IOT BASED SMART HEALTH CARE MONITORING SYSTEM

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Abstract:—

Internet of things (IoT) is a fast growing, a user-friendly technology which allows everything to connected and also allows effective communication between the connected "things". The Internet of Things, likewise called The Internet of Objects, alludes to a remote system between items, as a rule, the system will be remote and self-designing. The term "Internet of Things" has come to describe some technologies and research disciplines that enable the Internet to reach out into the real world of physical objects. IoT has many applications among them few are Traffic monitoring, Healthcare, Security, Transport, logistics and in our daily life. Generally in critical case patients are supposed to be monitored continuously to check their Heart Rate, oxygen saturation level and temperature as well. Previously doctors need to be present physically on sight. Now a day's SMS will be sent using GSM, but in this current data is displayed that is a specific time we mentioned. The past conditions of the patient cannot be displayed. It is like discrete data transmission, to convert it as analog we are going for IOT based health care system. The Internet of Things could be a game-changer for the healthcare industry. It is transforming healthcare industry by increasing efficiency, lowering costs and put the focus back on better patient care. IoT in Healthcare is a heterogeneous computing, wirelessly communicating system of apps and devices that connects patients and physicians to diagnose, monitor, track and store vital statistics and medical information. This paper describes E-Health Monitoring (EHM) and presents an architectural framework to describe the entire monitoring life cycle and highlights the essential service components. It serves as a fundamental basis for achieving robust, efficient and secure health monitoring. The primary aim of this paper is to design an IOT based architecture for health related issues such as Diabetics, Heart Monitoring system ,to check body temperature, Pulse rate and kidney functioning. we are analyzing different methods and techniques used for healthcare monitoring system where doctor can continuously monitor the patient's condition. The Data obtained through sensors are uploaded to the Ethernet module which is an IOT connected device to cloud and collected data is accessed by Authorized person through internet. Also the patient history will be stored in the web server and doctor can access the information whenever needed from any corner of the world. If there is any sudden change in the health condition of the person who are

using this health care system module, automatically the data of the patient will be uploaded to the concerned doctor, within few minutes user will get a prescription for his current situation. This will connect us with the doctors who are very far from us, and the immediate action will increase the health rate of people. This health care system will be most useful in rural and remote areas.

Index Terms: IOT, Healthcare , Sensors, WSN (Wireless Sensor Network)

I. INTRODUCTION

"Smart Health" refers to accomplishment of different sensors that captures the human body parameters. And the data obtained by the sensors can be used to provide smart health. 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 analyzing, 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 user's 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. For necessary diagnosis and advising they need to visit the patients. 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. 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 designed to be used in hospitals for measuring and monitoring various parameters like temperature, pulse rate, heart beat etc.

II. HARDWARE DESCRIPTION

Fig-1. System Block Diagram

A. Microcontroller (Arduino):

Microcontroller is referred as the chief functioning element which holds a mechanism of every element with a few interlinks between them. There are many microcontrollers in existence out of which we are preferring "arduino" microcontroller in our innovation. The main reason to opt arduino as our microcontroller is because of its simple characteristics as it enables the beginner to grasp the content quickly. It is possible to interact with the basic programming as it contains many inbuilt functions with an own compiler and a quick accessibility between the components is possible, it is eco-friendly and also cost-friendly. Referring to the merits of arduino, we chose to operate our module with this particular microcontroller.

B. Ethernet Module:

It is a module which consists of Internet protocol and Media Access Control Address. It has an ability to interface especially with arduino microcontroller. The module has an external storage capacity to store the commanded program. It establishes a connection with the web so as to receive message by the authenticated identity ,where the condition is further forwarded to doctor.

III. SOFTWARE DESCRIPTION

WIRELESS SENSOR NETWORKS

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.

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.

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Heart Beat Sensor

Heart beat sensor has been designed to give digital output of heat 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). In the project MCP6004 based pulse oximeter is designed and TCRT1000 reflective IR optical sensor is used for photo plethysmography(PPG).UsingTCRT1000 simplifies the process since both emitter and detector are arranged side by side. This technique is used to measure heart rate since change in blood volume is synchronous to heart beat.

ECG Sensor

ECG electrode sticks to chest to pick up ECG signals. Then wires are connected to AD8232.

This sensor is a cost-effective board used to measure the electrical activity of the heart. ECGs can be extremely noisy, the AD8232 Single Lead Heart Rate Monitor acts as an op-amp to help obtain a clear signal from the PR and QT Intervals easily.

Blood Pressure Sensor(MC1630)

The sensor is designed to be used with automated assembly equipment and can be dropped directly into a customer's disposable intrauterine housing. The pressure sensor consists of a pressure sensing element mounted on a ceramic substrate. Thick film resistors on the ceramic substrate are laser trimmed for compensation and calibration. A plastic cap is attached to the ceramic substrate to provide an easy method of attachment to the customer's assembly and protection for the sensing element. A dielectric gel is placed over the sensor to provide fluid isolation.

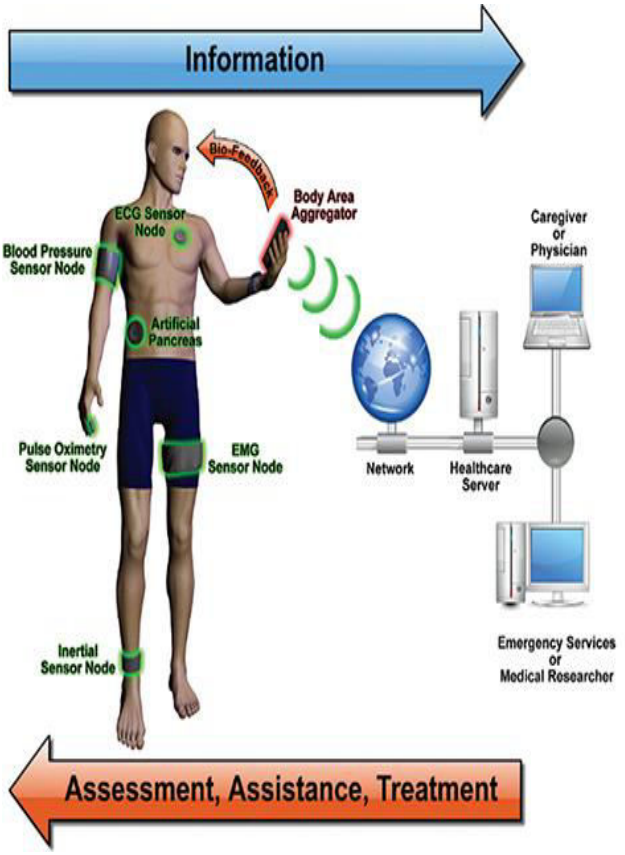

Fig-2 – Sensors interfacing diagram

A. Hosting:

Hosting maintains clients websites on its systems and provides related service,The Services may include leasing of hard disk space, stability of hardware and software , Securing with a backup ,unique content provision with high speed web access. in our proposed module it helps us to provide the authentication details which gets stored in database that can be accessed from any corne of world.In this point of view hosting has key role in the IOT based Health care monitoring system.

Need of Scripts to develop the module:

PHP:

Personal home page is an HTML-embedded, Server-side scripting language designed for web development. It generally works on a web server.

JSON (Java Script Object Notation):

JSON is a data structure format .the data are considered as objects with properties .This formalism is close enough is based on XML and java script.

My SQL:

My SQL is a relational database management system. (RDBMS) ,It is distributed under a dual GPL and proprietary license. It is one of the database management software most used in the world.

URL:

Uniform resource locator is the basic network identification to specify addresses on the web.

Mechanism:

Data transmission is performed by multiple sensors such as ECG, temperature,pulse oximeter sensor ,Heart beat sensor.Data 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 and which is further connected to wifi.Data of the sensors will 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.

Conclusion: 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 smart 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 Smart 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. 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.

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