

Heartbeat and Body Temperature Monitoring Device for Remote Patient

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Abstract: all countries around the globe are striving to improve and expand their health care delivery services. The current drawbacks and criticism against health care services is that they are urban oriented, curative in nature and it is accessible only to a limited population. To ensure health for all we all need to adapt and implement technologies. This device helps us to monitor patient even when the patient is not in the clinic or hospital [1]. It may increase access to health services and facilities while decreasing cost. It saves time of both patient and doctor, hence increasing efficiency and reliability of health services. Heartbeat and body temperature are the major signs that are routinely measured by physicians after the arrival of a patient [2]. The device can be connected to PC by using serial output so that measured heartbeat and temperature can be sent to PC for further online or offline analysis. Warning for abnormalities of health condition can be displayed. Sound can be added to the device so that the device makes a sound each time a pulse is received and alarm is started for abnormal health conditions. More parameter like (blood pressure) can be added. According to availability of sensors or development in biomedical trend more parameter can be sense and monitor which will drastically improve the efficiency of the wireless monitoring system in biomedical field [3]. The aim of this article is to discuss about the heartbeat and body temperature monitoring for remote patient.

Keywords— healthcare; management; device; remote; patients.

INTRODUCTION

I. IOT has given rise to smart health and its focus is on improving the health care system. Today Internet has become one of the important parts of our daily life. Visualizing a world where several objects can sense, communicate and share information over a Private Internet Protocol (IP) or Public Networks. The interconnected objects collect the data at regular intervals and used to initiate required action, providing an intelligent network for analysing, planning and decision making. This is the world of the Internet of Things (IOT). The IOT is generally considered as connecting objects to the Internet and using that connection for control of those objects or remote monitoring. Actual definition of IOT is creating a brilliant, invisible network which can be sensed, controlled and programmed. The entire concept of IOT stands on sensors, gateway and wireless network which enable users to communicate and access the information.

In India, everyday many lives are affected because the patients are not timely and properly treated. The prime goal was to develop a reliable patient monitoring system so that the health care professionals can monitor the patients, who are either hospitalized or executing their normal daily life activities. Currently, the health care system is going to change from a traditional approach to a modernized patient centered approach. In the traditional way the doctors play the major role, There are some basic problems related to this approach. Firstly, the health care professionals must be at place of the patient all the time and second, the patient remains admitted in the hospital, wired to bedside biomedical instruments, for a long period of time. Also, for real time parameter values are not efficiently measured in clinic as well as in hospitals. Sometimes it becomes difficult for hospitals to frequently check patient's conditions. Also, continuous monitoring of ICU patients is not possible and for viral diseases doctor can be at safe distance to deal with these types of situations, our system is beneficial. A recent health care system should provide better health care services to people at any time anywhere in an affordable and patient friendly manner. Our system is rate etc. [4] As Arduino.cc began developing new MCU boards based on non-AVR processors like the ARM/SAM MCU and used in the Arduino Due, they needed to modify the Arduino IDE so that it would be relatively easy to change the IDE to support alternate toolchains to allow Arduino C/C++ to be compiled for these new processors. They did this with the introduction of the Board Manager and the SAM Core. A "core" is the collection of software components required by the Board Manager and the Arduino IDE to compile an Arduino C/C++ source file for the target MCU's machine language. Some ESP8266 enthusiasts developed an Arduino core for the ESP8266 Wi-Fi SoC, popularly called the "ESP8266 Core for the Arduino IDE. This has become a leading software development platform for the various ESP8266-based modules and development boards, including NodeMCUs. [5]

A wireless sensor network is wireless network consisting of spatially distributed autonomous device using sensors to monitor to physical or environmental conditions. WSN is a network formed by large number of sensor nodes where each node is equipped with a sensor to detect physical phenomenon such a light, heat, sound etc. [6]

Temperature Sensor (LM35)

It is used to measure temperature. The LM35 series are precision integrated circuit temperature sensors, in which output voltage is linearly proportional to the Celsius (Centigrade) temperature. It measures temperature more accurately than thermistors. Temperature. It measures temperature more accurately than thermistors.

Heart Beat Sensor (Pulse Oximeter)

Heart beat sensor has been designed to give digital output of heart beat when a finger is placed on it. When we place the finger, the LED flashes in unison with each heartbeat. This digital output can be connected to microcontroller directly to measure the Beats per Minute (BPM) rate. It works on the principle of light modulation by blood flow through finger at each pulse. Pulse Oximeter Sensor Hardware Description Pulse oximetry is a simple technique to find the amount of haemoglobin. Oximeter measures number of hearts beat per unit of time which is usually conveyed in bits per minute (Bpm).

OLED Display:

OLED (Organic Light Emitting Diodes) is a flat light emitting technology, made by placing a series of organic thin films between two conductors. When electrical current is applied, a bright light is emitted. OLEDs are emissive displays that do not require a backlight and so are thinner and more efficient than LCD displays (which do require a white backlight).

I2C OLED display is used here. GPIO14 is SCL and GPIO02 is SDA.

ESP8266 OLED driver for SSD1306 library can be downloaded using Arduino library manager.

Thing speak and IFTTT:

Thing Speak™ is an IoT analytics platform service that allows you to aggregate, visualize and analyse live data streams in the cloud. ThingSpeak provides instant visualizations of data posted by your devices to Thing Speak. With the ability to execute MATLAB® code in ThingSpeak you can perform online analysis and processing of the data as it comes in. ThingSpeak is often used for prototyping and proof of concept IoT systems that require analytics.

Data collected are sent to thingspeak.com server using Thing speak API. After creating the channel, we have to copy write api key to our program. Thing speak app is installed on mobile phone. App requires read api key of your channel on thing speak. once we configure the app, data is shown on app.

Using IFTTT service we can act on data. Thingspeak thingHTTP app is created and it is configured to request the IFTTT service when certain condition is met. For example, if temperature is greater than 35°C it can send email, SMS or push notification. IFTTT maker service is used as Applet. [7]

Mechanism transmission components of the system are responsible for transforming recordings of the patient from patient house to the data centre of the health organization. The sensor will be connected to the network through an intermediate aggregator such as Ethernet module that is inbuilt feature of NodeMCU and which is further connected to WIFI. Data of the sensors will be uploaded to the server. this is further uploaded to cloud. And the data can be accessed by doctor from any corner of the world through a particular IP assigned to the system. The data will be visible to any audience who has the IP address. [8]

By seeing the many lives affected due to lack of proper treatment on time and failed to maintain continuous observation, we are intended to change the traditional approach to health care system. Internet of Things has many applications in different areas. IoT has been already designed for Wireless sensor network (WSN). It has been developed for health monitoring. This system presents the architecture of IoT and architecture of health monitoring using IoT, by using the IOT Health care monitoring system, the healthcare professionals can monitor, diagnose, and advice their patients all the time.[9] The health conditions data are stored and published. Hence, the healthcare professional can monitor their patients from a remote location at any time. In the designed system the enhancement would be connecting more sensors to internet which measures various other health parameters and would be beneficial for patient monitoring i.e. connecting all the objects to internet for quick and easy access. This health monitoring has a wide range of applications and can save rural and remote area people in emergency conditions. The device can be connected to PC by using serial output so that measured heartbeat and temperature can be sent to PC for further online or offline analysis. Warning for abnormalities of health condition can be displayed. [10] Sound can be added to the device so that the device makes a sound each time a pulse is received and alarm is started for abnormal health conditions. More parameter like (blood pressure) can be added. The output can be sent to mobile phones by using GSM module or Bluetooth module for further analysis.

Data transmission is performed by multiple sensors such as temperature, pulse oximeter sensor or Heart beat sensor. The sensor will sense the data with configuration of source code we will be able to check if the data exceeds its limits which is risky and on time update will be delivered. Data

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