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SMART SYSTEM MONITORING FOR BREATHE AND PULSE IRREGULARITY USING AI&ML

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ABSTRACT

This Project introduces the anatomy and physiology of the respiratory and pulse monitoring system, and the reasons for measuring breathing events, particularly, using wearable sensors. Respiratory monitoring is vital including detection of sleep apnea and measurement of respiratory rate. In this context, the goal of many research groups is to create wearable sensors able to monitor breathing activity and pulse detection continuously, under natural physiological conditions in different environments. Therefore, wearable sensors that have been used recently as well as the main signal processing methods for breathing analysis are discussed. The following sensor technologies are presented Heart beat/rate, GPS, GSM, IOT and infrared based Breathe sensor. New technologies open the door to future methods of noninvasive breathing analysis using wearable sensors associated with machine learning techniques for pattern detection. IOT and GSM is a great platform for monitoring human health and analyze the solution then and there and also show the details of every individual human by its own way without the need of an external source. This paper proposed a novel idea which is more helpful for society to improve the technology as well as the person to identify and analyze their problem by their own without any dependencies. Sensors secure the information of different parameters with regards to patients' wellbeing, and the IOT alerts and GSM sends that information and shows through the site, which also gives access to remote observing. This paper deals about the checking of health data like pulse, breathe parameters and give to the Raspberry pi processor. The processor sends the live location using GPS to Authorized person using GSM as well as IOT app notifications. This proposed system is very useful to the old age people and hospital patients effectively.

1. INTRODUCTION

Specialists throughout the healthcare sector are increasingly leveraging the areas of concern that these developments carry in and can allow considerable improvement in and beyond the medical administrations. Similarly, the capabilities of Electronic Health apps and Health (therapeutic organizations managed by ICT) are utilized by countless regular consumers to develop, support and strengthen their healthcare network. The SMS is submitted to the specialist or to any family member in some fundamental situation. Health analysts slowly misuse the points of value these developments

add to the social security market in the healthcare setting, thus creating a crucial change. Likewise, endless standard customers are helping and helping their health experts by using the M-Health (Mobile Health) applicants and E-Health. Health analysts slowly misuse the points of value these developments add to the social security market in the healthcare setting, thus creating a crucial change. Likewise, endless standard customers are helping and helping their health experts by using the M-Health (Mobile Health) programs and E-Health. A dependable and rapidly persistent portion of this corresponding technique. Structure like look (PMS). One of the biggest issues for society is the lack of social security. As the World Health Organization (WHO) parliaments demonstrate, the most elevated feature of the Medical system is a great best thing for a person. In order to persuade and render people look, it is important to have a flash similar to the new mending machine. The system for social insurance will include stronger remedial connections for people wherever they are, in a sustainable and careful manner. Provided that such contraptions support the Internet, they boost the environment and insure that organizations and social security become continually safe and logically drawn. The whole idea of IOT remains on sensors, portion as well as remote systems that allow customers to grant and access the application / information. No place, however, is the IOT across all zones more apparent than it was in the areas of prosperity treatment. As a cliché states, 'Prosperity is money,' the movement towards greater results is phenomenally important. Therefore, it is necessary to connect to an IOT framework that provides secure and prosperous analysis. At present, the contraction of human institutions, the conventional way of coping with a technologically advanced personally driven oriented system, is being traded. As the age profile of many societies continues to increase, in addition to the increasing population of people affected by chronic diseases, including diabetes, cardiovascular disease, obesity, and so on, supporting health, both mentally and physically, is of increasing importance if independent living is to be maintained. Sensing, remote health monitoring, and, ultimately, recognizing activities of daily living have been a promising solution. From a technical perspective, the Internet of Things (IoT) is gaining a rapidly growing attention in many disciplines, especially in personalized healthcare. Meanwhile, body area sensor network (BASN) under the IoT framework has been widely applied for ubiquitous health monitoring, for example. ECG monitoring has been commonly adopted as vital approach for diagnosing heart disease. The main contribution of this paper include the following: firstly, this paper presents a novel system, the WISE (Wearable IoT-cloud-based health monitoring system), for real-time personal health monitoring. WISE adopts the BASN (body area sensor network) framework in the support of real-time health monitoring. Several wearable sensors have been embedded, including the heartbeat, body temperature, and the blood pressure sensors. Secondly, the majority of existing wearable health monitoring systems requisite a smart phone as data processing, visualization, and transmission gateway, which will indeed impact the normal daily use of the smart phone. Whilst in WISE, data gathered

from the BASN are directly transmitted to the cloud, and a lightweight wearable LCD can be embedded as an alternative solution for quick view of the real-time data. The size and composition of the world population has changed over the last couple of decades, and these trends are projected to continue. Such demographic trends have significant implications for almost all areas of the society, particularly in health and healthcare. Life expectancy has increased dramatically, especially in the more affluent nations, which is set to be celebrated and should be viewed as an opportunity for people to live longer and better. However, this requires substantial improvement in both the healthcare service and the living environment, as older people generally require more healthcare than their younger counterparts. Additionally, older people are more likely to suffer from chronic disease as part of the natural ageing process. In parallel to this demographic time bomb, the cost of healthcare provision is increasing rapidly in all the nations across the world.

2. LITERATURE SURVEY

Many researchers have used machine learning and deep learning to carry out their works. For example, Masum et al. [3] made a comparison between different deep learning models, LSTM, BI-LSTM, and CNN, using univariate and multivariate time-series data. These models are used to predict blood pressure (BP) 30 minutes in advance and heart rate (HR) 30 minutes in advance as univariate and predict BP and HR as multivariate. Monkaresi et al. [4] proposed machine learning methods to improve the accuracy of HR detection in naturalistic measurements. The results show that the proposed model improved the root mean square error from 43.76 to 3.64 beats/min. Cömert and Kocamaz [5] used recurrent neural networks (RNN), support vector machine, extreme learning machine, radial basis function network, and random forest to classify fetal heart rate signals into normal and hypoxic. The results show that RNN achieved the best performance. Biswas et al. [6] used four-layer deep neural network layers, two CNN layers and two LSTM layers, to predict heart rate. The proposed network was evaluated on the TROIKA dataset having 22 PPG records collected during various physical activities. The result shows that the proposed network improved the mean absolute error for heart rate. Hsu et al. [7] developed a novel deep learning framework to estimate real-time heart rates using an RGB camera. Maragatham and Devi [8] proposed a novel LSTM model for the early diagnosis of heart failure. They compared the proposed models with a support vector machine, logistic regression, *k*-nearest neighbors, and a multilayer perception (MLP). The results show that the proposed model achieved the best accuracy compared to other algorithms. We have investigated the different examinations performed utilizing existing strategies that have been applied in the field of patient wellbeing checking. This study remembers current patterns for persistent checking frameworks and related work on the far off patient observing framework. In [2], a structure of IoT based wellbeing checking framework utilizing Rasberry Pi is proposed. In this paper, they have used Internet of Things (IoT) and distributed

computing advancements. The proposed model screens the Heart Rate, Oxygen level and Blood Temperature of a patient. Distributed computing empowers tenacious capacity of information. Thus the information assembled by the wearable sensors put on a patient's body is spared in the cloud with the goal that it very well may be gotten to from anyplace over the g projection. The specialist can login to the site to get to the patient's information and produce a wellbeing report. Patients can get to the wellbeing report by signing into the site. A visit alternative is given in the site to specialist and patient correspondence. The framework goes about as an extension among specialist and patient staying away from the separation obstruction. In country regions where satisfactory clinical offices are not accessible, it is useful and financially savvy arrangement. In [3], a wellbeing Monitoring framework utilizing Arduino is proposed thinking about the necessities of old individuals. In the maturing populace world, there is an expanded requirement for a specific wellbeing checking framework. In this unique situation, the proposed framework screens internal heat level, circulatory strain, and pulse and sends the information to specialists. These boundaries are commonly estimated during fundamental wellbeing exams as its qualities are significant indications of a patient's wellbeing condition. In the event of crisis, an alarm button is provisioned so the specialist will get a SMS when an alarm button is squeezed. Information is pushed to the web worker with the goal that the specialist and patient can see the qualities. The fundamental test watched was the delay of the older to utilize this new innovation. They should be taught to utilize new mechanical gadgets like cell phones and PCs. In [4], Wireless Bluetooth innovation with Android is investigated for the far off evaluation of wellbeing and fall identification. The framework screens the wellbeing boundaries like ECG, temperature, 'body pose', 'fall recognition' and present GPS area. Numerous synchronous Bluetooth associations are set up with an android telephone to move the gathered information. An android application investigations and procedures the information which is likewise sent to the worker utilizing the web. Information is sent to a crisis contact individual in the event of a crisis. Being a versatile, vitality productive, lightweight and adaptable plan, it is generally appropriate for people that are at high hazard like officers guarding at high elevations, travelers, unskilled workers, and so forth. In the recent years wireless technology has increasing for the need of upholding various sectors .In these recent years IoT griped 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 groped 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.[5] Medical 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 Early detection of chronic diseases can be easy with this technology. [6] The body temperature, heart rate, blood pressure, respiration rate are prime parameters to diagnose the disease. This project gives temperature and heart rate values using IoT. 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. [7] 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. [8] 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 up to the range of 33m2 at around 12 m altitude. Also they have demonstrated that power consumed by Lora WAN 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 Lora WAN is the energy consumption. The power consumption in idle mode for Lora WAN is 2.8mA while in GPRS is 20mA.Hardware cost in Lora WAN is 10doller while in GPRS is 50 dollar. Maximum data rate in Lora WAN is 50kbps (uplink), 50 kbps downlink while in GPRS is 86.5 kbps

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(uplink, 14kbps (downlink).These results gives the overall efficiency of Lora WAN in the demonstration of IOT for health monitoring system. [9] 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 [10] 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.

3. EXISTING SYSTEM

In existing system of health monitoring system many sensors are used to measure the health parameters temperature, body motion, pulse rate all are measure and displays in LCD only. In existing model we don't have data transfer through longer distance using any wireless communication. To secure the patience health the proposed model implemented with IGSM and GPS setup automatically sends alerts to doctor and relative in case of emergency with machine learning models and artificial intelligence concepts.

4. PROPOSED SYSTEM

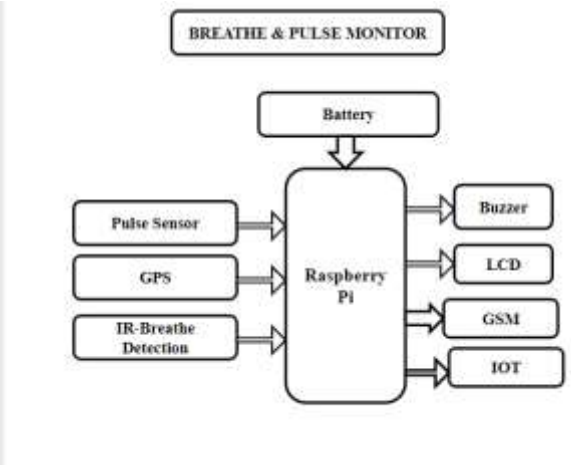

Fig.1. Proposed block diagram

WORKING MODEL:

This is a block diagram for the Smart system for detecting irregular breathing and heartbeat. Here, a pulse sensor is being used to detect the heartbeat of a human. A breathing sensor for humans that uses infrared technology. In this project, we use GPS and GSM to locate the patient and send their location to the closest 108's, hospitals, as well as their family doctor and family members, via SMS. IoT will be used to transmit the data obtained from the Pulse and IR-Breathe sensors to the server. The IR-Breath and Pulse modes of the patient's state are shown on the LCD display. The buzzer will sound and provide information to GPS and other devices if the patient's condition is critical or irregular. The buzzer sounds and informs GPS and GSM via IoT server if the patient's condition is critical or irregular

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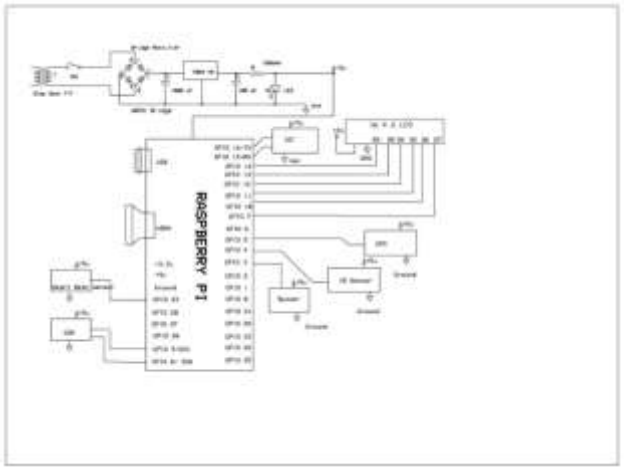

Fig.2. Proposed Circuit diagram

Fig.3. Proposed Output model LCD Data

PIN DESCRIPTION

This is the pin diagram where all the hardware components are connected. The IoT is connected to Tx and Rx pins and LCD is connected to 7th pin, 10-14 pins of the Raspberry pi board. The IR sensor is connected to 4thpin and Heart-beat sensors connected to 29th pin. The GPS is connected to 5th pin. The GSM module is connected to 8th and 9th pins. The buzzer is connected to 3rd pin. While coming toothier pins, all the components are connected to ground and to VCC and AVCC. Where VCC is used to power all Digital components and AVCC is used to power all Analog components. So, like this there are total 29 pins in the Raspberry pi. We are using Raspberry pi processor, which is low-cost, credit-card sized computer that plugs into a computer monitor or TV, and uses a standard keyboard and mouse. So, in this way the circuit is connected for the use of Monitoring of heart-beat and pulse rate of a person.

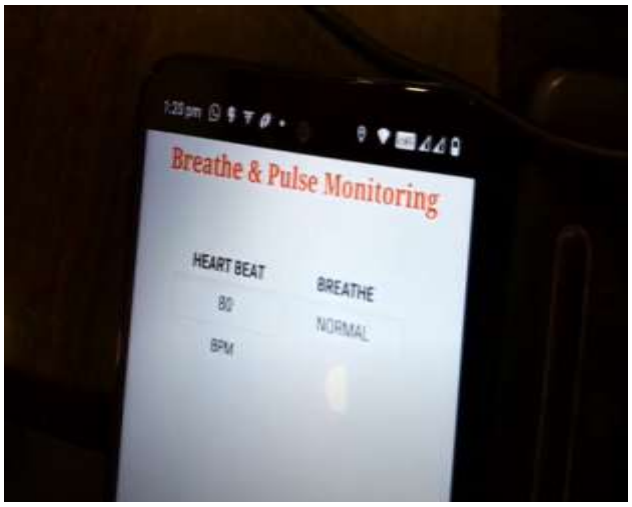

Fig.4. Proposed APP data

5. RESULTS

Fig.5. Proposed Output model output parameters

Table.1 Results comparison Table

Parameter	Existing Model	Proposed Model
Microcontroller	Arduino	Raspberry Pi
Speed	Low	High
Complexity	High	Low
Efficiency	LOW	HIGH

6. CONCLUSION

We designed and implemented IOT smart heart and breathe irregularity system. In the proposed system of health monitoring system we used IR sensor, heart beat sensor for monitoring the human body health parameters and display in LCD and IOT and GSM alerts. If the heart rate fluctuations mean if we got HIGH BP then buzzer module automatically alerts and same thing will update in server. The respiratory and pulse monitoring system, and the reasons for measuring breathing events, particularly, use wearable sensors. We executed successful results.

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