

Optimal Solution for Overcoming Difficulties in Prevalent Ubiquity Computing in Real World Using STC

S. Vishnu Priyadharshini

MSc (SS) Student, Department of Computer Science, PSG College of Arts & Science

Abstract: *Mobility in mobile computing and ubiquity computing is the major emerging technologies .To reduce the manpower in most of the fields like healthcare, educational system etc... Ubiquity computing technologies are developing in a fast rate. The prevalent ubiquity computing is a concept of connecting the computer with a world than vice versa like virtual reality. There are lots of advantages and as well as disadvantages in prevalent ubiquity computing like security, data storage etc. . . .The main objective in this paper is to overcome the cons in prevalent ubiquity computing using STC and case study about few of the applications in real world.*

Keywords: Prevalent computing, ubiquity computing, smart dust, Cloud

1. Introduction

The main aim of prevalent ubiquity computing is to make every object in the real world to communicate with the user by embedding components. There are lots of projects based on ubiquitous computing like self-driving cars, smart home assistant, clothing etc. The main components for achieving the goal is by using sensors and computing devices which communicates with each other and an action is performed according to the results. These applications focus on making peoples life easier and faster. These systems can identify deviation in usual behaviour, requirements of user and respond in time according to the emergency Moreover, these smart applications helps in reducing the human error on day to day life. Location router according to optimal distance, smarted systems all also inventions based on ubiquitous computing.

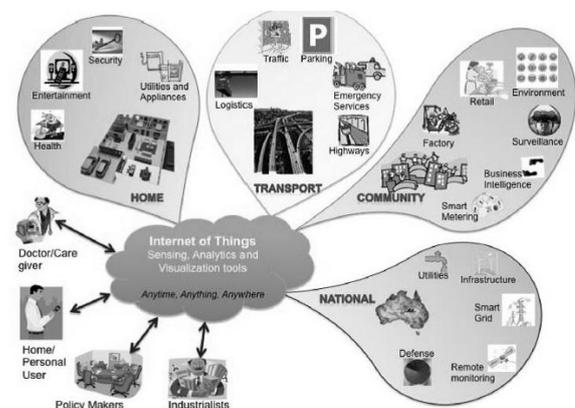
The major consequence is disappearing of computers and computing is done using everyday objects. People are not aware that the data is collected in the background stored, processed and exchanged with objects according to the necessity. This leads to the major security and privacy issues. The main areas like healthcare, emergency systems are affected in large scale. However the bottlenecks can be overcome by using simple computing, data storage techniques. According to the survey 40 percent of the total death in world population per year is due to medical errors. Half the people die in accidents due to lack of treatment in emergency situations. It is important to overcome and avoid the patient recognition, analysis and treatment errors.

Ubiquity computing is achieved using mobile computing, embedded sensors, Artificial intelligence, data centres, and human interaction. It is important to study all the fields to find optimal system. The two systems proposed in ubiquity computing is being discussed in the paper. The healthcare system for improving patients health by regular monitoring, analysing the result with normal rates and transforming the data to doctor and alerting them in case of emergency. The second is ubiquity education system which interacts with the

students at any time and make them learn using real time examples.

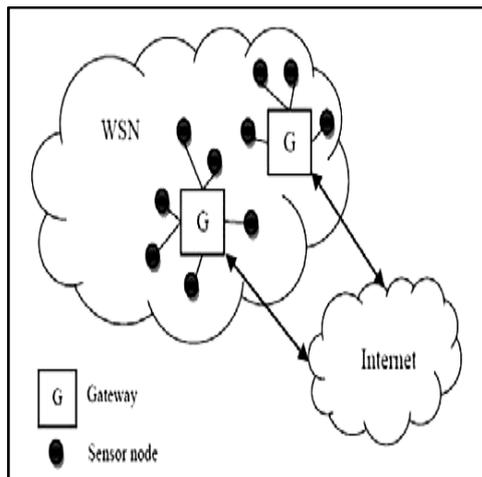
2. Health Care System

The main principle in healthcare is “right care for the right person at the right time”. The patients requiring close attention are connected with sensors using body area sensors and wireless sensor devices like smart watch. More than one sensor nodes can be implemented according to the necessity .These sensor nodes communicate with other nodes using gateway thus transmitting the data between the sensor to internet for processing and other transactions as required by the patients’ health. Sensor nodes are easy to implement, maintain and light weighted objects. The sensor nodes measure physical data from the patients like heartbeat rate, when they took medicine, blood pressure, body temperature etc... These data are collected by sensors and transmitted to internet or other computing devices. The result is computed using the reasoning algorithms. The result is then transmitted to other devices via internet on emergency or it can be stored for further use. The standard user interface and displays are used for displaying the result to the user and doctor. Any computing devices like mobile, tablet etc... Can be used for display.

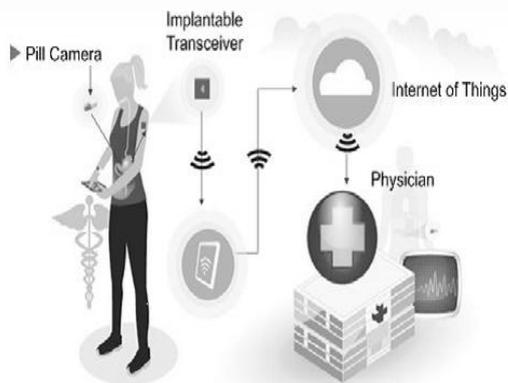


The major component in ubiquity computing is network connectivity this can be achieved by WIFI or Bluetooth

devices. The other in use requirements are interoperability, reliability, mobility, Flexibility and extensibility.



Interoperability is to facilitate seamless integration of products developed by different manufactures. The computing devices should be made with standards used to communicate with other devices as per requirement. Reliability is main feature that the system should always provide the right information. The accuracy of the information is the major aspect in emerging technologies. People are moving from one place to other. They do lot of activities. So a personalized health care device should be created allowing association with user even the underlying network changes.



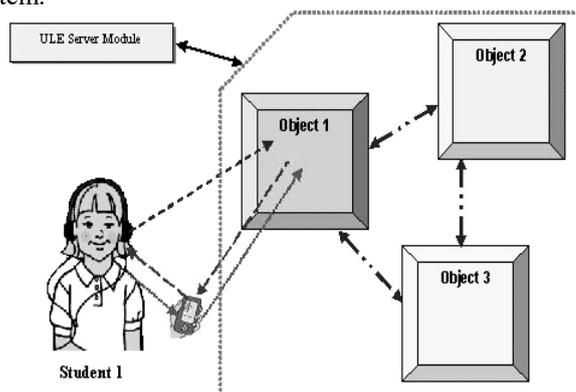
Ubiquitous Educational System (UES)

In Ubiquitous Educational system sensor are connected with real time object. The contents and functionalities of the object are provided by the main Ubiquitous Educational server. The contents are based on the student details. This system follows one to many relationship where one server is used by different objects for providing contents to n number of students. The student carries a computing device like mobile, tablet, tag etc... The components connected in this network is known as use-space.

The objects in the ues-space are interconnected with each other. So if student1 interacts with object1 then all the objects in the ues-space is aware of the interaction. The interaction result is stored for future use. So each student can progress in the learning experience in their own pace. The UES server has strategies to reinforce and aid student

understanding the subject through the interactions and feedback. The server is connected with a database with has the lessons and all the objects data about the students in the ues-space. So whenever there is an interaction between object and student. The sensor checks the student details and transmits it to the object via network like WIFI or Bluetooth. The objects then communicate with the server for the details about student and the server processes the reasoning algorithms. The result is generated i.e. the correct lesson suggested for the student. These details are obtained from the database and then transmitted to objects. The object then interacts with the student using GUI.

After the lesson session is over the results are transmitted to server which in turn stored in the database for further use. This system allows the students to learn quickly and efficiently providing the better and practical learning environment. The objects nodes intercommunicate with each other for providing maximum operability. The sensors in objects are basically Nano chips or any computing device which is capable of transmitting, processing and storing data. The advantages in the system has its own disadvantages too. The operations work only in limited ues-space. The datacentres are required for storing student information. As the number of student increases the data storage increases. So a large data centre is required for the system.



Advantages

Ubiquitous computing offers benefits to individuals by combining sensors, networking technology, objects and data analysis to monitor and report on many different things. E.g.: Purchasing thing, traffic analysis. The smart environment detects errors, anomalies and emissions, enabling early intervention or preventing a workplace disaster. Ubiquity computing can also track resource usage, inputs and outputs, transmissions allowing for better management of resources during high load periods or for better distribution of resources across a time period. There are many advantages in ubiquity computing. Few of them are:

Invisible: The smart environment is embedded in the real world by computing technologies. So the environment gain more capabilities with less or not visual clutter.

- **Decision making:** Smart environment will help users to make better decision in day to day life. It also reduces the manual errors by user.
- **Emergency behaviour:** The objects around us will learn how to respond to the emergency behaviour which helps

us to overcome the obstacles. The main field using this is Healthcare.

- Information processing, convergence and enhanced experience are the other benefits of ubiquitous computing.

3. Potential Crisis

1) Violation of Privacy

Ubiquity Computing drastically increase the intended and unintended privacy breaches. This is because of the new quality of data collection and transformation that varies from the current computational system. In current system duration of data collection and potential surveillance is limited to the time the person uses the system. But when interacting with smart objects and environment there will be no online and online in data collection. The current system uses singular data collection only where as in pervasive ubiquity computing sensors continuously and unobtrusively capture detailed real time data like current location, health of individual etc. These are done by automatic data capturing mechanism. So, the user has very little or no control over the data collected which is very dangerous, as highly sensitive data can be transmitted and accessed by unauthorized people which many lead to potential risks. This Situation can lead to misuse of personal data, loss of control over environment.

2) Dependent on technology

Smart sensors are in developing stage. The Nano chips embedded in object in real world has its own disadvantages. The main goal of smart environment is interoperability. The Nano chip should be fast enough to communicate with the user mobile devices and internet.

3) Data Storage

A vast amount of data will be collected in ubiquity computing. As there is not constraint and the sensors collect data continuously without user intersection the data should be stored in a proper way for further use. The data collected should be analysis whether the data will be required in future if so the data should be stored else the data should be discarded. So, large number of data centres will be used in ubiquity computing and this can make the system slow or lagging.

4. Methodology

To overcome the potential crisis STC Methodology is used. The major issues in ubiquity computing can be overcome by using the new technologies. The STC methodology is used to overcome privacy, technology and data storage issues. The STC stands for Smart dust transparent crypto graphical computing Cloud Storage System.

Privacy is a major threat as the data is stored at any point of time. The data thus stored should be secured. The data of user is transmitted using WIFI or Bluetooth were the intruders can steal or change the data. Therefore to overcome the privacy issues Transparentcrypto graphical computing is used. In transparent cryptographically computing the computer analysis the user needs and processes the results which are required by user, by without the knowledge of him. The input and output of the ubiquity system is made invisible so the nodes and sensors connected

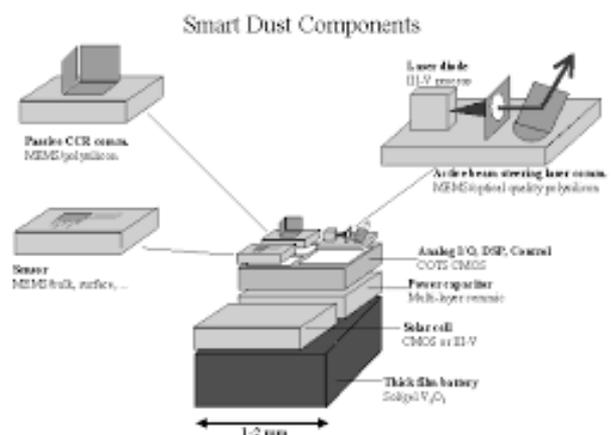
to the user automatically identify the user's needs and work for the fulfillment. Thus while processing the result data is transmitted from object to server or internet using cryptographic algorithms.

The data collected from the user by sensor is first encrypted by the computing device and then it is transmitted to the object. The embedded smart object decrypts the data and analysis the user needs. After analysing the needs the object communicates with the ubiquity server where the users past data are stored. The server then processes the message using reasoning algorithms. Then the data is transferred to object via server in the encrypted form. The Object fulfils the user's requirements. After the process if necessary the data is stored in database of the ubiquity server else if it's unnecessary the data can be deleted. The transparent computing acts as a black box for processing the input and outputs with less or no visibility to the uses.

The next privacy concern is embedded chips. The chips main functionality is to receive the data from sensor then transmit it to server and respond back to user with GUI. If necessary the chips have to store few information or at least contain a temporary memory. The performance of chips is a concern in ubiquity computing. Instead of using chips, Smart dust nanobots can be used. The smart dust is a Nano partial which is capable of identifying the sensor and computing the data. The smart dust particle contains many micro electro mechanical systems (MEMS). These particles has sensors, robots, storage and other devices that can detect, analysis and compute the data and store the data if necessary. The smart dust is an upcoming technology. This smart dust responds to the user in a high rate thus overcoming the delay in emergency situations.

The last concern is data storage. As there is no online and offline transmission of data the data is collected at any point of time and processed. Thus the data should be validated and stored in database for future use. Therefore enormous data will be stored per second which requires the large data centres for each separate servers.

User can't always carry a storage device all the time. So instead the data could be stored in cloud. Each person will be provided with the certain amount of data storage. So when every the data is collected from the sensors the smart dust analysis the data and sends it to server.



The server then processes the data and finds whether it is necessary for future processing if so the data is stored in users data space in cloud via internet. By using cloud the data is organised by a storage data centre company which is responsible for the security and accessibility of data required by the user.

The STC methodology in ubiquity computing is preferred to be an optimal solution with the present technologies for potential issues .The system is made quite secure with the STC methodology though there are other concerns like we can't trust other company to secure our personal data etc.. But still STC methodology can be implemented in mere future.

5. Future Outlook

The ubiquity computing is the upcoming technology which changes the life style of the people. Till now the people and connected with the systems according to the necessity. But by using ubiquity computing the computers will connect itself to the users in every walk of life. The way of connecting with wireless sensors is already being implemented in the world in applications like smart home, self-driving car, Google glass etc. The main difference ubiquity computing is going to make is processing the data with less or no visibility to the user. The disadvantages in ubiquity computing could be overcome using new inventions in technical field like nanobots etc...

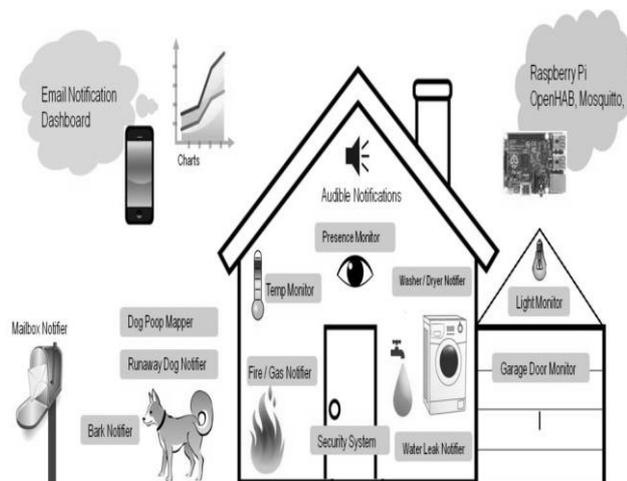


Figure: Smart home environment using STC ubiquity computing.

6. Conclusion

The paper makes clear the ubiquity technology revolution is already underway. And as new technologies are emerging they continue to address the disadvantages and overcome them. Meanwhile the automated machine to machine communication systems are being developed in a large scale. This paper explains STC method which provides one of the way to improve the ubiquity computing systems. The methodology can be implemented in real time system for improving the efficiency. The ubiquity revolution will lead the world in to an all-new way.

References

- [1] Healthcare applications of the Iot by Alok Kulkarni, 2014
- [2] Pervasive computing in healthcare system by Elhamrastegari, 2011
- [3] The ethical challenges of ubiquitous healthcare by International Review on information ethics, 2007
- [4] Abound GD, The human experience in pervasive computing IEEE col 1 pp. 48-57, 2002
- [5] Adamkowsky, "Ubiquitous computing" 2000
- [6] Transparent computing based on OS on cloud by Yaoxue Zhang, IEEE-vol2, 2012
- [7] Thomas Agosto on Pervasive computing in networked world, 2000
- [8] 8.UTI-Learn:A personalised ubiquitous teaching and learning system for smart societies byRashid Mahmoud; Furqan Alma; Nasser N. Albogami; IyadKatib; AiiadAlbeshri; Saleh Altowajjri, IEEE volume PP issue 99,2017
- [9] Model driven approach for self-aware pervasive systems by Eva Gerbert Gaillard, 2016 IEEE ICIS
- [10] Four stages of use on ubiquitous computing by jarilaru IEEE, 2014
- [11] A survey on ubiquitous computing by Vishal meshram, Vidula mesh ram, 2014
- [12] <http://www.cise.ufl.edu/~helal/publications.html>
- [13] 14th IEEE International Conference on Embedded and ubiquitous computing (EUC 2016)
- [14] A case study on pervasive computing in Manet by Subramanian Sharma, Ravi Kumar ISSN, 2011.