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IOT BASED PATIENT HEALTH MONITORING SYSTEM

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Abstract— **Technology plays the foremost role in healthcare not only for sensory devices but also in communication and recording. It is vital to observe varied medical parameters and post operational days. So the most recent development in healthcare communication ethodology, IoT is customized. IoT is a catalyst for the healthcare and plays distinguished role in many applications. In this project, microcontroller is used as a gateway for communication. This system puts forward a wise patient health monitoring system that uses sensors to trace patient health and uses internet to intimate their loved ones or concerned doctors in case of any emergency. The controller is additionally connected with a buzzer to alert the caretaker regarding variation in detector output. The sensors are connected to a microcontroller to trace the status of the patient which in turn is interfaced with LCD display furthermore as wireless local area network association so as to transmit alerts. If thesystem detects any changes in patient pulse rate or BP, the system automatically sends an alert to the doctor regarding the patient status over IoT and additionally shows the details of heartbeat, BP and temperature of patient, live over the cloud. So IoT based patienthealth monitoring system effectively uses internet to watch patient health status and save lives on time. For this reason fast conditional medication may be simply done by this technique. This system is easy to setup and is capable of high performance and time to time response.**

Keywords—**Embeded system, IOT, Patient monitoring system, Microcontroller.**

INTRODUCTION

Today internet has become one among the vital components of our daily life. It is modified to methodologies how individuals live, work, play and learn. Internet serves as a tool for several purposes like education, finance, business, industries, recreation, social networking, shopping and etc.

Future new mega trend of internet is IoT. Visualising a world wherever several objects will sense, communicate and share data over a NG SYSTEMpersonal net protocol or public networks can be done through IoT. The interconnected objects collect the data at regular intervals, analyse and initiate needed action, providing associateintelligent networks for analysing, designing and decision making[1].This is the world of Internet of Things. IoT is mostly thought about asconnecting object to the internet and victimisation that affiliates formanagement of these objects or remote watching. But definition of IoTis creating a brilliant invisible network which may be detected, controlled and programmed[3]. The products developed based on IoTinclude embedded technology that permits them to exchangeinformation, with one another or the internet and it is assessed that 8-50 billion devices are connected by 2020. Since these devices come online,they provide better life style, create safer and more engaged communities and revolutionised healthcare.

In low and middle economical gain countries, there is more and more growing range of individuals with persistent diseases because of totally different risk factors like nutrient imbalance and physical inactivity. According to WHO report, 4.9million individuals die from carcinoma from the consumption of snuff, over weight a pair of 2.6million, 4.4million for increased cholesterol and 7.1million for high pressure[1]. Chronic diseases are extremely variable in their symptom, evolution and treatment. Some, if not monitored and treated early, will end the patient's life. For several years the standard measure of glucose level, pressure level and heart beat was calculated in specialised health centres. Due to the technological development, there is a great variety of running sensors giving important signs such as blood pressure cuff, glucometer and pulse monitor together with electrocardiogram, which permits the patient to take their vital signs daily.

The readings taken daily are sent to doctors and enable them to suggest the medicine and physical exercise routine that enable them to improve the quality of life and overcome such disease. Internet of Things applied to the care and watching of patients is more and more common within the health sector, seeking to boost the standard of life of individuals. The Arduino is a programmable device that can sense and interact with its environment. The combination of Internet of Thing with Arduino is the new approach of introducing IoT in healthcare monitoring system of patient. The entire concept of IoT stands on sensor, gateway and wireless network that modify user to communicate and access the information. IoT offer more guarantee within the health awareness. As a saying goes "Health is wealth" it's exponentially crucial to form utilisation of innovation for better well-being[4]. Arduino Uno collects the information from the sensor and transfers it to the IoT website.

BACKGROUND OVERVIEW

A. EXISTING SYSTEM

The system used for health monitoring is the fixed monitoring system, which can be detected only when the patient is in hospital or in bed. Recently accessible systems are huge in size and available only in the hospitals in Intensive Care Unit[5]. Nowadays, zig bee can be used to transmit the patient information to their loved ones or to their concerned doctors.

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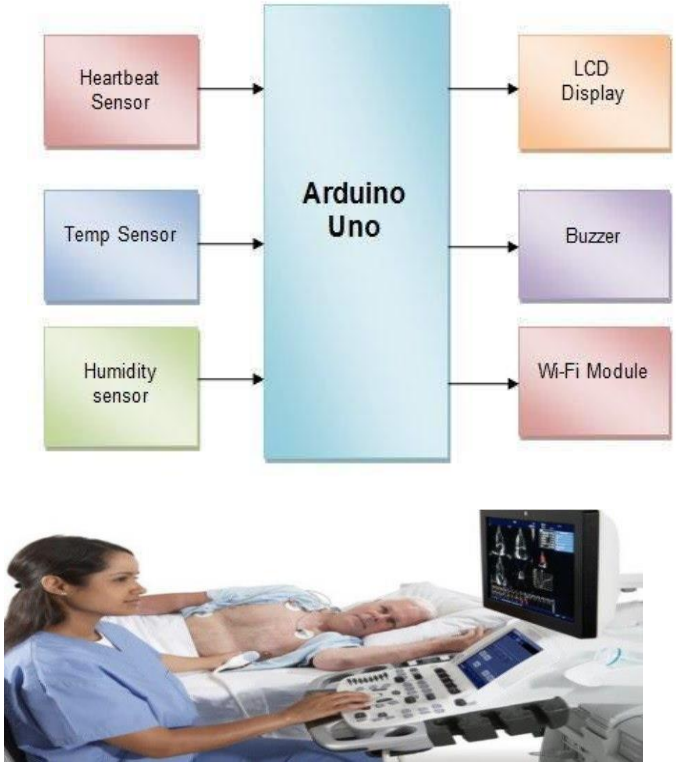

Fig.1. EXISTING SYSTEM

B. DRAWBACKS

In existing system, patient needs to get hospitalised for regular monitoring of the patient. It is not possible once he/she is discharged from the hospital. This system cannot be used at home. The existing systems are measuring the health parameters of the patient and send it through zig bee, Bluetooth protocol etc., These are used for only short range communication to transfer the data. Not all the time the doctor can fetch these details.

PROPOSED SYSTEM

The system which we prefer to develop would not only help in monitoring the health of the patient when he is in bed but also when he is out of bed. The main idea of the system is to transmit the information through the webpage to continuous monitoring of the patient over internet. Such a system would continually detect the important body parameters like temperature, pulse rate and would compare it against predetermined range set and if these values cross the specific limit, it would immediately alert the doctor. In this system microcontroller is used to transmit the data. It is connected to IoT which provides information to doctor or caretaker. The data of the patient's health is stored in the cloud. The doctor can easily access the patient's health anytime from anywhere. An LCD and buzzer is also connected to the microcontroller for the patients to view their health status live. In case of emergency it would automatically alert the doctor and relative of the patient via SMS. In such case the patient will get rapid medical help and also would save time and energy of the relatives, who cannot be near the patient all the time

SYSTEM OVERVIEW

Fig.2. SYSTEM OVERVIEW

A. MICROCONTROLLER

Microcontroller is the most important unit of the entire system. It is actually responsible for all the process being preceded. It will access and control all the peripheral devices or components, connected in the system. Arduino UNO is a free source microcontroller based on the microchip at mega 328pThis has some valuable facilities like they can easily convey the required information with a computer or with other microcontroller. In short, we say that complete success of the project depends on the software code in the microcontroller.

Fig.3. ARDUINO UNO

B. TEMPERATURE SENSOR

The LM35 series are integrated circuit temperature sensors, whose output voltage is linearly proportional to the Centigrade temperature. Temperature sensor hence is a preferable one over linear temperature. Sensors calibrated in kelvin like the user is not needed to less the large constant conductivity from its output to convert centigrade scaling[4]. Temperature sensor is a device which senses variation in temperature across it. LM35 need not any external source to provide typical accuracies. This is the 3leg IC that directly gives the analogue output. This requires +5v dc for its operation. Reading given by their sensor are in centigrade

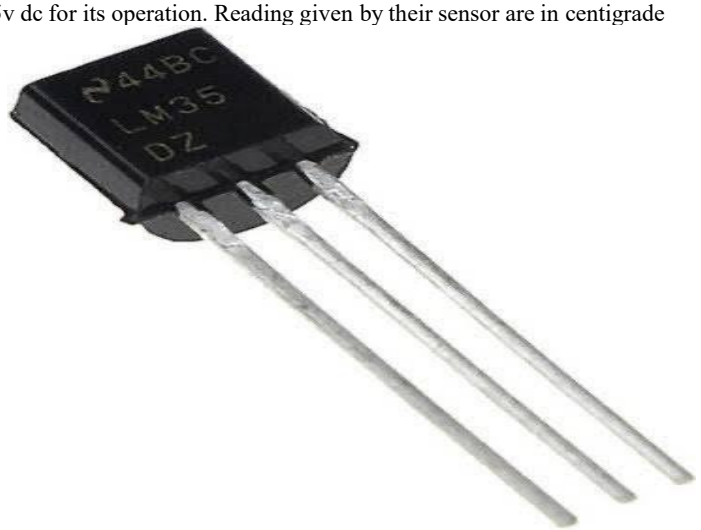

Fig.4. TEMPERATURE SENSOR

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.**C. HEART BEAT SENSOR**

Heart beat sensor is used to give digital output of pulse rate when a finger is placed on it. Here we will be making a cavity having a bright Light Emitting Diode and one LDR just opposite it. By locating the finger in between the Light Emitting Diode and LDR, the pulse of the heart is detected. When the heart beat detector is working, LED flashes in unison with each heartbeat. The digital output can be connected to the

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Fig.5. HEART BEAT SENSOR

D. IOT

Internet Of Things is usually considered as connecting things to the internet and using that connection to access an individual objects. Otherwise remote devices and objects with built in sensors are connected to an Internet of Things platform, which collects the information from different devices and stores it in the cloud. And then transfers the data to that particular website.

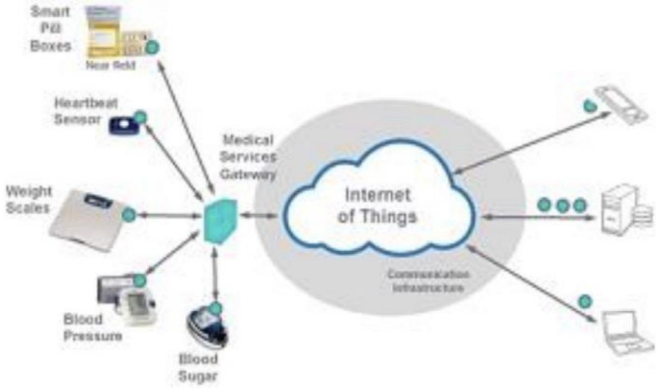

Fig.6. IOT

E. LIQUID CRYSTAL DISPLAY

An LCD is a flat board show or another electronically adjusted optical gadget that utilizes the light-balancing properties of fluid precious stones consolidates with polarizers. Fluid precious stones don't emanate light directly, rather utilizing a backdrop illumination or reflector to deliver pictures in shading or monochrome.

Fig.7. LCD

F. WIFI MODULE

The ESP8266 wi-fi module is a self-contained SOC with incorporated TCP/IP protocol stack that can offer any controller access to wi-fi network. It uses 802.11 b/g/n protocols. Standby power consumption is less than 0.1Mw.

whereas in Global System for Mobile communication based patient monitoring system, the health parameters are sent using GSM via SMS. IoT based health monitoring system has 3 senses. Initial one is a temperature sensor, second one is heartbeat device, and the third one is respiratory sensor. This is extremely useful since the doctor will detect the patient's health parameters simply by visiting internet website or IP address. And today several IoT apps are also being developed. So the doctor and relatives will monitor or track the patient health through Android apps. To operate an IoT based health tracking system, you will need a Wi-Fi connection. The microcontroller or the Arduino board connects to the Wi-Fi network using Wi-Fi module. This system will not work when there is no Wi-Fi network, Arduino UNO board continually reads the input from 3 senses. Then it sends the information to the cloud bysending this information to specific URL/IP address. Then this action of accelerating data to the cloud is repeated for a specific period of time.

SCOPE AND APPLICATIONS

IoT healthcare is the most emerging field in the medical area. This project is mainly for elderly person who is alone at home. It is also helpful for senior citizens living alone or with 1 or 2 members. This is really helpful when relatives or members of the family have to go out for some unavoidable reasons. Multi challenged person can use this project. Disabled patients who find difficulty to go to doctors on regular basis or for patients who need continuous monitoring from the doctor[3]. IoT tracking proves really useful when we need to record, monitor and keep track of changes in the health parameters of the patient. In Internet of Things based patient monitoring system, we can have the database of the health parameters. This helps the doctor to easily find the changes in the health parameters or history of the patient while suggesting the treatment or medicine for patient. Hospital stays are reduced due to remote patient monitoring. Hospital visits for regular check-ups are also minimized. Patient health parameters are stored in the cloud. So it is more beneficial than maintaining the records in printed paper in separated files or in digital computer, laptops, pen drives or specific memory location. In such cases there may be a chance of losing the data. Whereas in case of IoT, the datais stored in the cloud and has minimal chance of data loss[1]. Cure can be provided at starting stage. Notification to doctor is sent in case of critical conditions even though the patient is unable to provide any details.

CONCLUSION

With the wide use of internet, this work is concentrated to execute the internet technology to establish a system which would communicate through internet for better health. Internet of Things rules the whole world in various fields, mainly in health care sectors. Hence the present work is done to design an Internet of Things based smart patient health tracking system using an Arduino microcontroller. In this, pulse rate sensor is used to detect the heart beat and temperature sensor to read the temperature and sends the data to the cloud using internet. This information is also sent to the LCD display, so patient can easily know their health status. During critical situations to alert the doctor, the warning message is sent to the doctor's phone and at the same time buzzer turns to alert the care taker. The doctor can view the sent data by logging the specific website or IP address. Hence continuous patient monitoring system is designed.

FUTURE SCOPE

IMPLEMENTATION

In this project, detecting the various parameters of the patient using Internet of Things is done. In health monitoring system based on IoT projects, the real

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time factors of the patient are sent to the cloud by using internet connection. These data can be sent to anywhere in the world, so that the user will view the details anytime. This is the major advantage over SMS based health monitoring system. In IoT based patient health monitoring system, data of the patient health are often seen by doctors or their loved ones. The reason behind is that, the data has to be accessed by visiting an internet site or computer

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