

UNISEC-like activities in Korea: A proposal

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Agenda

- History of CanSat and CubeSat activities in Korea
- Current CanSat and CubeSat activities in Korea
- Current hands-on experiences in Korea
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Seoul National University - CanSat activity

- CanSat team since 2006
 - Advisor: SNU AE Professor In-Seuck Jeung
- Joint team of MAE and EE students
- 2nd place (2007) and 3rd place (2009) award
- Funding



Seoul National University - CanSat activity

- ARLISS Participation

2006



2007



2008



2009



2010

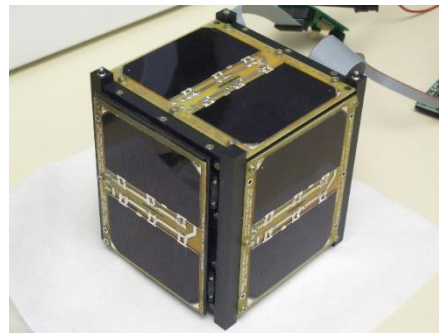


2012



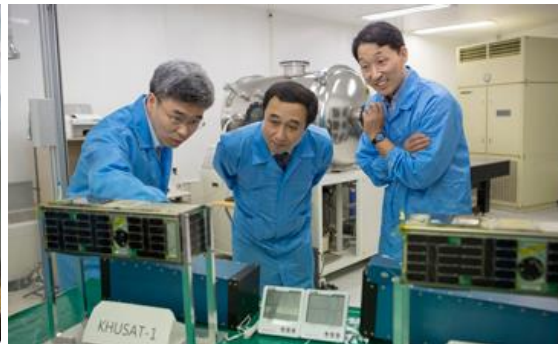
Korea Aerospace University – HAUSAT-1

- Project started in 2001
- 1U CubeSat, first CubeSat developed in Korea
- Mission:
 - Track satellite with GPS
 - Deploy solar panel
 - Space environment test
 - Receive satellite data
- Launched on July 2006 by Dnepr, but rocket failed



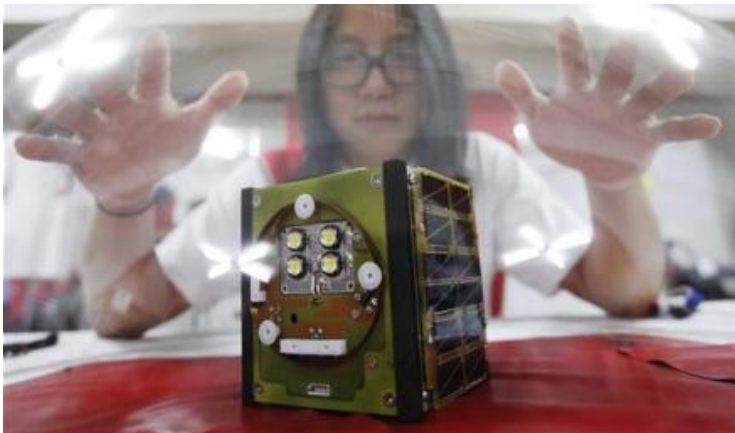
Kyung Hee University – TRIO-CINEMA

- Project started in 2009
- Joint project between UC Berkeley, Imperial College London
 - KHU made two CubeSats (KHUSAT-1, KHUSAT-2)
 - Developed STEIN sensor
- Mission:
 - Study space weather effects in near-Earth space
- Orbit: 770x480 km, 64° orbit



Open Source Satellite Initiative – OSSSI-1

- Project started in 2008
- First personal funded CubeSat project in Korea by Hojun Song
- Mission:
 - Media Art Project, development of open source CubeSat
- Orbit: 552.8x263 km, 64.9° orbit
- Launched on April 2013 by Soyuz in Baikonur, however is not heard



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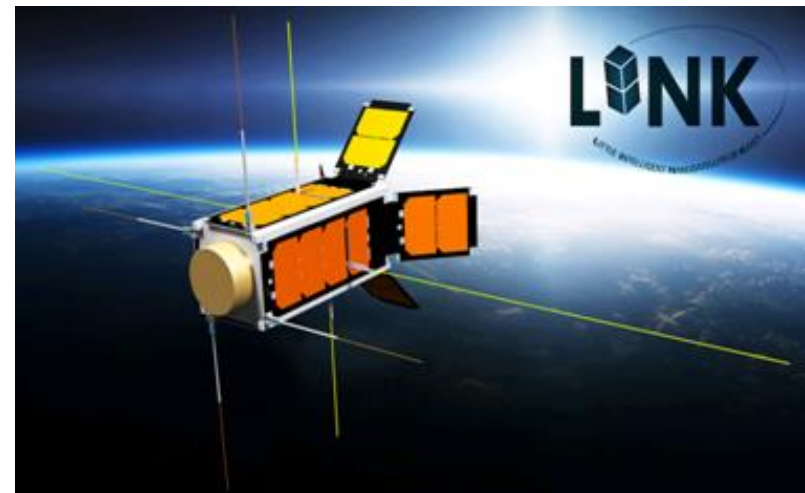
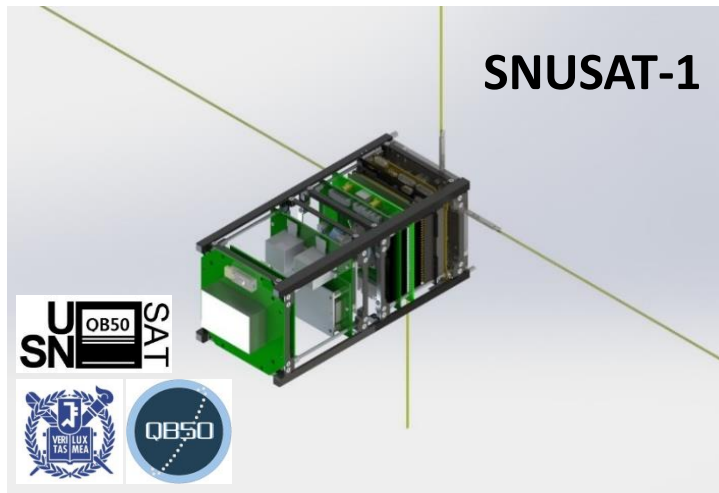
CanSat Competition

- Annual CanSat competitions for high school and university students
- Up to 10 teams each get to fly their CanSat (2~3 person per team)
- Selection
 - First stage: 20 teams each selected based on their proposal
 - Second stage: 10 teams each selected based on maturity of system, idea, and presentation
 - Winner: Based on mission accomplishment, team work, and presentation



QB50

- Seoul National University (SNUSAT-1) and KAIST (LINK) are participating in the QB50 project – a EUFP7 program led by von Karman Institute in Belgium
 - Each developing a QB50 CubeSat
 - In case of Seoul National University, project kick-off was in November 2012
- Launch planned for mid 2015



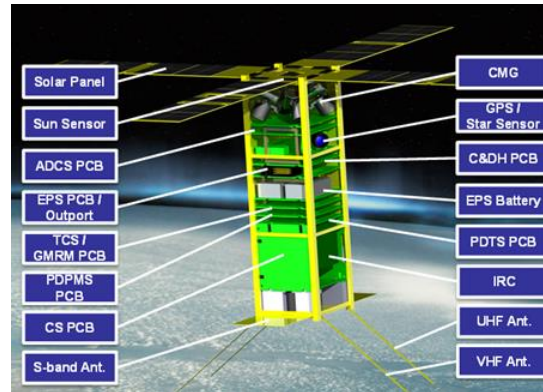
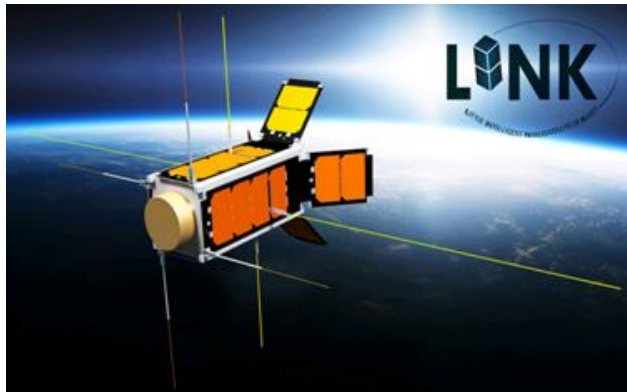
CubeSat Competition

- Bi- Annual CubeSat competitions universities
- Up to 3 teams selected with about \$170,000 funding per team (excluding launch fee)
- Teams are selected based on idea, feasibility, and presentation
- CubeSat 2012 Selected
 - KAIST, Korea Aerospace U, and Yonsei U
- CubeSat 2013 Selected
 - Kyung Hee U, Chosun U, Chungnam U



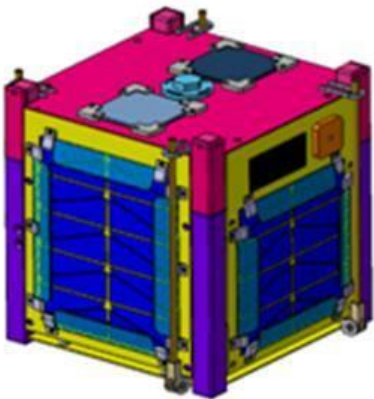
CubeSat Competition: 2012

- On going CubeSat missions
 - KAIST – LINK: QB50 mission and Langmuir probe
 - Korea Aerospace University – KAUSAT-5: Infrared imaging and space radiation detection
 - Yonsei University – CANYVAL: CubeSat astronomy using virtual telescope alignment



CubeSat Competition: 2013

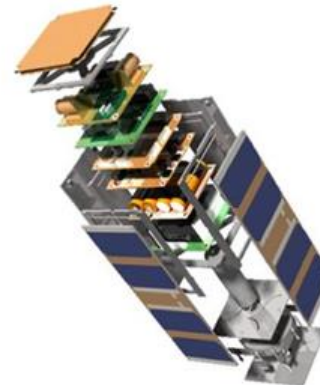
- New 2013 selected CubeSats
 - Chosun University – STEP CUBE LAB
 - Chungnam University – Papillon
 - Kyung Hee University – Sigma



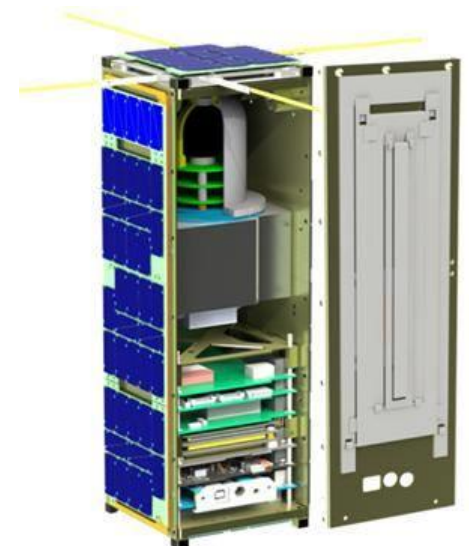
Chosun University – STEP CUBE LAB
Development of MEMS thruster,
variable emissivity radiator



Chungnam University – Papillon
Solar Sail and deployment systems



Kyung Hee University – SIGMA
Space radiation and magnetometer



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CanSat Camp

- For elementary (grades 5~6) and middle school students
- Two-day annual event, up to 30 teams (2 students per team)
- Uses a balloon or a multicopter to lift and drop the CanSat



Satellite Technology Research Center

- KAIST SaTReC (Satellite Technology Research Center)
 - Workforce development program for satellite development professionals
 - For masters and doctors degree and graduate course students
 - Participate on real satellite projects
 - Limitations
 - More like an intern opportunity rather than hands-on experience
 - Only limited amount of people have the opportunity to experience



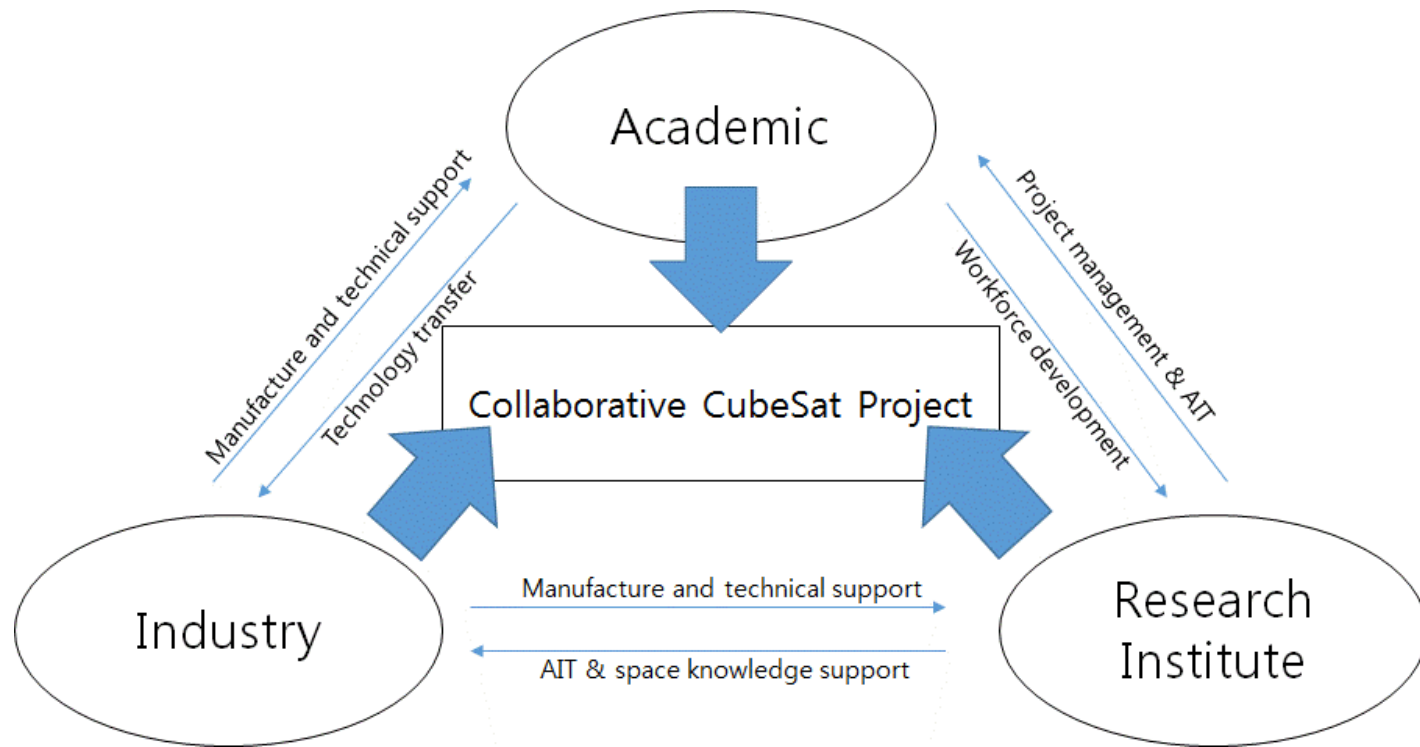
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Cooperative CubeSat Project for Universities in Korea

- Joint CubeSat Project to offer wider opportunity and to improve CubeSat technology maturity
- Start by developing parts/assembly or subsystem units of CubeSats
- Eventually build heritage and move up to larger satellites such as ~30 kg satellites
- Important point is how the funding will be made and what the work structure will look like

Cooperative CubeSat Project for Universities in Korea



Example of how the cooperative project may relate each other

Cooperative CubeSat Project for Universities in Korea

- Already, a proposal had been made for the ‘National Idea Contest for Space Technology Industrialization and New Industry Creation,’ and was selected as one of the ideas
 - “National Collaborative Nano-Satellite Development Project”
- Initial goal is to advertise the importance of the project
 - UNISEC Korea will be the next step for further advertisement
- Next milestone is planning on how to cover the funding
 - Search for national grants that suit such project
 - Piece by piece funding by industries and/or institutes
 - Currently, received starting funding from College of Engineering, Seoul National University

Invitation Lecture – Technical Series

- Invitation lecture of experts for both technical and fun
- Rotate venue for enhanced participation of all universities
 - Local technical series
 - Seoul
 - Daejon
 - Busan
 - Domestic technical series
 - Jeju Island

Invitation Lecture – Technical Series



Examples of past technical series held in Korea

Hands-on Experience

- Short term, low budget hands on experience for education
 - Fundamentals of CubeSats
 - Non-flying mock design of CubeSats for learning various components of CubeSats
 - A one week workshop covering fundamentals of CubeSats and space systems, CubeSat hardware, development software, operation and development

Summary

- First CubeSat activity started in 2001
- CanSat and CubeSat activities are increasing
- Organized cooperation is required for as many universities to participate in a CubeSat project
 - Cooperative CubeSat Project for Universities in Korea
 - Invitation Lectures – Technical Series
 - Hands-on Experience
- Promote CanSat and CubeSat activities in Korea by raising interest, fun and experience!
- By end of 2014, start first UNISEC-Korea Project