SPACE PROGRAM INITIATIVE IN LEBANON

CURRENT SITUATION AND FUTURE PLANS OF

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Lebanon
and
Outer Space Cooperation

Lebanon is a member of :

- The United Nations Committee on the Peaceful Uses of Outer Space
- The Arab Group for Space Cooperation
- The Regional Center for Space Science and Technology Education for Western Asia / United Nations

UNITED NATIONS
Office for Outer Space Affairs

ASCG
المجموعة العربية للتعاون الفضائي
Arab Space Cooperation Group

RCSSTEWA

Lebanon Space Initiatives

- Lebanon is a member of the United Nations Committee on the Peaceful Uses of Outer Space, the Arab Group for Space Cooperation and the Regional Center for Space Science and Technology Education for Westren Asia / United Nations
- Space-related activities started in the country in the 1960's with the installation of a terrestrial station for telephone communication through satellite.
- Lebanese Rocket Society had launched a total of 10 rockets between the years 1960 and 1964 with their most impressive ones being **Cedar IV (Arz 4)** that reached a height of 200km a little lower than where the International Space Station is today.
- With the recovery of peace in the early 1990's, some activities were resumed and efforts are being spent to reach new developments. At present, the application of space-related technology in Lebanon is restricted to the use of satellite capabilities in the following areas:
  - ✓Space telecommunications
  - ✓Space Education
  - ✓Meteorological information
  - ✓Earth observations - remote sensing

History of Lebanon's Engagement in Space Science and Technology

- In November 1960, a group of Haigazian College students got together under the guidance of Manoug Manougian (a Math and Physics instructor) to form the Haigazian College Rocket Society (HCRS).
- In April 1961, a single stage solid propellant rocket was Launched and reached an altitude of about one kilometer. With further improvements of the solid fuel system, a similar rocket called HCRS-3 was Launched all the way up to 2 000 m.
- On November 21, 1962 Cedar-3, a three stages solid propellant rocket prepared by the Haigazian group was launched. It had a length of 6.80 m and weight of 1250 kg.

National Center for Remote Sensing

The Lebanese National Council for Scientific Research decided in early 1995 to establish the National Center for Remote Sensing.

The aims of the Center include the following:

- ✓ Formulating and implementing scientific and planning programs needing remote sensing technology.
- ✓ Cooperating with and assisting the public and private sector organizations, institutes, etc. in planning and implementing the use of remote sensing and geographical information systems (GIS) in their operations, with emphasis on environmental concerns.
- ✓ Securing databases from satellite imagery on a timely basis in different areas and disciplines and making the information available, as needs arise, to the public and private sector.

Lebanese International University

- Largest private university in Lebanon:
  - 9 Campuses in Lebanon
  - 3 in Yemen
  - 1 in Senegal
  - 1 in Mauritania
- Student body around 35,000
- Five schools in Lebanon:
  - Engineering
  - Pharmacy
  - Education
  - Business
  - Arts & Sciences

LIU: Introduction to Space Technology Course

- Launched at the Lebanese International University under an MoU with Istanbul Technological Institute (2018 and 2019)
- Delivered as multidisciplinary course at upper undergraduate/entry graduate level course (3 credits)
- Applied as a 6 days CanSAT boot camp
- Drawn attention and interest of many students toward space science and technology

LIU: Introduction to Space Technology Course Topics

- Mission selection and definition
- Sensor technology
- CanSat hardware
- CanSat software
- GPS and RF communication
- Ground station development
- CanSat structural design
- Launch and post launch analysis

Other Universities Activities

- Saint Joseph University (USJ) recently introduced a hands-on course: "Introduction to Space and Micro/Nano Satellites Technologies (32Hours)
- Many students clubs exists (astronomy, HAM Radio, etc..)
- Promotion at universities is done for space related education (e.g., LIU)

The National NanoSatellite Project

Nanosatellite Project Objectives

- Develop Capacity Building in CubeSat Technology
- Establishing a Space Program Governance Structure
- Establishing a First Proposal of a Roadmap for Launching Lebanese NanoSatellites
- Public Awareness to Space Technology

Considered as Phase "o" toward developing Lebanese NanoSatellites & establishing a Space Program in Lebanon

Develop Capacity Building in CubeSat Technology

- Group meetings and seminars leaded by the **CNRS-L** with **12 Lebanese Public & Private Universities**
- **50 full working days** of lectures and hands-on technical and management trainings
- Trainings leaded by **Prof. Alim Rustem Aslan, Prof. Fabio Santoni and Prof. Fernando Aguado.**
- **45 Researchers & 42 Students** are officially involved in the project representing the 12 Universities.

Engage researchers and students from Universities

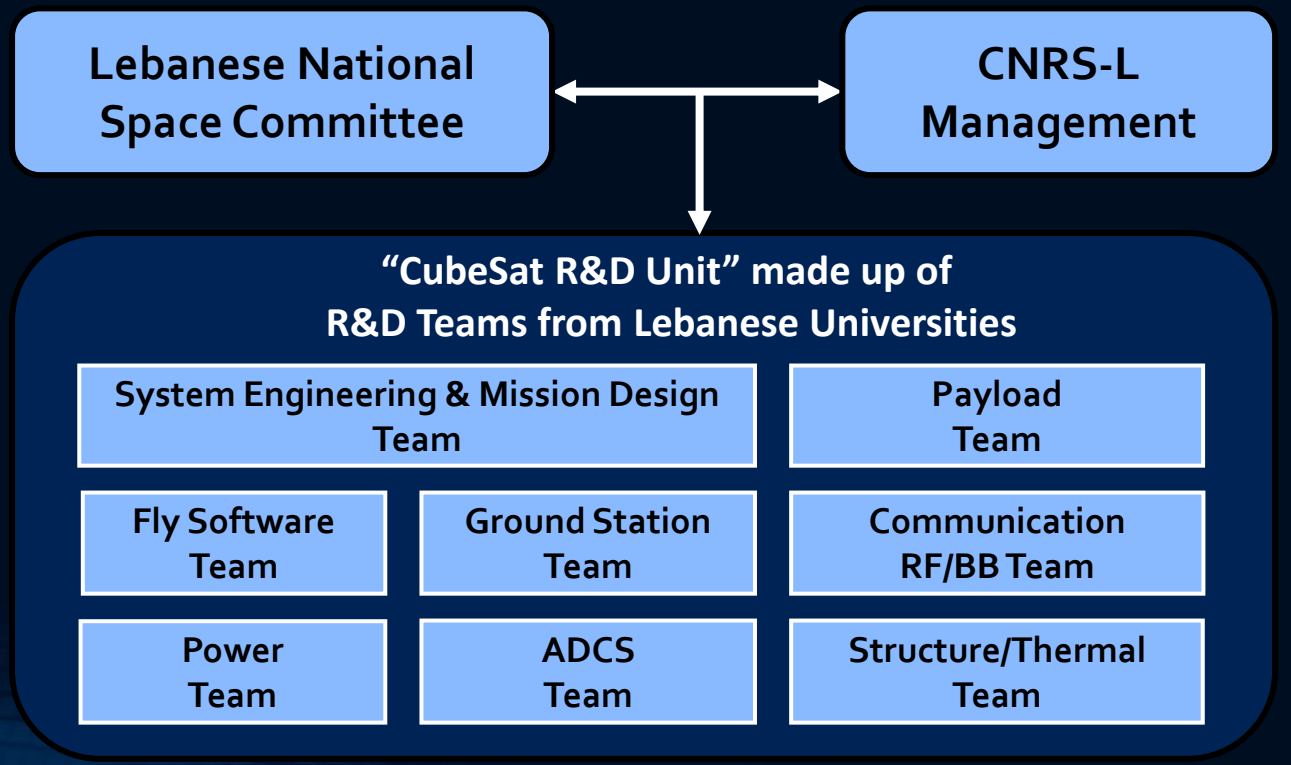
Organizing trainings conducted by International Senior experts

Involve Public & Private sector, Scientific NGOs

Establishing a Space Program Governance

- **Lebanese National Space Committee (LNSC) was formed from**
  - Representatives of 12 Universities in Lebanon (the public Lebanese University and the 11 main private Universities)
  - Representatives of the “National Center for Remote sensing”
  - Experts and Consultants

- **The LNSC will lead the development of space activity in Lebanon:**
  - **The first step was to realize a first** draft of the roadmap specifying the phases that should follow the first project to ensure program continuity and sustainability.
  - The committee will also work on the establishment of a **CubeSat R&D unit**.



Future Plans and Possible Cooperation

Online Courses

- Run online courses in space and nano-satellite technologies (e.g. HEPTA-Sat with UNISEC support)
- Develop specialized entry level multidisciplinary online courses for Lebanese universities

Erasmus Mundus Joint Master Degrees

- Under the umbrella of CNRS-L develop a space education program leading to a degree of Master of Science under Erasmus Mundus Joint Master Degrees program
- Partnership and cooperation with European and regional universities (e.g., ITU Turkey)
- Support from UNISEC