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# Pervasive and Ubiquitous Computing

## Technologies, Applications and Management

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*“The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are indistinguishable from it.” ... Mark Weiser, “Computer for the 21th Century”, Scientific American, September, 1991.*

### Course description:

Modern life brought computers to our society in an extent that will probably promote a paradigm shift in everyday life. In this scenario, Pervasive and Ubiquitous Computing (PUC) might be understood as the current trend in terms of computer use and dissemination in our society. It is about moving beyond the traditional desktop computing model, into embedding computing into everyday objects and everyday activities seamlessly.

The proposal of this course is to elaborate on the basic technologies and main applications supporting the pervasive and ubiquitous new computer paradigm. Topics discussed will include:

- An overview of the pervasive and ubiquitous computing scenario
- Technologies for pervasive and ubiquitous computing
- Context-aware applications
- Applications and appliances for pervasive and ubiquitous computing
- Social computing and impacts
- Quality of service (QoS) in pervasive and ubiquitous approaches
- Main management issues related to pervasive and ubiquitous scenarios

The approach adopted is to provide a global view of the problem focusing on the more strategic issues and discussing some applications.

The course is intended for PhD, masters and graduation students, network engineers and designers involved in network research and design. Some basic knowledge of IP and networking technologies basics is helpful but not absolutely necessary.

### Topics:

1. The fully Networked Collaborative Pervasive and Ubiquitous Scenario – Reality or Dream?
  - Technology evolution and market demands (IP mobile, GSM, 3G, 4G, UMTS, WLAN, wireless, sensors, others)
  - Pervasive and Ubiquitous Computing – Vision and Challenges
  - New paradigms and taxonomy: Location detection and tracking, Naming and discovering, Context-awareness, Ubiquitous Data Access
2. Pervasive and Ubiquitous Hardware and Technologies
3. P2P – Peer-to-Peer Architectures and Protocols:
  - P2P Paradigm, P2P Architectures and Protocols, P2P Distributed control and routing, performance and scalability, P2P Support, P2P Applications
4. RFID – Technology and Tagging



5. Context-Aware Applications
6. Location and Detection Tracking
7. Social Networks and Applications
8. QoS in Pervasive and Ubiquitous Systems
9. Management Ubiquity and Autonomic Computing
10. Sensor Networks:
  - Technology, Bio-inspired algorithms, Applications, Management

## References:

- [1] Aidarous, S., Plevyack, T., Martins, J. S. B., et al.; Managing IP Networks – Challenges and Opportunities, IEEE Press, John Wiley, 360 pp., 2003.
- [2] Martins, J.S.B., “Quality of Service and MPLS – Technologies and Applications Course Notes”, 2006.
- [3] Jennings, R. B., et al.; “A Study of Internet Instant Messaging Protocol and Chat Protocols”, IEEE Network, July/ August, 2006, pp. 16-21.
- [4] Azzedine Boukerche and Xu Li, “An Agent-based Trust and Reputation Management Scheme”, Proceedings of Global Telecommunications Conference - GLOBECOM, 2005.
- [5] I. Stoika et al., “CHORD – A Scalable Peer-to-Peer Networked Virtual Environment for Internet Applications”, IEEE/ACM Transactions on Networking, Vol. 11, n° 1, 2003, pp. 17-32.

Obs.: papers, sites and other online resources will be indicated and made available by the “*Campus Virtual - UNIFACS*”, a distance-learning tool that will support the course.

Duration: 30 hours

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