Horizon 2020 Secure Societies European Info Day and Brokerage Event

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**ICCS - Institute of Communications & Computer Systems, Athens, Greece,**

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- **ICCS – Institute of Communications & Computer Systems of the National Technical University of Athens (NTUA)**

- **MFOL: Microwaves & Fiber Optics Lab - established since 1984**
  - academic Lab of SECE/NTUA and a very active research lab of ICCS

- **The largest Hellenic University Lab**
  - in terms of Lab infrastructure and equipment

- **A wide variety of activities in a broad research spectrum**

- **in the RF/Microwaves field:**
  - **radar systems, remote sensing**
  - **and generally in the area of radio and satellite communications**
  - microelectronics, electromagnetism applications
  - applications of embedded systems and sensors
  - **measurements up to 50 GHz and up to 110 GHz**
    - Network Analyzers, Spectrum and Communication Analyzers
    - Faraday shielded enclosure and Anechoic Chamber
    - Advanced CAD Software (ADS / HFSS, Keysight Technologies)
    - Sensor's software using Labview, HP VEE, VISUAL C++ and MATLAB
    - EM field calculations & EMC/EMI measurements

➢ **Design and Development of Special Purpose Radars and Signal Processing**

■ *Development of SAR (low frequencies VHF/UHF and higher i.e. X-b*

- ■ Extensive experience in SAR image / signal processing
- ■ Ground / foliage penetration and detection
- ■ Aiming at static and moving targets detection
- ■ various methodologies (CW/FM-CW, UWB and other)
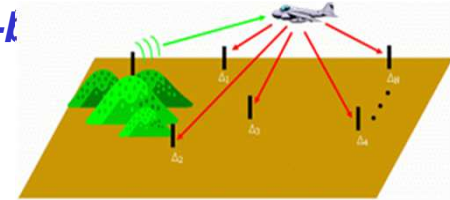
■ *Current research activities are in the fields of ISAR/InSAR studies:*

- ■ Investigation of the feasibility of using radar signatures for
- ■ targets classification and identification
- ■ 2D and 3D radio-coverage modeling in cellular wireless systems studies, development and design of Wi-Fi networks and satellite network interpretations.

■ *Detection of small flying objects / airborne threats with low RCS (i.e. small UAVs / drones, unmanned devices) based on active and passive sensors*

- ■ monitoring and detection of anomalies through combined radar and acoustic devices
- ■ Based on existing MFOL's laboratory prototypes (small Doppler radars at microwave bands combined with acoustic transducers and high sensitivity microphones)
- ■ signal processing and beamforming techniques
- ■ Potential intrusion events extracted to determine the movement of objects / drones.
- ■ Technical assessment is held through commercial Drones (DJI Phantom 3 Advanced)

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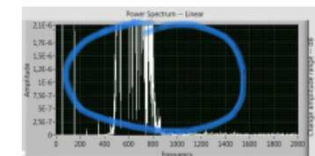
- ***Electronic Surveillance Systems for heavy loaded electromagnetic environments in VHF and UHF bands***
    - Advanced techniques for the surveillance and management of the EM spectrum
    - using both analog and digital techniques
    - for signal regeneration at extensive frequency bands and large dynamic ranges

- ***Multistatic UHF Early warning radar and Detection of small moving targets***
    - ***Data Fusion of multiple multistatic radars***
    - Cross-correlation fusion, Reconstruction of core evaluation
    - Reinitiating of local and central filters
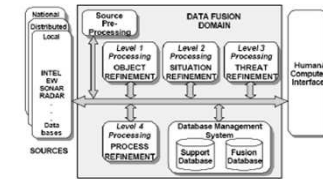
- ***Life Detector Radar*** for people trapped in buildings in case of earthquakes
    - Various frequencies 433 MHz, 2,45GHz, 10GHz

- ***Computational EM scattering problems***
    - Inverse scattering problems
    - EM scattering problems by jet engine inlets
    - Radiating antenna systems in the presence of reflectors
    - Use of distributed processing techniques for the solution of resonance, scattering and/or radiation problems.
    - Modelling with distributed objects (typical system modelling languages, UML, IDL).
    - Programing on CORBA platform (using Java or C)
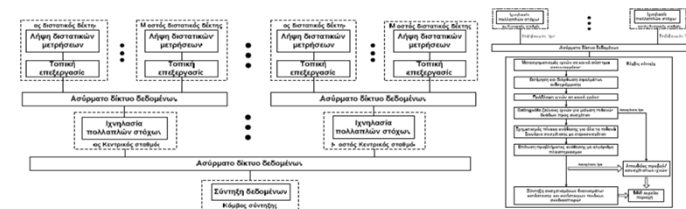
- ***Design of RF Microwaves & mm-wave Telecom systems***
  - RFIC / MMIC and Hybrid (MIC) systems and subsystems
  - Digital Microwave Radios (2-18 GHz) & surveillance receiver in 8-10
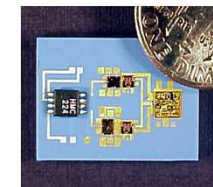  - Full System Analysis through in house software
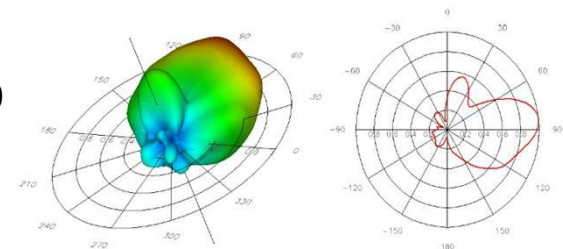
- ***Design, simulations and development of antennas / Arrays***
  - Conformal, Planar, L, S, X, Ku-band, multiband, miniature
  - adaptive & electronically beam steering 10 GHz
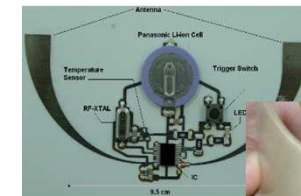
- ***Satellite Communications***
  - Ku-band / L band RF front-end SatCom Transceiver
  - Broadband portable sat terminals 14GHz, 20GHz
  - DVB/RCS terminals

- ***Wireless Sensor Networks applications***
  - sensors, active RFID and printed antennas in Flexible materials
  - power scavenging techniques and disitributed sensing intelligence
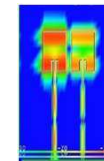
- ***Optical Systems***
  - designing and developing of optical transmitters and receivers, optical circuits and fiber waveguides, design of super high speed Gbit/s electronic circuits

- ***EM field calculations for wave propagation - Computational Electromagnetism***

➢ ***2017 Call topics we target:***

➢ **BES-16-2017: Through-foliage detection including in the outermost regions of the EU**

➢ **BES-15-2017:** Risk based screening at border crossing

➢ **BES-18-2017:** Acceptance of no gate crossing point solutions

➢ **Possibly BES-17-2017:** customs risk management – intern. good supply chain trade movements

➢ **CIP-1-2017:** physical and cyber threats to the Critical Infrastructures of Europe

➢ **FCT-12-2017 subtopic 2:** Technologies in the context of fight against crime and terrorism

➢ **Possibly FCT-10-2017:** Integration with utility provider's network

➢ Role: ***partner** - WP leader or S/T provider*

➢ **Seek to cooperate with:**

– Coordinator experienced in data fusion topics or integrator

– academic institutions/ research centers; radar and other sensors processing and data fusion

– Providers / companies : offering surveillance platforms

– SMEs i.e. in optical imagery to incorporate user / application experience

➢ **Recent Projects Highlights:**

➢ **H2020:** BES-5-2015 - land border security**: "iCROSS - Intelligent Portable ContROl SyStem"**

➢ **MFOL has been:** Partner and Coordinator in quite many National and European research projects (ICT, SPACE etc) and has close cooperations with the Hellenic Navy, the Hellenic CoastGuard etc

# Thank you for your attention!!

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