

International Journal of Innovative Research in Science, Engineering and Technology

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Visit: www.ijirset.com

Vol. 9, Issue 3, March 2020

Blockchain and IOT Based Medical Workflows Distributed Ledger Technology in Health Monitoring

Mrs. Vidya.D¹, M.Vani², V. Pradeepa², R. Vinoprabha²

Assistant Professor, Department of Computer Science and Engineering, Mahendra Institute of Technology,
Namakkal, India¹

Department of Computer Science and Engineering, Mahendra Institute of Technology, Namakkal, India²

ABSTRACT: Blockchain technology is a combination of distributed data storage, peer-to-peer network, consensus mechanism, timestamp technology, encryption algorithm and other computer technologies. It provides a new solution for the secure distributed cloud data storage system. Blockchain can provide a decentralized secure storage architecture that does not require the accumulation of trust, and it can provide new solutions for cloud storage security and can be applied in time-sensitive areas. Thus, security of these devices is very important in order to ensure the safety and effectiveness of the system. In this paper, a decentralized authentication and access control mechanism is proposed for lightweight IoT devices and is applicable to a large number of scenarios. The mechanism is based on the technology of the fog computing and the concept of the public blockchain. The results gained from the experiments demonstrate a superior performance of the proposed mechanism when compared to a state-of-the-art blockchain-based authentication technique.

I. INTRODUCTION

In rural hospitals, the facilities for health caring are limited. The poor quality of health management enables issues in health care system. Everyone should get the knowledge of own health as easy and early as possible. Also it should be worth for each. Latest report of The India Spend analysis of data says that the 500,000 doctors shortage in India. WHO defines the doctor patient ratio will be 1:1000 which has been failed in India. In developing countries there is lack of resources and management to reach out the problems of individuals. A common man cannot afford the expensive and daily check up for his health. For this purpose various systems which give easy and assured caring unit has been developed. These system reduces time with safely handled equipment.

In the recent years wireless technology has increasing for the need of upholding various sectors. In these recent years IoT graped the most of industrial area specially automation and control. Biomedical is one of recent trend to provide better health care. Not only in hospitals but also the personal health caring facilities are opened by the IoT technology. So having a smart system various parameters are observed that consumes power, cost and increase efficiency. In according to this smart system, this paper is reviewed. In traditional method, doctors play an important role in health check up. For this process requires a lot of time for registration, appointment and then check up. Also reports are generated later. Due to this lengthy process working people tend to ignore the checkups or postpone it. This modern approach reduces time consumption in the process. In the recent years use of wireless technology is increasing for the need of upholding various sectors. In these recent years IoT graped the most of industrial area specially automation and control. Biomedical is one of recent trends to provide better health care. Not only in hospitals but also the personal health care facilities are opened by the IoT technology. So having a smart system, various parameters are observed that consume power, cost and increase efficiency. In accordance with this smart system, this paper is reviewed.[3] Medical

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scientists are trying in the field of innovation and research since many decades to get better health services and happiness in human lives. Their contribution in medical area is very important to us and cannot be neglected. Today's automotive structures have the root ideas coming from yesterday's basics. Also

II. RELATED WORK

Modern health care system introduces new technologies like wearable devices or cloud of things. It provides flexibility in terms of recording patients monitored data and send it remotely via IOT. For this connection, there is need of secure data transmission .To transmit the data with privacy is the Moto of this paper. The proposed system introduces security of health care and cloud of things .System works in two major parts viz. storage stage and data retrieving stage. In storage stage, data is stored, updated for future use. In data retrieving stage, retrieve data from cloud. The cloud server can share with authenticated user as per request. A patient with wearable devices continually updates his record every 5 or 10 min. In emergency mode, it updates for every 1min.The wearied device will send results to phone using Bluetooth connection or NFC technology. This can able to give to cloud server using GSM and 3G. At cloud server, each patient is defines with unique address. So data at cloud can authenticate the right patient and provide the required request.[1] Telemonitoring system via WBAN is evolving for the need for home based mobile health and personalized medicine.

WBAN can able to collect the data acquired from sensor and record the output. This output results sent to controller wirelessly to health monitoring system. In this paper, Zigbee is used to in WBAN technology due to its guaranteed delay requirement for health telemonitoring system. Zigbee used in the communication.[2] Afef Mdhaffar, Tarak Chaari, Kaouthar Larbi, Mohamed Jmaiel and Bernd Freisleben has explained low power WAN network to perform analysis of monitored data in health caring system. They have established WAN network for communication upto the range of 33m² at around 12 m altitude. Also they have demonstrated that power consumed by LoRaWAN network is ten times less than the GPRS/3G/4G.The IOT architecture has been given for step wise working for understanding of IOT .The main purpose of LoRaWAN is the energy consumption. The power consumption in idle mode for LoRaWAN is 2.8mA while in GPRS is 20mA.

Hardware cost in LoRaWAN is 10doller while in GPRS is 50 dollar. Maximum data rate in LoRaWAN is 50kbps (uplink), 50 kbps downlink while in GPRS is 86.5 kbps(uplink),14kbps(downlink).These results gives the overall efficiency of LoRaWAN in the demonstration of IOT for health monitoring system. [5] Mohammad M. Masud, Mohamed Adel Serhani, and Alramzana Nujum Navaz had given the measurement of ECG signals at various intervals and at different situations. They have considered energy aware, limited computing resources and lose network continuity challenges .For these challenges; mathematical model has been developed to execute each task sequentially. There are three approaches designed to work out the process .One is mobile based monitoring approach, data mining and third is machine learning approach [6] Ayush Bansal , Sunil Kumar, Anurag Bajpai, Vijay N. Tiwari, Mithun Nayak, Shankar Venkatesan, Rangavittal Narayanan focuses on development of a system which is capable of detecting critical cardiac events. Using an advanced remote monitoring system to detect symptoms which lead to fatal cardiac events [7] Hamid Al-Hamadi and Ing-Ray Chen gives trust based health IOT protocol that considers risk classification, reliability trust, and loss of health probability as design dimensions for decision making. Comparative analysis of trust based protocol and baseline protocols te check feasibility.[8] Muthuraman Thangaraj Pichaiiah Punitha Ponmalar Subramanian Anuradha ."Digital hospital" term is introduced for hospital management. It enables automatic electronic medical records in standard. Also discusses with the implemented real world scenario of smart autonomous hospital management with IOT.[9]

III. METHODS

In rural hospitals, the facilities for health caring are limited. The poor quality of health management enables issues in health care system Everyone should get the knowledge of own health as easy and early as possible. Also it should be

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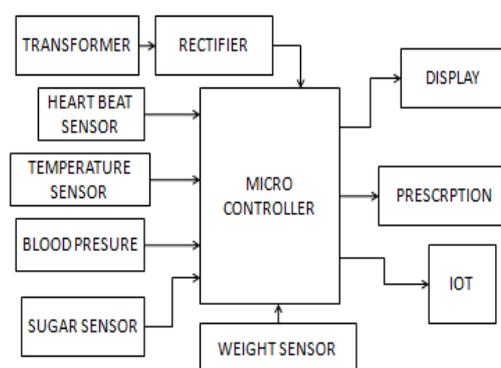
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Block diagram



The IoT technology has the opportunities and challenges in accessing the medical data. The computing resources is a challenges since the data used is huge and that is Big Data, so the data need to be decentralized. More over the data is of heterogeneous in nature Since the data is distributed data the software approach to deal this data is with the cloud computing platform. These are designed to coordinate with the hybrid data. A cloud platform is developed to deal the heterogeneous data [3]. An IoT for health care data is used for industrial applications. Data collections is used using sensors [4]. Data collection is done using a hard wired in assessing the operational performance. The data collected is correlated with the technician’s readings and thus the performance is check and decide on the usage of data [5]. Many conventional data analytical approach were done and there is a need to extend this approach in terms of scalability, diversity and distribution of the data. The data collection on the sensor is high voluminous and there is a need for continuous generation of data[6][7].The reliability of the IoT is often limited by the energy supply. So the devices are deployed in the location where energy is scare and human intervention is not possible. So to regenerate the power energy harvesting is needed. Energy harvesting is hunting energy from the environment like solar and wind[8].IoT with a smart connected elements and with appropriate infrastructure is represented as a technology stack for IoT. It is used in the manufacturing industry can also be used as a smart factory to assist government with the cyber physical platform which helps the IoT development of the country[9]. Security is the important factor that has to be considered in the data. Many wireless technologies could be used in the transmission of data like RFID, Bluetooth, Wi-Fi. So there is a need for reliability and availability of the IoT system[10].

IV. RESULT

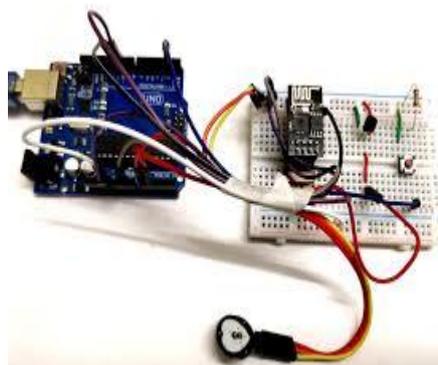
The machine learning algorithms are used to find data in patterns. A model is applied on that data which gives a prediction of the data.A prototype is developed that draws the air through the unit measurements are taken from the indoor data and it is applied on the home , the data is collected from the indoor air and the quality of health factors is monitored and informed to the persons in the house through their mobile phone. The system can also be applied in hospital environment. It could be scaled further to apply on the outdoor environment.

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The program is written in the IDE as shown in Figure 7. The program is compiled using the verify option. After verifying and when there are no errors the program is uploaded to the arduino using the upload option next to the verify option provided the arduino is connected to the system using USB. When the IDE shows the programming is done it is possible to view the real time output in the arduino.

V. CONCLUSION

The gadget designed is used to establish connection using internet anywhere, it is advantageous compared to zigbee or Bluetooth, in real time doctors can monitor the patients from any where. The IoT based patient monitoring system is an innovative technology that brings benefits to the society. It brings the biomedical application into the users mobile. This system can be applied in areas where there is a lot of people. This is a real time IoT application systems in mobile environment of IoT applications. The Big data collected in the IoT devices are also handled through the data analytics process. This system provides an improved efficiency in real time. These techniques can also be applied for all health care services and its applications like disease supervision and elderly care. The system can be modified to the industrial needs and could be used for industrial applications and many other applications.

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