



CLTP6

Cansat Leader Training Program 6

Program Reports

Reported by ...
Shuntaro SUDA
M1, Hokkaido Univ.

2015/12/06

SELF-INTRODUCTION (自己紹介)

Name

Shuntaro SUDA

Affiliation

Master 1st student

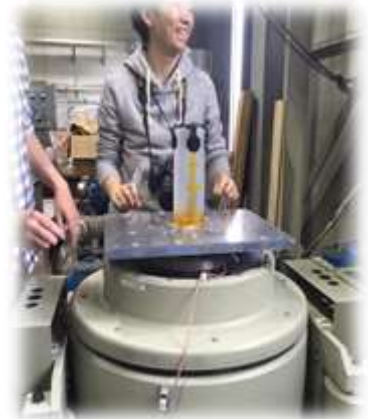
Department of Space and Engineering

Graduate school of Engineering

Hokkaido University

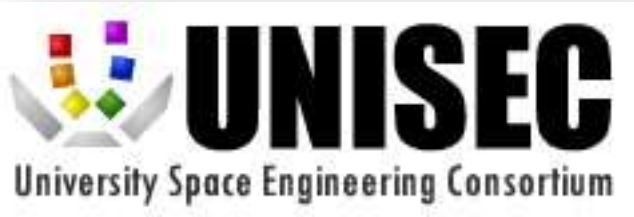
My JOBS in CLTP6

- TA of Hands-on training
- Cameraman
- Bus-tour coordinator



CONTENTS

- Self-Introduction
- **Overview of CLTP6**
- ★ Short movie of CLTP6
- Feedback from CLTP6
- CLTP7

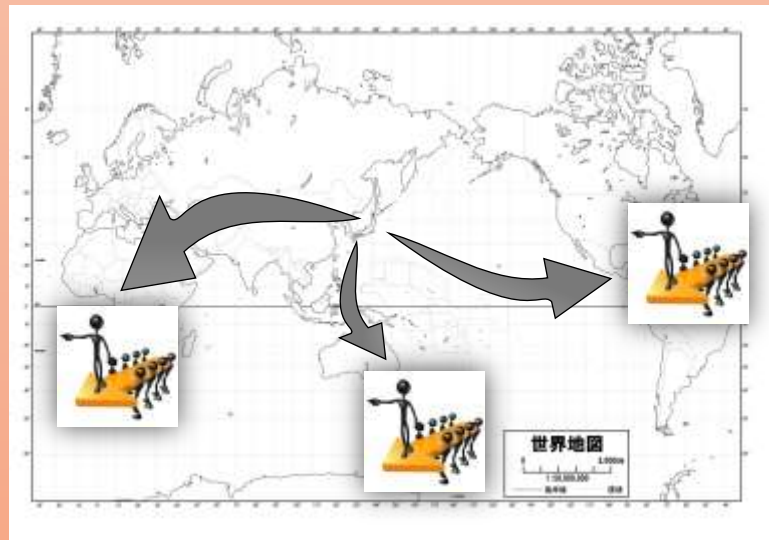
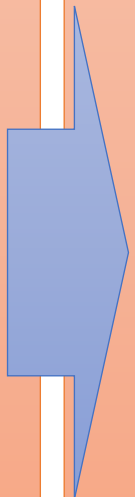


Cansat Leader Training Program

Hands-on Training in CLTP



Home countries



Learn Space engineering education methods

Be leaders of space technology development !

THE PURPOSE OF CLTP (CLTPの目的)

Popularize the Japanese method of space education worldwide

➡ Share foundation for the development of human resources

➡ Create markets fitted for Japanese space development

THE HISTORY OF CLTP (CLTPの軌跡)

CLTP1

(Feb-Mar,2011)



12 participants
10 countries

CLTP2

(Nov-Dec,2011)



10 participants
10 countries

CLTP3

(Jul-Aug,2012)



10 participants
9 countries

CLTP4

(Jul-Aug,2013)



9 participants
6 countries

CLTP5

(Sept 8-19,2014)



7 participants
5 countries

CLTP6



8 PARTICIPANTS OF CLTP6 (CLTP6の参加者)

Tunisia



Omar Ben Bahri
PhD student
University of Monastir

UN (Austria)



Werner Balogh
Program Officer Basic Space
Science and Technology
UNOOSA

Turkey



Omer Soykasap
Professor of Material
Science and Engineering
Afyon Kocatepe University

Mexico



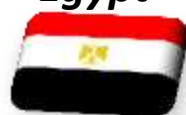
Angel Colin
Professor of
Universidad Autónoma de
Nuevo León – Facultad de
Ciencias Físico Matemáticas

Angola



Ivandro Rodrigues
Researcher
Head of the Department in
Electrical Engineering Angolan
Methodist University

Egypt



Alaaeldin Hassan
Researcher
National Authority for
Remote Sensing and Space
Science (NARSS)

Australia



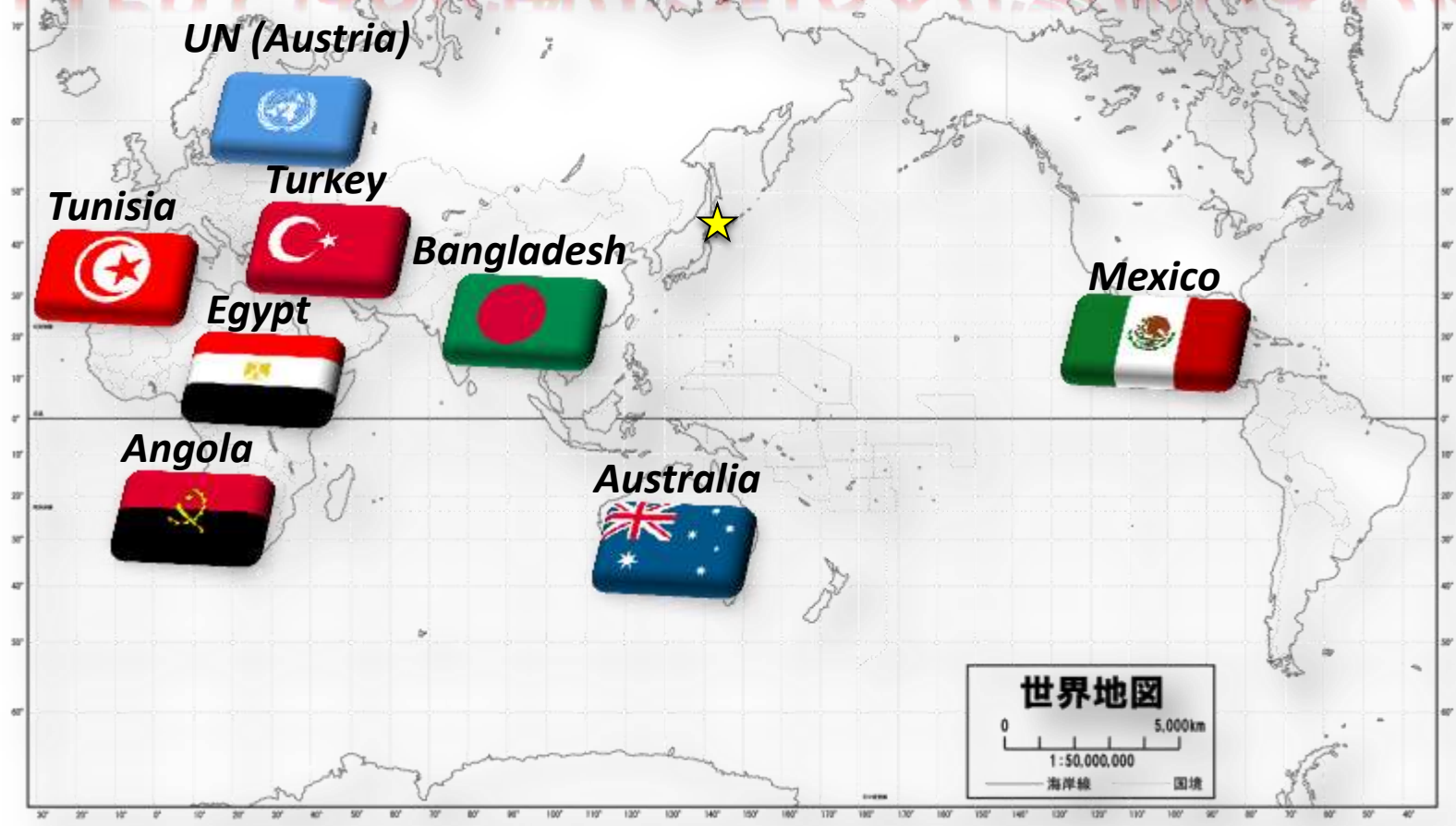
Jim Hefkey
External Professional
Teaching fellow
University of Auckland

Bangladesh



Raihana Shams Antara
Student
BAC University, Bangladesh

THE PARTICIPANTS CAME FROM 8 COUNTRIES ! (CLTP6では8か国から計8人が参加しました！)



PURPOSES OF THE PARTICIPATION IN CLTP6 (参加者の声：CLTP6に参加する目的とは?)

To establish Cansat and Small Sat education and competition throughout New Zealand. (teacher, Australia)
(ニュージーランドで缶サットや小型衛星教育を根付かせ、競技会を開催したい。)

To conduct research and educational projects for undergraduate and postgraduate students that can contribute to new developments on space technology. (Professor, Mexico)
(新たな宇宙技術開発に貢献できる学部生や大学院生の育成プロジェクトを実施する。)

To teach my laboratory students and make Cansat training courses in Tunisia. (PhD student, Tunisia)
(研究室の学生を教育し、チュニジアで缶サットトレーニングを実施したい。)

To become a qualified teacher and leader of Cansat training by having completed CLTP6. (Professor, Turkey)
(CLTP6を完遂することで、缶サットトレーニングの洗練されたリーダーになる。)

To get the material and technical project to pass this knowledge for university students to be ready for larger satellite projects in the future. (Researcher, Egypt)
(将来のより大きな衛星のプロジェクトに備えるために、CLTP6で得られた知恵を大学生に伝えるための教材や技術を得る。)

To introduce Cansat concept to the students in the Universities, and help GGPEM by assisting them in teaching Cansat in Angola. (Researcher, Angola)
(大学の学生たちに缶サットのコンセプトを紹介し、アンゴラの宇宙開発部で缶サットを教えることで貢献したい。)

To know about small satellite building to launch process and how it works in space and to spread my knowledge about space science among students of Bangladesh. (Student, Bangladesh)
(小型衛星の打ち上げプロセスと宇宙空間でどう機能するかを学ぶと同時に、宇宙科学の知識を広げたい。)

TEACHER AND TA IN CLTP6

In front of the faculty of Engineering in Hokkaido University

Teacher : 1 person
TA : 6 people



Sangkyun
Kim

Shuntaro
SUDA

**Prof. Tsuyoshi
Totani**

Akihito
OGATA

Delburg
MITHCHAO

Tomohiro
Takanashi

Rei
Kawashima

Masahiro
Mori

THE SCHEDULE OF CLTP6 (CLTP6本番の流れ)

Arrival at Sapporo



CLTP6 starts!

Aug.23 Day1

- ✓ Orientation
- ✓ Self-Introduction
- ✓ Hands-on Training



Aug.24 Day2

- ✓ Hands-on Training



Aug.25 Day3

- ✓ Hands-on Training




Aug.26 Day4

- ✓ Functional test
- ✓ Parachute test



Aug.27 Day5

- ✓ Thermal Test
- ✓ Vibration Test



Manufacturing Cansat, Mechanical Tests, Programing

Aug.28 Day6

- ✓ USBboard Training
- Additional Sensors
- Programming



Aug.29 Day7

Sapporo tour



Aug.31 Day8


Move to Akabira

- ✓ Paper rocket Manufacturing



Sep.1 Day9

- ✓ Launch test



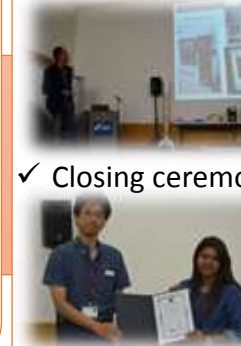
Sep.2 Day10

- ✓ Launch test



Sep.3 Day11

- ✓ Final presentation
- ✓ Closing ceremony



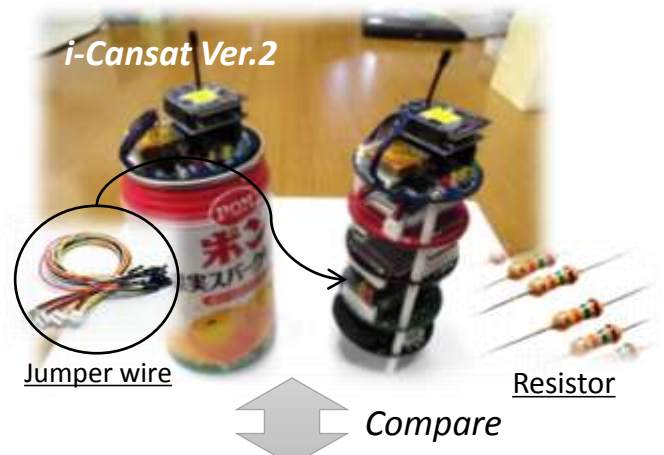
CLTP6 finishes!

Manufacturing Paper rocket, Launching Cansat, closing ceremony

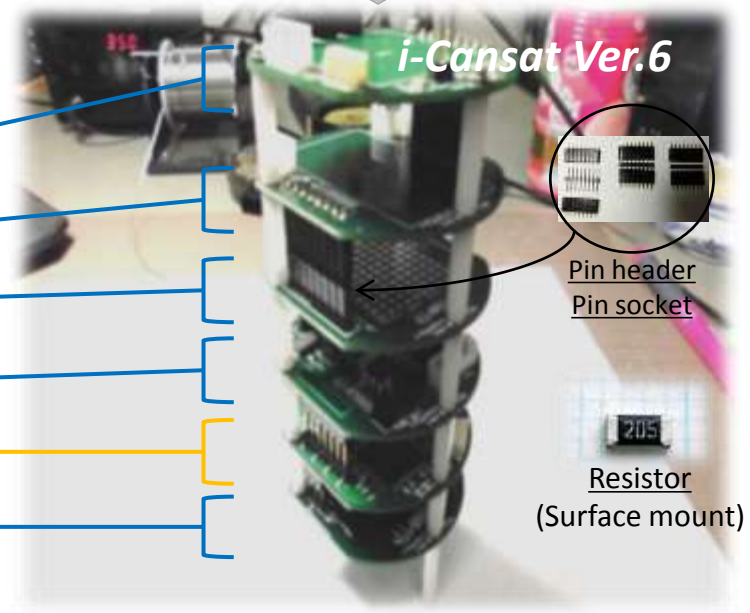
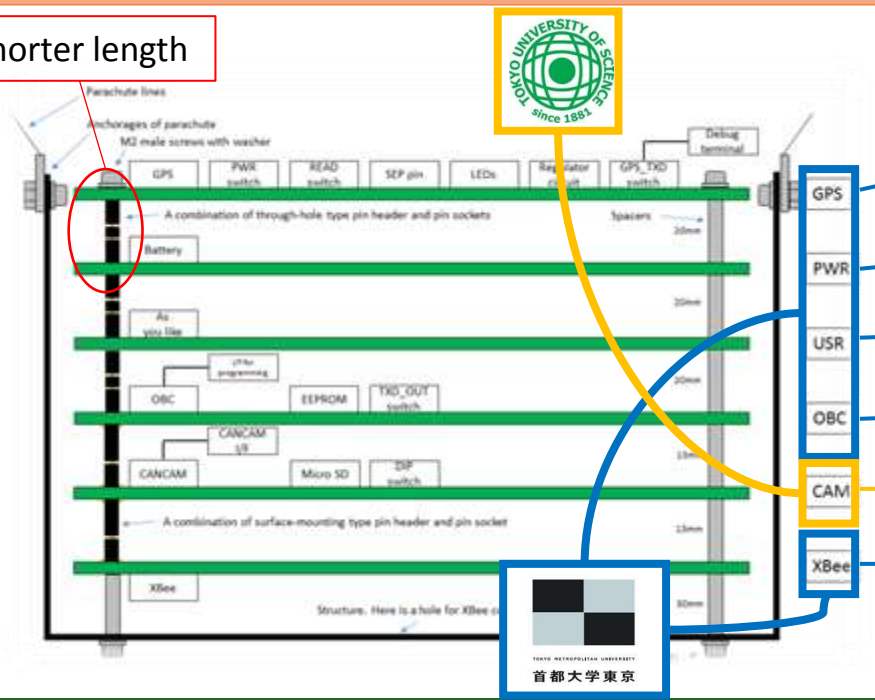
I-CANSAT VER.6



- Improved for the **simpler assembly**
- Consisted of **6 circular boards**:
 - **GPS, PWR, USR, OBC, CAM, and Xbee**
- **CANCAM Ver.2** was adopted



Shorter length



FUNCTIONAL TEST (GPS通信・カメラ動作試験)

- We checked GPS data acquisition through Xbee.



- We checked that camera on CAM board worked well.



PARACHUTE DROP TEST (パラシュート落下試験)

- Materials:
Trash bag Parachute, Kite string
- Shape:
Hexagon (Vertex distance: 30mm)
- Number: 3

Metal parts

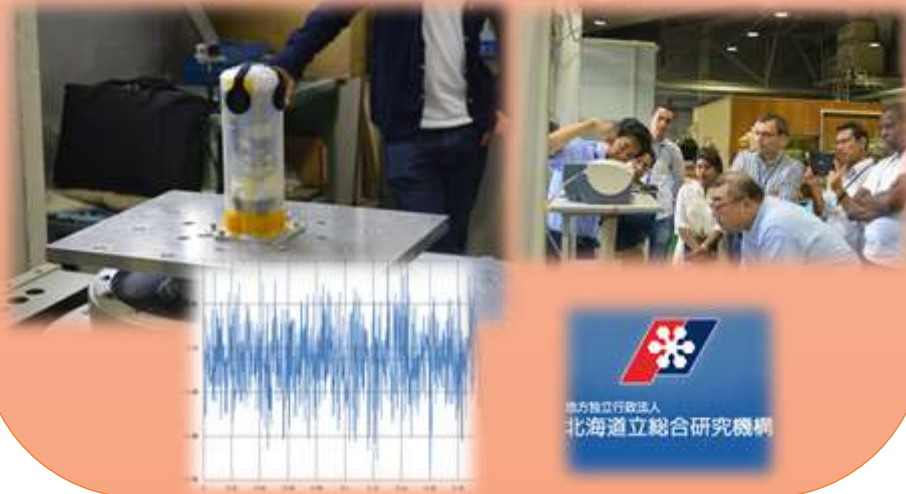


Parachute drop test



VIBRATION AND SHOCK TEST (振動・衝撃試験)

- *Random and shock loads were added to i-Cansat along the longitudinal direction in series.*
- ✓ All i-Cansat of the participants survived.



THERMAL CYCLE TEST (熱サイクル試験)

- *Thermal cycle: 0 – 40 °C*
- *Test time: 112 min*
- ✓ GPS communication stopped after 1 hours had passed due to the dead battery.



ADDITIONAL SENSORS MOUNTED ON USER BOARD

(USR基板実装のセンサー類: はんだ付けとプログラミング)

Adding sensors on USER board

Programming (Software installation)

1. Three Axis Accelerometer
2. Gyro sensor
3. Temperature Sensor
4. Pressure sensor
5. Humidity Sensor *

- *We debugged and programmed by using Pic-kit3 .*

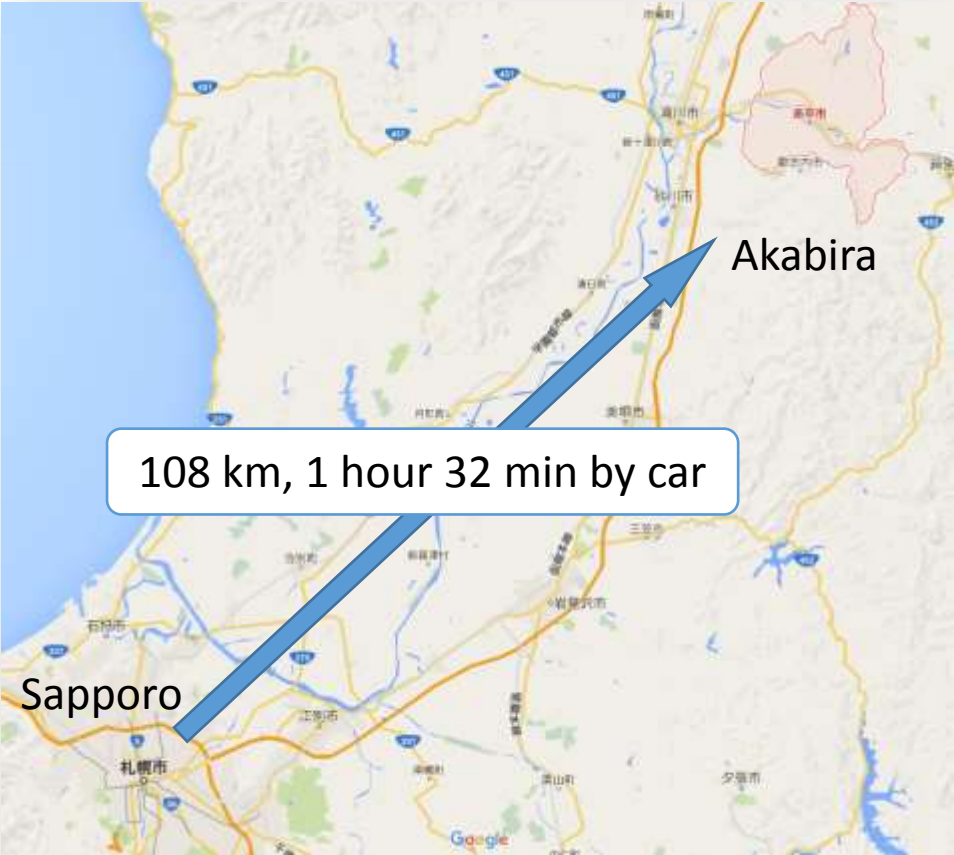


Day 7

HALF-DAY BUS TOUR IN SAPPORO CITY (札幌観光)



MOVING TO UEMATSU ELECTRIC CO...LTD (植松電機株式会社, 赤平市)

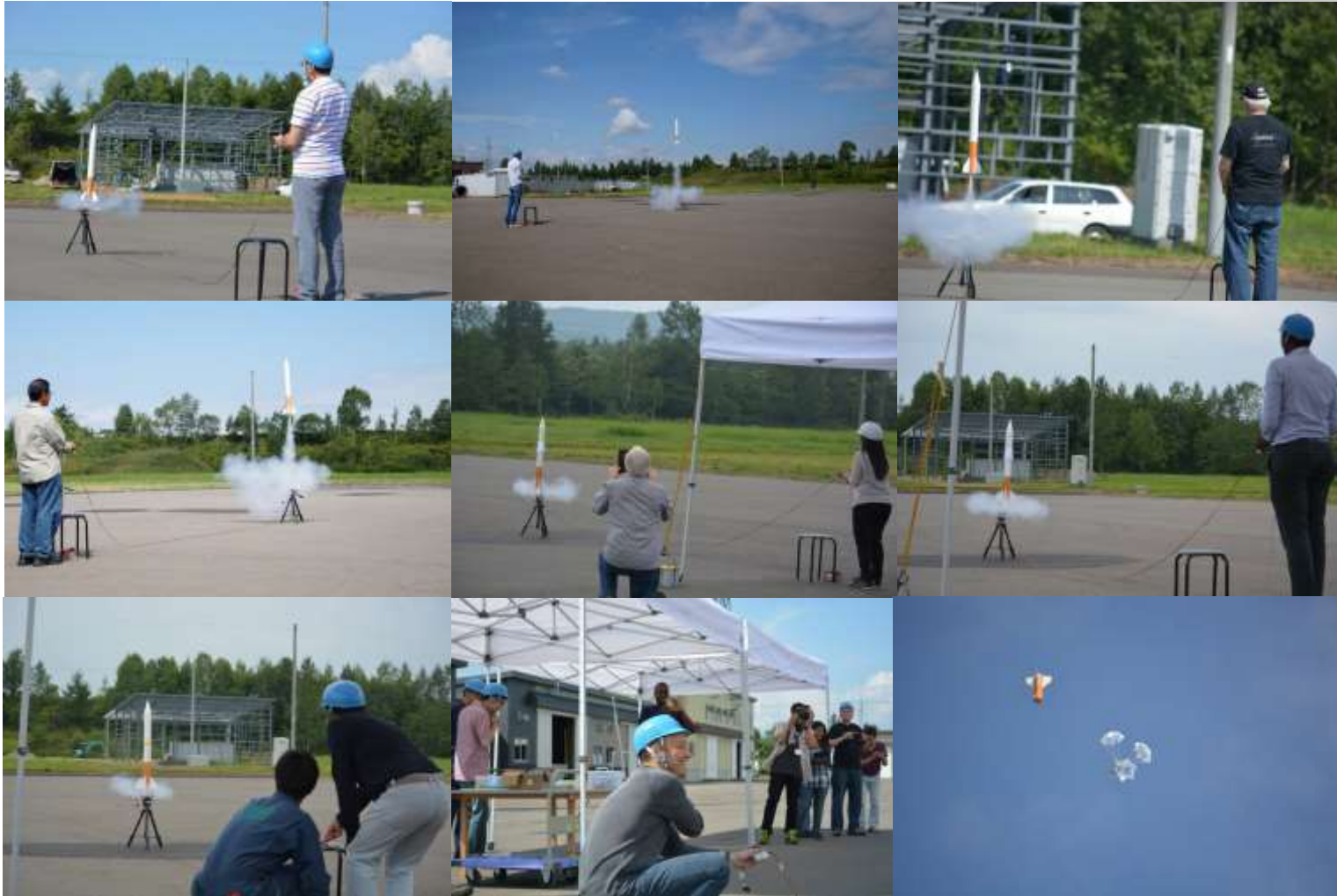


MANUFACTURING PAPER ROCKET

We made our own paper craft rockets in the workroom at Uematsu Electric Co.,...Ltd.



LAUNCH !



LAUNCH VIDEO



PHOTOS FROM THE SKY (空撮静止画像)

We could get 5 – 7 beautiful photos in the sky for each rocket launch.



LAUNCH RESULTS REPORTED BY THE PARTICIPANTS

(参加者がセンサーにより取得したデータ一覧)

GPS Tracking data



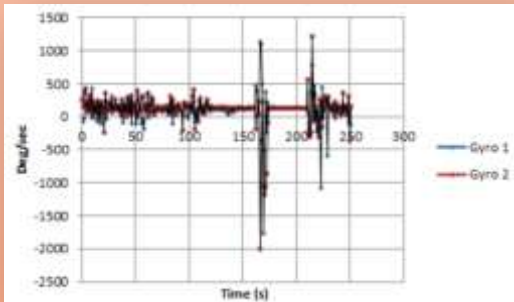
(Student, Bangladesh)

Accelerometer



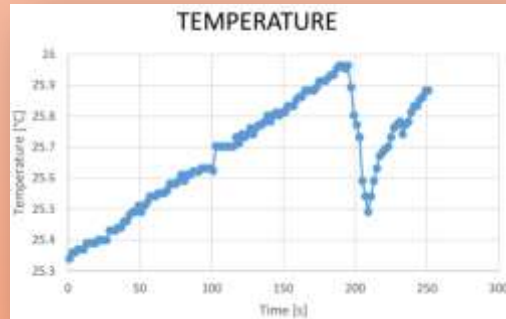
(Teacher, Australia)

Gyro sensor



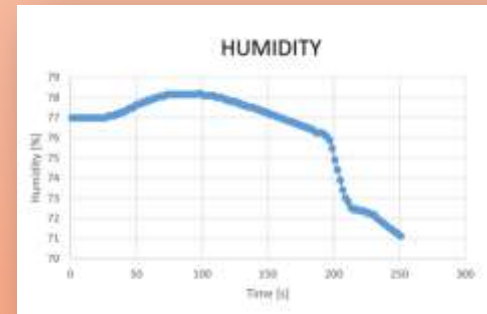
(Professor, Turkey)

Temperature sensor



(Professor, Mexico)

Humidity sensor



(Professor, Mexico)

GPS ◎

Accelerometer ○

Gyro sensor ○

Temperature sensor ○

Humidity sensor ○

Pressure sensor ×

FINAL PRESENTATION (最終発表)

- *Participants made their final presentation.*



AWARD CEREMONY (授賞式)

- *Certificates were given to all participants and people who were engaged in this program.*



SPEECH IN CLOSING CEREMONY (閉会の言葉)



Rei Kawashima



Tsuyoshi Totani



Harunori Nagata



Tetsuya Iwasaki

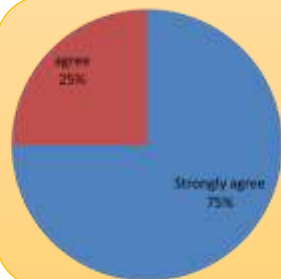
★ Short movie of CLTP6 (3.5 min) by MORI-san



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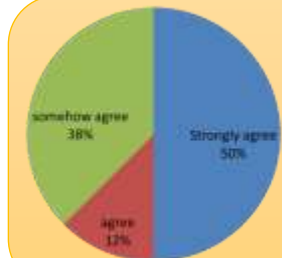
QUESTIONNAIRE RESULTS AFTER CLTP6 (CLTP6を振り返って：参加者アンケート)



Is this program suitable for your goal?

このプログラムはあなたの目的とする事に相応しかったですか？

大いに賛成：75%
賛成：25%



Do you think you can complete making textbook in your language?

Cansatの教科書を、母国語で作成できると思いますか？

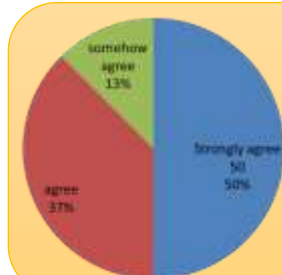
大いに賛成：50%
賛成：12%
まあまあ賛成：38%



Do you feel that the program is what you expected?

期待通りのプログラムだと思いましたか？

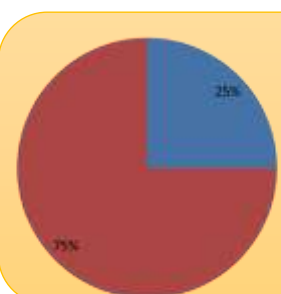
大いに賛成：62%
賛成：25%
まあまあ賛成：13%



Do you have confidence to teach Cansat in your country?

Cansatを母国で教える自信はありますか？

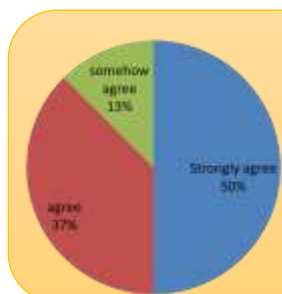
大いに賛成：50%
賛成：37%
まあまあ賛成：13%



How is your understanding in the lectures and experiments?

CLTP6の講義と実践をどれだけ理解できましたか？(何%理解できたか)

100%理解できた：25%
80%理解できた：75%



Are you comfortable with logistics arrangement (hotel, meal, etc.)?

諸設備(ホテル、食事など)の手配は快適でしたか？

大いに賛成：50%
賛成：37%
まあまあ賛成：13%

FEEDBACK FROM CLTP6 (CLTP6のフィードバック：参加者)

I hope that the enthusiasm we received from this course continues and allows us to spread these programs.
(CLTP6で受けた熱意が継続して、このようなプログラムを広げていけたらと願います。) (teacher, Australia)

Especially important is our own expertise in languages programming and basic knowledge in electronics, since with this, one can achieve most of the goals during the hands-on training program. (Professor, Mexico)
(プログラミング言語の専門知識と電子回路の基礎が重要！これらがあれば実践体験で目的をほとんど達成することができる。)

I learned how to get a successful mission including all steps you need for a real satellite. (PhD student, Tunisia)
(実際の人工衛星に必要な開発ステップを含んだミッションを、どのように成功させるか学ぶことができた。)

I gain the knowledge of small scale space project which is suitable for university studies; the online lecture was good to have some information about the theoretical background. (Researcher, Egypt)
(理論的な背景に関する知識を得るためにはオンラインの講義が非常によかったです。)

CLTP6 gave the necessary background to combine the theoretical and practical knowledge to someone who wants to enter in the space technology field. (Researcher, Angola)
(CLTP6は宇宙開発へ足を踏み入れたい人に必要な理論的かつ実践的な知識を組み合わせたバックグラウンドを与えてくれた。)

It was marvelous to be able to spend time and work with such a highly motivated group of people! Hokkaido university in Sapporo is a fantastic location and ideal environment for such a course, as is the launch location in Akabira (Researcher, Austria)
(宇宙開発への高いモチベーション・野心をもった人たちと一緒に作業し時間を共有できたことは素晴らしいかった！北海道大学や植松電機はこのようなプログラムを実施するには理想的な環境をもった優れた開催地だよ。)

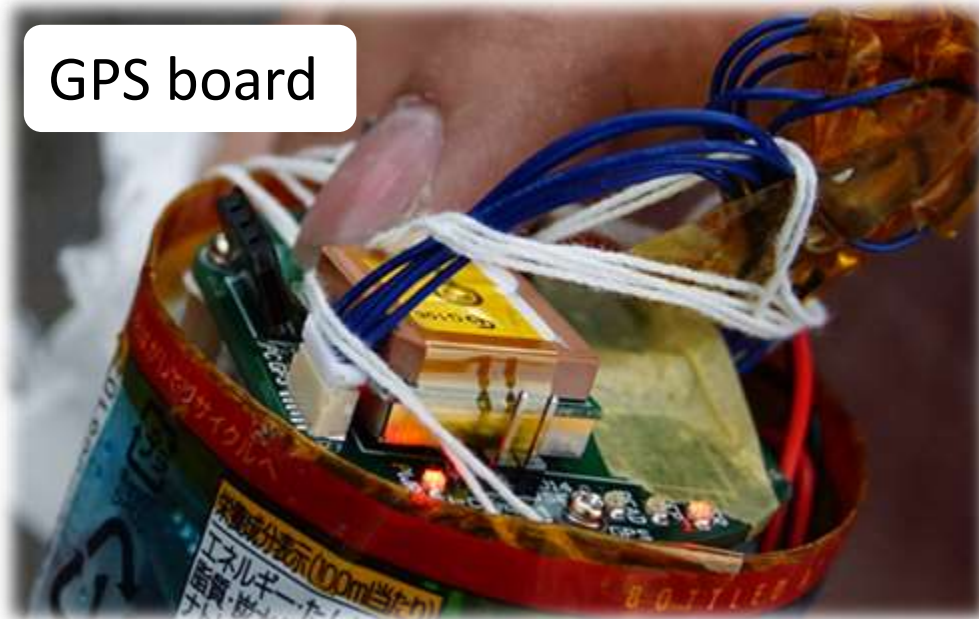
FEEDBACK FROM CLTP6 ① (CLTP6のフィードバック：北大)

- 従来のCansatと比較しVer.6は構造が簡素化したため、はんだ付け初心者の参加者も短時間で製作することができた。
 - 表面実装品のはんだ付けが最小となるような半完成品を用いたことも、短時間での製作を可能にした要因の一つである。
- Bleed boardやPIC boardを用いて各種センサー試験を実施することで、USR基板の回路設計を短期化することができる。
 - Cansat本体だけではなく、**開発環境の充実度も重要**である。
- XbeeのWi-Fiモジュールを用いてスマホと連動し、リアルタイムでCansatの位置情報のテレメトリをチェックできればもっと良い。

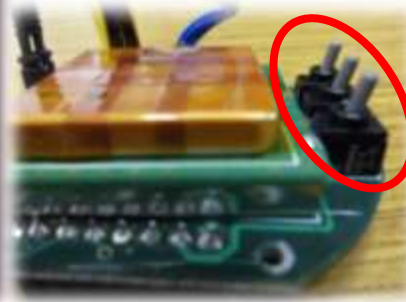
FEEDBACK FROM CLTP6 ② (CLTP6のフィードバック：北大)

- 最上層のGPS基板に設置してあるトグルスイッチが、何等かの影響で切り替わる現象が起きた。パラシュートコードとの干渉、あるいは着地の衝撃が原因だと考えられる。
- トグルスイッチからスライドスイッチへの変更を検討。

GPS board



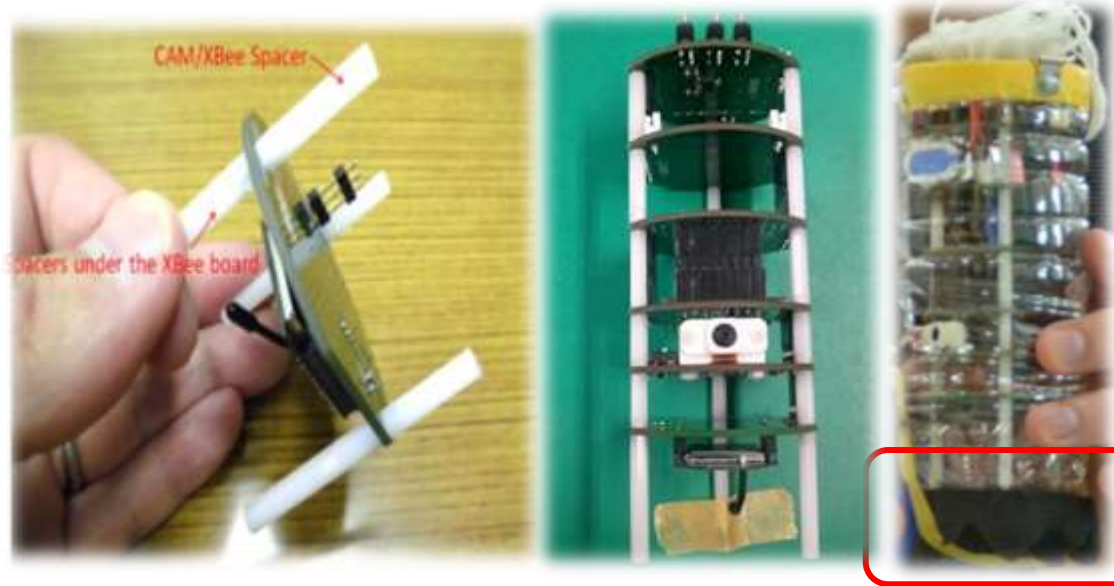
トグルスイッチ



スライドスイッチ

FEEDBACK FROM CLTP6 ③ (CLTP6のフィードバック：北大)

- XBeeを最下層に下向きで設置したことにより、着地の衝撃でXbee基板から分離する、あるいはXBeeアンテナが外装と接触し破損する、などの問題が発生した。
- (総重量を気にしつつ)クッション材で着地の衝撃を吸収させ、さらにマステ等でXBeeを基板に固定・保護する方が良い。



クッション材

FEEDBACK FROM CLTP6 ④ (CLTP6のフィードバック：北大)

- CLTP6は教育熱心な参加者が多かった。
 - TA側としては、彼らの期待に応えられるほど十分なサポートが出来たか不安だった。その一方で、彼らから学ぶ事も非常に多く、良い経験になった。(英語力を鍛える上でも！)
- 圧力センサーのプログラミング開発がCLTP6本番までに間に合わなかったのが残念だった。
 - CLTP6閉会后、北大側でプログラムを修正したところ、正常に動作したことを確認した。今後はやはり開発に十分に時間が取れるように早め早めに準備していく必要がある。

FEEDBACK FROM CLTP6 ⑤

(CLTP6のフィードバック：首都大学東京・東京理科大)

- トグルスイッチからスライドスイッチへの変更を検討
- コンパイラのバージョンを検討
- PIC書き込みソフトウェアに関して、サポート切れのものがあるため、最新版のコンパイラを使用すべき。CLTP6ではコンパイラのインストールに失敗した際に、やむを得ず他のPCを用いて対処したが、最新版のバージョンを使用できていれば、エラーの確認がより簡単だったはず。(北大)
- Xbeeの配置検討



- 実装パターンを変更せずに基板製造する場合、メタルマスクによるリピート製造・実装が可能であり、制作コストを抑えることができる

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CLTP7

Date

- ✓ Online Lecture: August, 2016
- ✓ Hands-on Training: **Sep21-Oct1, 2016**
- ✓ Optional Training: Oct2, 2016

Venue


- ✓ **Hokkaido University (Sapporo)**
- ✓ **Uematsu Electric Co,Ltd (Akabira)**

Eligibility

- ✓ Academic researchers, instructors, and graduate students who belong to universities or research institutes. A Ph.D. holder is preferable.
- ✓ Company employees who wants to use CLTP as an education and training program.



The 7th CanSat Leader Training Program (CLTP7)

Second Announcement Organized by  **UNISEC**
University Space Engineering Consortium

September 2016, Hokkaido, Japan

What is CLTP?
The CanSat Leader Training Program (CLTP) was established in 2010 to contribute to capacity building in space technology and improve teaching methods-based space engineering education. Education using CanSat will be available in more than half of nations (about 100 nations) in the world by the year 2020.

History
1st CLTP : Feb 14-Mar 20, 2011, Wakayama Univ
2nd CLTP : Nov 14-Dec 14, 2011, Nihon Univ
3rd CLTP : Jul 17 -Aug 20, 2012, TMU
4th CLTP : Jul 22-Aug 16, 2013, Keio Univ
5th CLTP : Sep 8-19, 2014, Hokkaido Univ
6th CLTP : Aug 24-Sep 4, 2015, Hokkaido Univ

Expected Participants
Future leaders and instructors of CanSat training, belonging to Universities or Research Institutes



What is CanSat?
The CanSat provides an affordable way for students to acquire the skills and knowledge to make, launch, and recover a satellite. Students learn to design and build a payload that can be launched on a CanSat, which is a rocket-powered parachute that returns to earth post-mission via a telecommand receiver. This allows the student to experience the cause of satellite failure.

Join us!

2016 (TBC)
Oct 1, 2016
Final charge) : Oct 2, 2016
University (Sapporo) and
Uematsu Electric Co., Ltd (Akabira)

Registration Due: March 15, 2016
Participation fee:
-Academic Fee: 300,000 yen
-Corporate Fee: 500,000 yen

CLTP Office
c/o University Space Engineering Consortium (UNISEC)
E mail: secretariat@cltp.info
URL : www.cltp.info



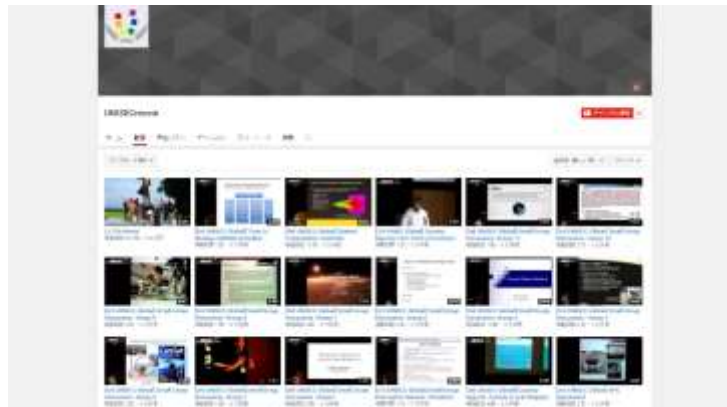
ADDITIONAL INFORMATION ABOUT CLTP



外国の方から「いいね」絶賛獲得中！



CLTPのHPで詳しい情報掲載中！



UNISEC MOVIE (YouTube) にCLTP6のPV掲載中！

ACKNOWLEDGEMENTS (謝辞)

- All Participants
- All staffs
- UNISEC
- Uematsu Electric Co., Ltd

<Can-sat>

- Prof. Shinichi Kimura (Tokyo university of Science)
- Prof. Hironori Sahara (Tokyo Metropolitan University)

<Online Course>

- Prof. Mohammed Khalil Ibrahim (Cairo University)
- Prof. Shinichi Nakasuka (University of Tokyo)
- Prof. Yasuyuki Miyazaki (Nihon University)
- Prof. Hiraku Sakamoto (Tokyo Institute of Technology)
- Dr. Masahiko Yamazaki (Nihon University)
- All Online course TAs

<Special Thanks>

- SAKURA Rubber Company Limited
- UNOOSA



TOKYO METROPOLITAN UNIVERSITY

首都大学東京



Thank you for your kind attention
(ご清聴ありがとうございました)

