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HealthCell

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Abstract *The intention of this review is to make obvious that how the concept of IoT can be used in transforming the health care services. It can be used to sense, detect and predict the health condition of the patient. However, data security and user privacy concerns in s-health have not been adequately addressed. Direct adoption of the traditional CP-ABE in s-health suffers two flaws. A privacy-aware s-health access control system, in which the key ingredient is a large universe CP- ABE with access policies partially hidden. In PASH, attribute values of access policies are hidden in encrypted SHRs and only attribute names are revealed. The advancements in IoT based health care systems and the ideas for taking it to the next level, in such a way that, the humanity gets benefitted.*

Key Words: mHealth, smart health, ICT, MIMO, EHR, Cloud, IoT, Attribute-based encryption (ABE).

1.INTRODUCTION

As the world grows with fascinating technologies, it adversely affects the life of every individual in all the way ranging from the way we take birth to the day we die. One of the main areas that are influenced due to the advancement of technology trend is the health care facilities and its management, to have a better world with productive and healthy people to develop the nation. As the healthy population is the back born of developing nations and vast majority lives in rural areas, it is necessary to improve the health conditions of the people in that area, by making them aware about the latest trends that are flying in our own atmosphere known as Internet of Things (IoT) which is very rarely known by the common people [1]. On this motive, we have looked upon how IoT transform healthcare system in a very vast way to improve each single breath of the eyes which newly gets opened to see the world to experience different stages of life. In the most of the developing country like India, the situation of people living in rural areas are very pathetic where they are completely adapted to the world of poor living background without even having common amenities such as fresh air, pure water and better home. Living with such a background and having a healthy mind and body is all like a dream which can never be aimed for. To uplift such people, it's necessary to make them aware and to see the world existing with exciting techies. The first and foremost thing is to set up health care organisation in each village with basic facilities of having doctors in very emergency situations. It is also necessary to identify a group of people who can be trained using IoTs, which helps them to handle the situation b themselves, when need arises. Even though we consider 'health is wealth', many remote villages even now have a situation where they don't have bare minimum health care facilities to look after their health. It is also evident that, people living in that village has to travel couple of hours to meet a doctor without even having proper transportation facilities [2]. So, on this note of paper, we have considered the remote village as a main area of focus to get developed with the health care system. Our main approach is to make them aware about the latest improvement in the medical field using IoT by providing required trainings to the new generation elderly population of the village. This approach can be a productive in those villages where the people are known with the basics of mobile phones and computers which they attain by limited level of schooling in their childhood.

2. LITERATURE SURVEY

Kavyashree Prakashan, A.S. Karthika , R. Ankayarkanni, J. Bright Jose- Transformation of Health Care System Using Internet of Things in Villages - This paper proposes the architecture of a village small cell network for rural and remote areas for enabling the delivery of healthcare services using mHealth applications and systems. The proposed architecture is based on emerging 5G technologies and is expected to address the need for cost-effective, high capacity and reliable mobile connectivity in rural areas. This will make it possible to provide more innovative video and Internet-based mHealth applications and services, in addition to the current SMS and voice-based services. Future work will include addressing issues of security, privacy and data integrity of patient health information. Reduce the cost of its delivery and extend the reach of healthcare services to millions of people. mHealth systems have successfully been implemented for disease surveillance, monitoring, diagnosis, adherence to treatment and for distributing health education.

Yinghui Zhang, Member, Dong Zheng, and Robert H. Deng Security and Privacy in Smart Health: Efficient Policy-Hiding Attribute-Based Access Control - Smart Healthcare is important for people who need continuous monitoring which cannot be provided outside hospitals. It is also important at rural areas or villages where nearby clinics can be in touch with city hospitals about their patient's health condition. This work presents a smart health monitoring system that uses biomedical sensors to check patient's condition and uses internet to inform the concerned. An android application has been designed in order to easily see the patient's information by their doctors and family members. Temperature and heart rate activity have the biomedical sensors reading with patient name and date time of that reading taken There is also a medicine reminder to remind the patients of their dosage timings through Alarm ringing system so that they can stay fit and healthy. Poor connectivity in rural areas.

Agusti Solanas, Constantinos Patsakis, Mauro Conti - Smart Health: A Context-Aware Health Paradigm within Smart Cities · IEEE Communication Magazine 2014 - The adoption of information and communication technologies (ICT) within the healthcare sector led to the concept of electronic health and mobile health, which is contributing to reduced cost and increased efficiency. Similarly its use for health-related issues ended up with the provision of patient monitoring and healthcare in a pervasive way through electronic and mobile health. The advantages of this survey paper are following: Delivery of healthcare services via mobile communication devices. It can be user oriented and thus extends the capabilities of indoor monitoring environments. The major drawbacks are: No presence of any encryption methods for securing the infrastructure that could endanger the privacy of citizens.

Aldenor F. MARTINS, Angelo PERKUSICH - IEEE 11073 and Connected Health: Preparing Personal Health Devices for the Internet · 2014 IEEE International Conference on Consumer Electronics (ICCE) -
This paper presents and discusses current Connected Health solutions, and how they fit into IoT paradigm. It is presented how IEEE 11073 family of standards may enable a truly and interoperable health IoT architecture. It is presented in a IEEE 11073 implementation aimed at portable devices, namely Antidote. New technologies enablers, such as low energy wireless standards and new sensors technologies, make possible the development of portable and connected Personal Health Devices. It has high connectivity due to internet and large information present on internet regarding health. But no thread creation hence limits the ability to multitask. Hence challenge with TCP on embedded device.

Liane Margarida Rockenbach Tarouco, Leandro Márcio Bertholdo, Lisandro Zambenedetti Granville - Internet of Things in Healthcare : Inter operatibility and Security Issues - Internet of Things devices being used now expose limitations that prevent their proper use in healthcare systems. Interoperability and security are especially impacted by such limitations. In this paper, we discuss today´s issues, including benefits and difficulties, as well as approaches to circumvent the problems of employing and integrating Internet of Things devices in healthcare systems. We present this discussion in the context of the REMOA project, which targets a solution for home care/telemonitoring for patients with chronic illnesses. Devices have Wi-Fi interfaces and features that enable interoperability and data transmission. So all the devices needed to be connected needed only wifi. Wifi uses high frequency for data transaction which many of the doctors do not want. Use of Bluetooth devices by medical practitioner were preferred.

Bessie Malila, Tinashe Mutsvangwa, Tania Douglas - Architecture of a Village Small Cell Network for Mobile Health - This paper proposes the architecture of a village small cell network for rural and remote areas for enabling the delivery of healthcare services using mHealth applications and systems. The proposed architecture is based on emerging 5Gtechnologies and is expected to address the need for cost- effective, high capacity and reliable mobile connectivity in rural areas. This will make it possible to provide more innovative video and Internet-based mHealth applications and services, in addition to the current SMS and voice-based services. Future work will include addressing issues of security, privacy and data integrity of patient health information. It needs real time data for processing which requires hardware with connectivity with network currently not possible for all regions. Depends highly upon single type of mobile connectivity which limits its area of reach.

3. PROPOSED APPROACH

Architecture of IoT system. The first stage encloses all the wireless and physical devices of both WPAN and WLAN. The next stage consists of the application hosting devices and converter that are used to perform Analog to Digital conversion. The third stage includes the WAN Devices and edge IT devices which can carry out preprocessing. The last stage holds the data centers for accumulating the data.

Stage1: The sensors and actuators present in this stage gather data from the surrounding environment and transfer it into beneficial one. In case of health care, the devices of this stage may collect information such as rise or fall in temperature, pressure, etc., and transmits it into the succeeding stages to for the purpose of recognizing and curing the disease.

Stage2: The data obtained in the first stage will be usually in analog form. The analog-to-digital converter present at this stage turns the analog data to digital form. This phase serves

as an Internet Gateway and transports the digital form of data to the next stage.

Stage3: The digitized form of data is made to enter into this phase for doing aggregation and preprocessing. After the completion of processing of the aggregated data by the Edge IT devices, it is shifted to the upcoming phase.

Stage4: The concluding phase of the IoT architecture has the Data centers and the cloud which are utilized for hoarding the data. Considering our example, the diagnosed disease details and its remedies will be stored in this stage. The valuable facts are made to undergo investigation. After appropriate management it can be securely included in the cloud.

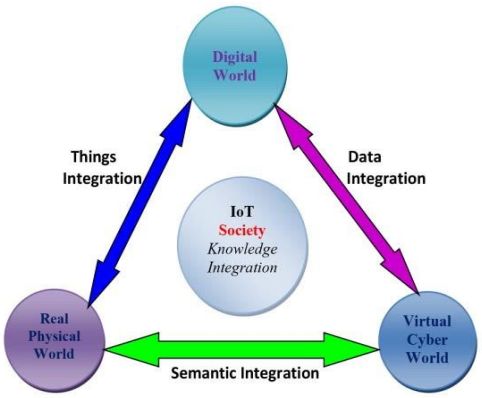

Fig -1: IOT working cycle

Cloud Computing and Distributed Systems —

The emergence of mobile devices has made millions of people turn to cloud-based services. Infrastructure as a service (IaaS), plat- form as a service (PaaS), and software as a service (SaaS) have become common jargon. The reason behind this shift is the need for seamless syncing of contacts, calendar events, emails, multimedia, and all kinds of data within a heterogeneous environment comprising different devices, operating systems and applications. Using cloud and distributed systems might help diminish costs of software and hardware maintenance as someone else handles the infrastructure. Using cloud services and distributed systems is paramount for mobile health and smart cities since a wide variety of devices have to coexist in a very heterogeneous environment. Hence, they will also be of great importance for the new concept of s-health.

Sensor Networks, Body Area Networks, and Their Interoperation —

A key element to provide s-health in a personalized way is the possibility of gathering multiple data from patients and the environment. Due to their flexibility, wireless systems are ideal candidates to be the communication medium from the users to the infrastructure, as well as among infrastructures. However, due to the great variety of network technologies, it is very difficult to interoperate them; also, during the deployment phase, it is paramount to avoid radio-electric interference and the like.

Privacy Protection and Security —

Privacy is a fundamental right that has to be guaranteed within the healthcare sector, privacy issues are even more apparent than in other contexts. For example, the continuous monitoring of patients could be seen as an invasion of privacy, and it must be carefully considered in order to stop patients refraining from using that monitoring. Private information retrieval and anonymization techniques will play a key role in s-health. Computer systems use passwords to identify and authenticate people. In order to gain security in the process of authentication, security protocols mainly based on public key cryptography have been widely used. In addition, biometric features (iris, fingerprints, ECG, etc.) are gradually being adopted. Also, technologies such as radio frequency identification (RFID) are used for identification of physical objects and people. Secure identification and authentication will be paramount for our s-health concept.

3.1 Implementation

The wearable health devices are highly expensive for the common users. In order to overcome this challenge, we have come up with an innovative idea which makes the device simple and affordable for health monitoring. For this we suggest connecting modules with the utilities that a person uses in his/her day to day life. One such thing that can be considered as the mobile device. The main modular device is connected directly with the help of camera sensor technology. In case of any illness occurring in the body of an individual, it affects the normal function of heart and result in change in body temperature. The change in heart rate can be monitored and recorded in order to analyze the result and take instant action by the user as well as the hospital linked to the patient remotely with the help of IoT technology.

Fig -1: Detecting heart rate

A photoplethysmogram (PPG) is an optically obtained plethysmogram that can be used to detect blood volume changes in the microvascular bed of tissue. A PPG is often obtained by using a pulse oximeter which illuminates the skin and measures changes in light absorption. A conventional pulse oximeter monitors the perfusion of blood to the dermis and subcutaneous tissue of the skin.

With each cardiac cycle the heart pumps blood to the periphery. Even though this pressure pulse is somewhat damped by the time it reaches the skin, it is enough to distend the arteries and arterioles in the subcutaneous tissue. If the pulse oximeter is attached without compressing the skin, a pressure pulse can also be seen from the venous plexus, as a small secondary peak. The change in volume caused by the pressure pulse is detected by illuminating the skin with the light from a light-emitting diode (LED) and then measuring the amount of light either transmitted or reflected to a photodiode. Each cardiac cycle appears as a peak, as seen in the figure. Because blood flow to the skin can be modulated by multiple other physiological systems, the PPG can also be used to monitor breathing, hypovolemia, and other circulatory conditions.Additionally, the shape of the PPG waveform differs from subject to subject, and varies with the location and manner in which the pulse oximeter is attached.

4. CONCLUSION

"Health is wealth and Healthy society leads to better nation". Due to the technology advancement, the information flow became much easier and faster. The new advancement in technology called Internet of Things (IoT) made some advancement in this field, by being effectively utilized to educate and avail the facilities to the people living in these remote rural areas. It would be interesting to construct a privacy-preserving and fully secure smart health system supporting large universe. It is our duty to make use of Science and Technology for the sustainability of human beings on the Earth which might have a significant impact on health care cost reduction. Such reduction will also be accompanied by an increase of system efficiency and improvement of provided services.

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