

THE 1ST UNISEC-GLOBAL MEETING, 23-24 NOVEMBER 2013
THE UNIVERSITY OF TOKYO, JAPAN



BUILDING A UNIVERSITY CONSORTIUM IN SPACE TECHNOLOGY IN TUNISIA



Country Reports

Prof Kamel BESBES



Microelectronics & Instrumentation Lab
University of Monastir - Tunisia

TUNISIAN SPACE OFFICIAL AGENCIES

- National Commission for Outer Space Affairs.

coordinate the activities of the various ministerial departments and organizations concerned with outer space.

- National Remote Sensing Center:

multi-disciplinary group (Agronomists, Geologists, Oceanographers, Cartographers, Geographers, computer scientists) qualified in Image Processing and Geographical Information Systems and related applications.

- National Institut of Meteorolgy

To consolidate the development potential in space technology and Tunisian governmental space program

- We try to build a New **Tunisian University Network** to develop learning and training in space engineering

In regard to Japan-Unisec experience

TUNISIAN UNIVERSITIES

- 11 millions population
- 13 universities
- 22400 Teachers
- 340 000 students
- 1/3 in Fundamental sciences, engineering, Informatics, multimedia,...



New opportunities

**Space technology is an attractive discipline
when it becomes available**

HOW TO UNITE MULTIDISCIPLINARY ACTIVITIES FOR SPACE

Basic approaches:

- Offer and Respond to new creative and innovative ideas related to National and regional needs
- Integer new standards and increase performance
- New technological solutions Development and improvement in Technologies
 - Decrease Mass, Volume, altitude, cost ...
 - Construction/Materials
 - Propulsion
 - Optics
 - Microelectronics
 - Micromechanics
 - Communication
 - Navigation
 - Computer Technology (Space & Ground Segments)
 - Specific Applications



University Space Engineering Consortium **TUNISIA**

UNISEC



**University
of Monastir**
Pr Kamel
BESBES

**University
of Sousse**
Pr Chokri
SOUANI



**Mission projects
& Ground station**

**UAV, Recognition
Embedded systems**

**University
Consortium**

**Sat Design
Power Systems**

**Antennas, RF
communication**



**University
of Sfax**
Pr Mohamed
Adel ALIMI

**University
of Tunis El
Manar**
Pr Ali
GHARSALLAH

CHARTER UNISEC TUNISIA CONSORTIUM



Is a nonprofit organization

Formed to support, in Tunisian universities and its environment, the development activities of promotion, education and research in space science and technology.

The consortium aims to compose **a network of excellence** to bring together the **human, financial, material** to raise the level of international attractiveness of Tunisia in space science and technology.

WHY SPACE ACTIVITIES ?



The society of tomorrow will be very related to **space activities**...

To be or not to be ... able!

Our activities are basically to

- Advise teachers, researchers, students, government, economic actors and medias
- Sensitize to Human resources development in order to:
 - Produce **future socio-economic actors**
 - **Attract industries**
 - and **new business** at the challenges of the 21st century
- **Still Open to those who wish to join us**

WORKING GROUP ROADMAP



- **Promotion of National projects:**
 - prototypes, experiments and launch operations, imaging, Monitoring, ground station, safety methods, Cansat....
- **Working on Fundraising and Project Support:**
 - design satellites, water monitoring, ground station, devices and antennas ..
- **Promotion of the alliance:**
 - Research-Education-Business-Industry-Government-Agencies
- **Organization of events:**
 - conferences, competitions, calls for mobilizing actors collaboration
- **Federation and dissemination:**
 - Training supports and academic activities in the field.
- **Promotion of International Cooperation:**
 - (IAA, UNOOSA, BSTI, UNISEC, other organization and universities...)

OUR OPPORTUNITIES TO LEARN :

[1] UN Symposium on Small Satellite Programmes for Sustainable Development: “**Payloads for Small Satellite Programmes**”, 21-24 September 2010, Graz, Austria

[2] UN Symposium on Small Satellite Programmes for Sustainable Development : “**Implementing Small Satellite Programmes: Technical, Managerial, Regulatory and Legal Issues**“ 13-16 September 2011, Graz, Austria

[3] UN/4th **Japan Nano-Satellite Symposium, Paradigm Shift Changing Architecture Technologies and Players**, Nagoya, Japan, 10-13 October 2012, and 2nd Mission Idea Contest (MIC2)

[4] 6th International Conference on Recent Advances in Space Technology, **New Ways of Accessing Space for the Benefits of Society**, 12-14 June 2013, Istanbul Turkey

[5] United Nations / United Arab Emirates **Symposium on Basic Space Technology “Small Satellite Missions for Developing Space Nations”** Dubai, EIAST, UAE October 2013

[6] 5th **Japan Nano-Satellite Symposium, Missions and Enabling Technologies Towards**, Tokyo, Japan, 20-22 November 2013, **Future** and 3rd Mission Idea Contest (MIC3)



WE ARE NOW ACTOR IN SMALL SATELLITE PROGRAMS:

- ▣ Mic 2 and Mic 3 Maghreb coordinator (2012-2013)



- ▣ Organise: *1st MIC-ST Monastir –Tunisia April, 10-11-12, 2012*

- ▣ The 1st Maghreb International Courses in Spatial Technology, -

- ▣ IAA: Proposal for Forming an IAA Study Group (2013)

- ▣ Title of Study: Review and perspective on the use of spatial networks for the development of the information society in africa

- ▣ Proposer(s): Dr. Mustapha MASMOUDI, Secretary: Kamel BESBES

- ▣ WLM- Water Level monitoring - International Group

- ▣ We try to contribute to Humsat, GENSO standardization programs

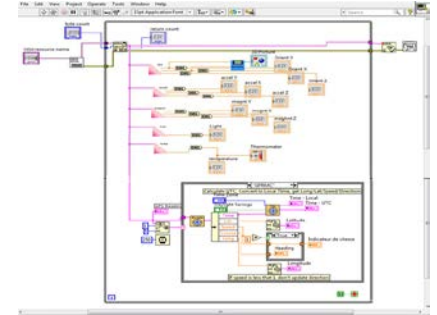
- ▣ Develop international network

CURRENT PROJECTS 1



University of Monastir :

- **Developping small satellite capabilities**
 - Design and Validation of Small Satellite Ground Station
 - Smartphone based small satellite prospection
 - Small satellite communication protocol optimization
 - RF-small Satellite circuits design
 - Synthetic vision with small satellite network
- **Real-time Monitoring and analysis of water level and quality via satellite**
 - Automatic Remote Sensing Image Descriptor for Urban Evolution and Flood Detection
 - Building a multisensor beacon GPS positionned for Space water control
 - Development of a positioning technics by multi-sensors fusion system



University of Sousse :

- **Intelligent methods development for intuitive image recognition and dynamic positioning**

Current projects 2



University of Sfax :

- **Design and Prototype devices and subsystems :**
 - Multi-Microstrip Antennas Network Fuzzy Controlled
 - Contribution in the study and design of intelligent Cube sat
 - Image Capturing and Processing System for PicoSatellite
 - Ultra low power consumption DHB and intelligent Subsystem Development



University of Tunis :

- **Optimizing communication and antennas:**
 - Development of planar Antennas for L-band (meteo Satellite)
 - RF circuits, frequency converter and amplifiers



SPACE TECHNOLOGY COURSES



University of Monastir

- Based knowledge in space physics and technologies
- Satellite Telecommunication
- Global Positioning Systems
- Signal and image processing
- Small satellite design



University of Tunis

- Space communication systems
- Smart antennas design



University of Sfax:

- History of Space Flight
- Small educational satellites design
- Space communication techniques
- New remote sensing technologies and applications
- Space Law and contribution to peace and security
- I-SAT: Intelligent Satellite (ERPSat-1)



University of Sousse

- Embedded Systems for Autonomous Aerial Vehicles
- Image processing and recognition

CONCLUSION



- We work to be ready for being a “space application” emerging nation
- No emergence of space interest economy without national efforts
- Challenges :
 - To develop a positive image by regional application interest
 - Start and reduce difficulties step by step
 - To work for Political and Financial support
 - Orientate some existing and new educational issues to space technology and application
 - New research subjects related to space technology

MIC Coordination



THANK YOU