# **PERVASIVE SYSTEMS**

## 1. KEY INDICATORS

CFU/ECTS: 6

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### 2. OBJECTIVE OF THE COURSE

### 3. ACQUIRED ABILITIES

Analysis and solution capabilities relevant to the problems of design, implementation and operation of pervasive systems, with particular regard to wireless technologies, sensor networks and ICT applications.

### 4. **PROGRAM**

References of hardware and software architectures, parallel computation on "fine grain" systems. References of networking systems (WSN, BAN, PAN).

Sensors and actuators: low power and low energy issues; energy harvesting and self-powering; reliability (fault tolerance, fault detection, self-organization).

Smart devices for pervasive computing: data loggers and embedded systems; smart sensors on mobile devices (smartphones, Tablet PCs, etc.); wearable computers.

Technologies and applications for identification and tracking: references on localization techniques; RFID sensors on pervasive systems; context-aware computing.

Distributed computational intelligence: neural networks, fuzzy logic, evolutionary algorithms, swarm intelligence; middleware services and agents; grid computing and cloud computing.

Trust, security and privacy issues.

Practical achievements of "Apps" for pervasive computing: adaptive multichannel communication, augmented reality; smart cameras, depth sensors and human-computer interaction (HCI); smart grids; intelligent transportation systems; logistics, safety and security; smart home and telemedicine; integrated measures using data loggers, smartphones and Tablet PCs.

### 5. **References**

J. Burkhardt, et al., Pervasive Computing, Addison Wesley, 2002.

U. Hansmann, et al., Pervasive Computing, Springer Professional Computing, 2nd ed., 2003.

S. Loke, Context-Aware Pervasive Systems: Architectures for a New Breed of Applications, Auerbach Publications, 2006.

A. Greenfield, Everyware: The Dawning Age of Ubiquitous Computing, Peachpit Press., 2006. Handouts distributed in class.

### 6. COURSE WEBSITE

http://massimopanella.uniroma1.it