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Advanced Healthcare System Using IOT

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ABSTRACT: Among the panoply of applications enabled by the Internet of Things (IoT), smart and connected health care is a particularly important one. Networked sensors, either worn on the body or embedded in our living environments, make possible the gathering of rich information indicative of our physical and mental health. Captured on a continual basis, aggregated, and effectively mined, such information can bring about a positive transformative change in the health care landscape. In particular, the availability of data at hitherto unimagined scales and temporal longitudes coupled with a new generation of intelligent processing algorithms can: (a) facilitate an evolution in the practice of medicine, from the current post facto diagnose-andtreat reactive paradigm, to a proactive framework for prognosis of diseases at an incipient stage, coupled with prevention, cure, and overall management of health instead of disease, (b) enable personalization of treatment and management options targeted particularly to the specific circumstances and needs of the individual, and (c) help reduce the cost of health care while simultaneously improving outcomes. In this paper, we highlight the opportunities and challenges for IoT in realizing this vision of the future of health care.

KEYWORDS: Health care system, Raspberry Pi, IOT, AES Algorithm.

I. INTRODUCTION

Recent years have seen a rising interest in wearable sensors and today several devices are commercially available [1]–[3] for personal health care, fitness, and activity awareness. In addition to the niche recreational fitness arena catered to by current devices, researchers have also considered applications
of such technologies in clinical applications in remote health monitoring systems for long term recording, management and
Clinical access to patient's physiological information [4]–[8]. Based on current technological trends, one can readily imagine a time in the near future when your routine physical examination is preceded by a two–three day period of continuous physiological monitoring using inexpensive wearable sensors. A recent healthcare system should provide better healthcare services to people at any time anywhere in an affordable and patient friendly manner. Currently, the healthcare system is going to change from a traditional approach to a modernized patient centered approach. In the traditional way the doctors play the major role. For necessary diagnosis and advising they need to visit the patients. There are two basic problems relatedto this approach. Firstly, the healthcare professionals must be at place of the patient all the time and second, the patient remains admitted in the hospital, wired to bedside biomedical instruments, for a long period of time. In order to solve these two problems the patient oriented approach has been received. In this theme,the patients are aware with knowledge and information to play a more active role in disease diagnosis, and prevention. The important element of this second approach is a reliable and readily available patientmonitoring system (PMS).Health is one of the global challenges for humanity [6]. According to the constitutions of World Health Organization (WHO) the highest attainable standard of health is a fundamental right for an individual. Healthy persons can secure their lifetime income and hence to increase in gross domestic product and in tax revenues. Healthy persons can also reduce pressure on the already overwhelmed hospitals, clinics, and medical professionals and reduce workload on the public safety charities, networks, and governmental or non-governmental centers. To keep people effective andhealthy, a readily accessible modern healthcare system is a prerequisite [6].

II. MOTIVATION

By 2050 India will become home to one out of six older persons. The elderly population is growing at a fast rate in India and in the world, only China having larger number of older people, estimates United Nations Population Fund. A report given by this organization says that about 90 million elderly persons lived in India in 2015 and is expected to

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grow upto 173 million till 2026. In such scenario there is going to be huge increase in the medical assistance and healthcare needs for this elderly population. Acomprehensive and separate health care to senior citizens would be in much demand sooner. Hence it is very necessary that the health care system in India must reach a level to provide accessible and affordable health care to elderly particularly to offer treatment and diagnostic services for the management of chronic diseases.

III. OBJECTIVES

Wearable IoT devices have more demand in the market, due to the availability of Internet for a decent price and well accessibility. Following are some important objectives of healthcare monitoring system[10].

a)To get the information about human health in real time via IoT wearable device. This application is develop for Rural area.
b)Analysis and Prediction of chronic disorders in primary stage through the data mining techniques which gives the methodology useful for decision making.
c)Preprocessing of data acquisitioned about human (if necessary).
d)To bring IoT-based healthcare monitoring solutions, anywhere, anytime.

IV.LITERATURESURVEY

Most proposed frameworks for remote health monitoring leverage three tier architecture: a Wireless Body Area Network (WBAN) consisting of wearable sensors as the data acquisition unit, communication and networking and the service layer [4], [7]–[10]. For instance [1] proposes a system that recruits wearable sensors to measure various physiological parameters such as blood pressure and body temperature Sensors transmit the gathered information to a gateway server through a Bluetooth connection. The gateway server turns the data into an Observation and Measurement file and stores it on a remote server for later retrieval by clinicians through the Internet. Utilizing a similar cloud based medical data storage; a health monitoring system is presented in [2] in which medical staff can access the stored data online through content service application.

Targeting a specific medical application, WANDA [3] an end to end remote health monitoring and analytics system is presented for supervision of patients with high risk of heart failure. In addition to the technology for data gathering, storage and access, medical data analysis and visualization are critical components of remote health monitoring systems. Accurate diagnoses and monitoring of patient's medical condition relies on analysis of medical records containing various physiological characteristics over a long period of time. Dealing with data of high dimensionality in both time and quantity makes data analysis task quite frustrating and error prone for clinicians. Although the use of data mining and visualization techniques had previously been addressed as a solution to the aforementioned challenge [1], [5], these methods have only recently gained attention in remote health monitoring systems [6], [7].
While the advent of electronic remote health monitoring systems has promised to revolutionize the conventional health care methods, integrating the IoT paradigm into these systems can further increase intelligence, flexibility and interoperability [9], [8]. A device utilizing the IoT scheme is uniquely addressed and identifiable at anytime and anywhere through the Internet. IoT based devices in remote health monitoring systems are not only capable of the conventional sensing tasks but can also exchange information with each other, automatically connect to and exchange information with health institutes through the Internet, significantly simplifying set up and administration tasks. As exemplified in [9], such systems are able to provide services such as automatic alarm to the nearest healthcare institute in the event of a critical accident for a supervised patient.

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V. SYSTEM ARCHITECTURE

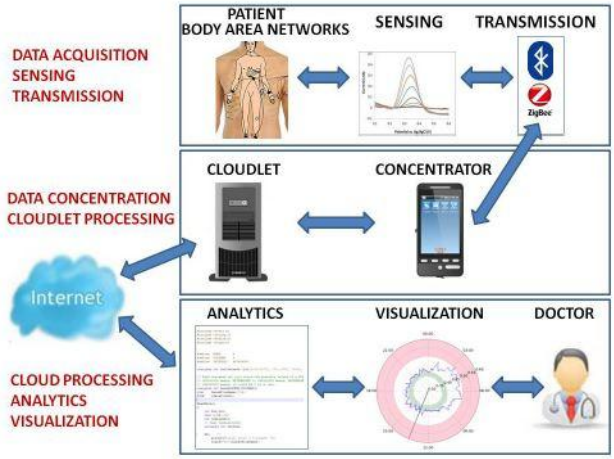

Fig1: System Architecture

Temperature detector converts the analog readings into digital by using analog to digital converter. By using python based pulse oxymetery detector count pulses as well as oxygen saturation level in the blood. Blood pressure detector detects blood pressure level i.e. systolic and diastolic blood pressure ranges of the patient's body. Python sends all information to the computer through the TCP/IP protocol. This data is encrypted with the help of AES 128-bit algorithm. Computer then decrypted the information and store at data base. All the information brows by PHP and HTML and show on web page.

VI. METHODOLOGY USED FOR SECURITY

This section provides the scope of the usage of AES i.e Advance Encryption Standard Algorithm for IoT in health care system:

AES is a symmetric block cipher like DES. Hence, it uses the same key for both decryption and encryption. AES and DES are quite different from each other in a number of ways. The algorithm Rijndael allows a different block and key sizes, not like DES which just allows the 64 and 56 bits block and key size. The key and block can in fact be chosen independently from 128,192,256 bits and need not to be the same. The AES standard states that the algorithm can only accept a block size of 128 bits and a choice of three keys - 128,192,256 bits.

The name of the standard is modified depending on which version is used, like AES-128, AES-192 or AES-256 respectively.

Rijndael was designed to have the below features:

- Resistance against all known attacks.
- Code compactness and Speed on a wide range of platforms.
- Simplicity in design.

Inner Workings of a Round like the algorithm starts with an Add round key stage followed by 9 rounds of four stages and a tenth round of three stages. This is applicable for both encryption and decryption having exception that each stage of a round the decryption algorithm is the inverse of it's counterpart in the encryption algorithm.

The four stages are as follows:

1. Substitute bytes
2. Shift rows
3. Mix Columns
4. Add Round Key

The tenth round simply leaves out the Mix Columns stage.

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The first nine rounds of the decryption algorithm consist of the following:
1. Inverse Shift rows
2. Inverse Substitute bytes
3. Inverse Add Round Key
4. Inverse Mix Columns

Again, the tenth round simply leaves out the Inverse Mix Columns stage.This type of function performed by the system for the security of the data.

VII. CONCLUSION

Networked sensors, either worn on the body or embedded in our living environments, make possible the gathering of rich information indicative of our physical and mental health. Captured on a continual basis, aggregated, and effectively mined, such information can bring about a positive transformative change in the health care landscape. In particular, the availability of data at hitherto unimagined scales and temporal longitudes coupled with a new generation of intelligent processing algorithms can: (a) facilitate an evolution in the practice of medicine, from the current post facto diagnose-andtreat reactive paradigm, to a proactive framework for prognosis of diseases at an incipient stage, coupled with prevention, cure, and overall management of health instead of disease, (b) enable personalization of treatment and management options targeted particularly to the specific circumstances and needs of the individual, and (c) help reduce the cost of health care while simultaneously improving outcomes. In this paper, we highlight the opportunities and challenges for IoT in realizing this vision of the future of health care.

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