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Ubiquitous Computing - New Wave in Computing

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Abstract

Ubiquitous computing is the method of enhancing computer use by making many computers available throughout the physical environment, but making them effectively invisible to the user. Ubiquitous computing, or calm technology, is a paradigm shift where technology becomes virtually invisible in our lives. This research paper provides a classification of the research areas on the ubiquitous computing paradigm

Keywords: *Ubiquitous Computing Paradigm, Context-Aware Systems, Pervasive Computing Middlewares*

1. Introduction

Ubiquitous computing (or "ubicomp") is a concept in software engineering and computer science where computing is made to appear anytime and everywhere. In contrast to desktop computing, ubiquitous computing can occur using any device, in any location, and in any format. Ubiquitous computing is a concept where computing is made to appear everywhere using any device, in any location and in any format.

Ubiquitous computing means devices in all forms, sensors everywhere seamlessly connected to mainly wireless networks to provide computing/communication services to the user. Ubiquitous computing is third wave of computing after mainframe computing and PC computing introduced by Mark Weiser in 1988 at Xerox's Palo Alto Research Center (Parc). He is often referred as the father of ubiquitous computing. He coined the term to describe a future in which invisible computers, embedded in everyday objects, replace PCs.

Merging of mobile computing with intelligent environment results in ubiquitous computing. For secure communication environment A6 which are Anytime, Anywhere, Any network, Anyone, Any organization has to be accomplished. Invisibility, Non-Intrusiveness, Context awareness, Mobility, Adaptability, extended computing boundaries are the features of ubiquitous computing. Ubiquitous computing is neither multimedia computing nor a virtual reality. Ubiquitous computing may use sound and videos as in multimedia computing but all these must fade in the background rather than demanding the focus of attention from user. Virtual reality means putting people inside the computer generated world but ubiquitous computing is just the reverse of it. It forces the computers to live out in this world with the people.

***Benefits of* Ubiquitous Computing**

Ubiquitous computing is giving architecture many benefits that we will continue to see embedded in our buildings.

Ubiquitous computing is the wave of the future – providing us with many new architectural functions as well as challenges. For now, let's focus on the benefits.

The following are the top seven benefits brought about by ubiquitous computing as they impact **architecture** and occupants in everyday life:

1) INVISIBLE:

"Smart" environments will be embedded with computing technologies that will be mostly out-of-sight. Architecture will gains many more capabilities- with less visual clutter.

2) SOCIALIZATION:

Interactions with architecture will be more social in nature. "Smart" buildings will illicit a more social response from occupants as computers user interfaces embed themselves within architecture. (1)

3) DECISION-MAKING:

"Smart" environments will help occupants to make better choices as they go about their everyday lives. At key moments within architectural experiences, a good architectural design will make "smart" environment helpful. Such architecture will be more proactive than passive.

4) EMERGENT BEHAVIOR:

Building are now becoming more and more kinetic in form and function. Their movements and constructed designs come together dynamically to yield behaviors that make them more adaptive. Buildings will learn how to learn – in order to run efficiently and aesthetically.

5) INFORMATION PROCESSING:

Since architecture will be gaining a type of "nervous system", information processing will be gaining a whole new meaning. Architecture will go from crunching data to making sense of data; therefore, eliminating our need to constantly input adjustments.

6) ENHANCING EXPERIENCE:

As computers ubiquitously embed themselves in our environments, sensors and actuators will create "smart" environments where architectural space will be goal-oriented. Therefore, more occupant needs will be better met.

7) CONVERGENCE:

Much of our environment will be supplemented with interconnected digital technologies. Such interconnectivity will allow for a new type of "sharing" that will serve to eliminate many undone tasks. Also, fewer errors will occur as systems pull data from shared digital locations (instead of having numerous copies to keep up-to-date).

Analysis of Current & Future Utility of Ubiquitous Computing

In this section some of the domains where ubiquitous techniques are currently are currently playing a significant role are discussed. Also some of the future domains are explored where ubiquitous computing will do wonders to change the present characteristics of the domain.

Evaluation System and Pollution Monitoring.

Pollution Monitoring and Evaluation system project was initiated at IIM Kolkata which uses Sensor based Wireless Mesh Network for the protection of Public spaces. The objective of the project is the development of a Wireless Sensor Network for pollution monitoring by identifying the primary source of emission, (detecting Benzene, Toluene, Xylene, CO & CO2 et al, developing a mechanism for data filtering and aggregation, power management and finally commercialization of the product/system. The field trials have been successfully completed in Kolkata Metropolitan area and the project is to be launched soon.

Wireless Senor Network for Real-Time Landslide Monitoring

Amrita University, Kollam, Kerala is working on a project based on Wireless Sensor Network for Real-Time Landslide monitoring. The project aims at development of a Wireless Sensor Network for Real-Time Landslide Monitoring with pore water pressure, tilt meter and rain gauge sensors, along with a wireless sensor network for the deployment site. With this technology in operation, the risk of landslide will be assessed and remote command and control interface will be provided for different purposes. The on-site sensors are to be installed very soon.

USikshak- Learning Application for Mobile Computing Technologies

Ubiquitous computing can be a great help in the field of education. Ubiquitous learning is projected as the next phase in the evolution of learning methodologies. USikshak—Learning application [3] for mobile computing technologies was developed by the Ubiquitous Computing Research Centre, Centre for Development of Advanced Computing (CDAC), Hyderabad. The project is funded by the Department of Information Technology, Government of India. The main focus of this project is on mobility in learning. USikshak allows readers to access information anywhere, anytime, The moment one enters a particular zone; sensors scan radio frequency identification tags embedded in mobile phones or identity cards. The user information is transmitted to a data grid (a content repository) that composes relatable information into a message and broadcasts it to a user.

Ubiquitous Computing in Sports

Sport is an extremely exciting field to apply ubiquitous computing technologies. These technologies provide innovative and effective support to coaches, players and athletes. Ubiquitous computing has the potential to change the characteristics of sports. Imagine a soccer game with an electronic error-free referee. The integration of sensors, information and communication technologies provides promising means for developing systems to acquire, process and wirelessly transmit data during sportive activities.

One of the important aspects when evaluating sports activities is the control of rules. The Hawk-Eye system used to decide, whether a ball is pitched in line and hits the stumps to get LBW decision in cricket is a good example. Wireless sensor technologies may also support judges making their decisions.

Ubiquitous Computing in Transportation

Present problems of traffic management, control and planning; have strived to tackle congestion in large urban networks. The design and specification of future transport solutions featuring autonomy, putting the user in the centre of all concerns and largely oriented to services will be the future necessity. Such efforts will eventually result in the emergence of the concept of Ubiquitous Transportation System (UTS) [6], basically relying on a distributed and advanced communication infrastructure favoring interaction in virtually all level, from users to services, vehicles to vehicles, vehicles to infrastructure and so on.

Ubiquitous Computing Environment and Future Network Security

In this section we discuss how ubiquitous computing environment is different from traditional computing environment. What are the key parameter of ubiquitous environment and how future network security technique are affected by ubiquitous computing environment ?

Traditional Computing Environment

Traditional computing is generally based on Centralized Environments and to some extent distributed environment. Server is accessed through dummy terminals and Setup is limited to a building mitigation. Traditional Security Solutions are static, Non-Adaptable, Context In-Sensitive generally based on client server architecture. Access and Control policies in traditional networks are static.

Ubiquitous Computing Environment

Ubiquitous environment is very different from traditional computing environment. It consists of different homogeneous as well as heterogeneous networks having diverse client nodes with minimal or no user involvement. Communication between devices is blended into the environment without distracting users. Ubiquitous Computing combines context and situational information to provide services to the user in active space.

Scalability is another feature of Ubiquitous Computing environment as this environment can host hundreds or thousands of diverse devices. Ubiquitous applications require continuous monitoring [7], gathers lots of sensitive electronic information about the users, hence opportunities for data interception, theft will grow.

Future Network Security

When ubiquitous computing actually take over the current computing environment in few years of time, current network security schemes will have to provide security for the ubiquitous environment. As new authentication mechanisms and devices keep evolving, different authentication & cryptographic mechanisms suiting the requirements of different Ubicomp applications will have to be developed which combine different identification and authentication mechanisms to build up confidence among the computing devices. Security will have to be provided at different levels based on system policy, services, context information, and available resources. Security policies should be able to change dynamically. Security Framework should interface with other security solutions and negotiate security

Requirements. Security framework should be flexible and adaptable. It should provide support for plugging in new devices, mechanisms or reconfiguration to existing ubiquitous applications and services. The security services should be able to scale to wide variety of mobile and embedded devices.

Conclusion:

There are many applications, different for each person. The real goal for ubicomp is to provide many single-activity interactions that together promote a unified and continuous interaction between humans and computational services. The focus for the human at any one time is not a single interface to accomplish some task. Rather, the interaction is more free-flowing and integrative, akin to our interaction with the rich physical world of people, places, and objects in our everyday lives.

References:

- http://en.wikipedia.org/wiki/Ubiquitous_computing.
- A Comprehensive Security, Privacy & Trust Management Framework for Ubiquitous Computing Environment-UbiComp India 2008.
- E.H. Chi. Introducing wearable force sensors in martial arts. IEEE Perv. Comp. 2005, 4(3):47-53.
- http://www.ubiq.com/hypertext/weiser/UbiHome.html
- http://www.cc.gatech.edu/fce/pubs/tochi-millienium.