Recent advancements in building UNISEC Tunisia

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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
• 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.
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:

• 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

  - 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:**

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

**University of Sousse**
- Embedded Systems for Autonomous Aerial Vehicles
- Image processing and recognition

**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 Tunis**
- Space communication systems
- Smart antennas design
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

UNISEC