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Ambient Intelligence Programme

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Abstract:Throughout their history, humans had to continuously adapt themselves to their surrounding environment, in order to survive, but also make the best out of it. Today, Ambient Intelligence (AmI) technologies have the potential to change this status quo through the creation of "intelligent" environments able to proactively adapt to humans, as well as serve their needs and goals, in the best possible way. In this context, our vision is to improve the quality of life of all citizens of the emerging Information Society through the creation and provision of safe, efficient and user-friendly AmI technologies, which support and cater to the needs of each and every individual user in a seamless, unobtrusive and invisible way. The Ambient Intelligence Programme will constitute platform for cooperative research towards developing and studying AmI-related technologies and assessing their impact on the individual, as well as society as a whole, but also as a unique showcase for demonstrating the potential, added-value and benefits of AmI technologies in different aspects of everyday life and activities.

1 Introduction

In computing, ambient intelligence (AmI) refers to electronic environments that are sensitive and responsive to the presence of people. Ambient intelligence is a vision on the future of consumer electronics, telecommunications and computing that was originally developed in the late 1990s for the time frame 2010–2020. In an ambient intelligence world, devices work in concert to support people in carrying out their everyday life activities, tasks and rituals in easy, natural way using information and intelligence that is hidden in the network connecting these devices (see Internet of Things). As these devices grow smaller, more connected and more integrated into our environment, the technology disappears into our surroundings until only the user interface remains perceivable by users.The ambient intelligence paradigm builds upon pervasive computing, ubiquitous computing, profiling practices, context awareness, and human-centric computer interaction design.The AmI Programme aims to realise a link for technology transfer and know-how dissemination to industrial actors. Particular emphasis will be given on the simulation and experimentation with several indoors and outdoor environments of key importance, taking into account related parameters ranging from domestic and rural environmental features, to distinctive cultural and societal traits. Research and development work will be predominantly human-, rather than technology-, centred and will focus on selected key application domains: housing, work, health, security, education, transport, and entertainment. Last but not least, the AmI Programme will seek to develop multidisciplinary research and promote collaboration with other research and academic organisations around the world working in this area.

2.Reasearchworks

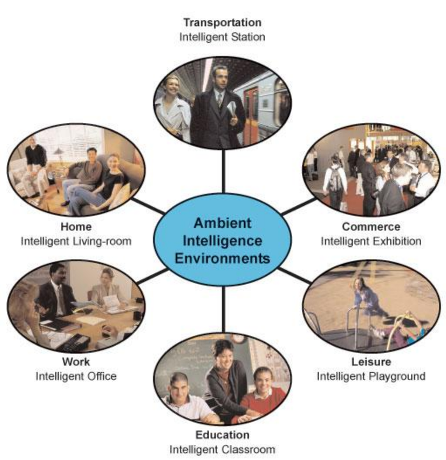
The AMI Programme will support research and development activities in numerous related scientific areas including, but not limited to:

- Human-computer interaction
- Networks and telecommunications
- Distributed systems
- Semantic-based knowledge systems

- Computer architecture
- Microelectronics
- Sensors
- Robotics and automation
- Computational vision

In the context the AmI Programme, the research activities will focus on six thematic areas, each related to a number of application domains. These thematic areas will also act as: (a) inspiration drivers for envisioning realistic, meaningful and added-value application scenarios for AmI technologies; and (b) test-beds for assessing and validating constituent AmI technologies in simulated real-life contexts. The selected thematic areas represent both private/restricted and public environments and include:

- **Home**: Intelligent living room
- **Work**: Intelligent Office
- **Education**: Intelligent classroom
- **Transportation**: Intelligent transportation
- **Commerce**: Intelligent exhibition
- **Leisure**: Intelligent playground



The key thematic areas in the context of AmI Programme

Each thematic area will be equipped with basic AmI infrastructure components (e.g., sensors, actuators, screens, speakers, networks), as well as with special-purpose equipment required for the specific imulated environment, supported user activities and eployment scenarios (e.g., home electronics and healthcare quipment for the home). Additionally, a control center will be created, which will incorporate all the necessary equipment (e.g., servers and routers,

chargers, video recorders) to effectively operate and monitor all the thematic areas. A structural representation of the AmI Laboratory is depicted below.

Structural overview of the foreseen laboratory facilities for the AmI Programme.

3 Technologies

A variety of technologies can be used to enable Ambient intelligence environments such as:

- RFID
- Ict implant
- Sensors
- Software agents
- Affective computing
- Nanotechnology
- Biometrics

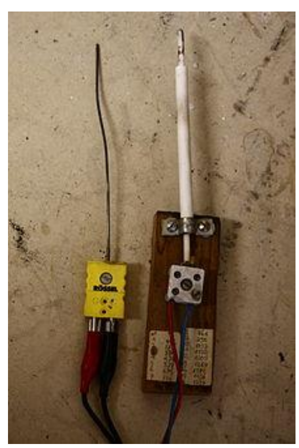
3.1 Radio-frequency identification (RFID) is the use of a wireless non-contact system that uses radio-frequency electromagnetic fields to transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Some tags require no battery and are powered by the electromagnetic fields used to read them. Others use a local power source and emit radio waves (electromagnetic radiation at radio frequencies). Thetag contains electronically stored information which can be read from up to several meters (yards) away.

RFID tags are used in many industries.

3.2 Ict implants:

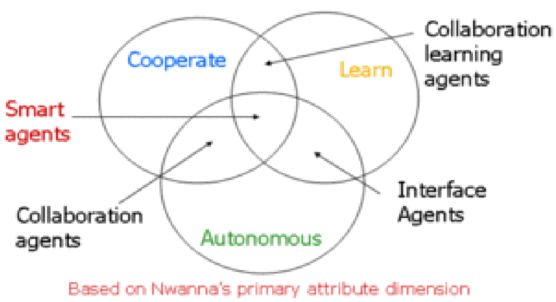
Human information and communication technology (ICT) implants have developed for many years in a medical context. Such applications have become increasingly advanced, in some cases modifying fundamental brain function. Today, comparatively low-tech implants are being increasingly employed in non-therapeutic contexts, with applications ranging from the use of ICT implants for VIP entry into nightclubs, automated payments for goods, access to secure facilities and for those with a high risk of being kidnapped. Commercialisation and growing potential of human ICT implants have generated debate over the ethical, legal and social aspects of the technology, its products and application. Despite stakeholders calling for greater policy and legal certainty within this area, gaps have already begun to emerge between the commercial reality of human ICT implants and the current legal frameworks designed to regulate these products. This book focuses on the latest technological developments and on the legal, social and ethical implications of the use and further application of these technologies.

A sensor (also called detector) is a converter that measures a physical quantity and converts it into a signal which can be read by an observer or by an (today mostly electronic) instrument. A sensor is a device which receives and responds to a signal. A sensor's sensitivity indicates how much the sensor's output changes when the measured quantity changes. For instance, if the mercury in a thermometer moves 1 cm when the temperature changes by 1 °C, the sensitivity is 1 cm/°C (it is basically the slope Dy/Dx assuming a linear characteristic). Sensors that measure very small changes must have very high sensitivities. Sensors also have an impact on what they measure; for instance, a room temperature thermometer inserted into a hot cup of liquid cools the liquid while the liquid heats the thermometer.



3.3 Software Agents:

A software agent is a software program that acts for a user or other program in a relationship of agency, which derives from the Latin agere (to do): an agreement to act on one's behalf. Such "action on behalf of" implies the authority to decide which, if any, action is appropriate.Related and derived concepts include Intelligent agents (in particular exhibiting some aspect of Artificial Intelligence, such as learning and reasoning), autonomous agents (capable of modifying the way in which they achieve their objectives), distributed agents (being executed on physically distinct computers), multi-agent systems (distributed agents that do not have the capabilities to achieve an objective alone and thus must communicate), and mobile agents (agents that can relocate their execution onto different processors



3.

4 Affective computing:

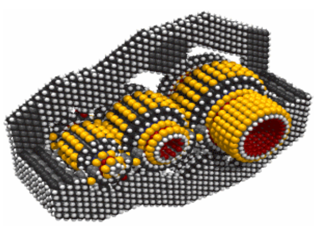
Affective computing is the study and development of systems and devices that can recognize, interpret, process, and simulate human affects. It is an interdisciplinary field spanning computer sciences, psychology, and cognitive science. While the origins of the field may be traced as far back as to early philosophical enquiries into emotion,the more modern branch of computer science originated with Rosalind Picard's 1995 paper on affective computing.A motivation for the research is the ability to simulate empathy. The machine should interpret the emotional state of humans and adapt its behaviour to them, giving an appropriate response for those emotions.

In e-learning applications, affective computing can be used to adjust the presentation style of a computerized tutor when a learner is bored, interested, frustrated, or pleased. Psychological health services, i.e. counseling, benefit from affective computing applications when determining a client's emotional state. Affective computing sends a message via color or sound to express an emotional state to others.Robotic systems capable of processing affective information exhibit higher flexibility while one works in uncertain or complex environments. Companion devices, such as digital pets, use affective computing abilities to enhance realism and provide a higher degree of autonomy.Other potential applications are centered around social monitoring.

3.5 Nanotechnology:

Nanotechnology (sometimes shortened to "nanotech") is the study of manipulating matter on an atomic and molecular scale. Generally, nanotechnology deals with developing materials, devices, or other structures with at least one dimension sized from 1 to 100 nanometres. Quantum mechanical effects are important at this quantum-realm scale. Nanotechnology is considered a key technology for the future. Consequently, various governments have invested billions of dollars in its future. The USA has invested 3.7 billion dollars through its National Nanotechnology Initiative followed by Japan with 750 million and the European Union 1.2 billion.Nanotechnology is very diverse, ranging from extensions of conventional device physics to completely new approaches based upon molecular self-assembly, from developing new materials with dimensions on the nanoscale to direct control of matter on the atomic scale. Nanotechnology entails the application of fields of science as diverse as surface science, organic chemistry, molecular biology, semiconductor physics, microfabrication, etc.

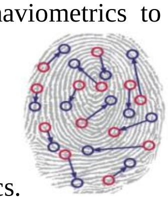
A basic definition: Nanotechnology is the engineering of functional systems at the molecular scale. This covers both current work and concepts that are more advanced.In its original sense, 'nanotechnology' refers to the projected ability to construct items from the bottom up, using techniques and tools being developed today to make complete, high performance products.



With 15,342 atoms, this parallel-shaft speed reducer gear is one of the largest nanomechanical devices ever modeled in atomic detail.

3.6 Biometrics:

Biometrics refers to the identification of humans by their characteristics or traits. Computer science, biometrics to be specific, is used as a form of identification and access control. It is also used to identify individuals in groups that are under surveillance.Biometric identifiers are the distinctive, measurable characteristics used to label and describe individuals.The two categories of biometric identifiers include physiological and behavioral characteristics. A physiological biometric would identify by one's voice, DNA, hand print or behavior. Behavioral biometrics are related to the behavior of a person, including but not limited to: typing rhythm, gait, and voice. Some researchers have coined the term behaviometrics to describe the latter class of biometrics.



4 Networking & Communication

The levels of interaction that may occur between the user and the technology within the AmI context is shown in the “MultiSphere Reference Model” ().

Figure : A visualisation of the MultiSphere Reference Model [WWRF (2001)] showing various layers of interaction desirable in the AmI scenario.Although this model aims primarily at putting issues and ideas of wireless communications in context, from such models the following interaction levels can be identified [Riva (2001)]:Body area network (BAN) connecting sensors, chips or devices attached to the body/clothes or implanted in the body (distance: <1 meter) Personal area network (PAN) consisting of personal and/or shared devices or peripherals (distance: <10 meters) Local area network (LAN) for the nomadic access to fixed and mobile networks, and to the Internet (distance: <100 meters)Wide area network (WAN) for the access and routing with full mobility (worldwide access) .The ‘Cyberworld’ where users and intelligent agents interact (virtual).To fulfil the current vision of AmI, it is necessary that fluid communication between these layers is realised through the use of interoperable hardware and software standards and protocols.‘Body-centric’ wireless communications is a new and developing field which refers to human-self and human to human networking through the use of wearable and implantable sensors. Existing technologies which allow portable devices to connect are typically based on PAN standards such as 802.11x or on Bluetooth. Neither of these are spectrum efficient for BANs in that most of the radio energy becomes directed away from the body when the radio antenna is placed close to the skin.

5 Privacy in Ambient Intelligence

Intelligent fridges, pay-per-use scenarios, and dynamic insurance rates paint a future in which all of our moves, actions, and decisions are recorded by tireless electronic devices, from the kitchen and living room of our homes to our weekend trips in our cars. Not surprisingly, many critics see this as “an attempt at a violent technological penetration of everyday life” [7], as the “feverish dream of spooks and spies – to plant a ‘bug’ in every object” [23] or even as “a project that aims at totality and, of course, verges on the totalitarian” [6]. By virtue of its very definitions, the vision of ambient intelligence has the potential to create an invisible and comprehensive surveillance network, covering an 10 Social, Economic, and Ethical Implications unprecedented share of our public and private life: “The old sayings that ‘the walls have ears’ and ‘if these walls could talk’ have become the disturbing reality. The world is filled with all-knowing, all-reporting things” [8]. And with the economic possibilities described above, such a comprehensive coverage seems more likely to be put into place: shopping without participating in comprehensive profiling, buying instead of renting items in a pay-per-use scheme, as well as fixed insurance schemes that do not constantly transmit information to insurers – all of this might become an expensive luxury for well-off citizens, while the population at large must trade in their privacy for increased productivity and market transparency. This might very well be self-inflicted: given the immediate economic returns of consumer loyalty programs or low insurance rates, the rather vague threats of future privacy violations are easily enough ignored. The following sections try to add a differentiated view to this problem, especially with respect to ubiquitouscomputing technology, by first examining why personal privacy is desirable, describing when we feel that it has been violated, and then assessing how the deployment of future ambient-intelligence systems will affect all that.

5.1 The Many Facets of Personal Privacy

Even though critics continue to argue that “all this secrecy is making life harder, more expensive, dangerous and less serendipitous” [24], privacy is still predominantly seen as a fundamental requirement of any modern democracy [25]. It is only when people are free to decide what to do with their lives, according to their interests and beliefs, and without fear of repression from their fellow citizens, that the necessary plurality of ideas and attitudes can develop that will prevent society being subjugated under a charismatic leader. Harvard law professor Lawrence Lessig [26] takes this requirement a step further and distinguishes between a number of motives for the protection of privacy in today’s laws and standards:

• **Privacy as Empowerment**. Seeing privacy mainly as informational privacy, its aim is to give people the power to control the publication and distribution of information about themselves [27]. A recent legal discussion surrounding this motivation revolved around the question of whether personal information should be seen as private property (which would entail the right to sell all or part of it as the owner sees fit) or as intellectual property (which would entitle the owner to certain inalienable rights, preventing him for example from selling the rights to his own name to anybody else).

• **Privacy as Utility.** From the viewpoint of the person involved, privacy can be seen as a utility providing more or less effective protection against nuisances such as unsolicited phone calls or emails. This view probably best follow Brandeis’ definition of privacy as “The right to be left alone,” where the focus is on minimizing the amount of disturbance for the individual.

• **Privacy as Dignity.** Dignity not only entails being free from unsubstantiated suspicion (for example being the target of a wire tap, where the intrusion is usually not directly perceived as a disturbance), but also focuses on the equilibrium of information available between two people: as in a situation where you are having a conversation with a fully dressed person when you yourself are naked, any relationship where there is a significant information imbalance will make it much more difficult for those with less information about the other to keep their composure.

• **Privacy as a Regulating Agent.** Privacy laws and moral norms to that extent can also be seen as a tool for keeping checks and balances on the powers of a decision-making elite. By limiting information gathering of a certain type, crimes or moral norms pertaining to that type of information cannot be effectively controlled. Depending on what kind of motives one assumes for preserving privacy, ambient-intelligence technology can become the driving factor for changing the scope and impact of privacy protection as it exists today, and creating substantially different social landscapes in the future. This is because ambient-intelligence technology influences two important design parameters relating to privacy: the ability to monitor and the ability to search .

6 Conclusion

The Bluetooth protocols are intended for rapidly developing applications using the Bluetooth technology. The lower layers of the Bluetooth protocol stack are designed to provide a flexible base for further protocol development. Other protocols, such as RFCOMM, are adopted from existing protocols and these protocols are only modified slightly for the purposes of Bluetooth. The upper layer protocols are used without modifications. In this way, existing applications may be reused to work with the Bluetooth technology and the interoperability is ensured more easily. The purpose of the Specification is to promote the development of interoperable applications targeted at the highest priority usage models identified by the SIG's marketing team. However, the Specification also services as a framework for further development. Naturally, vendors are encouraged to invent more usage models within this framework. Using the Bluetooth technology with the capabilities of current computers and communications devices, the possibilities for new future wireless applications are unlimited.

7 References

[1] E. Aarts, R. Collier, E. van Loenen, B. d. Ruyter (Eds.), Ambient Intelligence, First European Symposium, *Proceedings EUSAI*, Veldhoven, The Netherlands, 2003 .
[2] The Internet Mail Consortium, vCard - The Electronic Business Card Exchange Format, Version 2.1, September 1996.[3] The Internet Mail Consortium, vCalendar - The Electronic Calendaring and Scheduling Exchange Format, Version 1.0, September 1996.[4] WAP Forum, WAP Forum Specifications(http://www.wapforum.org/what/technical.htm), July 1999[5] Bluetooth Special Interest Group, Bluetooth Host Controller Interface Functional Specification.[6] Ahola J (2001) Ambient Intelligence, ERCIM News, No 47, October 2001.

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