nSHIELD project
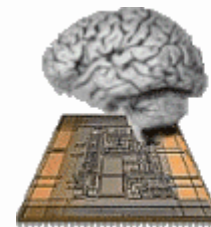
DIBE research unit expertise, roles and expectations
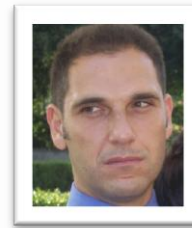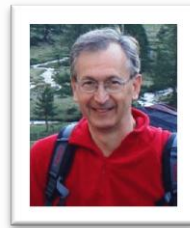
UNIGE research group

DIBE research group for nSHIELD project is coordinated by Prof. Regazzoni and is composed by

- 3 Full Professors
- 2 Assistant Professors
- 5 PhD students

(some of them)

Main research topics:

- Communication and Cognitive Radio
- Smart Embedded Application
- Microelectronic systems for telecommunications

Research group expertise

- **Communication and Cognitive Radio Area:**
  - Radio-Mobile Channels Modeling
  - Terrestrial, Satellite and Indoor Communication Systems Simulation
  - Signal Processing for Cognitive Radio Systems
  - Advanced Pattern Recognition, Automatic Decision and Reasoning for Cognitive Radio Systems
  - Signal Processing for Advanced Localization Systems
- **Smart Embedded Application**
  - Computational intelligence - models and applications
  - Objective assessment of visual quality
  - Text and document clustering
  - Security - intelligent data/signal processing
  - Network Security - intelligent methods for Intrusion Detection and Defense
  - Embedded electronic systems - design and realization
- **Design and development of mixed-mode (analog/digital) Integrated Circuits for telecommunication systems (wireless and wireline)**
  - Design of a full custom PLL Integrated Circuit in a 0.8 µm CMOS technology for 25 - 50 - 75 MHz CK frequency generation
  - Adaptive equalization of digital transmission channels based on a neural network approach and its real-time implementation through mixed-mode microeletronic systems. Application to xDSL and fastEthernet.
  - Design of IF A/D converters with 10 - 12 bits accuracy

nSHIELD project tasks

- **T3.4 (Dependable self-x Technologies) – 20 mm:**
  - ❑ Study of reconfigurable hardware SPD platforms
- **T3.5 (Cryptographic technologies) – 15 mm:**
  - ❑ Study of elliptic curve cryptography (ECC) Koblitz curves
- **T4.1 (Smart SPD driven transmission) – 20 mm:**
  - ❑ Study of novel techniques for radio resources usage improvement for embedded applications
- **T4.2 (Distributed self-x models) – 5 mm:**
  - ❑ Study of multiple antennas or cooperative terminals for improving radio resources usage

nSHIELD expectations

- The main expectations of the research group with respect to the nSHIELD project are related to:
  - Study and development of novel algorithms for improving SPD of the nSHIELD architecture at the node and network levels
  - Innovative techniques for improving the usage of available radio resources
  - Improved cryptograpy algorithms at hardware level
  - New concepts in reconfigurable hardware platforms