



CubeSat activities in ETSIT-UPM

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Associate Professor

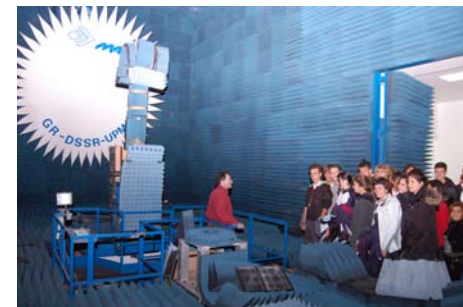
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Who are we?

- **UPM: Technical University of Madrid**
 - +4000 faculty staff, +40000 students
 - 21 Engineering Schools (incl. Telecomm and Aeronautics)
 - +200 Research Groups, +10 Research Institutes
- **ETSIT: Telecommunication Engineering School**
 - +200 faculty staff, +1300 students, +30 PhD thesis/year
 - Expertise in:
 - Communication systems
 - RF and antenna technology
 - Digital Signal Processing
 - Electronics and Photonics
 - Networks and Services
 - Projects with ESA, EC and private companies

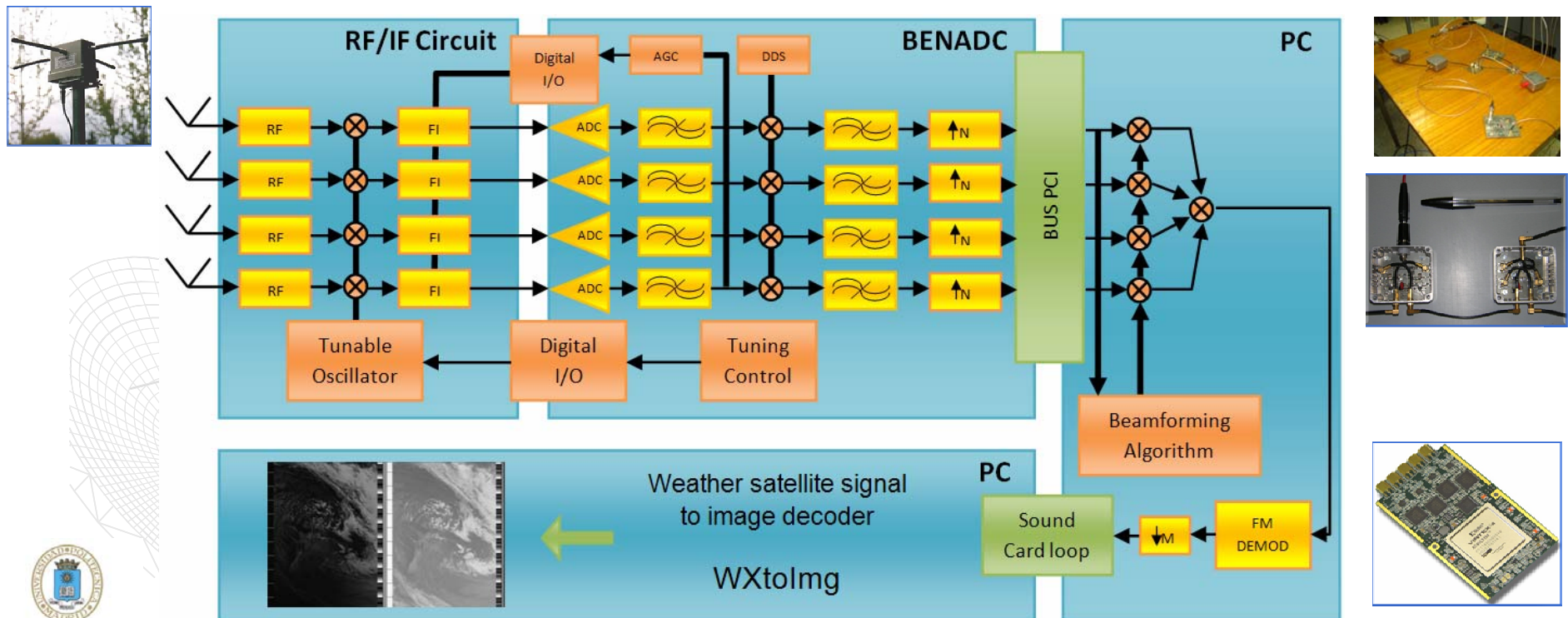


- **In the near future, larger small satellites constellations with higher communication requirements**
 - Large sensor network
 - *Network issues (architecture, cooperation, DTN)*
 - More complex ground segment
 - *Frequency allocation and coordination activities*
 - *Use of antenna arrays in ground stations*
- **Trend to innovative services and applications**
 - Higher data rates required and larger number of stations/users
 - More efficient terminals/sensors required
 - *Smart allocation of communication resources*
- **Communication between small satellites required to improve system performance**
 - *Secondary payload opportunity*



A³TB (Adaptive Antenna Array Test-Bed)

- 4-elements Software-Defined Radio receiver array (FPGA)
- Flexible test-bed to evaluate receiver and beamforming algorithms
- Field trial with VHF signal from NOAA satellites (APT)
- Focus on digital beamforming implementation
- Suitable hands-on platform for training and education (lab)



Our education activities in Small Satellites

- **We started in 2006 ...**
 - Evaluation of a “*Software Defined Radio Ground Station*” reconfigurable to adapt to link requirements
 - Cooperation with Narvik University College
 - Education Project (shall be used as a lab for SatComs and operations)
 - Support to students to upgrade a ground station (compatible with GENSO)
- **Courses**
 - Satellite Communications Systems
 - Picosatellite and ground station design (with invited lecturers from ESA and industry)
- **TelCUBE**
 - Hands-on activity to encourage students developing new concepts for small sats constellations
a killer application...
- **Master in Space Technology**
 - Focus on Space System Engineering and Space Project Methodology



Support and Cooperation

- UPM (University) recognizes and supports TelCUBE as an Innovation Project in Education
- ETSIT (Telecomm School) supports TelCUBE as Interest Activity to Promote the Students' Motivation
- Local space industry supports the project
- Open to international cooperation
- Our scope is to start a cubesat project and continue with our activities in ground stations/user terminals
- Proposal of new concepts and applications for small satellites
- Provide our expertise in communication systems



Contact information

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