Providing Primary Medical Care for People with Cardiovascular Diseases Using IoT Technologies

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Annotation. Workre presentsof health monitoring the system and implementation of Internet Of Things (IoT-Internet-connected physical objects) technology. Nowadays, innovation swith expansion Together , specialistsare looking for Innovative electronic devices,in the bodyexisting to detect violations. on IoT supporte dtechnologiesgivesnew and non-invasive clinical support systems developmen to pportunity. workre presents of health monitoringthe system For patients with cardiovascular diseases, who do not they haveinstant Access to clinics of healt hor urgent to receive help. individual of instrument spurchase, orin hospitals visitit`s expensive for the population. web developed system will measure of the patient body temperature, heart rateandin the blood of oxygensaturation (SpO2) level and will send data Mobile in the application. Our main The goal is Access to health care for people to increase of financein context sustainability Except for patients will havee asy access personalon healthcare . The paper describes IoT Based on the system, which will make it easier hard medical device use to a minimum At the price, 95 percent trustinterval, which connected of the patient of healt hparameters to establish. thisDevices like _ helper of instruments by using wide of societyby, certainIn the situation, maybe biginfluence to have themon life.

Introduction

The term IoT was first used by Kevin Ashton in 1999. [1]IoT in healthcare refers to a network of interconnected medical devices that can generate, collect - store, analyze and transmit several types of data.Internet Of Things (IoT-physical objects connected to the Internet) devices are used in the clinical field. The study deals with an IoT-based health monitoring system. For patients with high and low blood pressure, for patients with hypertension, medical equipment is not available, except in state medical centers. The IoT health monitoring platform has brought significant benefits to the advancement of modern medicine. IoT devices are widely used in the medical sector and the technology we are talking about is a patient health monitoring system that uses IoT. Thanks to IoT-based health monitoring systems, it has become possible for users to obtain the necessary physiological information without leaving their homes. This system will make life easier for elderly patients, for whom the long journey to the hospital can be difficult and tiring.

Various sensors have been used to measure patient data in real time. A mobile application has been developed for this purpose. Because regular testing is quite expensive, people living in rural areas cannot go to hospitals or medical centers daily, especially people from highland villages, where health facilities are not available. This system is not only cheap but also easy to use. The system will help people of all ages, especially the elderly. It measures the patient's heart rate, oxygen saturation level, body temperature and transmits the results to a web server or mobile applications. A website can be created as well as a mobile application that individuals can access and view results by date and time. In addition, during critical situations, medical staff or the patient's guardian can see the patient's condition. The system should be characterized by high accuracy, low cost, so that anyone can use it.

In this health monitoring system, the sensor will collect information about the patient's health status. It is a multiparameter monitoring system that monitors oxygen saturation level, heart rate and temperature simultaneously. It is especially important to track

patients' heart rate in real time, which can be done with the help of IoT based real time monitoring system.

Low oxygen levels can be a precursor to the need for medical intervention. Pulse oximetry is a technology for determining the amount of oxygen-containing hemoglobin in the blood. Most doctors consider it to be a vital sign of a person, like blood pressure. With the help of a pulse oximeter, the oxygen level or saturation (SpO2) is controlled. Body temperature is another vital physiological parameter of a person, and it is important to it.[2]

Due to the increase in the number of IoT devices embedded in various objects, it has become increasingly widespread, the devices have become "smarter", highly efficient, and affordable. IoT includes a wide range of technological hardware and software, including sensors, actuators, wearable devices, and information and communication technologies. It can integrate the virtual world and the real world and is currently used in various fields such as: manufacturing, banking, transportation, agriculture and especially the healthcare system.

Between 2003 and 2010, the number of Internet-connected devices increased from 500 million to 12.5 billion. Today, thanks to widely available technologies such as communication technologies and "smart" mobile devices, IoT has become one of the hottest topics in all fields.

IoT is the infrastructure that enables 'smart' healthcare services to function. When health data is collected by IoT sensors, timely identification of risk factors, disease diagnosis, treatment and remote monitoring are possible.

A survey in the US in recent years revealed that more than 58% of smartphone users have downloaded health-related apps to self-manage their lifestyles. Artificial intelligence has also led to the availability of health information such as chatbots (or AI doctors) that can offer lifestyle and medical advice. Examples of AIbots include: Woebot, Your.Md, Babylon and HealthTap, where a patient can input their symptoms and advice is generated instantly. If healthcare professionals have access to evidence-based digital resources, devices, and mobile apps, digital prescriptions can become a means for widespread use of IoT in healthcare and help focus populations on disease prevention.

Thanks to recent advances in computer science and informatics, artificial intelligence (AI) has quickly become an integral part of modern healthcare. Artificial intelligence algorithms and applications powered by AI are used to support medical staff in clinical settings and ongoing research.

Currently, the most common roles for AI in healthcare settings are clinical decision support and image analysis. Clinical decision support tools help people make decisions about treatment, medication, mental health, and other needs. In medical imaging, artificial intelligence tools are used to analyze CT scans, X-rays, MRIs, and other images for lesions or other findings that might be missed by the human eye.

The challenges that the COVID-19 pandemic has created for the healthcare system have also prompted many healthcare organizations around the world to start field testing modern technologies supported by artificial intelligence, such as algorithms designed to monitor patients and AI-powered tools for screening for COVID-19. The possibilities of artificial intelligence for researchers and the patients they serve are steadily increasing. At this point, there is no doubt that AI will become an essential part of digital healthcare systems.

Our focus is on the use of IoT in healthcare. Continuous monitoring of patient's vital parameters is particularly important in the medical field, we have developed a low-cost Arduino-based pulse monitoring system that will monitor the pulse rate continuously and if the data value is outside the acceptable range, an alarm function will be triggered with a notification.[3] A notification will be sent to the concerned guardian and the nearest hospital. The main advantage of this method is that it does not require constant direct supervision of a doctor. Because it is a mobile device, it is possible to monitor a person's critical functions using the IoT method, regardless of where they are or what they are doing. In healthcare, IoT plays a significant role in easing clinic workload. The microprocessor transmits the pulse frequency through the pulse sensor, and then when the range is crossed, an alarm is triggered which is connected to the microcontroller itself.

Very few pulse monitoring devices are designed specifically for the elderly. All existing devices are wired and intended for inpatient use only. Lifesaving alarms are improved because they are portable and wireless, allowing patients to move freely. Lifesaving alarms are cheaper than existing devices. Since it does not involve complex sensors. The main goal of this research is to develop a convenient and smart device that can help the elderly in critical conditions, especially when access to medical facilities is difficult.

In today's life, due to busy schedules and lack of time, people find it difficult to be around elderly people all the time. Old age is an age where health has always

been a problem. Can technology enable us to monitor or see the health status of older people?

Mostly elderly people have heart-related problems at their age. They lose their lives because no one is there for them at the critical moment. So, overcoming this problem and intending to save lives motivated us to create a system that would somehow help these people. First, the user's pulse rate is read using a pulse sensor. Then, the pulse rate is converted to BPM and passed to the NodeMCU. A pulse sensor reads the user's heart rate. We have used NodeMCU as a microcontroller, which is small in size and allows to connect to the device wirelessly and make it easier for a person to carry it. We will upload the code to the NodeMCU which will continuously monitor the heart rate data received from the heart rate sensor and then check for critical conditions i.e., heart rate and pulse rate.

The ESP32-based IoT healthcare panic alarm has a simple and nifty architecture. [4]The design idea and motivation of this project is also present. The project is intended for the elderly. The operation of the panic alarm is remarkably simple for adults. You just need to press the button and email. The letter is sent to the people from whom it is necessary to draw attention. Of course, an SMS or a phone call can also be sent. It is also possible to set a parameter that will call an ambulance.

The structure of the system is shown in Figure 1.

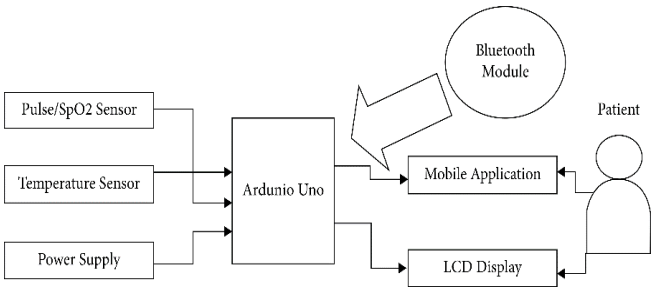

Figure 1. System block diagram.

Here, patients measure pulse rate and SpO2 using the max30100 sensor and body temperature using the Lm35 sensor, and patients can view the measurement data on the mobile app and LCD screen. The data will be displayed in the mobile application with the help of a Bluetooth module, which will receive the data from the Arduino and store it. From there, the data is transmitted to a mobile application, and patients can view measurements of health parameters. After measuring the physiological vital data of the human body, it will be sent to the Arduino UNO, which will process the analog data into digital. After that, the data of the Bluetooth module will be displayed in the mobile application. The measured data from the human body can also be seen on the LCD screen.

Conclusion.

Electronic health system refers to the use of both information and communication technologies in the health care system. The rapid development of internet access and technology around the world, along with the proliferation of smartphones, makes e-health relevant for everyone. E-health has expanded from web-based services to health apps, so new services and technologies are constantly being introduced. An aging population and an increase in chronic diseases are straining health services in both developing and developed countries. Existing knowledge-based systems for eHealth services can improve access to quality health information and improve self-management, thereby helping to ease the burden on health services. Monitoring, learning, validation, transparency, accountability, and responsibility will become part of eHealth systems.

The paper presents original, innovative, and modern machine learning methods, algorithms, and architectures to improve the modern vision of intelligent solutions in e-health and medical communication services. The description of innovative solutions in the form of intelligent systems frameworks for personalized health and new algorithms that consider several key factors, such as the measurement of risk factors and the localization of causes, are welcome. As technology and software improve, smart medical devices will be able to communicate with other nearby smart devices to help diagnose and improve a patient's condition. This will allow doctors to systematically monitor the condition of patients remotely. Because this case involves increased patient awareness, symptom monitoring, medication adjustments, and behavioral changes, it is not only expensive but also time-consuming for both medical staff and patients. Our proposed system provides a solution to this problem exactly.

References

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