



A Brief Summary of Pervasive Computing System's Main Structure

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Abstract: Recently, the people have many technological opportunities to reach data. Nowadays, many products and new technologies are put on the markets at every hour. Today, in addition to produce new devices and technologies, the researchers should provide these devices to cooperate with each other at the most. And also, these devices and technologies should present an anywhere and anytime intelligence which is proposed with pervasive computing for users, lately. Here, the user is covered with an intelligence provided by miscellaneous technologies and technological products at no matter where.

Keywords: Pervasive Computing, Healthcare System, Ubiquitous Computing, Wireless Networks

1. Introduction

Recently, people utilize sensors comprehensively because it is easy to assemble them over many devices in large environments. Thus, there are many users who take advantage of these managing, computation and monitoring features owning devices with the evolved and new generation mobile devices that have many valuable abilities. Nowadays users' data transfer increase and human activity contexts are produced. Eventually, system of ambient intelligence is proposed about ubiquitous intelligence around. It is also delicate to the human presence and pervasive computing applications. Ubiquitous computing systems have a human centric structure, mobility and pervasiveness, also they need to be fault tolerant and robust. The heterogeneity of hardware, networks and operating systems should be masked in an ubiquitous computing system. In ubiquitous computing systems multi disciplinary research areas cooperate, for this reason security and privacy is the vital factors for the considered multidisciplines [1].

The basic idea of pervasive and ubiquitous computing is advancing a smart area for users by seamless service access with considering requirements and developing service provisioning to provide better life standards for users with computing and networking infrastructures and also presenting sources for the high level requirements of applications that have context and needs of the users together

with ensuring efficiency. Most familiar of these applications are medical care, social networking, assisted living, smart spaces and logistics which own adaptability, reliability, context awareness and flexibility properties [2].

In the work, ubiquitous computing techniques are briefly proposed. The paper is organized as follows. In Section 1, an overview is provided about the ubiquitous computing. In Section 2, system types are surveyed. In Section 3, basic applications are given. The conclusion part, provides a summary.

2. Ubiquitous System Types

For years, the evolution of computing proceeds with reducing device sizes and producing more efficient devices. Nearly forty years ago, a main workstation was used to be able to provide a simple operation with sending some commands and spending too much time. Then, personal computers were presented in the years of 1980s, so every one of a user would use a computer. Mobile devices are produced in the years of 1990s, laptop, personal digital assistant (PDA) and smartphone become widespread as illustrated in figure 1. To reach data become simple and cheap by the help of these devices at anytime and anyplace. Today, these devices present many useful applications to provide better life standards for us like a smart adjunct with providing users to share information, arrange meetings and watching movies. Because of these valuable specialities, these devices are

known as pervasive devices. Pervasive computing is utilized in education with changing many rules and routines. The cooperation of people and the computer is enhanced with pervasive computing. Also with new technologies and business models owning pervasive computing, applications and services become reachable over Internet based pervasive devices [3].

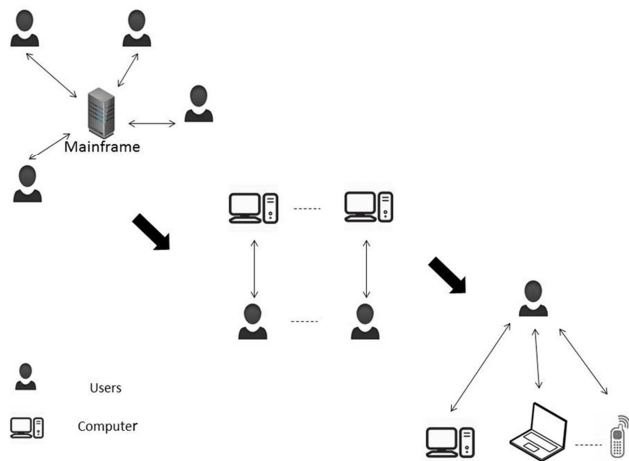


Figure 1. The evolution of computer system [3].

Transmission of a mobile node is ensured over an access point depending on the WLAN coverage with many handovers over miscellaneous IP subnets. At IP address changes, for ensuring the wireless and mobile connection, mobility management schemes are utilized. While having an application, a ubiquitous wireless LAN belonging mobile node can travel between access points. Mobility is used in many areas: enviromental, military, commercial and civil areas [4-8].

Sensor nodes are composed of processor, transmitter, sensing part, power units, mobilizer and position finding system. They are used for data sensing and data collecting about a topic or area together with the considered factors. Next, data is send to be processed as signals towards the sink over a multihop structure. Data is collected, processed and transmitted with sensors, in distributed computing, stock monitoring, health care monitoring and rescue managements [9].

Mobile users' requirements are ensured with wireless access technologies. Next generation all-IP network architecture focuses on providing the cooperation of many diverse but complementary technologies over an internet based general structure, to provide an ubiquitous, anytime, anywhere connectivity and transmission. Wireless networks are compatible with ubiquitous network structures, for cooperating with each other [10].

Radio frequency identification (RFID) is utilized in medical areas by ensuring secure access, decreasing medical errors and improving the healthcare quality in hospitals by monitoring and identifying patients, hospital staff and hospital devices. RFID is required for monitoring patients and staff in hospital. In an emergency state, RFID yields

security and time saving while serving patients. Initially, RFID tags were mounted to patients and considered places, later low frequency (LF) and high frequency (HF) RFID systems were placed on the bodies but these systems were restricted because of their short ranges and very low data rates. Here, the attenuation of the signal is basic reason of the disadvantages. With the strong attenuated signals inside the body tissues, ultra high frequency (UHF) and microwave RFID systems have bigger operation areas and more data rates. They are mounted in the human body instead of wearing over the body, nowadays. So, there will be losing of the tags. And also they will not be perceptible from outside with its invisible structure. RFID is utilized at integrated sensing and signal processing areas, other than tagging applications. The usage of RFID tags with RFID based personal area networks at monitoring with sensor applications, will be more useful in collecting informations about the patients [11].

3. Basic Applications

To cover vaste areas over the world with wireless sensor networks is easier depending on the technology and basic needs with spending less power and lower cost compared with other communication technologies.

WSNs are used in environment monitoring by collecting data about the wildlife of animals, plants, climate, pollution rates in air, water and soil. Furthermore, to take precautions as in disaster and battlefield monitoring, at volcanic eruptions, earthquakes, flood disasters and tornados, WSNs can be useful.

Besides, the considered technology develops the reproductivity of agriculture and farming in big farms. Today, users attain network resources with Wsn at everywhere and anytime over primary networking environments. E-agriculture, e-livestock and e-education applications are based on computers and mobile phones [12].

Wireless sensor networks are utilized to evaluate body temperature, body pressure, heart pulses and activity rates of people in remote medical care applications. Huge amounts of medical and general data of patients can be collected by the sensors and extremely important results can be produced in health areas with these precious data. The data of patients are collected in patients' houses during their daily routine. The data can be easily collected at everywhere and anytime. Thus, the collected data is very valuable, it presents many clues about the illness of the patient. Without utilizing such applications, doctors may gather these type of data only a few times in a day. With gathered variable types of data, the doctors will provide better medical treatments. Because the doctors will monitor the state of the patient during seven days and twenty four hours a day. Also, they can easily communicate and reach history of the patient [13].

Today, social networking is getting more popular because of the recent technological developments of smartphones and the increasing pervasive connections of internet networks. Thus, reaching real time worldwide news and staying up to

date is very easy. Also, with the pervasive communication platform which is composed of smartphones, network infrastructures and social networking, message transmissions at everytime and everywhere is provided [14-20].

4. Conclusion

Contemporarily, internet technologies are in an insuppressible growth because of the recent developments in communication areas. Today, many applications are presented for users. These applications are mostly based on the needs and requirements of the users.

For social and business areas, to provide wireless connections which are suitable for the building of anywhere, anytime computing that is known as pervasive computing by ensuring multiple of computers to be in a suitable connection over a physical environment is a remarkable topic for researchers and profitable area for markets.

As a result, great improvements in internet technologies provide reliable digital environments with pervasive computing. Thus, the life standards of people develop and become better.

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Biography



Pinar Kirci received the B. Sc. degree in mathematics and computer from the Beykent University, Istanbul, Turkey, in 2002 and the M. A. Sc. degree in computer engineering and the Ph. D. degree in computer engineering from the Istanbul University, Istanbul, Turkey, in 2005 and 2011, respectively.