004**: Sept.24-25 (Japan:6, USA:3)
- **ARLISS 2005**: Sept.21-23 (Japan:7, USA:3)
- **ARLISS 2006**: Sept.20-22 (Japan:8 USA:3 Europe:1)
- **ARLISS 2007**: Sept.12-15 (Japan:10 USA:3 Korea:1)
- **ARLISS 2008**: Sept.15-20 (Japan:14 USA:2 Korea:1)



# 7 CubeSats and Nano-Satellites developed and launched by Japanese universities

(r: Russia)

University	Name of Satellite	Year	Launcher	Outlook
University of Tokyo	XI-IV	2003	ROCKOT(r)	
	XI-V	2005	COSMOS(r)	
Tokyo Institute of Technology	CUTE-1	2003	ROCKOT(r)	
	C-1.7+APD	2006	M-V(Japan)	
	C-1.7+APDII	2008	PSLV (India)	
Hokkaido Institute of Technology	HITSAT	2006	M-V(Japan)	
Nihon University	SEEDS	2008	PSLV(India)	

# 6 Universities involved in H-IIA Piggyback Launch in Jan. 2009

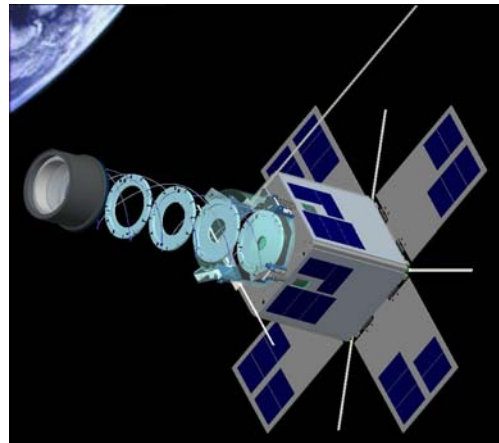
Tohoku Univ.

***SPRITE-SAT***



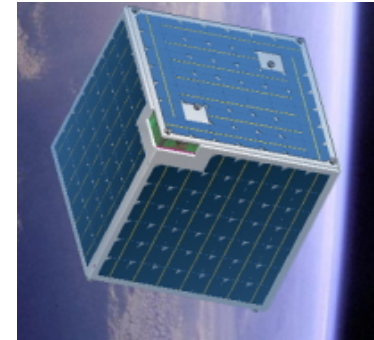
Univ. of Tokyo

***PRISM***



Tokyo Metro.  
College of  
Aeronautics

***KKS-1***

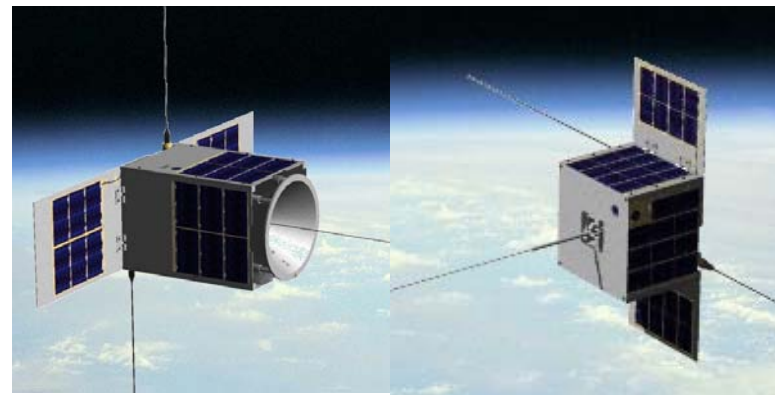


Osaka Prefect. Univ.

***SOHLA-1***

Tokai University

***Kagayaki***



Kagawa Univ. ***STARS***

# “Space Surviving Contest” in UNITEC-1 Flying to Venus in 2010

- Accepted as H-IIA piggyback payload in 2010
  - Each university C&DH system should compete in survival in the harsh space environment
    - Various parts/semi-conductors can be tested at once
  - Experiment of very low rate communication from deep space in collaboration with amateur HAM engineers
  - **World first university-developed “deep space probe”**

