The Second UNISEC-Global Meeting
November 18-20, 2014, Kitakyushu, Japan

Recent advancements in building UNISEC Tunisia

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**

- We need more and more !!!

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

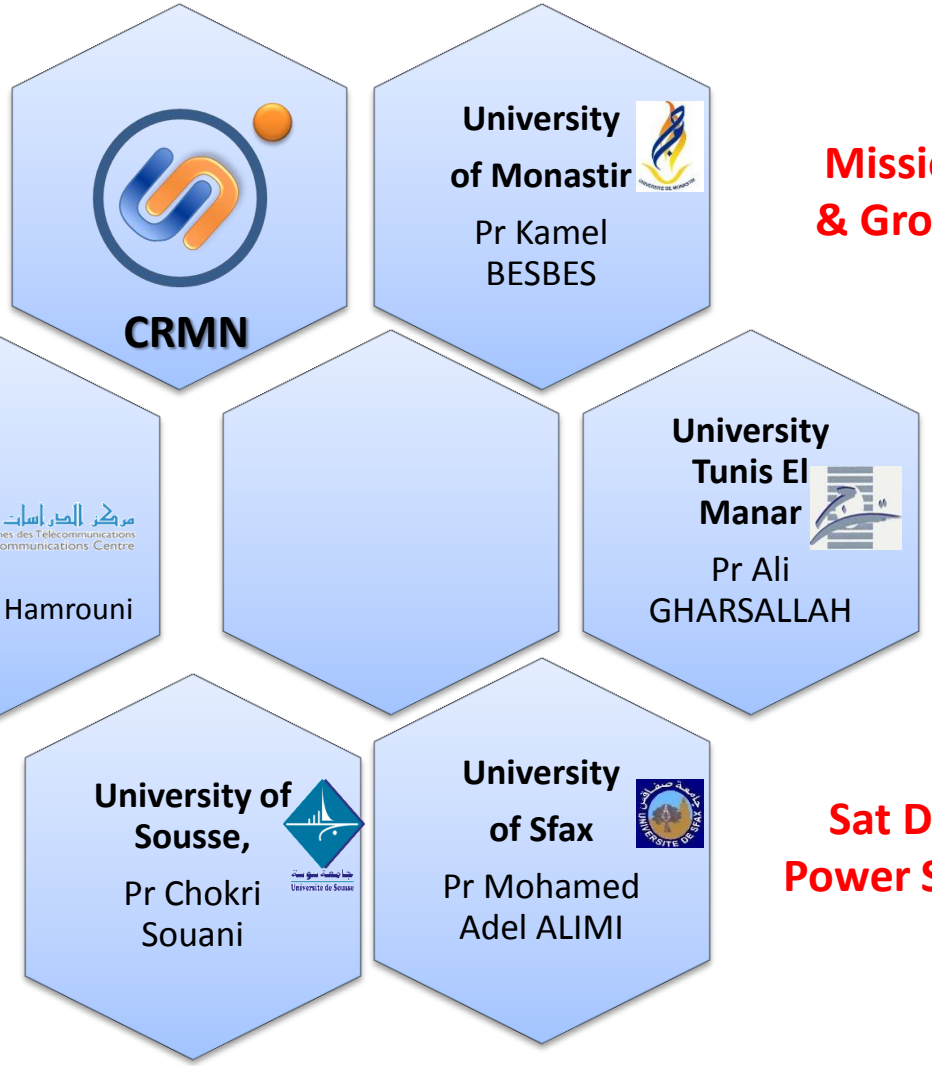
University Space Engineering Consortium TUNISIA

UNISEC

- 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 ….. And Unisec Global
- In consequence, with other universities and research centers, we founded a consortium to create UNISEC Tunisia.
- The group is sensitive to the importance of new ideas and original technological developments especially for our region needs and local development models.

University Space Engineering Consortium TUNISIA

UNISEC



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...)

UNISEC Tunisia, action Plan

Satellite-based water control tags,
for real-time telemetry
A collaborative project

- We organized special seminars, with a prestigious scientist, to PhD students and senior researchers.
- To develop technical means, the ground station is under construction at the University of Monastir and cubesat mounting laboratories at the University of Sfax.
- New orientation of microelectronics, signal processing, energy distribution, RF and antennas subjects are conducted in relation with nanosatellite design and water control applications.
- We develop original new microsensors and microsystem elements for space or ground segments.

Regional cooperation

- As an important project, we are currently developing a new mission with CRTEAN to control water quality and quantity for health and environmental applications.

- CRTEAN is the Regional Centre for Remote Sensing of northern Africa states. It depends on UN-ECA and is constituted by 7 countries in the sub region of North Africa:
- Algeria, Libya, Morocco, Mauritania, Tunisia, Egypt and Sudan.

We want to be actors in small satellite programs:

- Mic 2 and Mic 3 Maghreb coordinator (2012-2014)

- Organise: seminars *1st MIC-ST Monastir –Tunisia*
  - The 1st Maghreb International Courses in Spatial Technology, ***April, 2012***
  - The 2nd Maghreb International Courses in Spatial Technology, **March 2014**

- 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

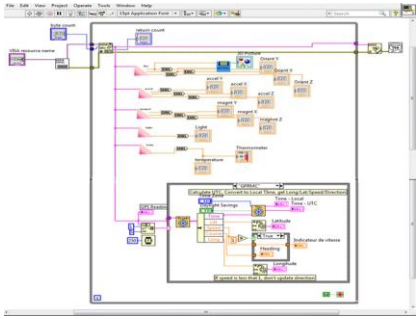
- We try to contribute to Humsat, GENSO networking

- REGIM produces also two phd in Nanosatellite contribution and seminars

- 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
  - Lab-on-Chip for water analysis

University of Sousse :

- **Intelligent methods 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 training

University of Monastir

- **Based knwoledge 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**

University Space Engineering Consortium TUNISIA
UNISEC

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 and global challenges (water)
- Why not to develop a regional group:
  - Mediterranean work group (SP – TK – TN-…)
  - or **MENA** ***MIDDLE EAST*** **NORTH AFRICA**

MIC Coordination

University Space Engineering Consortium TUNISIA
UNISEC