Ubiquitous Computing

The Cyberpunk Project

This research area tackles with applications and enabling technologies for ubiquitous and wearable computing (such as ad hoc networking technologies).

In ubiquitous computing a user has access to many computing devices. These computing devices will be unobtrusive and provide seamless access to a wide variety of data and allow the user to perform tasks as needed, where needed. The objective of ubiquitous computing is to move interaction with computers out of a person's central focus and into the user's peripheral attention where they can be used subconsciously. Ubiquitous computing is often characterized by the attributes of mobility, interconnectivity and context-awareness.

One of the key attributes of ubiquitous computing is mobility. An individual will carry or wear multiple devices and move about the office, home or public places. It's obvious that these devices should be both easily transportable and simple to interact with. User interfaces, whether voice, pen based or key based, will present particular challenges in mobile devices. Frugality will be important when mobile devices are designed since resources of mobile devices are minimal. Displays of mobile devices have limited graphics capabilities and are quite small. Similarly, memory is limited, disks may be nonexistent, and software availability may be restricted.

Another key attribute of ubiquitous computing is interconnectivity. Current mobile hosts such as notebooks, PDAs and cellular phones provide connectivity but lack interconnectivity. With these devices a user may connect to another system on a point to point basis. The ubiquitous computing paradigm will take this a step further. "Ubiquitous" devices, like existing devices, will have the ability to connect to systems on a point to point basis. They will have additional capabilities too. Devices will be aware of each other and know how to exchange information among themselves. In addition, they will be able to control each other as needed. Just how this will be accomplished remains to be seen. Suggestions including the use of infrared (IrDA), low power RF, or even inductive (EMF) communications have been proffered.

For Ubiquitous devices to be truly useful they must support the concept of context awareness. Context aware devices will be able to adapt their behavior to the environment in which they find themselves. Devices should recognize when they transition to a new network or one that uses a different protocol and adapt appropriately; e.g. switch from using low power RF for communication to using an IrDA port instead. Context aware devices will also recognize the software, hardware and other resource constraints of devices they are interacting with. For example, a device should know or be able to discover whether a device it wishes to interact with can support a certain protocol or windowing system. This is often referred to as resource qualification.

References & Links

Ubiquitous Computing : An Interesting New Paradigm

Hot Topics in Ubiquitous Computing

[The World is not a Desktop](#)

[The Computer for the 21st Century](#)

[Ubiquitous Computing](#)
>Ubiquitous Computing page at Xerox Palo Alto Research Center.

[Some Computer Science Issues in Ubiquitous Computing](#)
>An essay by Mark Weiser.