

# Ubiquitous Computing

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## What is Ubiquitous Computing?

Today's computers need specialized approach by the users to extract information out of them. For example if a person wants to access data from a remote location, he needs specialized knowledge regarding networks, remote administration etc. Ubiquitous computing solves this problem by just pressing a button.

Central administration in conventional networks is a very tedious process where the administrator needs specialized knowledge. Again, Ubiquitous computing solves this problem with a button.

Data logging for a given network is achieved in a very crude manner, which makes the analysis of this data very cumbersome, especially for huge companies which have large man power. Ubiquitous computing solves this with a button.

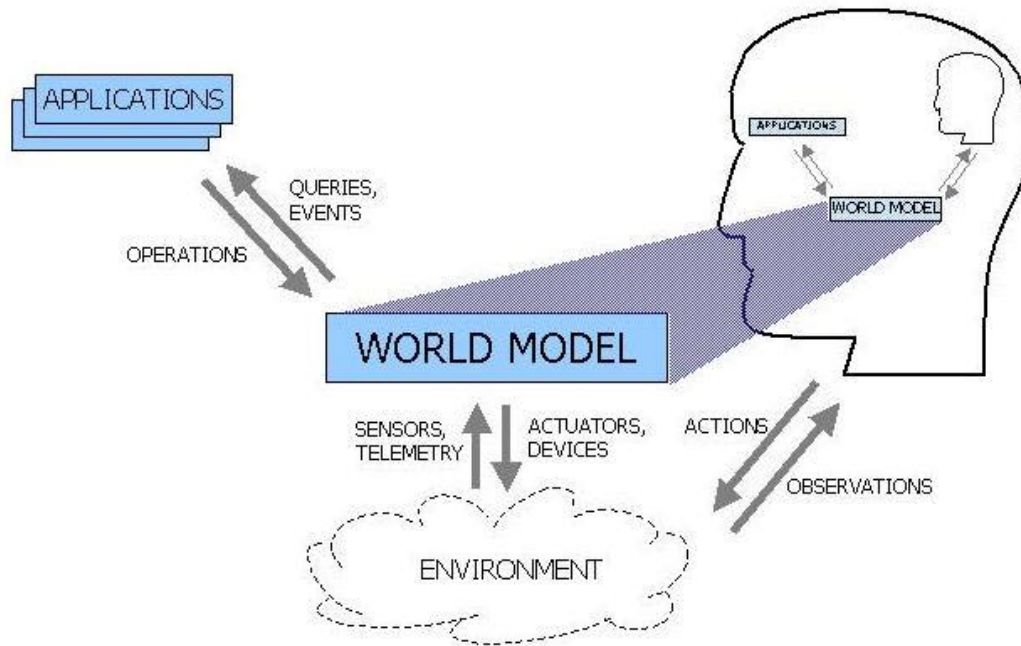
Data loss due to theft is a very serious problem especially in research oriented companies. Ubiquitous computing knows which data should go where and comes to the rescue with a button.

This magic button introduces ubiquitous computing which is a responsive and awake computing system capable of interacting with world models the way humans do.

### **It is the next generation of Human Technology.**

What could we do if computer programs could see a model of the world? By acting within the world, we would be interacting with programs via the model. It would seem to us as though the whole world were a user interface.

## Explanation



Here is a diagram showing what we are trying to achieve. While people can observe and act on the environment directly, application programs observe and act on the environment via the world model, which is kept up to date using sensors and provides an interface to various actuators; if the terms used by the model are natural enough, then people can interpret their perceptions of the world in terms of the model, and it appears to them as though they and the computer programs are sharing a perception of the real world.

The technological challenges for this system are:

- creating an accurate and robust sensor system which can detect the locations of objects in the real world
- integrating, storing and distributing the model's sensor and telemetry information to applications so that they get an accurate and consistent view of the model
- and finding suitable abstractions for representing location and resource information so that the model is usable by application programs and also comprehensible by people.

In order for a computer program to track its user, researchers had to develop a system that could locate both people and devices. The AT&T researchers came up with the ultrasonic location system. This location tracking system has three basic parts:

- Bats - small ultrasonic transmitters worn by users
- Receivers - ultrasonic signal detectors embedded in ceiling
- Central controller - coordinates the bats and receiver chains

Users within the system will wear a bat, a small device that transmits a code to the receivers. Bats also have an imbedded transmitter which allows it to communicate with the central controller.

If a bat needs to be located, the central controller sends the bat's ID over a radio link to the bat. The bat will detect its ID and send out an ultrasonic pulse. The central controller measures the time it took for that pulse to reach the receiver. Since the speed of sound through air is known, the position of the bat is calculated by measuring the speed at which the ultrasonic pulse reached three other sensors.

Apart this, with proper hardware and software systems in place, the BAT can transfer desktops to the closest computer within its range. Its like creating desktops which actually follow their owners within the system. This is handy if you want to leave your computer to show a coworker what you've been working on. Your desktop is simply teleported from your computer to your coworker's computer.

The advantages of such a system to central administration and monitoring is immediately apparent. Some other applications may include :

1. Data Logging
2. Data security
3. Smart posters
4. Streamlined interfaces and others.

The details of these applications are beyond the scope of this synopsis.

## **Software Design**

The software would be using a time-line model comprising of the following components:

- UFO (Ultrasonic Freq Organizer)
- TTL (Time to Time Logger)
- Intelligent Command Director (ICD)
- POD (Profile Oriented Desktop)

The details of these modules too are beyond this synopsis.

## **Conclusion**

**The most obvious real-world application areas for this technology are in large buildings with highly mobile populations who spend their time generating information, looking at information, using different kinds of equipment and communicating with each other. Examples of such environments include hospitals and large office buildings. Ultimately, we believe that ubiquitous computing provides benefits wherever people have to interact with machines. One day, all user interfaces could work this way.**