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A REVIEW ON PATIENT HEALTH MONITORING SYSTEM USING VENTILATOR

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ABSTRACT :- Patient monitoring is a pivotal part of the health care system nowadays, either at hospitals or at home. This report proposes an intelligent patient monitoring system that automatically screens the patient's medical issue through different sensors. The information is then handled utilizing an Atmega328p microcontroller and valuable data is saved to the IoT cloud. Essentially the framework would separate the Heart Rate, SPO2, and Temperature Sensor. Through constant observing and graphical portrayal of the patient's data, specialists/medical attendants/family members can remotely check the patient's condition. Furthermore, if the condition becomes critical, a notification is sent to the doctor/nurse/relative to inform them.

In response to the health condition message received by the doctor by GSM Module we have used. Mobile phones transfer measured parameters via SMS to doctors/nurses/relatives for further analysis or diagnosis.

Keywords — Patient Monitoring, Atmega328p microcontroller, MAX30100, GSM Module, DHT11.

I. INTRODUCTION

Patients need to be monitored constantly, 24 hours a day which is very difficult to do either at hospitals or at home. This system tries to ease this problem through automatic monitoring of some basic variables that governs a patient's health condition. The variables that this system monitors are: PULSE OXIMETER signal using single lead heart monitor and oxygen level and temperature using temperature sensor. The information is then saved to the cloud which can be viewed by the doctor, nurses or relatives remotely. It can be accessed from anywhere and on any device, via the cloud. Moreover, if the values become critical, a SMS notification is sent to a

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predefined emergency number so that necessary steps can be taken to help the patient. +Finally, using a switch, the patient themselves can send a notification if they feel uncomfortable. For this monitoring system, Atmega328p microcontroller is utilized to make and connect between the equipment parts and the cloud. Beat OXIMETER sensors and temperature Sensor are associated with the Atmega328p microcontroller through I2C Communication Protocol. Beat OXIMETER information is passed from the Atmega328p microcontroller and afterward the information is ship off the cloud. GSM Module sends the Message given by the patients through which the switch is utilized to the specialists/attendants/family members. Diagrams are generated on the web interface, which will be only accessible to the users with username and password. The web interface will also allow the users view the previous records of the patient.

1.1 Objective

- The system even facilitates the doctor to monitor the patient's previous history from the data in Server in the monitoring device.
- If the heart rate goes below 60bpm or above 100bpm, a SMS notification is send to a predefined individual which can be a nurse, doctor or relative.
- Similarly, if the body temperature is below 36°C or above 38°C a notification is send.
- In the case of an emergency, the patient presses a push switch when they are feeling uncomfortable and the system sends a SMS notification just like before.
- Switches are used for a particular message while pressing each switch it will send the message through GSM for different Purposes to doctors/nurses/relatives.

II. BLOCK DIAGRAM

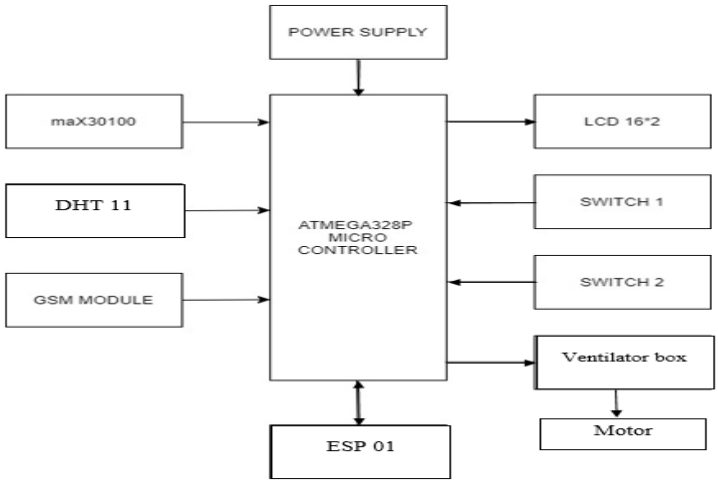

Fig.1. Block diagram health monitoring

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TECHNICAL DETAILS

SOFTWARE REQUIREMENTS

- Server-side Requirements
- Web Server : IIS 6.0(Internet Information Server)
- Arduino IDE (Programming)
- Proteus for Simulation

HARDWARE REQUIREMENTS

- Atmega328P Microcontroller
- MAX30100 Pulse Oximeter Sensor
- DHT – 11 sensor
- GSM Module
- 16*2 LCD Display

2.1 Atmega328P Microcontroller:

The microprocessor is the central unit of a system that performs arithmetic and logic operations, low-powered, low-cost micro-controller. Perhaps the most common implementation of this chip is on the popular Arduino development platform, namely the Arduino Uno and Arduino Nano models. Arduino Uno and Nano, with a maximum clock frequency of 20MHz, 32KB program FLASH, and 2KB of RAM. Since **ATmega328P** is used in Arduino Uno and Arduino boards, you can directly replace the arduino board with ATmega328 chip. For that first you need to install the **Arduinobootloader** into the chip (Or you can also buy a chip with bootloader – ATMega328P-PU). This IC with bootloader can be placed on Arduino Uno board and burn the program into it. Once Arduino program is burnt into the IC, it can be removed and used in place of Arduino board, along with a Crystal oscillator and other components as required for the project. Below is the **pin mapping between Arduino Uno and ATmega328P chip**.

Fig.2. Atmega328P Microcontroller

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2.2 MAX30100 Pulse Oximeter Sensor:

MAX30100 is an integrated pulse oximeter and heart-rate monitor sensor solution. It's an optical sensor that derives its readings from emitting two wavelengths of light from two LEDs – a red and an infrared one – then measuring the absorbance of pulsing blood through a photodetector. This particular LED color combination is optimized for reading the data through the tip of one's finger. It is fully configurable through software registers and the digital output data is stored in a 16-deep FIFO within the device. It has an I2C digital interface to communicate with a host microcontroller.

The pulse oximetry subsystem in MAX30100 consists of ambient light cancellation (ALC), 16-bit sigma delta ADC, and proprietary discrete time filter. It has an ultra-low-power operation which makes it ideal for battery operated systems. MAX30100 operates on a supply in the range of 1.8 to 3.3V.It can be used in wearable devices, fitness assistant devices, medical monitoring devices, etc. The MAX30100 operates from 1.8V and 3.3V power supplies and can be powered down through software with negligible standby current, permitting the power supply to remain connected at all times.

Fig.3. MAX30100 Pulse Oximeter Sensor

2.3 DHT – 11 sensor:

DHT11 is a Humidity and Temperature Sensor, which generates calibrated digital output. DHT11 can be interface with any microcontroller like Arduino, Raspberry Pi, etc. and get instantaneous results. DHT11 is a low cost humidity and temperature sensor which provides high reliability and long term stability.

It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and outputs a digital signal on the data pin (no analog input pins needed). Its very simple to use, and libraries and sample codes are available for Arduino and Raspberry Pi.

This module makes is easy to connect the DHT11 sensor to an Arduino or microcontroller as includes the pull up resistor required to use the sensor. Only three connections are required to be made to use the sensor - Vcc, Gnd and Output.

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It has high reliability and excellent long-term stability, thanks to the exclusive digital signal acquisition technique and temperature & humidity sensing technology.

2.4 GSM Module:

GSM is a mobile communication modem; it stands for global system for mobile communication (GSM). The idea of GSM was developed at Bell Laboratories in 1970. It is a widely used mobile communication system in the world. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operate at the 850MHz, 900MHz, 1800MHz, and 1900MHz frequency bands.

GSM technology was developed as a digital system using the time division multiple access (TDMA) technique for communication purposes. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has the ability to carry 64 kbps to 120 Mbps of data rates.

There are various cell sizes in a GSM system such as macro, micro, pico, and umbrella cells. Each cell varies as per the implementation domain. There are five different cell sizes in a GSM network macro, micro, pico, and umbrella cells. The coverage area of each cell varies according to the implementation environment.

The time division multiple access (TDMA) technique relies on assigning different time slots to each user on the same frequency. It can easily adapt to data transmission and voice communication and can carry 64kbps to 120Mbps of data rate

2.5 LCD Display:

Screen consists of two lines with 16 characters each. Each character consists of 5x7 dot matrix. Contrast on display depends on the power supply voltage and whether messages are displayed in one or two lines. For that reason, variable voltage 0-Vdd is applied on pin marked as Vee. Trimmer potentiometer is usually used for that purpose. Some versions of displays have built in backlight (blue or green diodes). When used during operating, a resistor for current limitation should be used (like with any LE diode).

- Pin1 (Ground/Source Pin): This is a GND pin of display, used to connect the GND terminal of the microcontroller unit or power source.
- Pin2 (VCC/Source Pin): This is the voltage supply pin of the display, used to connect the supply pin of the power source.

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- Pin3 (V0/VEE/Control Pin): This pin regulates the difference of the display, used to connect a changeable POT that can supply 0 to 5V.
- Pin4 (Register Select/Control Pin): This pin toggles among command or data register, used to connect a microcontroller unit pin and obtains either 0 or 1(0 = data mode, and 1 = command mode).
- Pin5 (Read/Write/Control Pin): This pin toggles the display among the read or writes operation, and it is connected to a microcontroller unit pin to get either 0 or 1 (0 = Write Operation, and 1 = Read Operation).
- Pin 6 (Enable/Control Pin): This pin should be held high to execute Read/Write process, and it is connected to the microcontroller unit & constantly held high.
- Pins 7-14 (Data Pins): These pins are used to send data to the display. These pins are connected in two-wire modes like 4-wire mode and 8-wire mode. In 4-wire mode, only four pins are connected to the microcontroller unit like 0 to 3, whereas in 8-wire mode, 8-pins are connected to microcontroller unit like 0 to 7.
- Pin15 (+ve pin of the LED): This pin is connected to +5V
- Pin 16 (-ve pin of the LED): This pin is connected to GND.

III. INNOVATION AND USEFULNESS

This is a convenient process to monitor the patient's health conditions from any distance. Since we are using GSM technology, this makes the user to communicate for longer distances. This work provides real-time update of the patient's health to the doctor along with necessary preliminary action taken by physician in case of his absence. It reduces the frequent visits of the doctors to the patient in person and assistance to the patient in case of biomedical parameter change.

The remote patient monitoring system is one of the major improvements in the hospitality because of its advanced technology. A wireless patient monitoring system to measure heartbeat, body temperature and blood pressure by using embedded technology is discussed. An embedded technology is used instead of DSP technology to develop this system so that it is easy to operate and available at an affordable cost.

Terms and Basic Definitions:

Internet of Things (IoT): A network of Internet connected devices (electrical) able to interchange data between them using sensors and actuators.

IoT device: Any type of electrical Internet connected device/s that can be monitored and/or controlled through Internet from anywhere (remote location).

IoT ecosystem: All the components that enable consumers, governments and businesses to connect with their IoT devices, including remotes, networks, dashboards, gateways, storage, analytics and security.

Entity: Mainly includes the users of IoT system such as consumers, governments and businesses etc

The system proposed in this paper is a simple yet effective patient monitoring system that takes pulse oximeter signal and temperature as the input, saves the data to the cloud and takes actions based on the values. The primary goal for proposing a system as such was to provide an inexpensive alternative to existing health monitoring systems. So even though introduction of a GSM module would have made the system better, the less costly option of using a web-based SMS service was used. The SMS service had a pay-per-use system and no initial costs unlike the GSM module, where the module had to be purchased.

IV. CONCLUSION

This report presents a design and implementation of health monitoring system, within the context of IoT environment. This system will provide a constant health monitoring facilities for the patients who are in the ICU or confined to bed at home from a distance from any spot. Beat OXIMETER sensor and temperature sensor are the two sensors that have been utilized to permit constant checking of PULSE OXIMETER sign and temperature of the patient. Besides, the information are constantly refreshed to the cloud at a normal time stretch. This helps the specialists, medical caretakers or the family members of the patient to screen the ailment of the patient and furthermore assists with making any move at the suitable time. The framework likewise sends a robotized notice by means of message to the specialists or the family members if the PULSE OXIMETER signals and the temperature reading go above or below the threshold value. It will help doctors in many ways and will enhance the efficiency of monitoring and treatment for patients. In the future, it will be modified by adding the pulse oximeter to measure oxygen saturation in blood for a patient to make the system even more efficient.

REFERENCES

[1] B. Priya, S. Rajendran, R. Bala and R. Gobbi, “Remote wireless health monitoring systems,” Innovative Technologies in Intelligent Systems and Industrial Applications, Monash, pp. 383-388, 2009.

[2] M.S. Uddin, J.B. Alam and S. Banu, “Real time patient monitoring system based on Internet of Things,” 4th International Conference on Advances in Electrical Engineering, ICAEE, Dhaka, pp. 516-521, 2017.

[3] R.T. Hameed, O.A. Mohamad, O.T. Hamid and N. Ţăpuş, “Patient monitoring system based on e-health sensors and web services,” 8th International Conference on Electronics, Computers and Artificial Intelligence, ECAI, Ploiesti, pp. 1-6, 2016.

[4] K. Jaiswal, S. Sobhanayak, B.K. Mohanta and D. Jena, "IoT-cloud based framework for patient's data collection in smart healthcare system using raspberry-pi," International Conference on Electrical and Computing Technologiesand Applications, Ras Al Khaimah, pp. 1-4, 2017.

[5] P. Singh and A. Jasuja, "IoT based low-cost distant patient ECG monitoring system," International Conference on Computing, Communication and Automation, Greater Noida, pp. 1330-1334, 2017.

[6] M. Neyja, S. Mumtaz, K.M.S. Huq, S.A. Busari, J. Rodriguez and Z. Zhou, "AnIoT-Based E-Health Monitoring System Using ECG Signal," IEEE Global Communications Conference, Singapore, pp. 1-6, 2017.