

AmI Group

Research

Abstract

The research activity of **AmI** (Ambient Intelligence) Group at Bologna University spans multiple aspects of distributed embedded and mobile systems design, with special emphasis on location, user and context aware intelligent media delivery and capture, that enable the so called *Ambient Intelligence*. Targeted applications concern navigation in immersive virtual environments, interactive gaming and personalized services for mobile users. The research focus on the design and implementation of the hardware/software infrastructure, which mainly involves two research issues.

First, personal devices should be able to give the user ubiquitous access to multimedia services made available by the surrounding environment. Moreover, personal information systems should be equipped with sensors and actuators to provide fast and natural interaction to control or receive feedback from the environment. System resources should be controlled in a power efficient way in order to enhance wearability and ubiquity. For this reason, design of low-power operating systems and applications is a critical issue.

Second, the surrounding environment, composed by mobile terminals and infrastructure elements (such as servers, network access points), should be able to extract the required information about the user to enable user-dependent services without involving an explicit request where possible. This involves the design of distributed sensing elements (fixed or mobile) performing for example position localization, body tracking. In this context, the design of collaborative distributed applications supported by an efficient communication stack is critical.

The research approach followed by the group is based on a mix of theory and practice. Theoretical research results are applied to fully working hardware devices. The group currently works on both commercial off the shelf products and hardware prototypes, that allow to hardware and software design issues.

The research is carried out at several levels starting from hardware prototype design, operating systems and middleware, application development and system integration. The work plan is organized in three main projects, each of them is described in the following and covers both issues described before.

1. Enabling Technologies

2. Wireless Sensor Networks

3. Interactive Virtual Reality and Gaming

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