Abstract for Regional Report

at the 7th UNISEC-Global Meeting

Alim Rüstem Aslan

UNISEC-TURKEY (UTEB)

Nov 30 (Sat) - Dec 3 (Tue), 2019

7th UNISEC-GLOBAL MEETING

Turkish UNISEC (UTEB)
2018 November – 2019 November Activities

Prof.Dr. Alim Rustem Aslan, UTEB Coordinator, UNISEC Global PoC
Manager, Space Systems Design and Test Laboratory
Istanbul Technical University, Faculty of Aeronautics and Astronautics,
Istanbul, Turkey
aslanr@itu.edu.tr

ITU/FAA
Faculty of Aeronautics and Astronautics

Space Systems Design and Test Laboratory

USTTL

Prof.Dr. Alim Rüstem ASLAN

Astronautical Engineering Department
Istanbul Technical University, Turkey

- Manager, Space Systems Design and Test Laboratory
- Manager, SmallSat Communication Laboratory
- UNISEC-GLOBAL SC Member, PoC, MIC Coordinator
- IAA Corresponding Member
- IAF Correspondant
- CSO-STO AVT Panel Member
- VP, TAMSAT/AMSAT-TR, TA1ALM

Area of expertise: Design, analysis and development of pico- and nanosatellite (5 in orbit – 2 deorbited), manned and unmanned rotorcraft systems (including prototypes), computational fluid dynamics and aerodynamics, propulsion and, defense and education technologies.

UNISEC GLOBAL
University Space Engineering Consortium

UNISEC-TR History

- Started Nov 2011, by three Istanbul Universities (ITU, NDU (TurAFA), YTU)
- Over 20 participant universities
- Support of government, aerospace industry and research institutions
- 12 meetings so far hosted by starters and supporting institutions
- Working on establishing UTEB as a legal entity
- Various joint CanSat/CubeSat activities/projects
- International cooperation

SPACE TECHNOLOGY

Technology required

- To access space,
- To use all kind of tools and systems in space and to sustain them,
- To return to earth

Major source of wealth and driving force for developed and developing countries

It is of paramount importance, to have space technology development capability to increase national wealth and quality of life through exposure to cutting edge technology, knowledge and education

History of Local Chapter Activities

Established in *2011, became Local Chapter in Nov 2014*

Past activities

- *Participated in CLTP1 and 2 in 2011, 2012, 2015 and 2017*
- *Participated in MIC in 2011, 2012, 2014, 2015, 2016 and 2017*
- *Attended All UNISEC-Global Meeting since 2013*
- *Organized MIC Seminars*
- *Participated in AIAA/APSCO/TEKNOFEST ISTANBUL CanSat*
- *Held CanSat Training Program/Competition since 2014*
- *Practical Space Projects: 5 CubeSats launched, 3 ongoing projects*

• Keep it multidisciplinary, international and multi institutional

UNISEC-Global Activities in 2019

Number of
- Member Universities: N/A no official members (about 20)
- Students: N/A
- Professors: N/A
- Others（Corporative members, etc.): N/A

- Organizing a Program/Training/Competition: Seminars, CanSat WS, CubeSAT WS, Teknofest

- CLTP10: No

- MIC6: No

- ARLISS21: May be

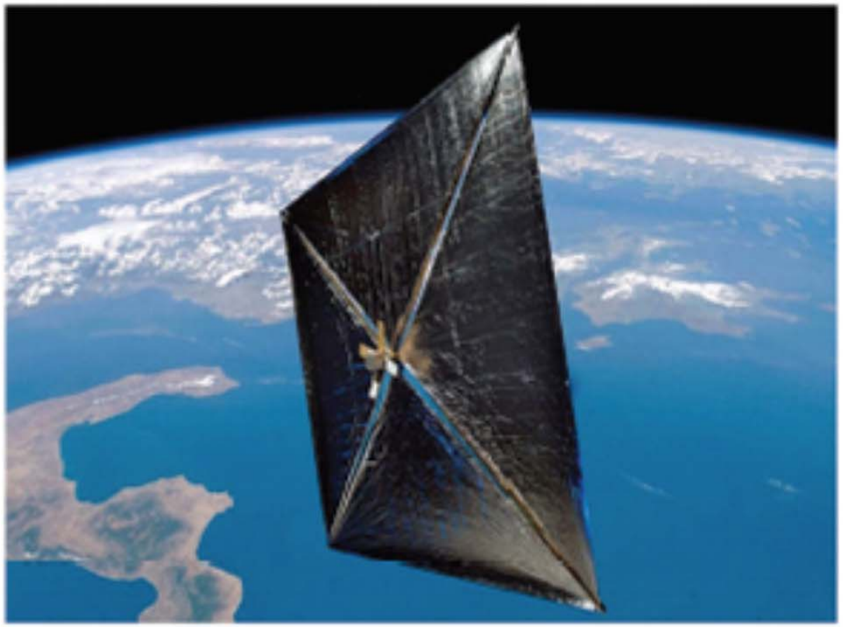
- UNISEC-Global Meeting: Yes

- On-going Practical Space Projects: Yes

- CanSat Competition/Training: Yes

- HEPTA-Sat Training: Yes

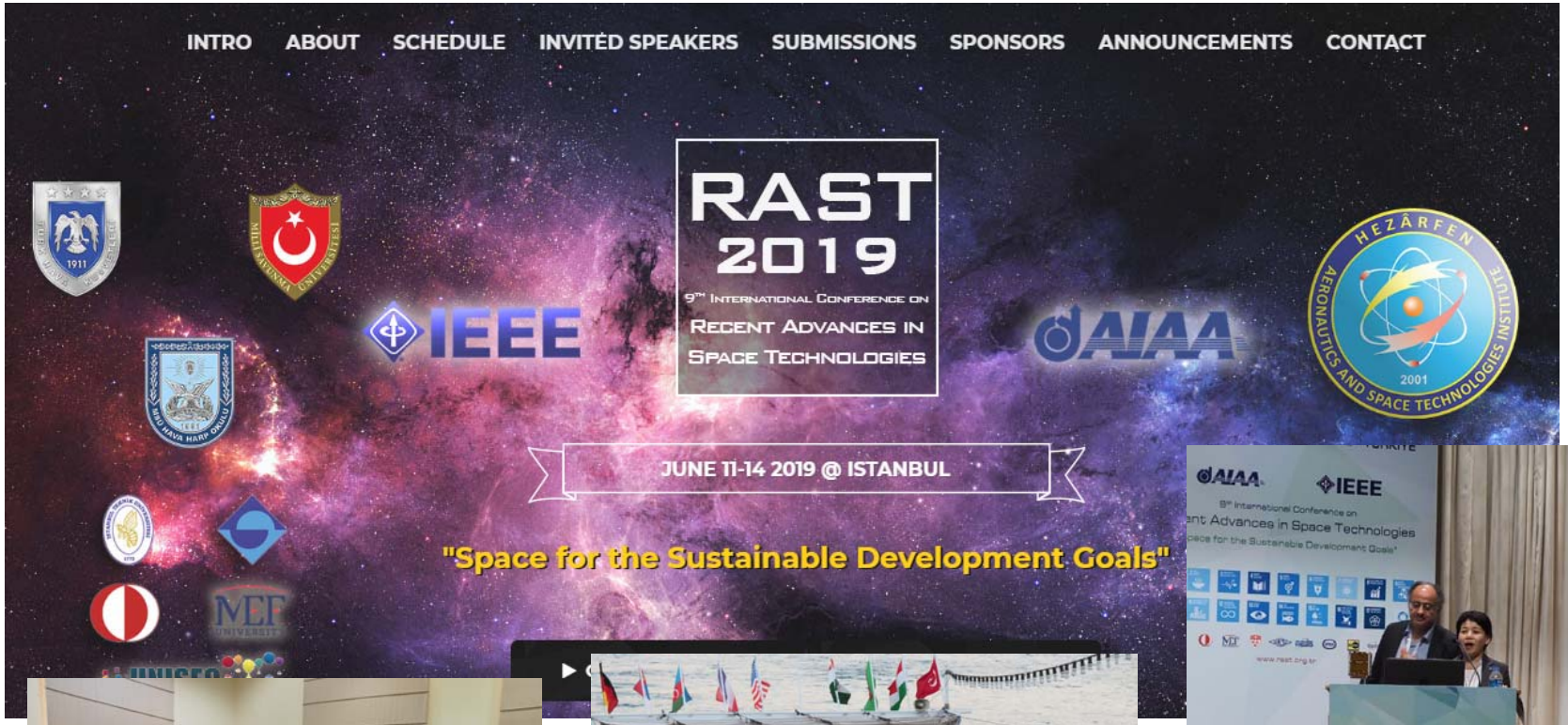
A Handbook for Post-Mission Disposal of Satellites Less Than 100 kg



International Academy of Astronautics

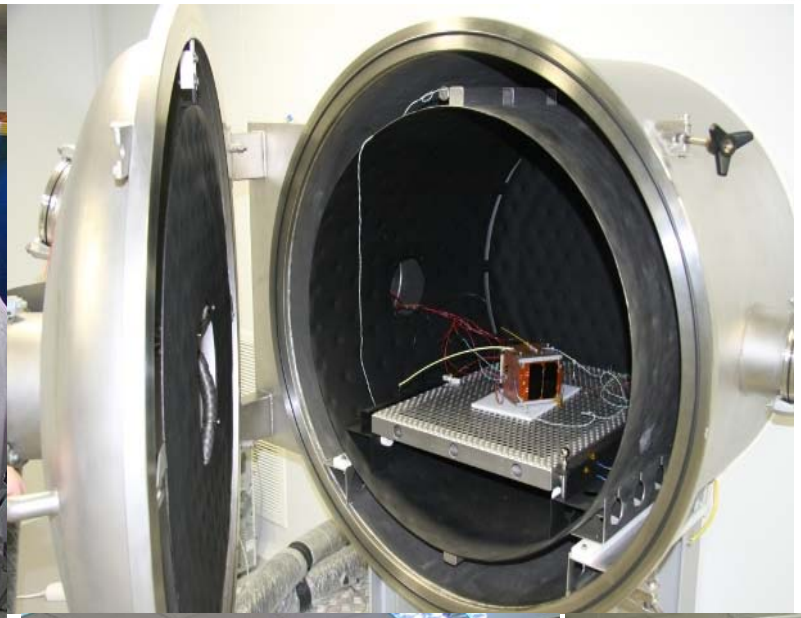
RAST 2019, 11-14 JUNE 2019

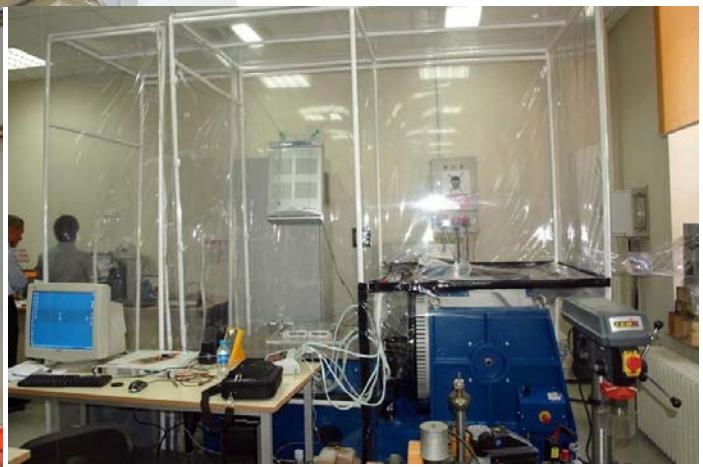
SPACE for SUSTAINABLE DEVELOPMENT GOALS



RAST2019 TESTING TUTORIAL at ITU

UNISEC TURKEY
University Space Engineering Consortium





UNISEC GLOBAL
University Space Engineering Consortium

ITU, Istanbul, Turkey

by 360 Degrees by Orhan Durgut

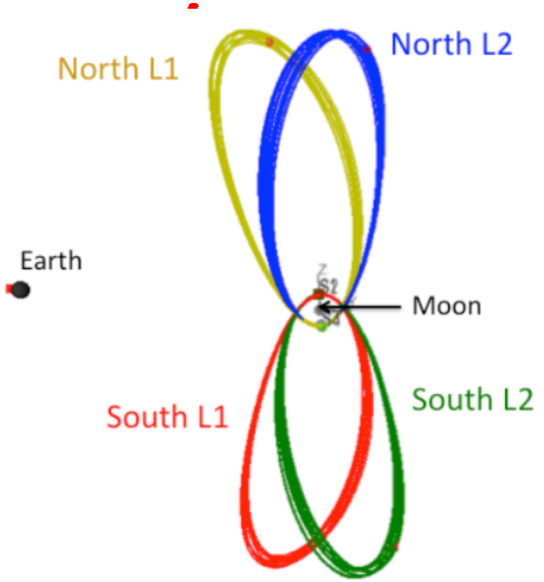
With a history stretching back over 246years (1773), providing technical education within a modern educational environment and strong academic staff, **Istanbul Technical University (İTÜ) is strongly identified with architectural and engineering education in Turkey**

- **Department of Astronautical Engineering since 1983**

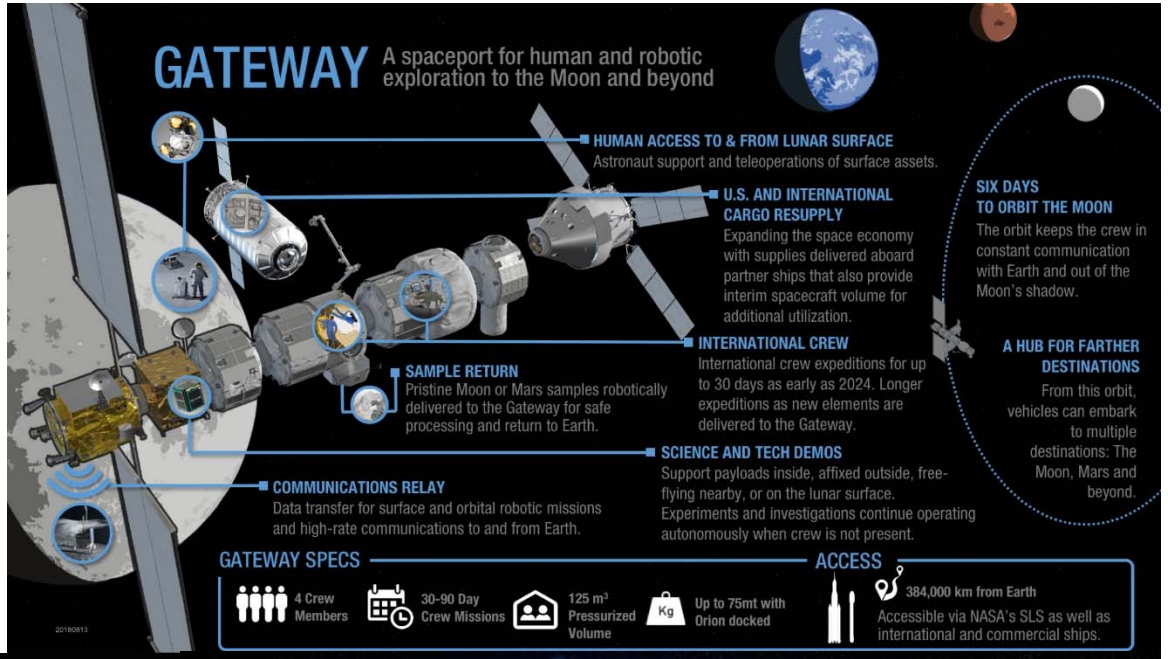
Astronautical Engineering Curriculum

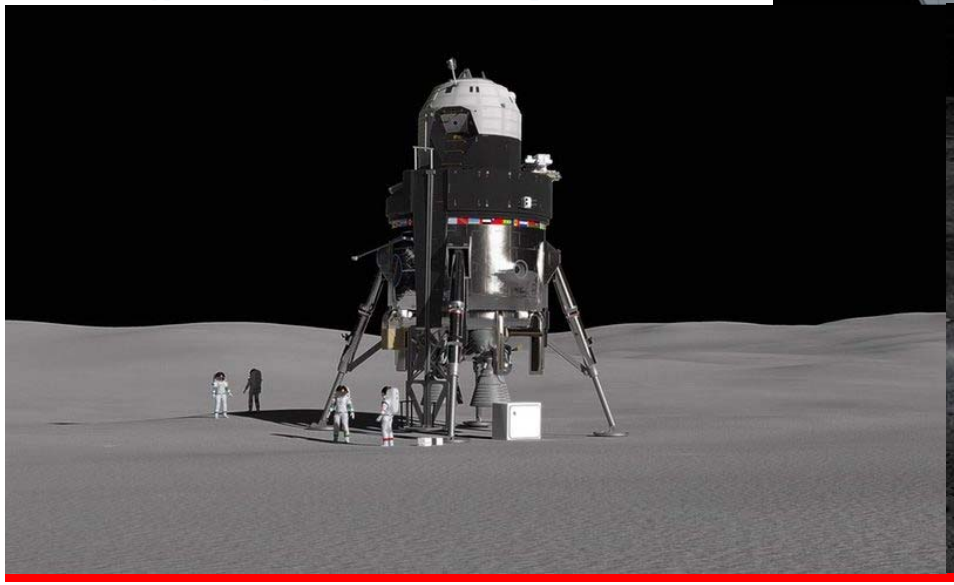
- Education in space science and technologies
- Follows AIAA recomendations
- Fully Accredited by ABET till 2023
- Space related undergraduate courses
  - Introduction to Space Engineering (1st year)
  - Astronautical Engineering&Design (CanSat Application) (1st)
  - Aerospace structures (3rd year)
  - Orbital Mechanics, (3rd year)
  - Space environment, (4th year)
  - Spacecraft Attitude Determination and Control (4th)
  - Rocket and Electric Propulsion (4th)
  - Spacecraft system design with application (SSD) (4th)
  - Spacecraft communications (4th)
  - Space Law(elective)

Deep Space Gateway and RLSAV



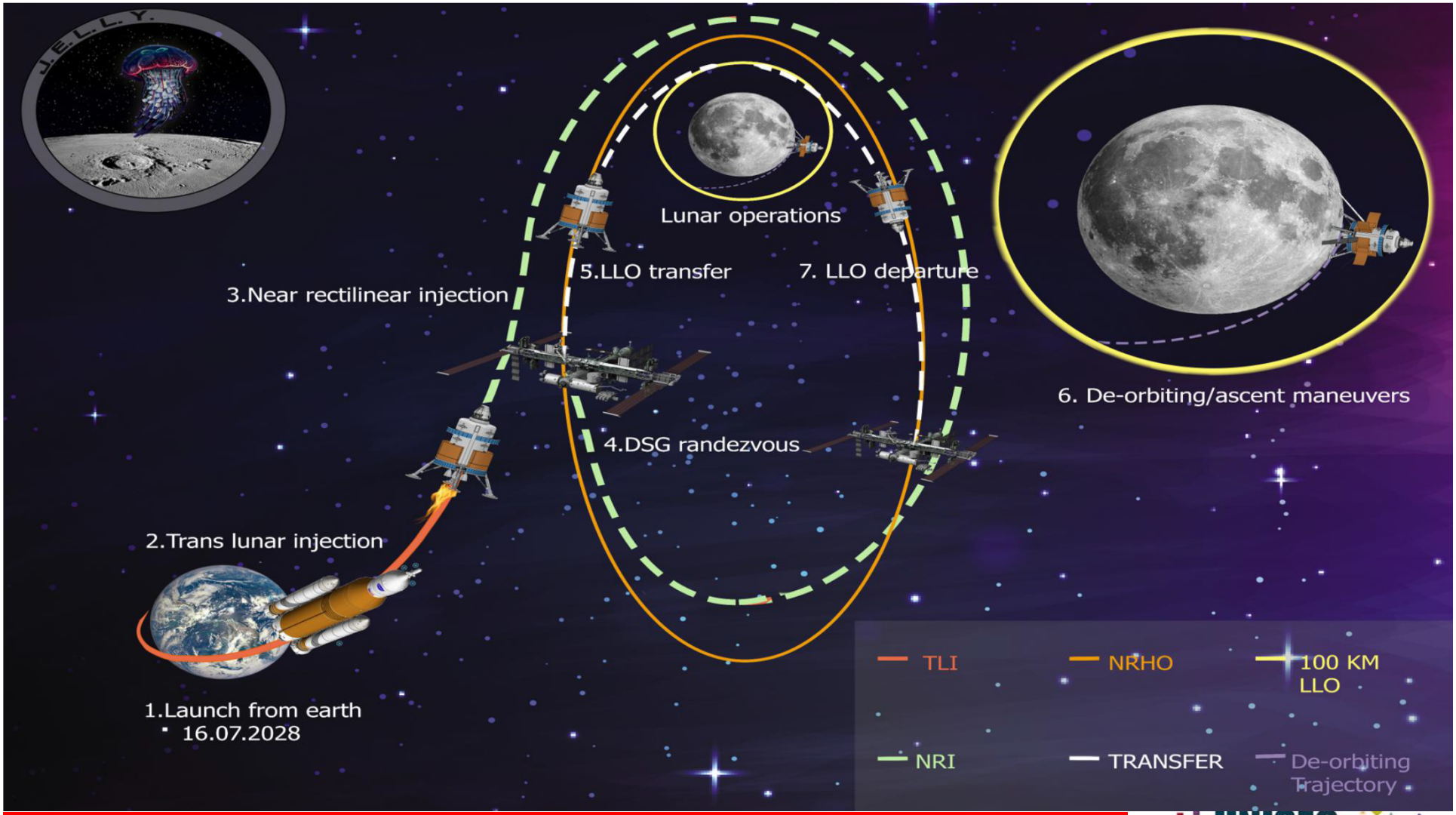
ur NRO Orbit Types: multiple revolutions in a rotating Earth-Moon frame.





AIAA SPACE DESIGN CONTEST 3rd PLACE

Reusable Lunar Surface Access Vehicle



USA CANSAT 2019 1st PLACE

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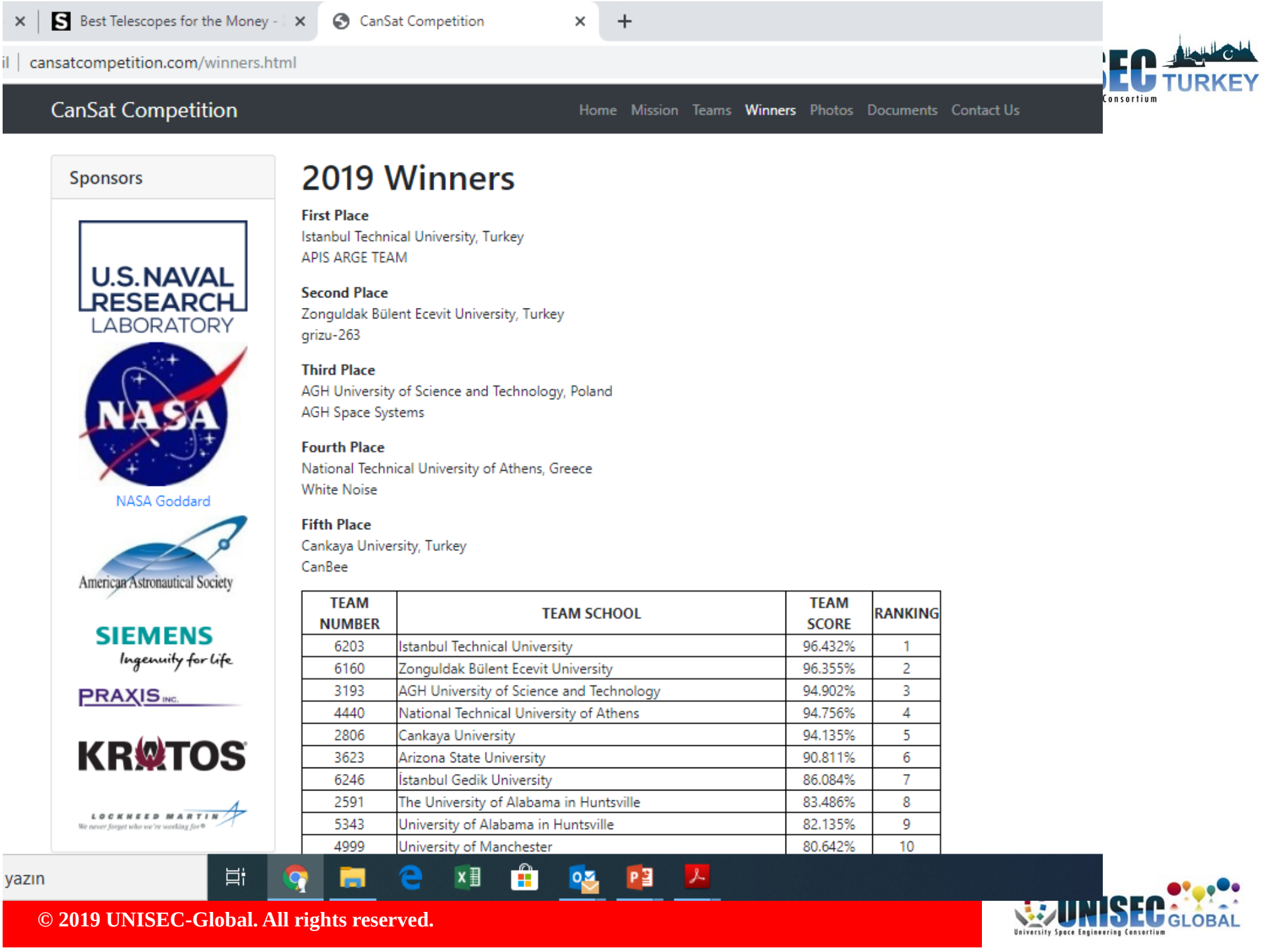
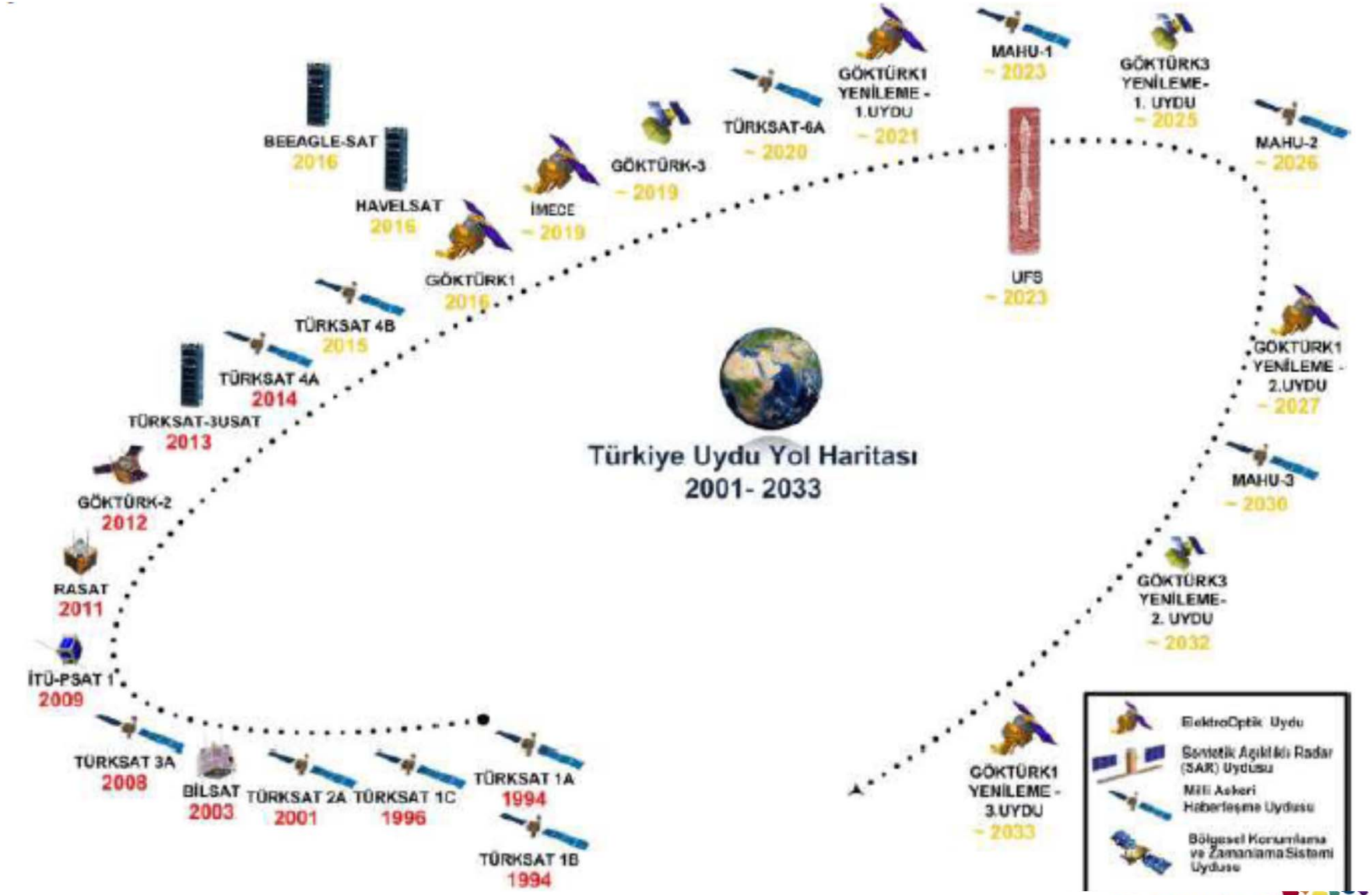
University Space Engineering Consortium



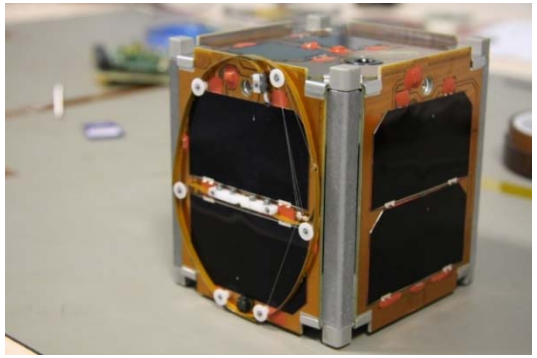
TEKNOFEST 2019

CanSat, UAV and Rocketry Contests

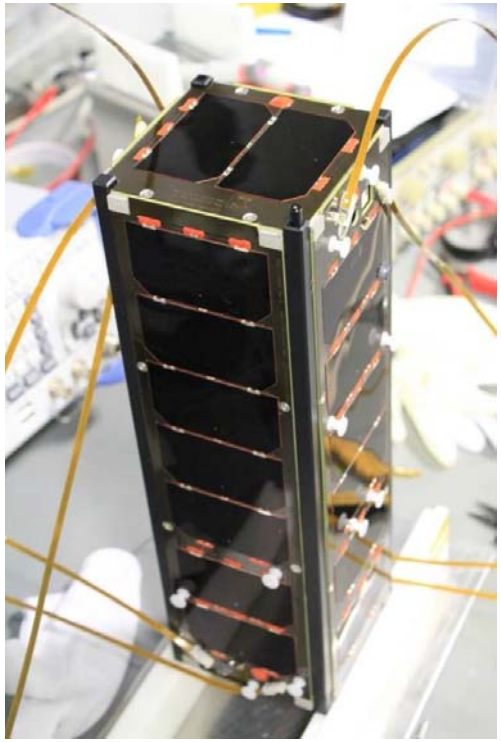
Turkish Satellite Road Map

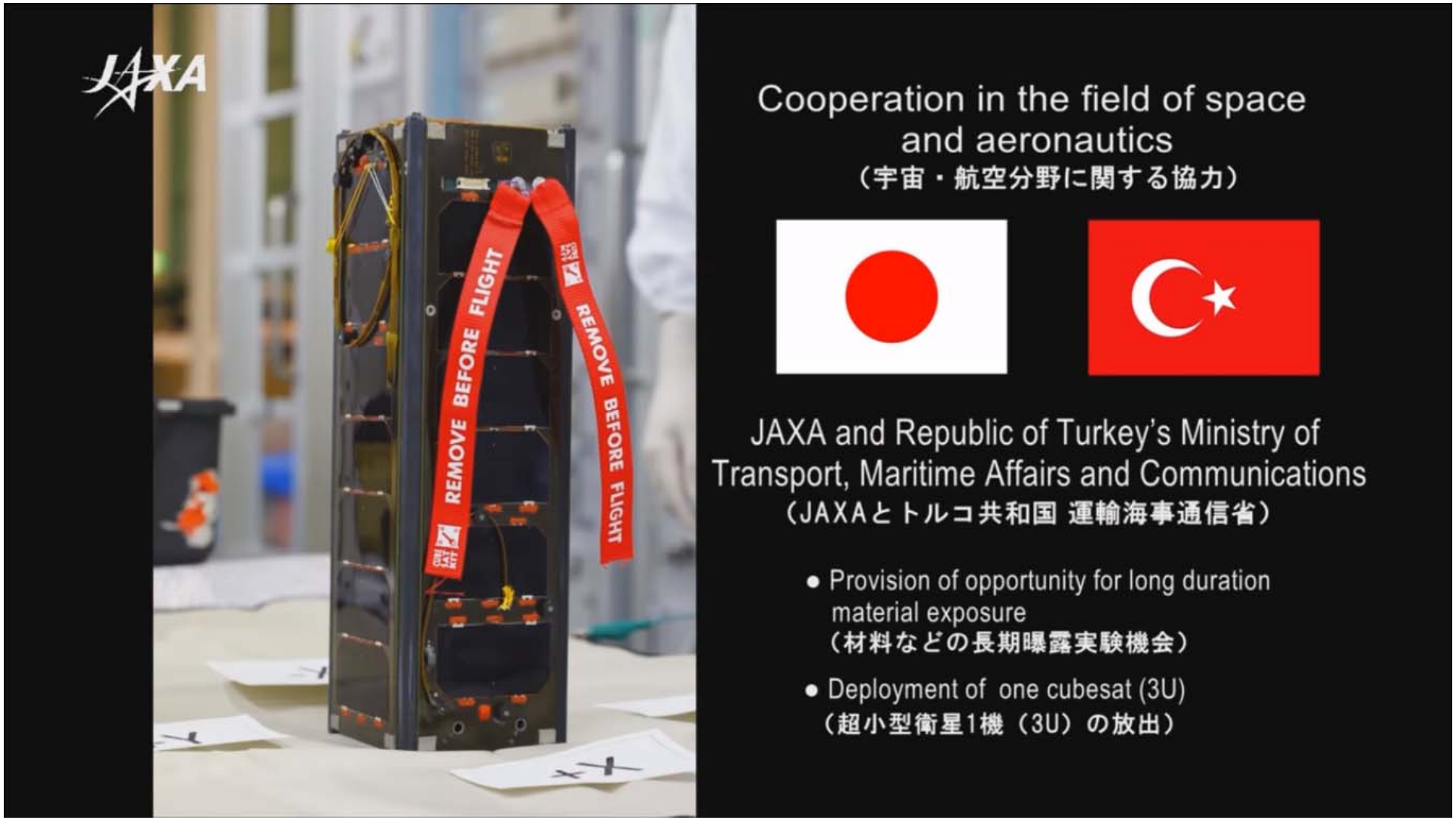


COMPLETED CUBESAT PROJECTS

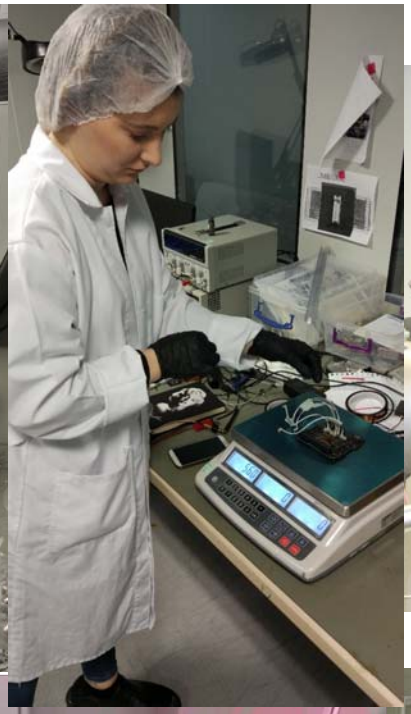
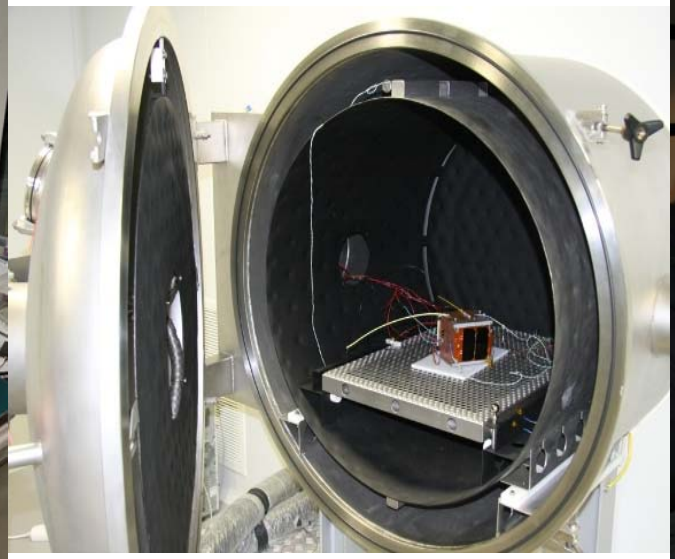


ITUPSAT1: 2009
TURKSAT 3USAT: 2013
BEEAGLESAT and HAVELSAT: 2017
UBAKUSAT: 2018





INTEGRATION and TEST at ITU

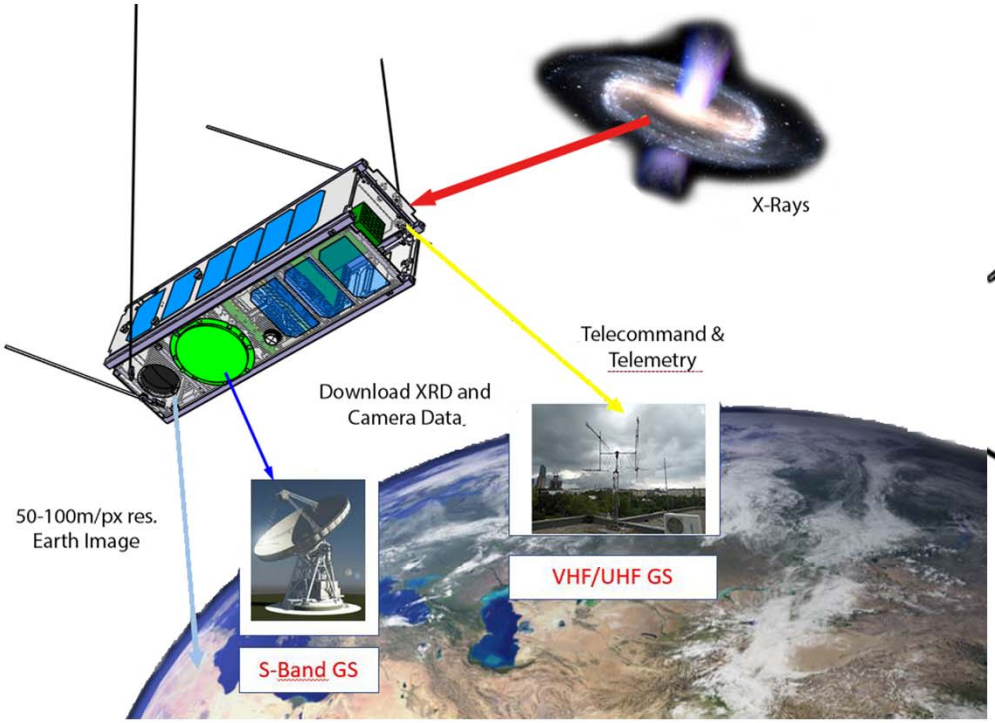


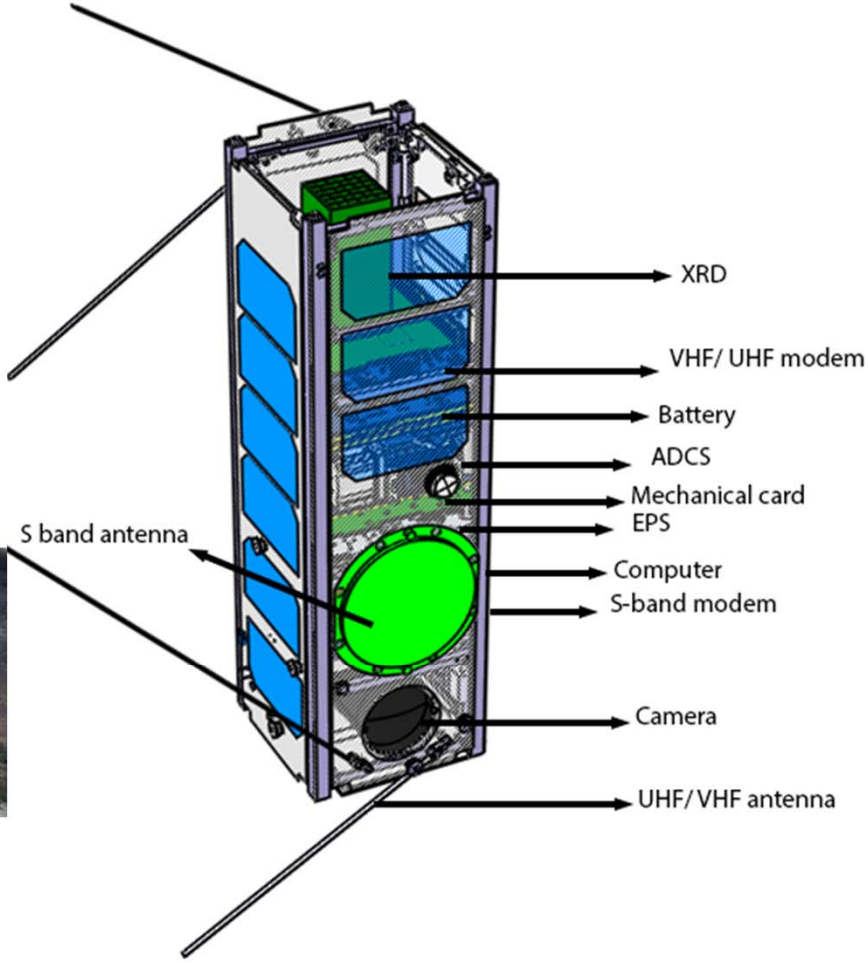
X BAND and VHF/UHF GROUND STATIONS at ITU

SHARJAHSAT-1 MISSION

- For UNIVERSITY of SHARJAH, UAE
- Capacity development through
  - Science mission: star detection and sun observation
  - Imaging mission: earth and space
- Payload
  - X Ray detector (spesifications given)
  - Optical camera (spesifications to be determined)

SHARJAH SAT -1

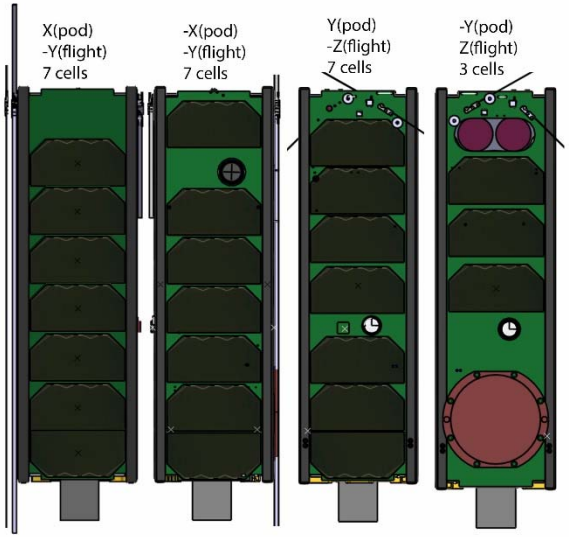


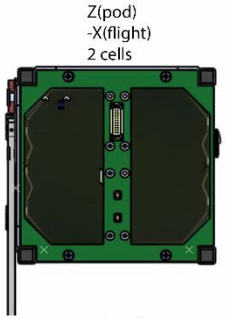


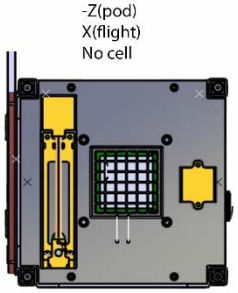
LAUNCH END of 2020 or Q1/2021

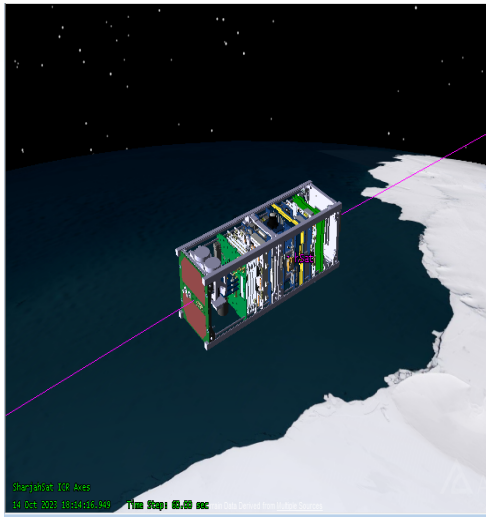
LAUNCH END OF 2020

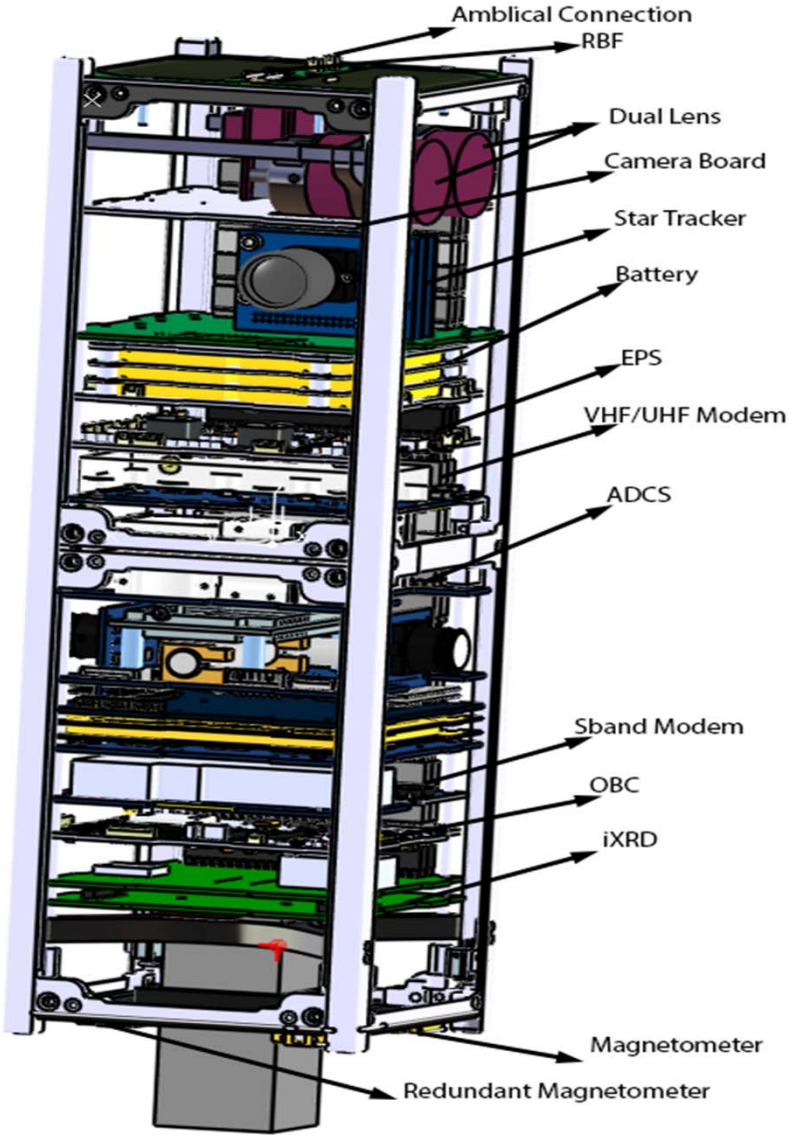
SHARJAH SAT -1





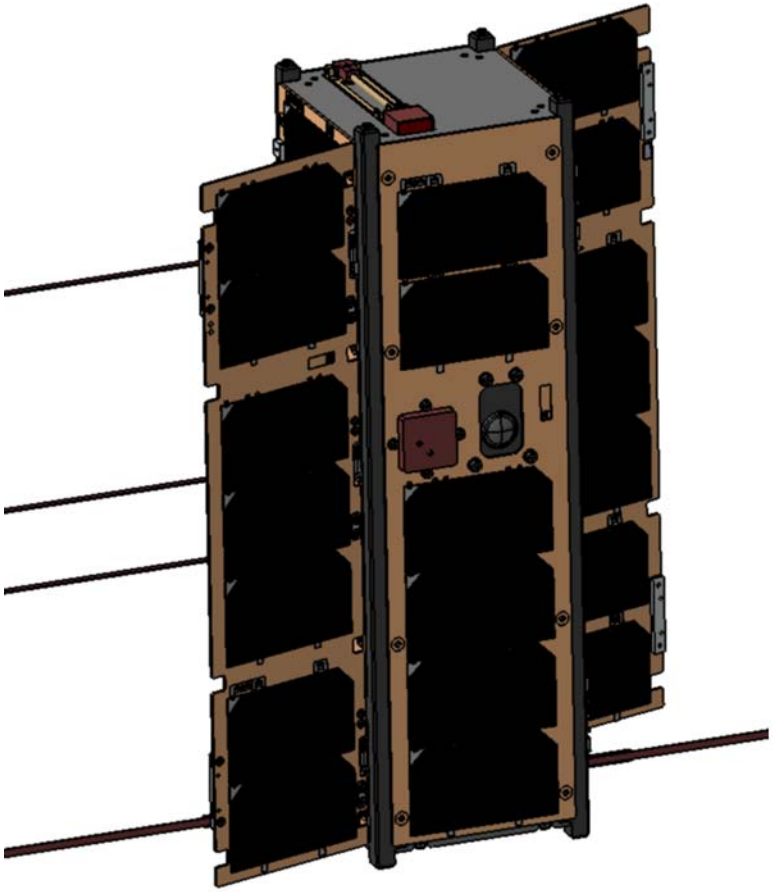


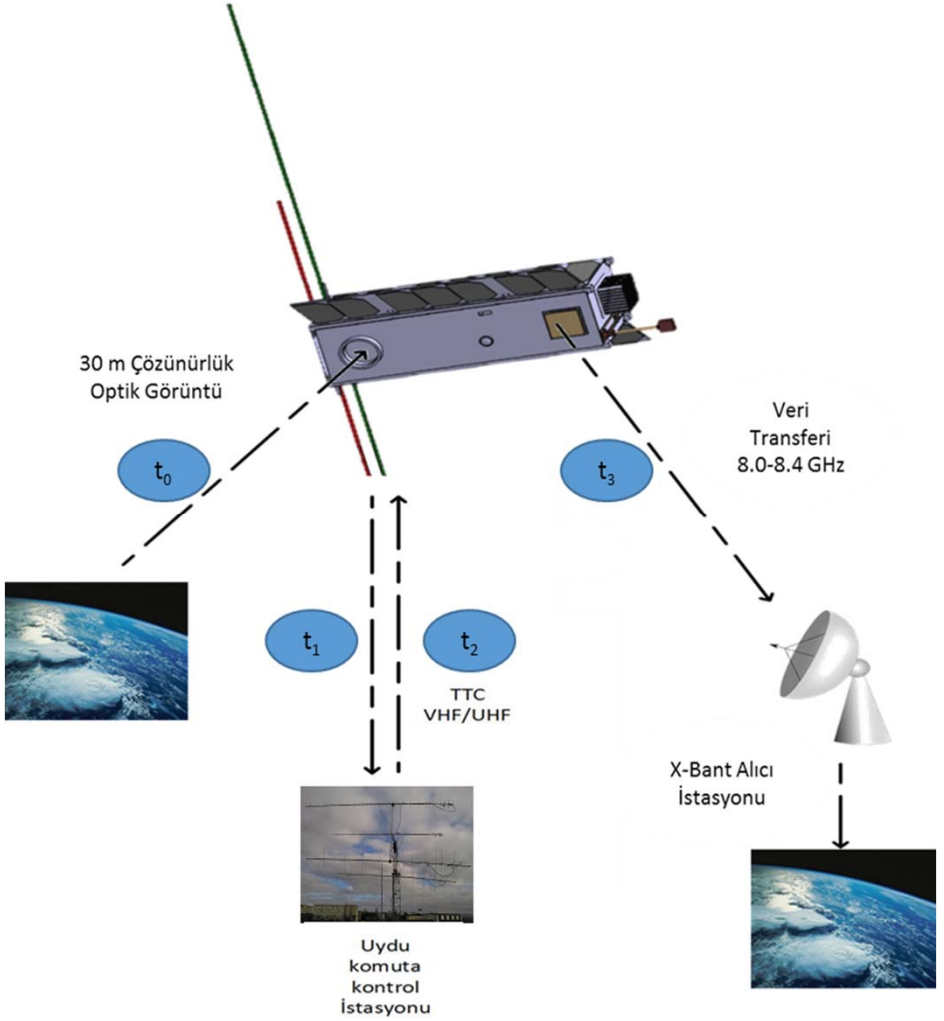


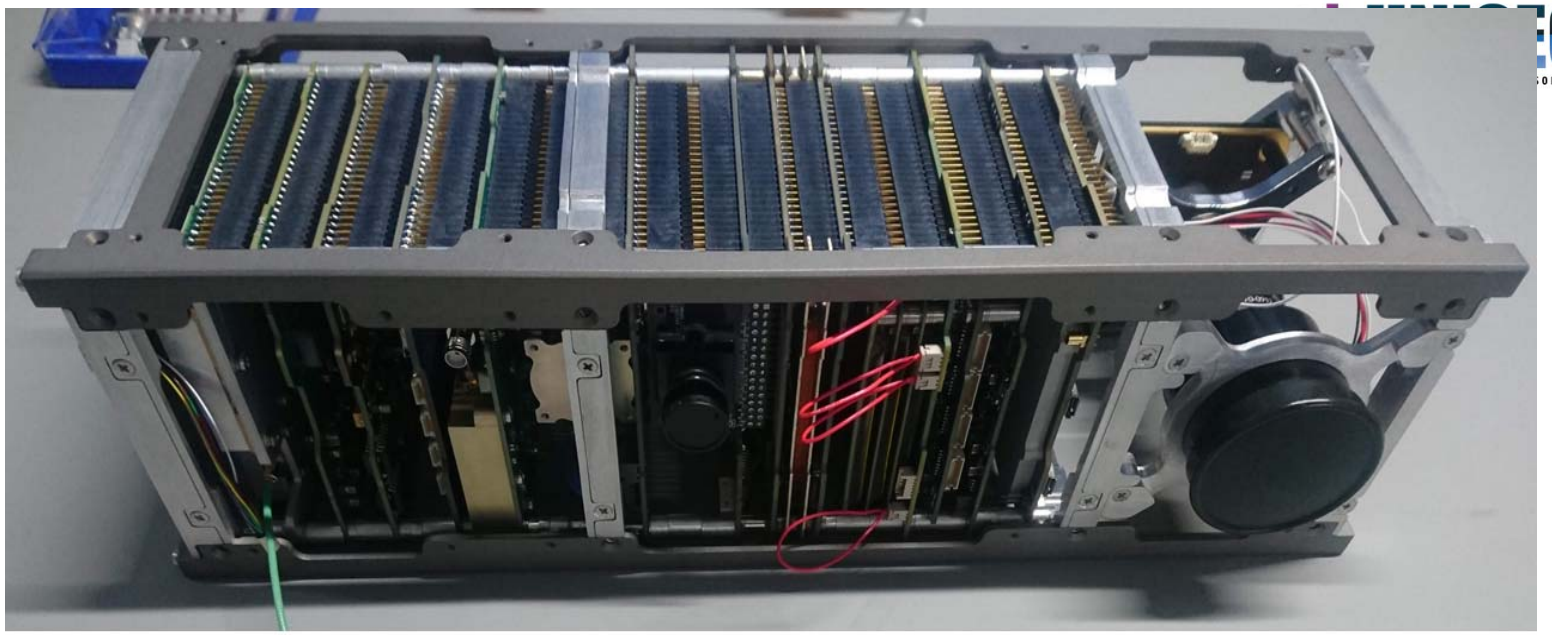


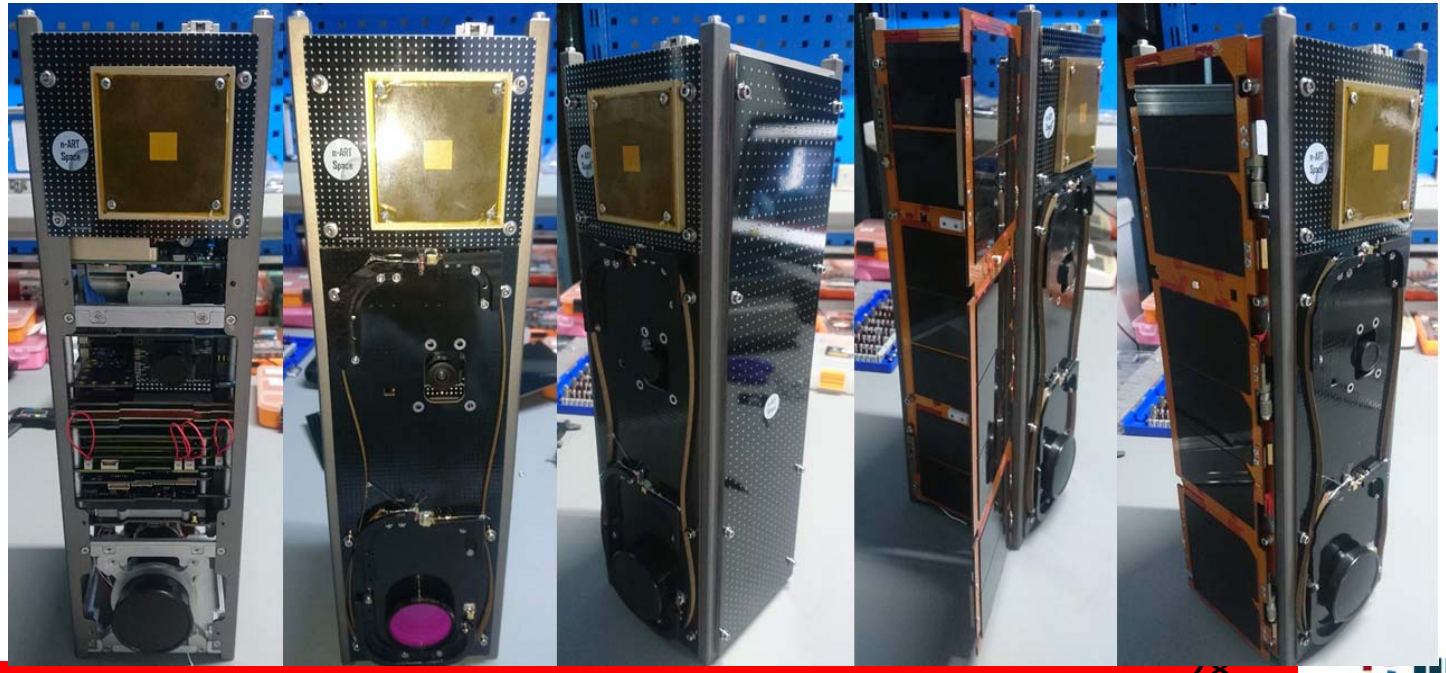
CubeSat Training at SAASST in Sharjah, Clean Room and CubeSat Design Lab

ASELSAT MISSION for ASELSAN Company

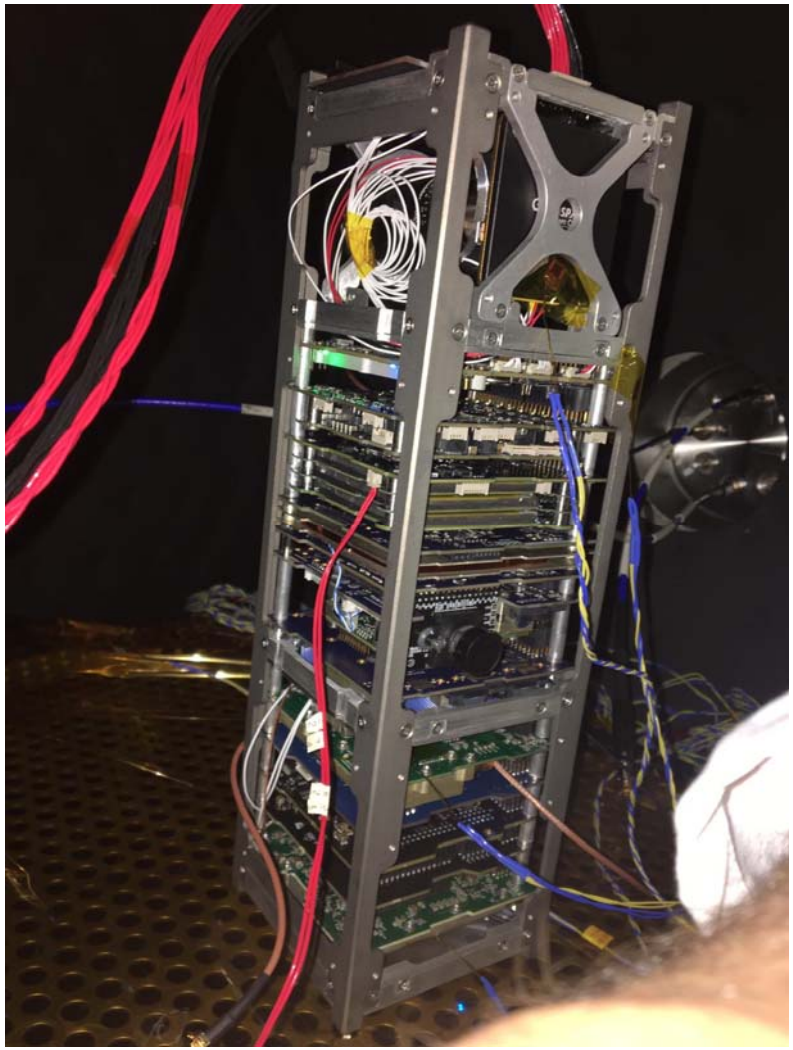


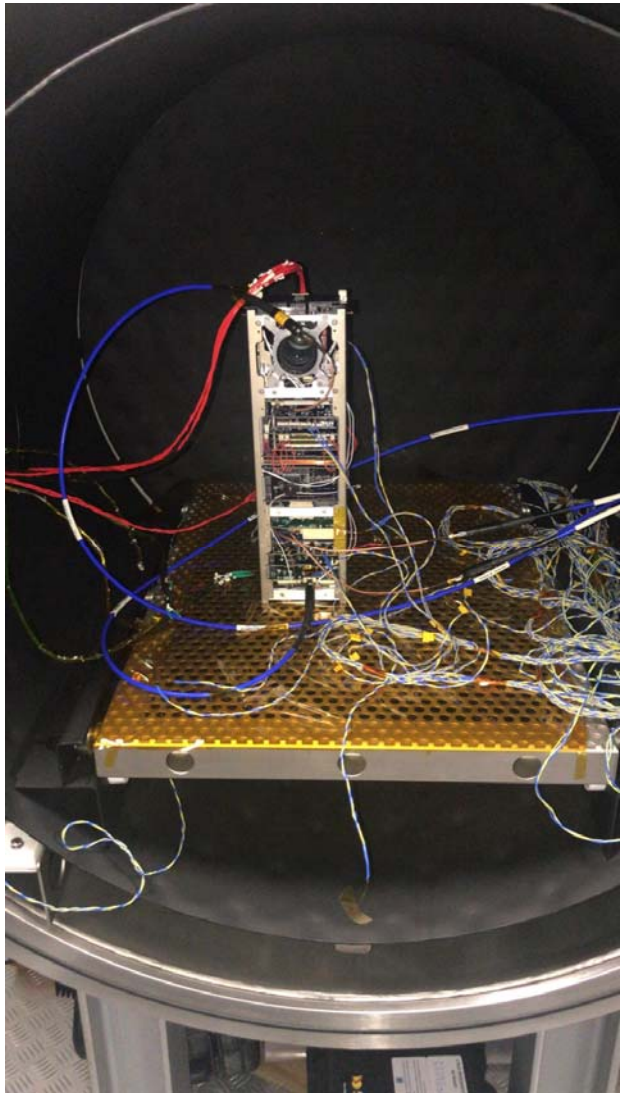




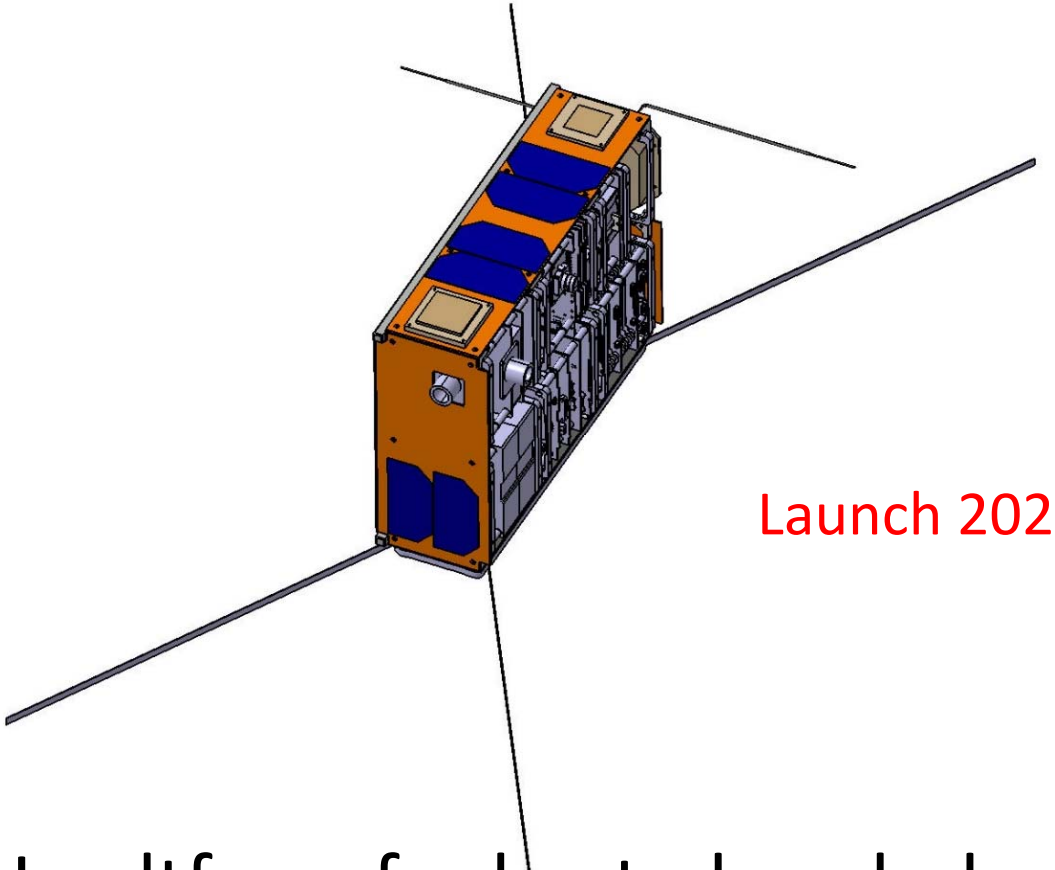


TVAC TESTING





STM -- PIRI-SAT, 6U

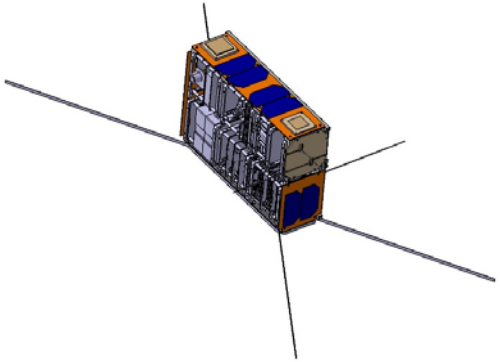


Launch 2020 or 2021

Modular 6U paltform for hosted paylods: to provide free platform and launch for payload developers without the burden of finding a satellite/launch

PROJECT TARGETS

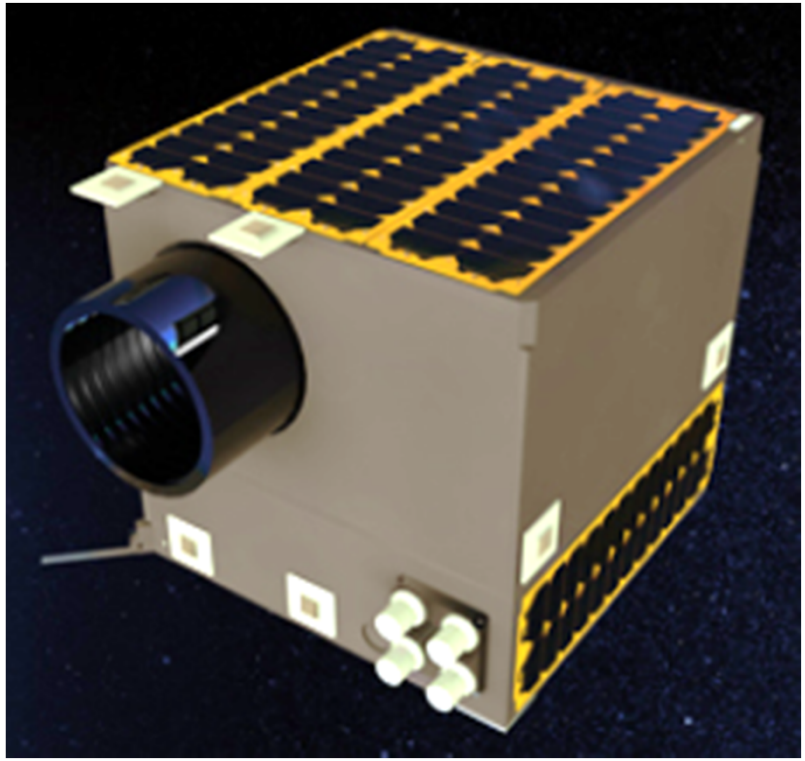
- Develop novel payloads for Turkey
- Develop a platform that can be used without major validation and verification for subsequent missions
- Encourage Universities and SMEs to develop nanosatellite payloads to increase involvement of people and institutions/companies in space Technologies
- Provide the opportunity to developing countries towards helping UN SDG 2030

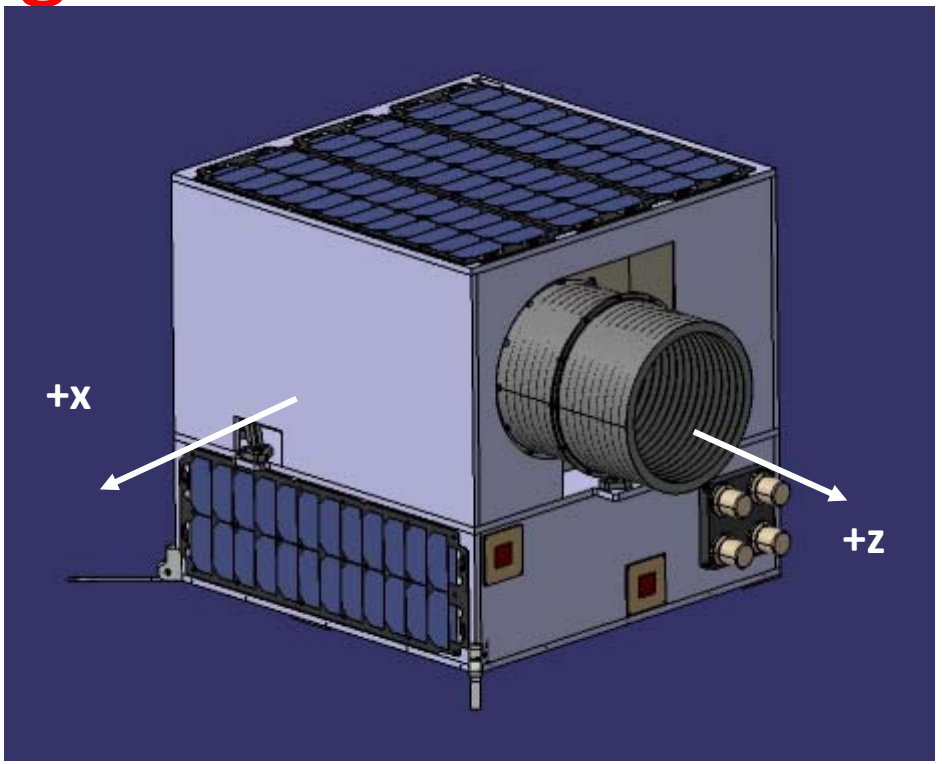


STM -- LAGARI UNISEC TURKEY

University Space Engineering Consortium

Launch August 2020





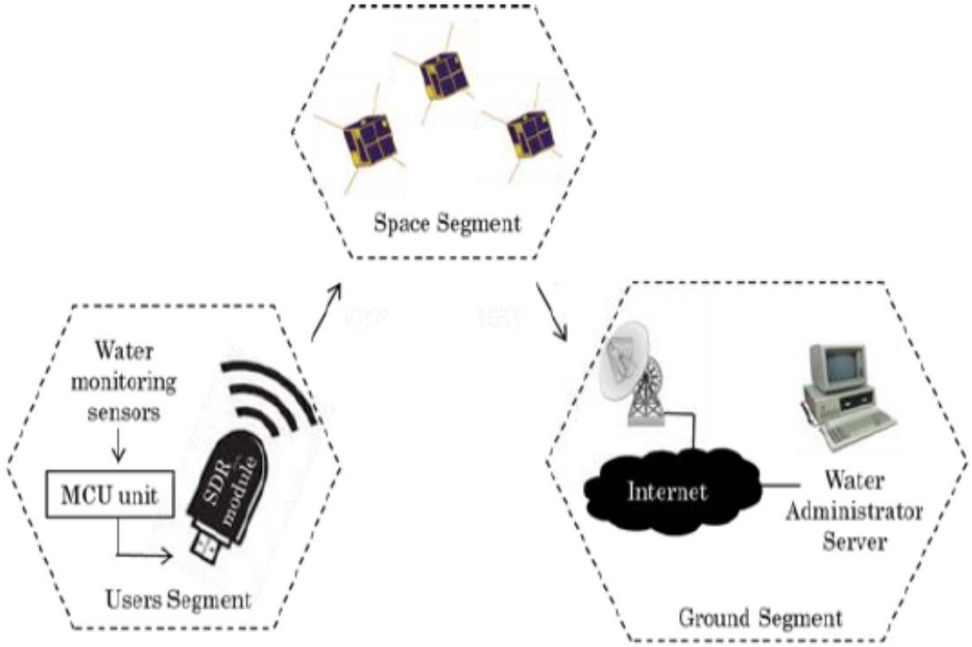
Hi Res EO, PAN <2m, MS<8m

Micro Sat, <70kg, operational satellite

UNISEC GLOBAL

University Space Engineering Consortium

TURKEY-TUNISIA PROJECT
Water Quality Monitoring with Network of CubeSats



CANSAT HANDS ON WORKSHOPS

- CANSAT Design and development WORKSHOPS in
- Turkey
- UAE (Univ of Sharjah)
- Lebanon (LIU-CNRS)

- Efforts towards 2030 goal

100 Graduate Students

UNISEC TURKEY
University Space Engineering Consortium

USTTL

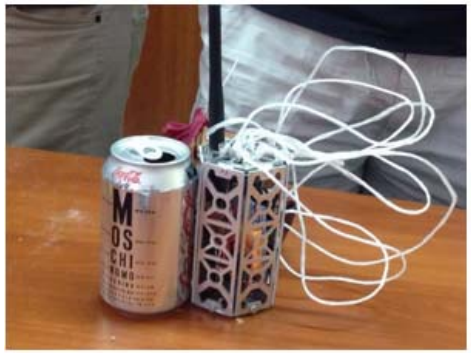
LIU

İTÜ

2nd CANSAT(MODEL SATELLITE) TRAINING

LIU, KHIARA CAMPUS, 23-28 SEPTEMBER 2019

CanSat – Model Satellite
Intro to CanSat, Mission Definition and Sensors



Prof.Dr. Alim Rustem Aslan
Manager, Space Systems Design and Test Laboratory
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Istanbul, Turkey
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İSTANBUL TEKNİK ÜNİVERSİTESİ
Ayarlardır Çağdaş

UNISEC GLOBAL
University Space Engineering Consortium

Course Content: “Cansat as an educational tool”

- Formation of the CanSat Teams (of 6 students)
- Intro to CanSat, Mission Definition and Sensors
- Introduction to CanSat Hardware and Software
- Introduction to programing of microcontrollers
- Introduction to programing of GPS
- CanSat Ground Station Development
- CanSat Structural Design
- CanSat Design and Development
- CanSat Decent and landing system design
- CanSat final Integration and functional checks
- CanSat drop test, ground station track and controls
- Post launch (drop test) analysis
- Reporting and presenting

DAY by DAY HANDS ON WORK

1. September 23: Intro, teaming, equipments and tooling, CanSat development on breadboard (table top model), STM MCU and buzzer operations
2. September 24: CanSat development on breadboard, rest of subsystems
3. September 25: CanSat development on PCB
4. September 26: CanSat development on PCB, placement in Structure and Drop Testing
5. September 27: Flight test in the field, post flight analysis, reporting
6. September 28: Presentations and grading, Ceremony

CUBESAT DESIGN and HANDS ON WORKSHOPS

UNISEC TURKEY
University Space Engineering Consortium

Arthur C Clarke Institute for Modern Technologies, Katubedda, Moratuwa

جامعة الشارقة
UNIVERSITY OF SHARJAH

CNRS
المجلس الوطني للبحوث العلمية
National Council for Scientific Research

ICASE
International Conference on Aerospace Science & Engineering

Sixth International Conference on
AEROSPACE SCIENCE & ENGINEERING
November 12-14, 2019
Islamabad, Pakistan

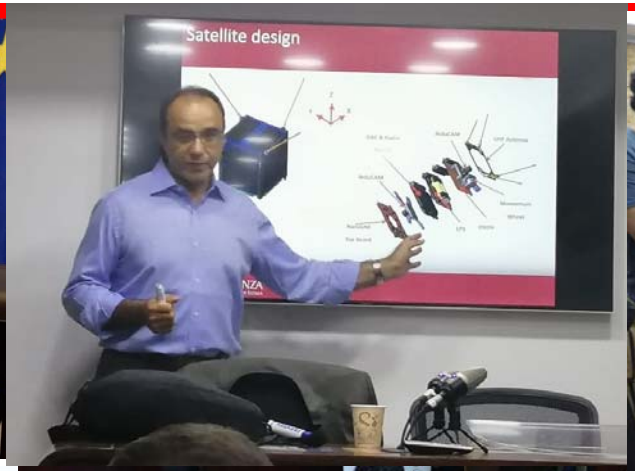
الجامعة اللبنانية
UNIVERSITE LIBANAISE

Workshop
On
Design of the 1st Lebanese Nano-Satelite
Organized by
Faculty of technology –Lebanese University, Saida
In collaboration with
Pr. A. Rüstem Aslan
From 30 September to 1 October 2019,
Faculty of Technology – Library Hall – Saida

الجامعة اللبنانية
كلية التكنولوجيا

UNISEC GLOBAL
University Space Engineering Consortium

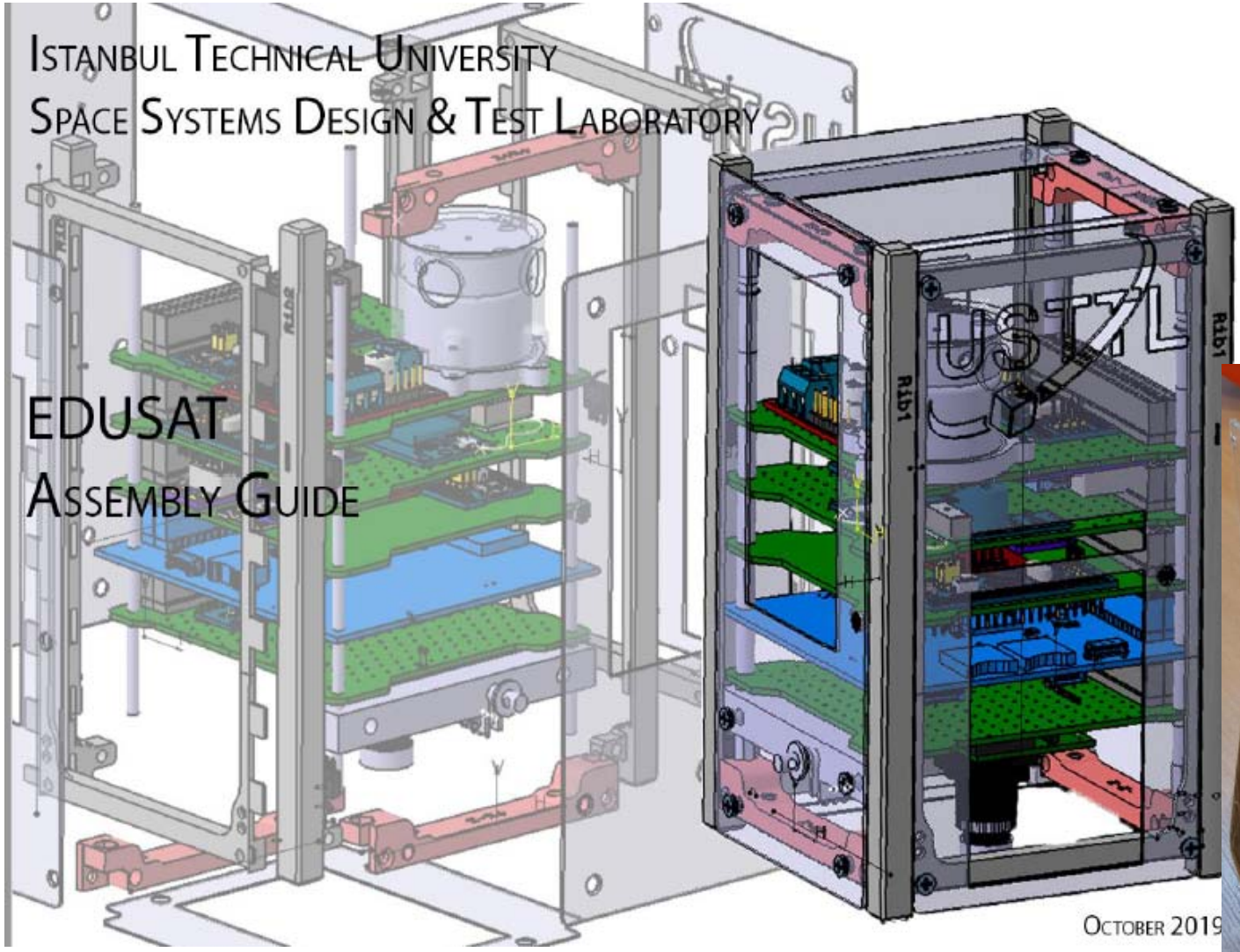
CubeSat design and hands on training to Lebanese Universities



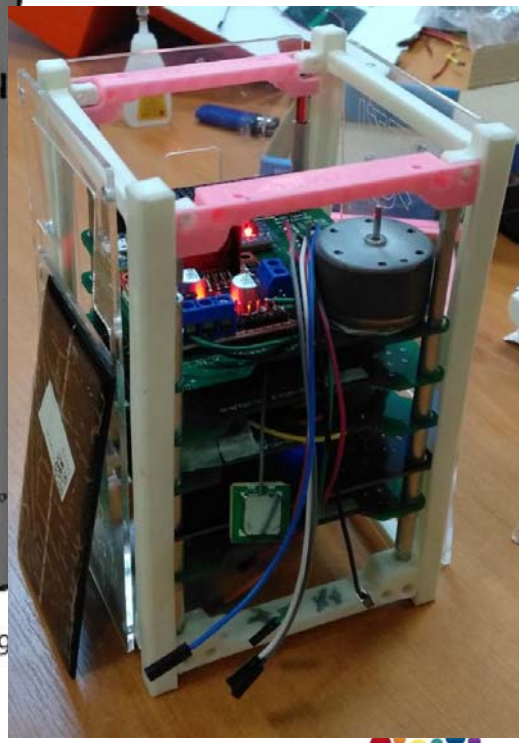
UNISEC GLOBAL
University Space Engineering Consortium

Amatuer GS Design and Establishment

Training CubeSat (EDUSAT)

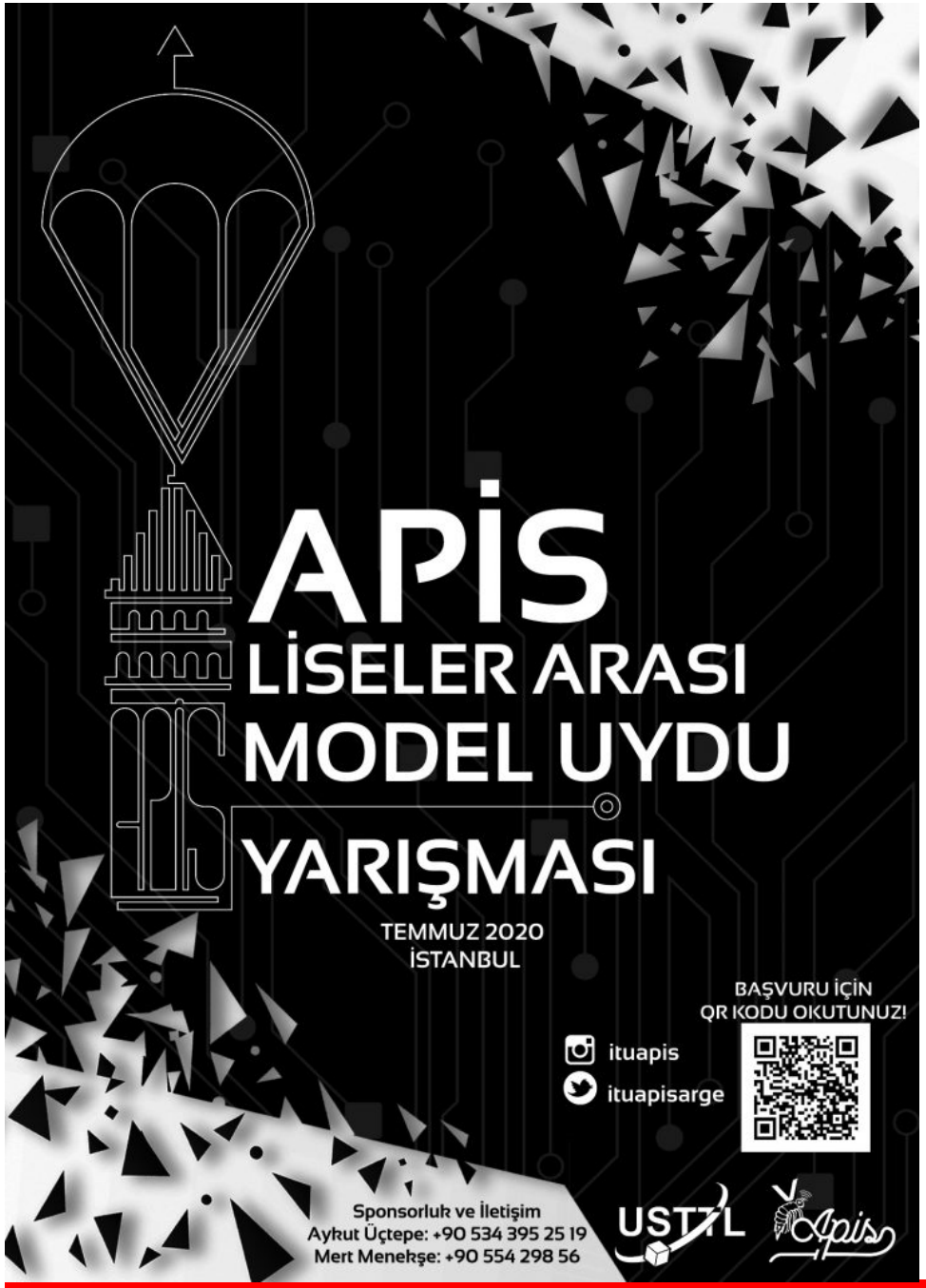


Develop actual mission software for CubeSat



CAnSat WS for BahceSehir High Schools (80 students)

SPACE MINING WORKSHOP



UNISEC TURKEY
University Space Engineering Consortium

APIS HIGH SCHOOL CANSAT COMPETITION July 2020

UNISEC GLOBAL
University Space Engineering Consortium

UNISEC TURKEY
University Space Engineering Consortium

TeknoFest 2020 National CanSat Competition

UNISEC GLOBAL
University Space Engineering Consortium

ITU-USTTL ROCKET, 2 CanSats

Plan for 2020 and beyond

- 8 th UNISEC GLOBAL and 10th NanoSatellite Symposium in Istanbul, July 2020
- Continue CubeSat projects
- Support to Regional Space Projects
- Support to schools and other educational institutions (space technology seminars)
- Keep it multidisciplinary, multi institutional and international

We Look Forward To a Sustainable Fruitful Cooperation

Towards being a civilization living in the Solar System

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