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AMBIENT INTELLIGENCE AN APPLICATION FOR REAL TIME SYSTEMS AND SECURITY

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Abstract: Ambient intelligence is a growing real time response for human presence that brings intelligence to our day to day life and makes that life sensitive to us. Ambient intelligence is based upon sensors and networks of sensors, pervasive computing, and artificial intelligence [5]& embedded systems. Because these technologies have contributed tremendous growth in the last few years, ambient intelligence research work has strengthened and expanded. Because ambient intelligence research is maturing, the resulting technologies promise to revolutionize daily human life by making people's surroundings flexible and adaptive. In this paper we have provided more focus on ambient intelligence requirements with authentication & security mechanisms that are useful for implementation of real time systems.

Keywords: Ambient Intelligence, Ami, Artificial Intelligence, Sensors, Machine Learning

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INTRODUCTION

Ambient Intelligence refers to an exciting new way in information technology as application of artificial intelligence in real time systems, in which human being are empowered through a digital environment that is aware of their presence and context and isadaptive, sensitive and responsive [3] to their needs, habits, gestures and emotions. It is an emerging trend that brings artificial intelligence [5] to our day-to-day environments and makes those environments sensitive to surrounding people. Development of real time systems and embedded systems for domestics inclines that need of high end optimization of intelligence. Ambient Intelligence is a computerfuturevision.

The most supporting definition for Ambient Intelligence is the presence of a digital environment that is sensitive, adaptive, and responsive to the presence of people.This signifies that it used to describe

Three Key Technologies used in Ambient Intelligence:

A. Ubiquitous Computing

It means that integration of microprocessors into everyday objects like furniture, clothes, toys, other household appliances etc. This kind of computing is also referred as a pervasive computing for describing a ubiquitous computing.

B. Ubiquitous Communication

It enables these objects to communicate with each other and with the user for providing much more interactivity.

C. Intelligent User Interface

It enables Ambient Intelligence to controland interact with the environment in a natural (voice, gestures) and personalized way (preferences, context).
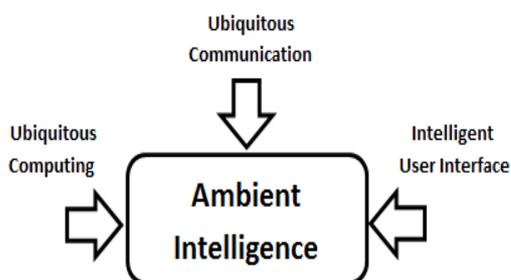

Figure 1. Key Technologies used in Ambient Intelligence

Above three aspects suggest Ambient Intelligence is nothing but the making technology invisible to people, embedded in natural surroundings & present whenever we need it and making interaction with technology very easily.For example: informing automatically about heart beat rate, dehydration rate etc. about body while doing exercise or suggesting cloths to the user in mall on the virtual screen based on skin colorof that person.

To use Ambient Intelligence there are many hardware components are been use. For example sensors for sensing the people presence, cameras to take real time picture, software to perform intelligence on gathered data, nanotechnology, biometrics for user authentication etc.

Ambient Intelligence is useful in various day to day as well as business strategies. It can be present in house, hospitals, class rooms, e-commerce, e-business, transportations etc. A major challenge about Ambient Intelligence is to build a bridge between the contradictory requirements of personalization and privacy of people who use it.

D. Real Life Example

Consider an example of house containing ambient intelligence where it will contains all components of ambient intelligence like sensors, embedded system, network etc. There will be installations of sensors in various appliances like microwave, washing machine, doors, fire alarms, windows, T.V., bed, sofa, light system etc. To carry out any activity this sensors are play important role. Sensors does various activities like opening of door automatically when user pass from door, informing about microwave status to user regarding it is ON or OFF, automatic adjusting brightness of light, detecting smoke in house etc. Whenever owner of home is not present at home then he/she can access house status directly through his mobile, laptop, PC, tablet etc. where he will see all information related to house like how many person is present in house, who is doing what, status of digital appliances, controlling appliances remotely, giving some message to home users etc. For doing so it is necessary to have some kind of network to pass information and some storage to store it.

Another thing that can happen with ambient intelligence is to shows various TV channels base on our facial expression when we switch ON TV. It will capture our expression like happy, anger, sadness etc. and based on that it will suggest something to watch. Sometimes it may happen that our tomorrows breakfast food material like eggs, bread etc. is over then in such case sensors in refrigerator will scan it and based on that it will suggest that some food is over and it's time to buy. Now if we ready to buy then it will show some local online shop near to our house on virtual ambientdisplay [1] from where we can order that food material and make payment from that display itself.

II. AMBIENT INTELLIGENCE

A. Embedded Systems

Embedded system [7] isthat system which contains embedded software with hardware which meant for specific application. Such system is created for the desired application. For example: creating custom fire alarm system which send automatically message to the owner of house whenever fire alarm rings due to fire. Such system will contain several microprocessors & microcontrollers along with network connecting capability.

B. Sensors

A sensor is a converter that measures a physical quantity and converts it into a signal which can be read by an observer or by an instrument. It is essential to get knowledge regarding surrounding environment. The sensors can be accelerometers, biosensors, image sensors, motion detectors etc. For example: Face Recognition system used to automatically opening of house door when house owner face get verified with camera sensor.

C. Network

All the components in the ambient intelligence is connected through network. The network may be of any kind like PAN, WAN, MAN or even internet also. It make direct transfer of data from source location to intended receiver. We can also make use of our cellular network to connect. For example: We can switch off A.C. of house using mobile phone which is been left ON by mistake while leaving home or our house monitoring ambient system will inform to house owner regarding current status of people in house.

D. Memories

Memories are been used to store huge amount of data been creating after installing the ambient intelligence. Based on the data generated, it may use that data for machine learning. This type of technic called supervised learning [8]. For example: based on past data the learning system will try to guess the likelihood TV channels been watch by house owner when there is Sunday.

III. SECURITY

A. Identification System

If we are using ambient intelligence system for our house then it is require that the system should recognize his authorize user only. To do so we can make use of different identification system like Face recognition, Iris Recognition, Thumb Recognition ,Palm Recognition, Hands geometry scan, Facial features, Voice Verification, Gesture Recognition etc. It will help to give

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access based on user type. For example: This system should show the location of various exercise machines in gym to its user and it should give information regarding number of user is currently present in gym to the owner of gym. So in such cases it is required to distinguish user from gym owner using identification system. Also to carry out some payment transaction, legal access to given to intended user only.

Figure 2.Various Identity Management system using biometrics

B. Transaction System

If we are making any money transaction using the ambient intelligent then it is required to have security to access it. Suppose we are ordering something from virtual environment present in our house it is mandatory to transact using secure channel. To do so we may either use certain private channels or some security protocols for it. We can make use of symmetricorasymmetric cryptography[6] along with digital signature [6] for making transaction.

IV. APPLICATIONS

While ambient intelligence looks like very similar to the science fiction, it will play a very important role in many field like-

1. Classroom Areas

2. Monitoring Traffic signals

3. E-shopping

4. Patient Monitoring

5. Gymnasium (Gym)

6. House Monitoring

7. Recreation

8. Virtual office at house

9. Social network etc.

V. FUTURE

Ambient Intelligence puts the emphasis on user-friendliness, efficient and distributed services support, user empowerment, and support for human interactions. This vision takes us away from personal computers to other devices which are embedded in our environment and which are accessed via intelligent interfacesusing mobile phone, PDA, robot etc.

The new technology will be based on smart environments, Ambient Intelligence, Disappearing Computers [2], Ubiquitous Computing [4], all computer parts like sensors, chips, memories, processors etc. will be movable to the human bodies, home appliances, office, mall, trains, buses, health centers, hospitals, military etc. They will show their functionality without their presence.

As the World Wide Web has changed our ways to communicate, to collaborate and share information in previously unavailable ways, ambient technology will even further influence our lives. It will make new revolution in our daily live and work environment. The improved technology will adapt all human need at one easy point of center. Our complete life will be get more control on daily task with simple friendly interfaces.

VI. CONCLUSION

Research and technology must go hand in hand to develop ambient intelligence systems. Technology must move forward to provide the backbone of the ambient intelligence system: fast seamless clusters of computers communicating at very high speed, sharing information acquired by highly sophisticated sensors and ambient-controlled real time. The current state of the art in information understanding and relaying will have to make huge steps forward to design algorithms capable of understanding and intuiting human actions and speech. Neither research nor technologies are sufficient to implement ambient intelligence environments. Both are necessary to create the soul and body of a truly pervasive and distributed layer, capable of dealing with user requests, preempting the user and guiding the user in private and public enhanced spaces.

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