Ambient Intelligence (AmI)

- The term “ambient intelligence” is referred to the integration of sensors and systems for associating “intelligent” behaviour to objects of a given scenario
- Examples
  - Ambient intelligence for remote control
  - Domotics
Ambient intelligence (AmI)

- Involves the convergence of several computing areas
  - ubiquitous or pervasive computing
  - development of various ad hoc networking capabilities that exploit highly portable or else numerous, very-low-cost computing devices
  - intelligent systems research
  - Provides learning algorithms and pattern matchers, speech recognition and language translators, and gesture classification and situation assessment
  - context awareness
  - tracking and positioning objects of all types and represent objects’ interactions with their environments
  - social interactions of objects in environments

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Editor-in-Chief of IEEE Intelligent Systems

Targets of ambient intelligence

- Security
- Ambient personalization
- Domotics
- Increasing the skills of people affected by disabilities
  - Interaction with objects
  - Social interaction
  - E-learning

Ambient intelligence for security: the PRIO project

- “Procedura RIconoscimento Oggetti”
  - Objects recognition assessment
- The aim of “PRiO” research project is to develop a prototype, proof-of-concept, intelligent system for environmental video-surveillance
- Multiple sensors are interconnected and share several types of information, mainly extracted from video-surveillance cameras

People involved in PRIO

- PRIO has been managed by Vitrociset S.p.A. company
- DIEE has been involved as consultant
- The role of DIEE was to develop:
  - An object tracker.
  - A car-person classifier.
  - An ancillary information extractor.
  - A proximity biometric verification system.
Overview of PRIO project

Main features of developed systems

- Interaction among sensors
- An object entering into a security area is first classified as person or vehicle
- People recognized by proximity verification system is “tracked” as he left the personal verification checking area by several cameras
- A PTZ camera allows to extract further ancillary information as gait speed and height
- If “person behaviour” is out of “normal”, its detected position is managed by the tactical simulator
- A “warning message” can be sent to the human operator, which can decide the best actions to do with the help of the tactical simulator

Biometrics and Domotic: the challenge for the future

- Domotic, or “Home automation”
  - It requires the interaction of sensors and systems for simplifying the house management
  - Ambient personalization
    - Maintaining the temperature of the room depending on people in it
- Help of people affected by disabilities
  - Development of systems able to detect face expressions for making actions otherwise impossible to people
  - Actions are implemented by autonomous agent
    - Automated wheelchairs or arms
  - Managing the health
    - People which cannot move from the bed

Scenarios for AmI (2010)

- Study promoted by European Union
- Key technological requirements:
  - Very unobtrusive hardware
  - A seamless mobile/fixed communications infrastructure
  - Dynamic and massively distributed device networks
  - Natural feeling human interfaces
  - Dependability and security
- Framework-Programme 7° (FP7)
Scenarios for AmI (2010)

- AmI compatible enabling hardware –
  - including fully optical networks, nano-micro electronics, power and display technologies.
- AmI open platforms:
  - for interoperating networks based upon a corporate effort to define a 'service control platform'.
- Intuitive technologies involving efforts to create natural human interfaces.
- AmI developments in support of personal and community development:
  - including sociotechnical design factors, support for human to human interaction and the analysis of societal and political development.
- Metacontent services developments
  - to improve information handling, knowledge management and community memory, involving techniques such as smart tagging systems, semantic web technologies, and search technologies.
- Security and trust technologies in support of privacy safety and dependability

Privacy issues and ambient intelligence: PRIAM project

- The PRIAM project addresses the privacy issues raised by ambient intelligence technology in a transversal and multidisciplinary way, favoring the exchange of ideas between lawyers and ICT experts.
- Ubiquitous computing technology need not necessarily be an obstacle to privacy protection

The “Ambient Intelligence” Lab

- Sardegna Ricerche, Pula
- It is managed by people from PRA group
- Mission:
  - to become a leading institution in the Sardegna DistRICT for the development and testing of qualifying technologies aimed at building intelligent environments, like artificial vision systems, intelligent systems, biometric and multimedia technologies, video surveillance and RFID.
  - The activities of the AmI Lab are focused on the development of image recognition, artificial vision and multimedia content management systems, applied to ambient and computer security
- http://prag.diee.unica.it/amilab

Other links

- http://www.ambientintelligence.org
- http://www.domotica.it