

# UbiCom Series

## TCG Software LP

Waleed Ahmed

## [ UBIQUITOUS COMPUTING ]

The field of Ubiquitous computing was inspired by the Mark Weiser's ideology of making computers available everywhere, but invisibly. This documents describes how the idea was started, what expectations were made that could make ubiquitous computing distinguish from personal computers, virtual reality and multimedia systems. Ubiquitous computing research work started at PARC in 1988 where researchers built different prototypes: live boards, pads and tabs, to evaluate the feasibility of ubiquitous computing in a real world.

## Revision Details

Date	Version	Name	Comment
12 Nov, 2009	1.0	Ahmed, W	Introductory document created.

## Table of Contents

History .....	4
Inspiration.....	5
Ubiquitous Computing and Personal Computers.....	5
Ubiquitous Computing and Virtual Reality .....	5
Ubiquitous Computing and Multimedia Systems .....	6
Initial work .....	6

## Ubiquitous Computing

---

Ubiquitous Technologies are those that disappear themselves in a background but provide extensive user friendly facilities to users without requiring any specific attention. The main idea of ubiquitous computing came from the “literacy technologies” of real world where unlike books, magazines and newspaper that give information, there have been many signboards, billboards, logos, charts, maps, etc which provide information to the users without requiring their active attention. We can judge different vehicles due to constant appearance without remembering their details. For example, appearance of ambulance and its horn convey its importance and shows that there is some emergency which require people quick reaction to clear the road. All these are ubiquitous by nature which are available in all industrial countries today. The idea of Ubiquitous Computing is similar to the way in which we use different “literacy technologies” in our daily life.

### History

In late, 1987, Bob Sprague, Richard Bruce, and other members of the Xerox Palo Alto Research Center (PARC) Electronics and Imaging laboratory (EIL) proposed the idea to fabricate large, wall-sized. Flat panel computer displays from large amorphous silicon sheets. It was also thought at the time that this technology might also permit these displays to function as input devices for electronic pens and also for scanning of images. Quickly, Members from PARC and other labs willingly started their work to design hardware and software for this new kind of system, one that seemed to honor the transparent ease of use of a traditional whiteboard while extending its power computationally, particularly when networked with other such devices. The research vision of these “computer walls” inspired was far different from the then-current “one person-one personal computer” paradigm and opened up to researchers at PARC the idea of spreading computers ubiquitously, but invisibly, throughout the environment [4]. According to Weiser:

*“Ubiquitous Computing enhances computer use by making many computers available throughout the physical environment, while making them effectively invisible to the user”*

The purpose to introduce a new concept was to eliminate the threads of usage complexity of so called personal computers for which people were expected to learn different techniques before using them. Physical appearance of these systems was also engaged to occupy large space where implementing new features in a system requires more space for new hardware. These constraints forced the researchers at PARC to make computers available everywhere invisibly in order to provide psychological ease to human by eliminating the need of learning different technologies in depth.

## **Inspiration**

The field of Ubiquitous Computing was first inspired by Mark Weiser's [1] vision of computing artifacts that disappear similar to the "literacy technologies". According to him,

*"The most profound technologies are those that disappear. They weave themselves into the fabric of everyday life until they are distinguishable from it", Mark Weiser*

Ubiquitous Computing improves the use of computers by making hundreds of computers available in people's everyday life and environment while keeping them practically invisible to the user [1]. This follows Weiser's fundamental idea that the most influential technologies are the ones that fade into the background and becomes a part of everyone's normal life so that no special attention needs to be paid to them [1]. In this way, we use technologies without thinking and so can focus beyond them on new goals.

Some people says that the basic idea behind the Ubiquitous Computing is to make the computer so exciting, so powerful, so interesting, so imbedded, so fitting and so natural that we never want to be without it while making it invisible to everyone. This idea first arose from contemplating the place of today's computer in actual activities of everyday life [3].

Ubiquitous computing is used to describe a future where computers are so numerous they affect every action we take. This includes computers that are part of our clothing and which monitor our vital functions, computers which control traffic, computers which are integrated with television sets, and computers that control our homes [2].

## **Ubiquitous Computing and Personal Computers**

Ubiquitous Computing doesn't mean just computers which can be carried to the beach, jungle or airport. Even the most powerful notebook computer, with the access to world wide information network, still focuses attention to a single box. By analogy with writing, carrying a super-lap-top is like owning just one very important book. Customizing this book even writing millions of other books, doesn't begin to capture the real power of literacy [1].

## **Ubiquitous Computing and Virtual Reality**

Ubiquitous computing is roughly the opposite of virtual reality. Where virtual reality puts people inside a computer-generated world, ubiquitous computing forces the computer to live out here in the world with people. Virtual reality is primarily a horse power problem; ubiquitous computing is a very difficult integration of human factors, computer science, engineering, and social sciences [5].

Most importantly, the main purpose of virtual reality is to deceive humans by putting their physical life behind and to make an expression of imaginary world. This thought compel Weiser to realize that

ubiquitous computing is something different which can make the world easy for humans. It can be used to provide real time processes closed to human psychology which might have a purpose to facilitate, but not to deceive the humans.

## **Ubiquitous Computing and Multimedia Systems**

Similar to multimedia systems, ubiquitous systems may use sound and video along with the text and graphics but it doesn't mean that both type of systems are same. Nowadays, multimedia systems are more focused in demanding the extensive users' attention and don't keep them hidden in a background environment. The examples of such systems are cinema screens and LCD TV.

## **Initial work**

Computer scientists at Xerox Palo Alto Research Center (PARC) started to emerge the idea of ubiquitous computing in the form of live boards, pads and tabs. The live boards were used for the meeting discussions where all researches gathered around the display and wrote their ideas on the screen using writing pads. The idea of building these boards and integrating them with different tools has helped researchers understand better the shape of ubiquitous systems.

With the initial work, Weiser realized that there are two main issues that which should be considered: location and scale. In ubiquitous computing, system should be able to know about where they are and adapt behavior accordingly. Simple personal computers don't know their location and surroundings hence don't react differently with the change in environment. This think make the Ubiquitous computing more inspiring when they change their functionality by analyzing its room location without requiring even of a hint of artificial intelligence.

Ubiquitous computer can be of any size depending upon their usage and a particular task. There have been different systems like tabs, pads and boards developed at PARC: inch-scale machines that approximate active Post-it notes, foot-scale ones that behave something like a sheet of paper and yard-scale displays that are the equivalent of a blackboard or bulletin board [1].

## References

---

- [1] Weiser, M. The Computer for the 21<sup>st</sup> Century, *Scientific American*, Vol: 265 No: 3, (1991), pp 94-104
- [2] DARREL INCE. "ubiquitous computing." A Dictionary of the Internet. 2001. *Encyclopedia.com*. 11 Nov. 2009 <<http://www.encyclopedia.com>>
- [3] Weiser, M. Some Computer Science Issues in Ubiquitous Computing. *Communication of the ACM*, Vol: 36, No: 7, (1993), pp 74-84
- [4] Weiser, M. & Gold, R. & Brown, J.S. The Origins of ubiquitous computing research at PARC in the late 1980s. *IBM Systems Journal*, Vol: 36, No: 7, (1999), pp 693-696
- [5] Weiser, M. "What Ubiquitous Computing is not?" 17 March 1996  
<<http://www.ubiq.com/hypertext/weiser/UbiHome.html>>