Design of Health Care Monitoring System Based on Internet of Thing (IOT)

Taisir Hasan Abdulameer
Department of Information Technology, *Altinbas University*
Taiseeriraq1979@gmail.com

Abdullahi Abdu IBRAHIM
Department of Electrical And Computer Engineering, *Altinbas University*
Abdullahi.ibrahim@ altinbas.edu.tr

Alaa Hamid Mohammed
Department of Computer Engineering, Karabuk University, Turkey
Aallaaha12@gmail.com

***Abstract*— The Internet has made this place a worldwide city and web of things (IoT) by allowing the range of captors and keen items to collect and process data for various use. In weakening the physical structures of the digital shrewd (IoT) shrewd items become a definitive building. The IoT has a variety of applications, including social security. Different restore and post-operative information should be screened. The human services correspondence using the Web of Things (IoT) technique is adjusted to achieve the therapeutic parameters in the nearby and remote zones. In this paper, we use the remote health care system using advanced information technology and new communications developments and remote physiological measuring technology. The remote benefit services framework provides for the 'free welfare authorities' and 'remote long-term human services administrations' through an entire 'remote social insurance data stage' work instrument by way of coordinated terminal programming and improved social insurance modules. This would encourage the real-time activities of elderly citizens and monitor the healthcare system. The information gathered from various sensors is stored on a local server that connects people, physicians and practitioners to the right information at the time of an emergency. In this way, the framework could increase availability, productivity and reduce well-being costs in order to increase peace of mind and safety. I hope the design and implementation of this system will improve elderly health monitoring in future.**

Keywords*— *Internet of Things (IoT), Medical Services, Healthcare, Health Monitoring, Arduino

I.INTRODUCTION

Research shows that around 2000 people died every month because of their health's sole carelessness. Because, due to their heavy workload, they don't have time to get away from their health management. There has been a growing interest in wearables and several devices for personal health, fitness and activity consciousness are now available [1] on a commercial basis. In order to provide long term recording of[2], management and Clinical Availability of Physiological Information Patients [3] researchers have also considered applications for the niche recreational fitness field covered by current devices, such as the Internet of Thing (IoT). IOT is a technological and communication revolution aimed at connecting objects together via the internet. In order to collect and send data on objects to other locations via Internet for storage and analysis, IOT is a global network concept that can be used in all environments[4]. The definition of the Internet of Things by Forben magazine means things which interact with the Internet by using sensors, microcontrollers and communications transceivers, which is built with appropriate protocol stacks that enable them to interact and communicate with each other and therefore become an essential part of the internet. The internet now affects many aspects of the daily life of the potential user. IoT is a very dynamic distributed network consisting of many objects. People provide most of the content and information on the internet, while IoT provides information for small objects. IoT apps include smart home, medical IoT, farm IoT, smart distributors, energy use, connected cars, industrial internet, smart supply chain and many more[5].

IoT Healthcare Technology has a wide range of potential applications, such as remote monitoring and health integration, to revolutionize the medical industry for the coming decade. In developing health information systems, IoT-based healthcare systems play a major role in. Healthcare dependence on IoT is increasing daily to improve access to healthcare, improve quality of treatment and eventually reduce health care costs. An improved healthcare regime should address real-time health monitoring and early detection and provide home-based care in lieu of expensive clinical care[6].

In healthcare and the prediction of different diseases using various techniques[7], many researchers have suggested different IoT models. The work in this section is focused on the same field.

Ahn et al. [8] have an intelligent chair, which feels uncontroversial signals and which can be monitored using this monitoring system[9].

In the context of BSN-Based Human Services Framework and protected IoT-based medicines, Snehal Sanjay Kale [10] highlights the genuinely necessary safety conditions for BSN, called BSN-Mind. Data is uploaded to the cloud server and the mobile app is used for Android. Using the PIC and Wi-Fi module of raspberry can be seen here[11].

r. K N Muralidhara [12] Microcontroller PIC18F46K22, Wifi module. In all 15 seconds, the page or data refreshes which is not a good practice as previous or previous documents would be difficult to mention. The paper includes the use of advanced software like MPLAB IDE V8-92, DIPTRACE and ISIS Professional Proteus 7.0[13].

The wearable and implantable body zone focused on Narendra Kumar [14] provides patients' framework for consistent observation. Medicinal sensors have been used for the collection and transmission of physiological information in patients to (IPDA) Smart digital assistant. Uses have been made of electrodes, advanced sensors and biosensors[15]. Radio transceiver and the communication protocol ZigBee are used.

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The Maruf Pasha [14] Syed Muhammad Waqas Shah proposed a model in which basic health units of the country (essentially for underdeveloped countries)[16] They are subsequently converted into intelligent health units connected to their hospitals. Government tracks the entire nation's health. On the basis of certain protocols data is transmitted. Here is a layout approach (sensor, network and layer of service)[17].

II. PROPOSED SYSTEM

All these developments are integrated into our system. In addition, our system is low cost and can be implemented very easily. For maintaining patient data, we use a local server. Furthermore, the collected details of the sensors attached to the body of the patient are also sent to the mobile phone registered in the GSM module[18]. The sensors used in our model are low-cost[19]. The data are picked up directly on computers that reduce people's power. We use a cheaper Arduino than raspberry pi.

Proposed system consists of a microcontroller (Arduino), a NodeMCU, a heartbeat sensor, a temperature sensor and a high definition camera for blood group detection purpose. In our proposed framework, the heartrate and body temperature are automatically sensed, the readings are recorded continuously[20]. Finally, after processing the collected data, these data are sent to the server through the existing Local Area Network. The doctors can check the health condition parameter through a web application developed using PHP. This framework can also detect the blood group from the blood sample by using the image processing algorithm.

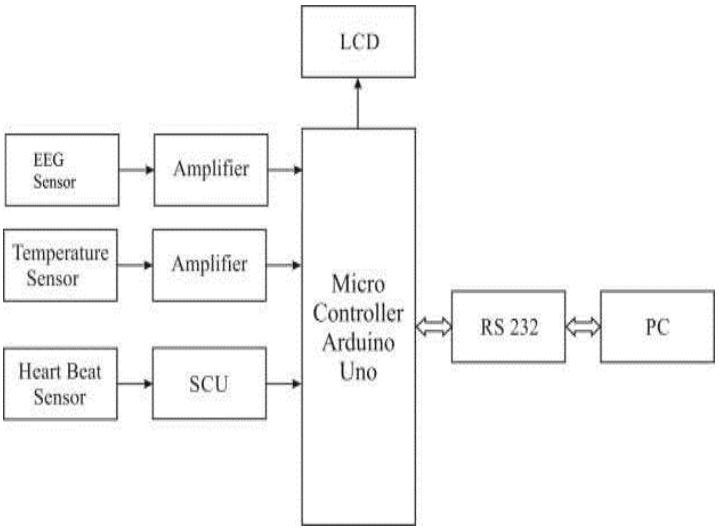

Figure 1 : PC-connected sensor block diagram.

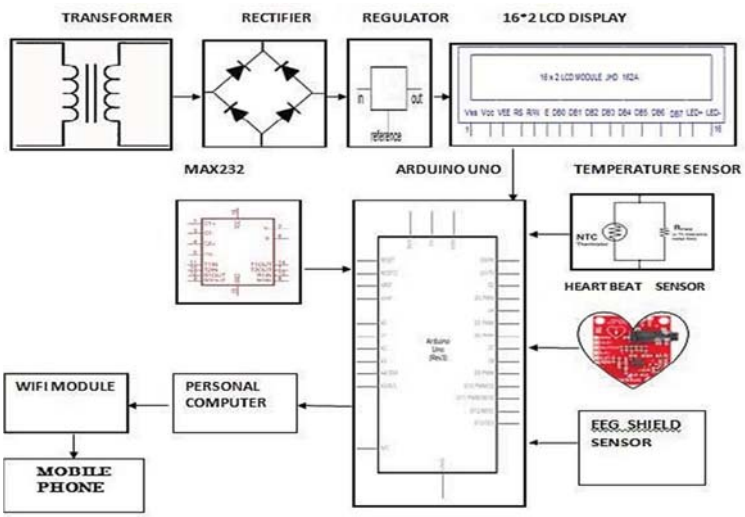

Figure 2 : Health surveillance system block diagram.

An Arduino Uno microcontroller functions as an intermediary between sensor nodes and cloud servers. Arduino Uno collects and submits biological sensor data via the REST API to a cloud server. This IoT healthcare system can also be used for the monitoring of health status by ordinary people through biosensors by collecting and analyzing data from the cloud to visualize patient health information on a physician's behalf in real time[21]. This model is available in various hospitals and healthcare institutions. The system uses bio sensors to generate raw data and send it to a database server to analyze data and statistics maintained by specialists and the patient's previous electronic health record (EHR) can be tracked and better analyzed.

These subjects are of great importance to Freescale in designing and developing integrated technologies for the use of IoT-based health systems, including:

- Patient data-gathering sensors.
- Microcontrollers processing, analyzing and transmitting data wirelessly.
- Microprocessors that allow rich graphical interfaces for users.
- Health gateways for the further analysis and transmission of sensor data into the web server.

III. ARCHITECTURE OF PHYSIOLOGICAL DATA ACQUISITION SYSTEM

This section describes the system architecture, data transfer and cloud processing, of physiological data acquisition systems. As shown in figure 7, the hardware part includes the main part of the hardware of the arduino uno microcontroller. Hardware part contains the main system controller arduino uno. Different physiological parameters of the human body are used as bio monitors to feel: cardiovascular sensors, electric sensors, gsr sensors, and temperatures. The esp8266-01 wi-fi system is connected to the internet. Arduino uno is connected to bio sensors and other sensors to human body are connected to arduino uno's web server via the wifi module esp8266-01. Arduino has a 16 * 2 display for the visualization of patient health data. On the other hand, a web application for collecting bio-sensor data is used in software part . The medical systems also contain historical patient health data, enabling physicians to thoroughly analyze medical data under critical conditions of the patient's health. The data is collected in the web application and shows patient physiological information.

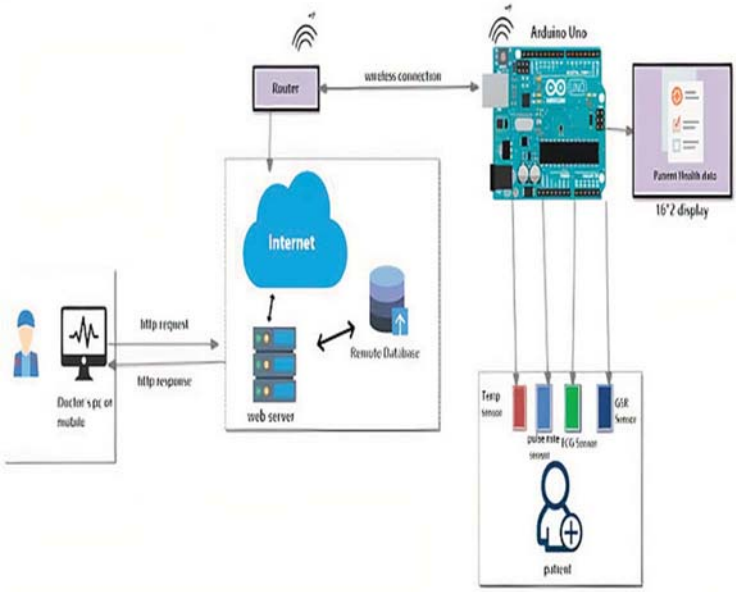

Figure 3: System Architecture

A. *Hardware Modules*

In this section, several described hardware devices for the development of a health monitoring system based on IoT.

- Arduino Uno

The Arduino Uno is an ATmega328-based microcontroller board. This consists of a combination of 14 digital output / input pins (6 of them for use as PWM outputs). It includes 6 analog input pins (A0 through A5) and a 16 MHz crystal oscillator. It contains everything necessary for supporting the microcontroller; it is simply powered by an AC to DC adapter or battery to a computer with a USB cable or.

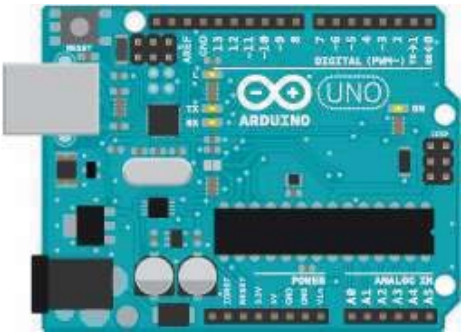

Figure 4: Arduino uno microcontroller

- Pulse rate sensor:

The pulse rate sensor is a heart rate measurement device. Essentially it is an integrated, noise removal and optical circuit booster. Specifications: 3.3V – 5V voltage, 4mA current, LED indicator.

Figure 5: Pulse rate sensor

- Body Temperature Sensor

The digital thermometer DS18B20 offers a temperature of 9 to 12 bits Celsius. A 1-wire bus that requires only one data line (and ground) is used for communication to the microcontroller. The DS18B20 can also draw power from the data line directly (“parasite power ”).

Figure 6: Body temperature sensor (ds18b20)

- ESP8266 Wifi module

This small module enables a Wi-Fi system to be connected to microcontrollers and to create basic TCP / IP connections using Hayes-style instructions. The ESP8285 is a 1 MiB built-in ESP8266 which takes one-

chip gadgets suitable for Wi-Fi connectivity into account. The following chips are followed by the ESP32.

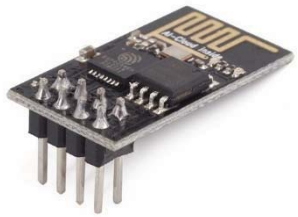

Figure 7: ESP8266-01 wifi module

B. Software Description

Various software tools used to design the IoT based health monitoring system are described in this section.

The PHP and the SQL language of the user application is phpMyAdmin and the health-related data are forwarded via the Internet to the server. Details can be easily accessed online through proper patient authentication and health monitoring.

In the Arduino integrated development environment (or Arduino IDE software) you will find a content tool for the composition of code, message area, text console, toolbar with normal capture and menu progression. It involves the transfer of programs and speaks with the Arduino and Genuino equipment. Sketches are known as composed projects using Arduino Software (IDE). These images are composed in the content tool and are not included in the record extension. (.ino). The content is highlighted in the proofreader and is cut / bonded and search / suppled. In sparing and trading, the message zone is critical and also shows errors.

The title says that the result of the intelligent health monitoring system is extremely useful for both patients and doctors. The patient can monitor his health from home and visit hospitals at any time only when he or she really needs to be able to.

This can be done by using our system, the results of which are available online and from all over the world. From everywhere. Since this model is a prototype, our system shows and emulates nearly real-time values of different health parameters in the real world. Doctors can also study the effect of medicine and other such matters using the record of the patient's body.

IV. RESULT AND DISCUSSION:

A. Operating Mechanism

Step 1: The Heartbeat sensor is attached to the finger of the patient. This includes an IR. Every pump from this sensor we receive a pulse. A signal conditioning unit for amplification is used to supplies Arduino with this sensor output.
Step 2: As a temperature sensor, the NTC type thermistor is used. The output of the sensor depends on the temperature.

Step 3: EEG sensor is a low-cost board for measuring the heart 's electric activity. Analog reading of the electrical activity can be drawn for the ECG or Electrocardiogram output. The AD8232 Single Lead Heart Monitor can be extremely noisy and acts as a feature to help easily and connect to Arduino to achieve a clear signal from PR and QT intervals.
Step 4: All these values are forwarded to the PC via the RS 232 to the mobile UR application.

B. Output in the Application

In a particular time, interval, the output is shown as a string. The application is very simple because it only displays analog values and an indication of the type of value appearing.
In the intelligent prediction module, the disease is predicted by asking for different symptoms and options based on the previous symptoms. At least 3-4 symptoms are identified and the final conclusion is reached. If more and more symptoms become visible, the result is more accurate. Figure 8 shows a sample screen shot of the web interface.

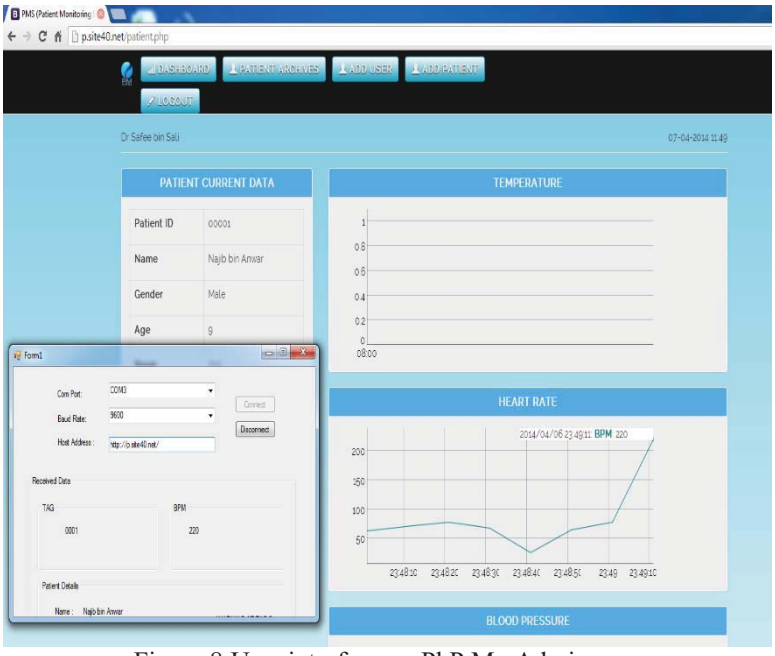

Figure 8:User interface on PhP My Admin

C. Testing and findings health care unit

Different people with normal or abnormal medical conditions are being tested in the developed health surveillance system. The following are the various tests and results with a minimum error rate:
Temperature Findings: The used NC thermistor is programmed to show room temperature with a minimum error of + or 5 for demo purposes.

Table 1 : Observed temperature readings

Testings	Normal value	Observed value	Error rate
Person 1	24	28	+4
Person 2	24	30	+6

ECG Findings: the IR sensor is used in the error range + or – 6 to measure pulse rates.

Table 2 : ECG values observed from different person

Testings	Normal value	Observed value	Error rate
Person 1	74-78	72	-2
Person 2	74-78	84	+6

V. DISCUSSION

The Health care surveillance system helps the parents to monitor the baby's heart rate and oxygen levels in real time (0 to 18 months). Finally, a few minutes are needed for the mobile app to read. The baby is however 14 months old, and sometimes the smart sock cannot be placed on her foot. Parents put the application to their foot when she is in deep sleep. Sometimes, because the baby moves and attempts to remove the sock, we got false alarm. We believe that for babies below 12 months and New Parents this Smart application is more helpful.

VI. CONCLUSIONS

This article shows and demonstrates the prototype of an automated system that ensures constant control on the health parameters and prediction of any disease or disease which precludes patients from frequent hospital visits. It is possible to install the proposed System in hospitals and to obtain and store massive data in the online database. Even the results can be obtained via an application from mobile.

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