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Remote Health Care Monitoring System using IoT for Asthma/Heart Patients

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Abstract: ***Healthcare has now become a big concern in almost everyone's socioeconomic routine. With the digitalization of lifestyle, the era of modern human evaluation began, making people robust and machine dependent. This leads to the numerous amounts of data that are scattered everywhere in each and every move in his day-to-day life. Digitization transformed basic information technology into intelligent technology by altering human lifestyle. Additionally, the world's population is expanding, which means the occurrence of numerous chronic heart illnesses. Consequently, more people get sick, hospitals are congested, and the death rate rises. Additionally, this technology transmits real-time data on patients' heartbeat and temperature with records over the Internet. Therefore, a patient health monitoring system based on IoT uses the internet to efficiently monitor patient health. It also allows users to monitor their loved ones while they are at work and has even saved lives. Also, NodeMCU is used as the web server to track patient health while using this monitoring system. Consequently, patient health indicators like body temperature, heart rate, and blood oxygen level are get monitored and stores the data. Also, Big data is a concept that can be applied to better health monitoring.***

Keywords: IoT Health Care, Blynk App, Node MCU

I. INTRODUCTION

Modern human, in this digital world technology is evolving drastically day by day in a fast pace. The era of modern human evaluation has started from the digitalization of his lifestyle making them robust and machine dependent. This leads to the numerous amounts of data that is segregated everywhere in each and every move in his day-to-day life. As the time passes the definition of data has been changing making it more and more vulnerable and at the same time opening new ways to the evolving technology. The digitization made the basic information technology to intelligent technology by changing the lifestyle of the human era.

Data is everywhere and anywhere. Technology has started mimicking the human capabilities and even more than that by the evolution of artificial intelligence and machine learning. Humans are capable of highly complexly connected neural network that is in an average a human brain consists of 10^{11} neurons that are connected to 10^{4} neurons each. Such a massive connection of human brain cannot even compute their own daily living requirements in this competitive world [1]. Since a simple aircraft to launch need to send some zetta bytes of information. In that case the total air traffic itself needs a lot of data processing per second. This itself shows how loaded and complicated the human needs are.

The concept of big data came from the human era and the corresponding technological evolution depending on their needs. The name itself came from the heaps of data that are collected from each and every move of an individual to make his life easier and simple. So, the data collected from every moment in the human life had opened to a new technology or a new invention to ease the human life and not to overload the brain with heaps of data. To automate the daily needs of the individual the data collected has to be initially filtered and next organized followed by automate in a computing system. From a statistical survey, currently the data heaps have been increased up to 78 yottabytes that may double in future generations.

The next challenge that has been faced by many researchers is to recognize what is the data and how to organize the collected data from various sources. As the technology has evolved in such a way that the computer that has been used in a satellite launch in late 90’s can be seen in every individual hand in the form of mobile devices with the same processing capabilities or even more. So, the collection of data has become simpler, but the task is to organize the data. There are several parameters that has to be considered while collecting the data. Whose, when why and what are the 4 w’s that has to be considered in this context[2].

1) Whose data we are going to collect?
2) When we have to collect?
3) Why we have to collect?
4) What kind of data we have to collect?

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These are the most important challenges that mainly effects the resources that are available for processing the data. Big data analytics helps to not only optimally utilize the available resources like bandwidth, energy and medium but also helps in predicting the future usage impacts of the data. The applications of big data have been emerged to every nook and corner of the world. The major applications like social media, health, finance, entertainment, safety, security and what not. It covers almost each and every application of human needs and to make their life simple and robust. The major connecting platform for humans is social media which uses big data analytics as a major tool to analyse the human behaviour to make them engaged in that as well as to make their work simpler.

II. MOTIVATION

Health is the major factor that effects any human financial as well as mental condition. The big data analytics are used in latest technologies like BAN (Body Area Networks) which required very low latency and high level of accuracy [3]. The current cloud computing technology came to the premises to reduce the latency in various applications like health, automated vehicles etc. By reducing the data processing in cloud servers, the data will be processed in the premises itself and forwarded with high data rates depending on the applications.

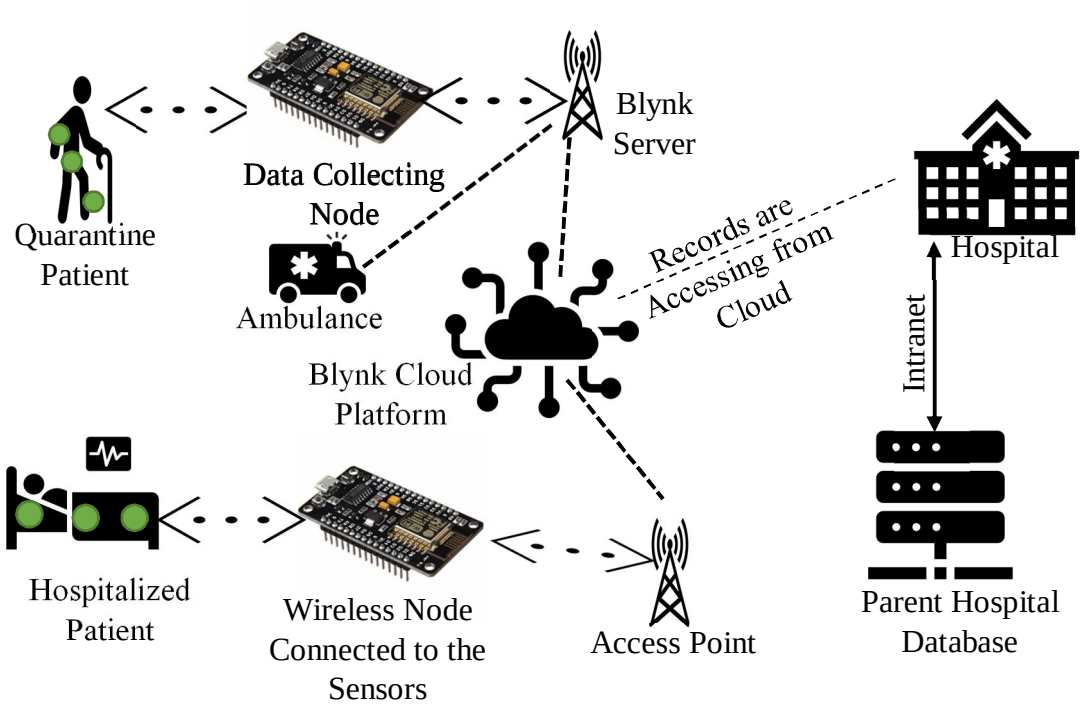


Figure1: Remote Patient Monitoring System

The next major field of study in human life is safety, security, and disaster management. The continuous analysis of data needs to be secured and at the same time has to be processed in a fast mode if not the life of the individual will be on high risk due to extensive level of automation in day-to-day life. IoT Weather monitoring and disaster predictions has been made easier in order to reduce the level of destruction and at the same time to increase the precautionary measures that has to be taken for some unavoidable situations [2]. In the recent times a virus named COVID-19 had hit the human race by effecting the majority of population leading to huge loss in financial resources along with many lives. In this crisis situation big data can be used to prevent the attack of virus by analysing the human's health condition continuously [4]. As India became the most effected country in the current situation big data analytics using neural networks can be used to process the continuous monitored data of the individuals in order to optimally utilize the very limited resources available like ambulance, ventilators, oxygen cylinders and so on.

Generally, IoT-based systems may link several sensors and devices to the internet, and because each connected device has a unique identity, they can interact and share data without the need for human involvement. An huge increase in a health monitoring system's effectiveness, accessibility, and cost has resulted from the use of IoT in the healthcare industry.

A variety of chronic sickness tracking and real-time location tracking are included in IoT-based healthcare, like Asthma and Heart patients. As more and more devices would be connected the amount of data collected would also be increased. So, the cloud computing is used to store the data. In order to store and retrieve data, cloud computing uses remote servers as opposed to local hard drives and private datacenters. It is a set of services offered through the internet. To analyze the huge data we need a techniques to analyze quickly and efficiently. The most suitable technique would be big data analytics. Big data analytics refers to the gathering, handling, cleansing, and analysis of huge volume of data. Big data analytics in healthcare provides a better analysis of the patient's health. Healthcare professionals aimed to solve patients problems at little cost while not upsetting their comfortable lifestyles. While the patients are at home performing their everyday tasks, the monitoring devices will collects the data then stored using cloud computing and then analyzed by bigdata analytics. It offer their physicians a current health status update and health care practitioner might give drugs based on any changes in daily activity. Bigdata is classified in to three ways: Structured, Unstructured and Semi-Structured. IoT device data and information are made understandable through big data analytics. With Vast unstructured data that's been collected from IOT can be organized into smaller data sets

When used with IOT, big data analytics may produce a variety of insights:

1) Description-based analytics
2) Analytical diagnostics
3) Predictive modeling
4) Fourth-generation analytics

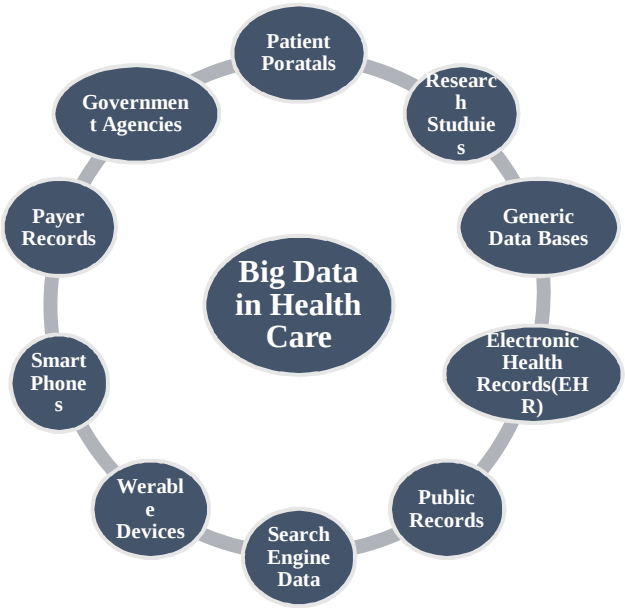


Figure2: Bigdata Analytics in Health Care Industry

There is no human race with technology in now-a-days. Modern human is surrounded by the technologies that leads him to be dependent in each and every moment of his life. Big data helps in utilizing these technologies in an optimized as well as organized manner so as to make his life simpler and less sophisticated.

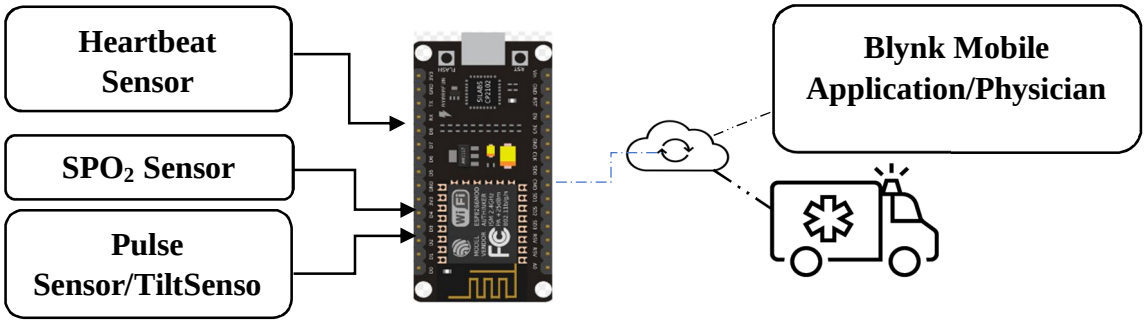


Figure3: Node MCU based Health Monitoring System

III. RESULT ANALYSIS

The patient monitoring system is created to monitor the patient activity. The system consisting of SPo2 Sensor and pulse oximeter sensors and an Arduino Uno coupled with a temperature sensor. A USB connection is made between the Arduino and the system's power source. The system begins to function when we upload data to the Arduino. The measurement data is then displayed on the LCD display and the serial monitor of the Arduino Integrated Development Environment (IDE). A Bluetooth module also enables the presentation of the data in a mobile application.

The whole system diagram, which includes the readings of the pulse rate, SpO2, and body temperature shown in the mobile application and serial monitor of the Arduino IDE, is shown in Figure 3. The data from all parameter measurements in the blynk application monitor of the Arduino IDE are shown in Figure 4. The sensors MAX30100 and LM35 are used to collect the data.

IV. CONCLUSION

This lockdown situations lead to lot of entertainment apps along with food delivery apps that are majorly utilizing these big data analytics to engage humans by analysing their search behaviour and directing them to their requirement easily.

In this the Internet of Things-based human health monitoring system has finished collecting the user's blood pressure, pulse, body temperature, heart rate, physiological data, and other vital sign data. By using big data helps in utilizing the technologies which optimized as well as organized manner. When it comes to healthcare, it enables the analysis of big datasets from countless patients, discovering groupings and association across datasets and also it contain a cloud platform to store the data

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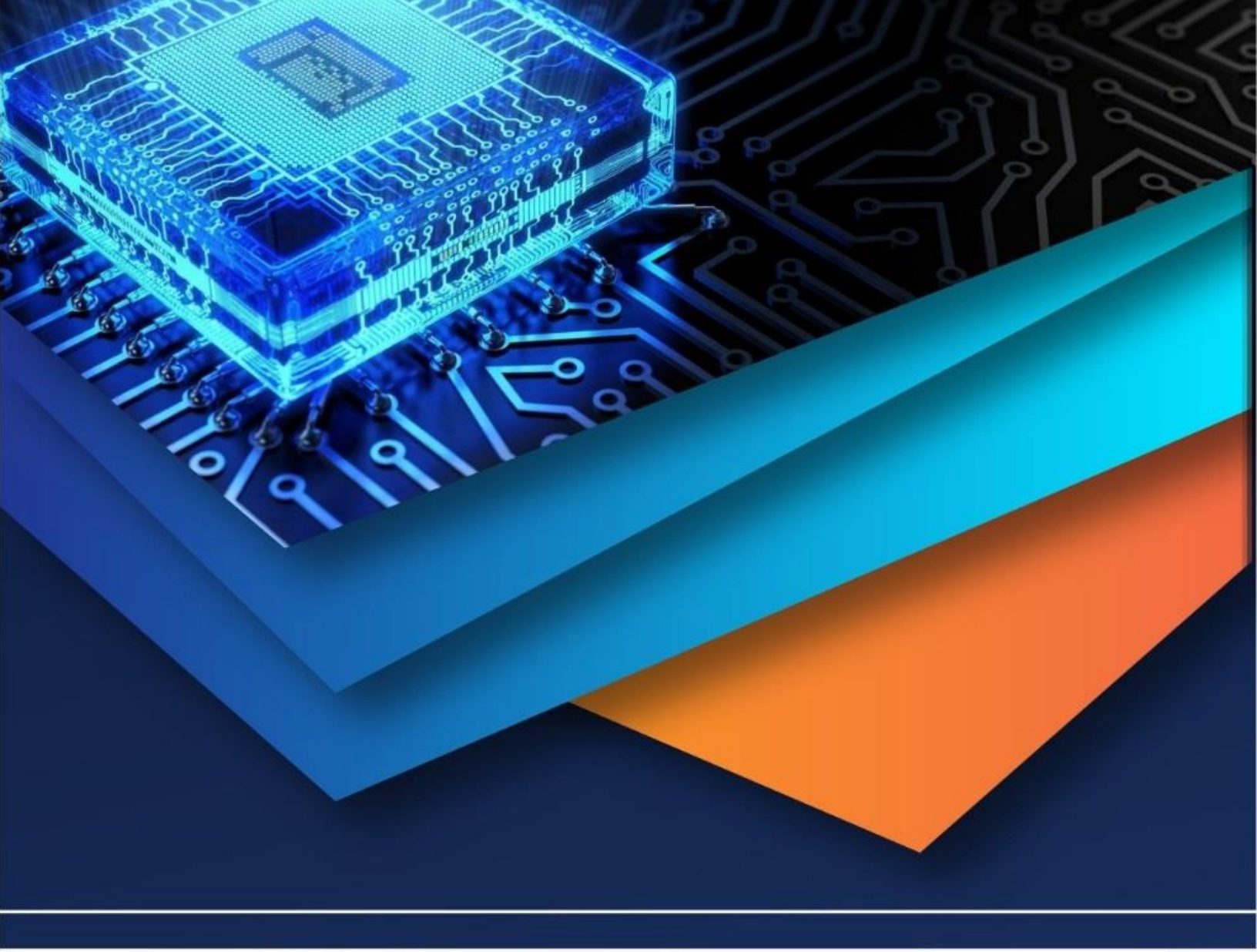
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