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# STATE OF ARTS IN PERVASIVE COMPUTING

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## ABSTRACT
Pervasive computing is a post-desktop model of human-computer interaction in which information processing has been thoroughly integrated into everyday objects and activities. Pervasive computing environments involve the interaction, coordination, and cooperation of numerous, casually accessible, and often invisible computing devices. These devices will connect via wired and wireless links to one another as well as to the global networking infrastructure to provide more relevant information and integrated services

## 1. INTRODUCTION
Imagine a world filled with all sorts of gabby electronic devices - traditional desktop computers, wireless laptops, small PDA ipaqs, smart cell phones, tiny wristwatch pagers, clever little coffeepots. Imagine all these devices talking easily to one another to bring you the news you need when you need it, regardless of where you are. You have just imagined the future of Pervasive Computing (PvC). Pervasive computing environments involve the interaction, coordination, and cooperation of numerous, casually accessible, and often invisible computing devices. These devices will connect via wired and wireless links to one another as well as to the global networking infrastructure to provide more relevant information and integrated services. Existing approaches to building distributed applications, including client/server computing, are ill suited to meet this challenge. They are targeted at smaller and less dynamic computing environments and lack sufficient facilities to manage changes in the network configurations. Networked computing devices will proliferate in the user¡¦s landscape, being embedded in objects ranging from home appliances to clothing. Applications will have greater awareness of context, and thus will be able to provide more intelligent services that reduce the burden on users to direct and interact with applications. Many applications will resemble agents that carry out tasks on behalf of users by exploiting the rich sets of services available within computing environments.

Mobile computing and communication is one of the major parts of the pervasive computing system. Here data and computing resources are shared among the various devices. The coordination between these devices is maintained through communication, which may be wired or wireless. With the advent of Bluetooth and Ad hoc networking technologies the wireless communication has overtaken the wired counter part.

## 2.A PERFECT EXAMPLE OF A SMART HOME
The Bill Gates home is a perfect example of a home where ground breaking technologies have been applied to make the home more livable. It could serve as an epitome of the application of pervasive computing. A hundred microcomputers and the software that controls them have been embedded in the home and it makes you experience the home without paying any attention to the technology at its heart. It provides an intelligent environment around with features like :

1. It allows you to listen to your choice of music when you enter the room.

  

2. The lights goes on when you enter the room , its brightness adjusted to suit the weather outside.
3. High resolution displays present electronic versions of your favourite art on the walls of the room.
4. The room by itself adjusts to the temperature according to the time of the day.
5. The home is also equipped with energy saving instruments.

## 3. CURRENT EMBEDDED TECHNOLOGY

Embedded technology is the process of introducing computing power to various appliances. These devices are intended to perform certain specific jobs and processors giving the computing power are designed in an application oriented way. Computers are hidden in numerous information appliances which we use in our day-to-day life. These devices find there application in every segment of life such as consumer electronics, avionics, biomedical engineering, manufacturing, process control, industrial, communication, defence etc…

Today, many people carry numerous portable devices, such as laptops, mobile phones, PDAs andmp3 players, for use in their professional and private lives. For the most part, these devices are used separately i.e, their applications do not interact. However, if they could interact directly, participants at a meeting could share documents or presentations, business cards would automatically find their way into the address register on a laptop and the number register on a mobile phone, as commuters exit a train, their laptops could remain online; likewise, incoming email could now be diverted to their PDAs.

In such a distributed environment where several embedded devices has to communicate and coordinate with each other. For this a communication link is required which may be wired or wireless. In initial stages of Networked embedded system environments wired connection was preferred as it provided a safer and faster channel for communication. But the cost, immovability and the cables running around the floorboards became less attractive. On top of this, dishing out the cash for network cards, cables and a hub/switch reserved this practice to the more elite computer users, until wireless networking hit the scene. Infrared communication was initially used for wireless communication because of the low cost offered by it. But it suffered from the limitation that it can be used only within Line Of Sight. IEEE introduced 802.11 as the international standard for wireless LANs. This used a 2.4GHz transmission band while maintaining a steady 1-2 Mbps bandwidth rate. Being that this was extremely slow compared to 100Mbit wired LANs, it took a while for the 802.11 standard to develop into a viable solution, achieved shortly after with the 802.11a, b and g standards, offering bandwidth ranging from 11Mbps to 54Mbps. Although this is still considerably short of the 100Mbit found in cabled networks, 802.1 xwireless technologies is now literally regarded as the future of networking. Bluetooth, Wi-Fi, Wi-Max are the latest solutions, under the 802.1x standard, for wireless communication over short,medium and long range communication respectively.

## 4. UBIQUITOUS \ PERVASIVE COMPUTING

Pervasive computing can be explained in two different perspectives:

### User view

For an end user Pervasive approach act as a method of augmenting human abilities in context of tasks. It provides Interaction transparency which means that the human user is not aware that there is a computer embedded in the tool or device that he or she is using.

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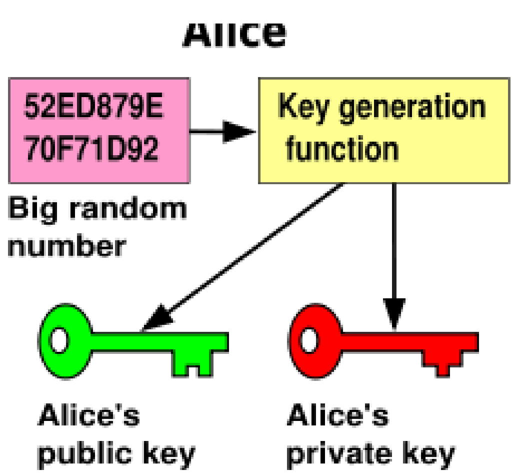
**Technological view**

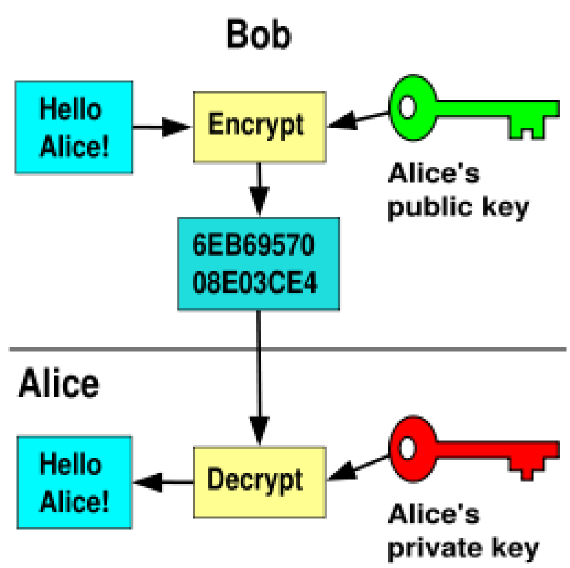
It means access to information and software applications are available everywhere and any where. Technically pervasive computing involves in embedding intelligence and computing power to devices which are part of our daily life. As the word ¡¥Pervasive¡¦ means, we create an environment with intelligence and which can communicate with each other. This technology is intended for mobile as well as localized devices. It must also posses the ability to locate an object or a user using Pr visions such as Global Positioning System (GPS). After positioning, a dynamic link must be setup for communication which may use the recent concept of ADHOC networking. User can interact with and control these devices using steerable interfaces, using voice and gesture recognition facilities

## 5.HOST IDENTIFICATION PROTOCOL for PRIVACY SOLUTIONS

The Host Identity Protocol (HIP) provides a method of separating the end-point identifier and locator roles of IP addresses. It introduces a new Host Identity (HI) name space, based on public keys. The public keys are typically, but not necessarily, self-generated.

**PUBLIC KEYS:** Public-key cryptography, also known as asymmetric cryptography, is a form of cryptography in which the key used to encrypt a message differs from the key used to decrypt it. In public key cryptography, a user has a pair of cryptographic keys-a public key and a private key. The private key is kept secret, while the public key may be widely distributed. Incoming messages would have been encrypted with the recipient's public key and can only be decrypted with his corresponding private key. The keys are related mathematically, but the private key cannot be practically derived from the public key. Conversely, secret key cryptography, also known as symmetric cryptography uses a single secret key for both encryption and decryption. To use symmetric cryptography for communication, both the sender & receiver would have to know the key beforehand, or it would have to be sent along with the message.



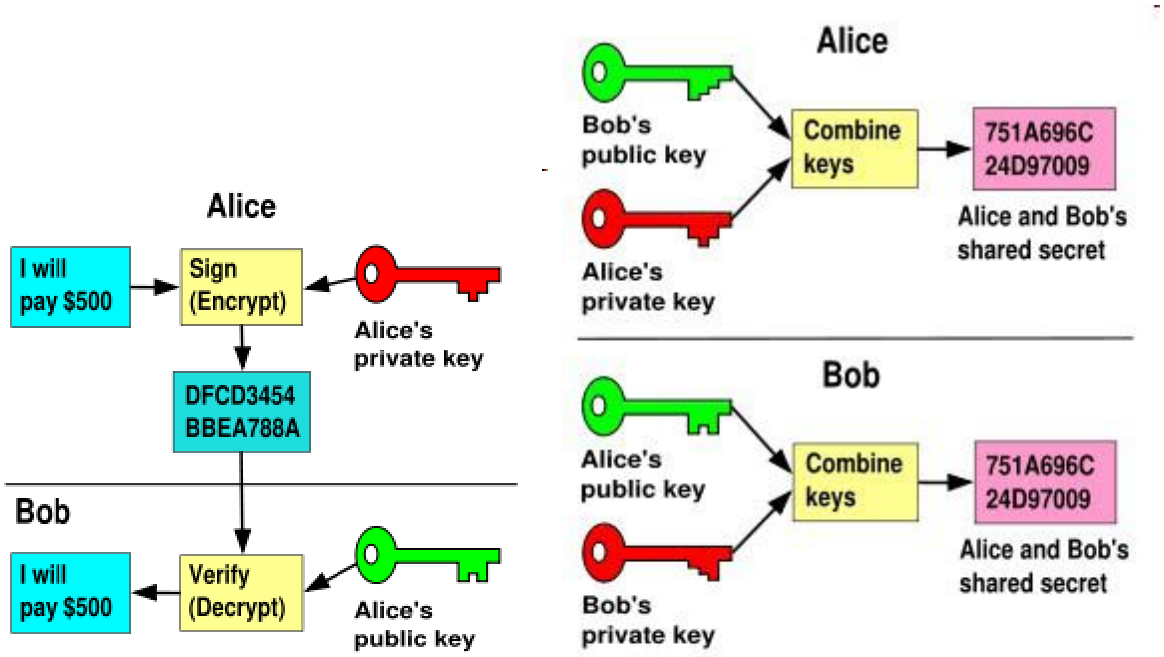



Fig.1 Public keys

## 6. TRUST BASED ARCHITECTURE FOR PERVASIVE SYSTEMS

Simple public key infrastructure (SPKI, pronounced spoo-key) was born out of a joint effort to overcome the over complication and scalability problems of traditional X.509 public key Pervasive Computing infrastructure. It is specified in two Internet Engineering Task Force (IETF) Request For Comments (RFC) specifications -- RFC 2692 and RFC 2693 -- from the IETF SPKI working group. These two RFCs are at the EXPERIMENTAL maturity level of the IETF's RFC status. The SPKI specification defines an authorization certificate format, providing for the delineation of privileges, rights or other such attributes (called authorizations) and binding them to a public key. In 1996, SPKI was merged with Simple Distributed Security Infrastructure.

## 7. CONCLUSION

We stand at the beginning of yet another epoc in computers. The battle lines are drawn for the heart and soul of this new infrastructure. Let the games begin. The trends in pervasive computing are increasing the diversity and heterogeneity of networks

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