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Internet Of Things (IOT) Based Smart Health Monitoring System

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Abstract: ***IOT is one of the flourishing fields in coming years and it has a vital role in the health care sector. IOT helps us to connect with people by collecting major parameters of the patients directly through some wearable devices transmitted to smartphones and laptops of the authorized person using the cloud server. We are using devices which gives flexible operations to both for the patients and also for healthcare professionals. IOT is slowly becoming a trend in recent times by improvement in the wireless sensor networks. We are fetching such parameters like body temperature, oxygen saturation percentage, heart rate by using NodeMCU WIFI module and cloud computing. Patients with serious health issues can be quickly identified and can be provide a rapid solution by this health monitoring system. And by using BLYNK mobile application we can have those measurements of the parameters from anywhere in the world.***
Keywords: Health monitoring, Arduino UNO, IOT.

I. INTRODUCTION

At present days IOT has hijacked multiple technologies specifically in the area of automation and control. Wireless technologies in healthcare sector is playing a major role with the upcoming rate of senior citizens. These technologies are commercially available for physical and personal healthcare, fitness and activity awareness. Doctors plays a major role in everyone's life, as concern by this technique we can reduce huge amount of time consumption which takes for registration, appointment and check-up. IOT technology is working for personal healthcare and hospitals also. In recent years people gaining huge interest in the wearable sensors, such devices are available in the market for cheaper price so anyone can get it by any means. Researchers are implementing those devices for data recording, management and also to continuously monitor the patient health. IOT can ensures low cost, reliable, affordable though good devices for everyone.

II. BLOCK DIAGRAM

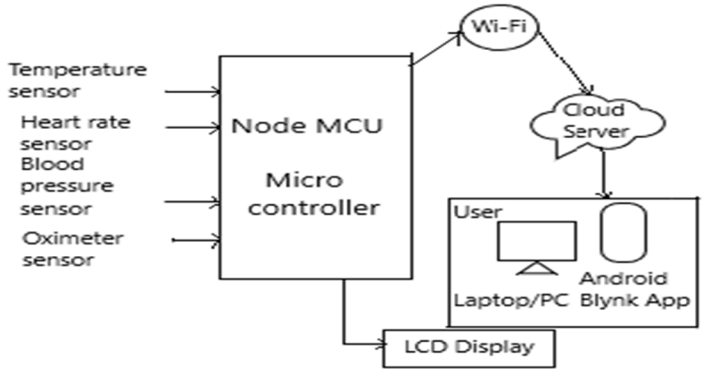


Figure 1: Block Diagram of Smart Health Monitoring System

The above figure shows the system design for the IOT based health monitoring system. The health monitoring sensors helps to collect health related data. Communication can be done by Microcontroller for sending data on the internet without any wire. Data processing has been done at the server. All data composed and aggregated at server. Finally, we will get health related information in the understandable format it can be shown on the web page i.e., data management.

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III. HARDWARE REQUIREMENTS

1. NodeMCU (ESP8266) **2.** Power Supply **3.** Temperature Sensor (LM35) **4.** Heart rate sensor (AD8232) **5.** Oximeter sensor (MAX30100) **6.**LCD Display **7.** Jumper wire **8.** Internet

1) *NodeMCU:* The NodeMCU ESP8266 development board comes with the ESP-12E module containing ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. NodeMCU has 128 KB RAM and 4 MB of flash memory to store data and programs. It's high processing power with inbuilt WIFI / Bluetooth and Deep Sleep Operating features make it more ideal for IOT projects. NodeMCU can be powered using Micro USB jack and VIN pin (External supply pin). It supports UART, SPI and I2C interface.

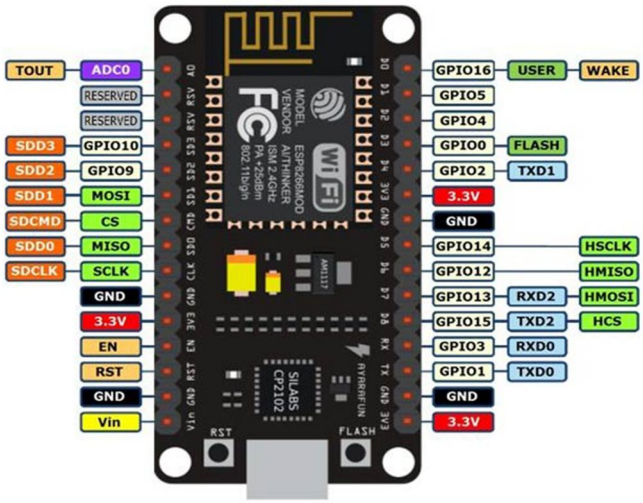


Figure 2: NodeMCU

2) *Power Supply:* It is defined as an electronic device which segregates electrical power to the electrical load. The basic parameter of a power supply is to transform from an origin to the recent electric current to the proper voltage, frequency, current to reach the load in order to generate a power. Other applications that power supplies may work consist limiting the current strains the load to protect the levels. Shutting of the power in the program of electrical fault, current conditions are used to secure electric noise and voltage surges from reaching the load, power ratio correction, accumulating energy so that the power can be resumed in Terms of temporary interruption.

3) *Temperature Sensor (LM35):* LM35 is a precession Integrated circuit Temperature sensor, whose output voltage varies based on the temperature around it. It is a small and cheap IC which can be used to measure temperature anywhere between -55°C to 150°C. It can easily be interfaced with any Microcontroller that has ADC function or in any development platform.

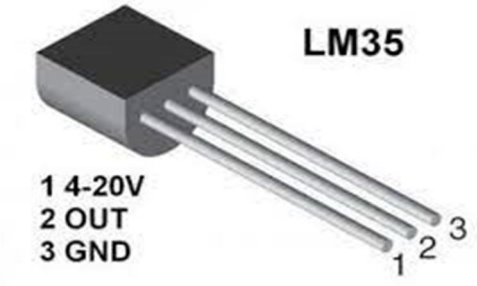


Figure 3: Temperature Sensor (LM35)

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4) *Heart rate sensor (AD8232):* This sensor is a cost-effective board used to measure the electrical activity of the heart. This electrical activity can be charted as an ECG or Electrocardiogram and output as an analog reading. 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.

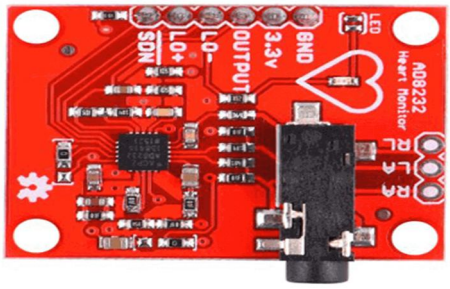


Figure 4: Heart rate sensor (AD8232)

5) *Oximeter sensor (MAX30100):* The MAX30100 is an integrated pulse oximetry and heartrate monitor sensor solution. It combines two LEDs, a photodetector, optimized optics, and low-noise analog signal processing to detect pulse oximetry and heart-rate signals. 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.



Figure 5: Oximeter sensor (MAX30100)

6) *LCD Display:* An LCD is an electronic display module that uses liquid crystal to produce a visible image. The 16×2 LCD display is a very basic module commonly used in DIYs and circuits. The 16×2 translates a display 16 characters per line in 2 such lines. In this LCD each character is displayed in a 5×7 pixel matrix**.**

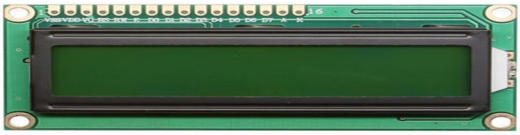


Figure 6: LCD Display

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7) *Jumper Wire:* Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed.



Figure 7: Jumper wire

8) *Internet:* IOT is a modern technology which is implemented in every field in order to improve the lifestyle which makes easy and effortless. The classification of internet of things are QR Codes, Wireless technology, sensor technology which is detected with the term RFID. IOT plays a major role on health monitoring a device.

IV. SOFTWARE REQUIREMENTS

1.Open-source Android app 2. Embedded C 3. Arduino IDE

1) *Open-Source Android App (Blynk):* Blynk is an open-source android app which is designed and developed in order to control the hardware via internet of things (IOT). This digitally displays sensor data; it can accumulate and visualize the data. Plus, it can also do other parameters such as Blynk App this app gives us to create amazing interfaces for a project using multiple widgets which is an in-build app. Blynk Server It acts as an interface between the smartphone and hardware which is responsible for the communication. We can also use blynk cloud or compile our private blynk server. It's an open source that can control any number of devices plus can also be launched on Raspberry Pi. Blynk Libraries – for all the standard hardware platforms, supports communication with the server and the complete progression of incoming and outgoing instructions.
2) *Embedded C:* It is mainly used for the purpose of real time response. RTS (Real Time Response) is designed and developed as a device which corrects based on the time of response. The version of RTS follows the concept of responding with delay is fine. For instance, this includes railway platform which displays schedule system.
3) *Arduino IDE:* Arduino IDE where IDE (Integrated Development Environment). This is basically an open-source app where one can code, compile, and upload a file in an Arduino device. In fact, any Arduino modules are adapted by this software, which has in build features by default. It is available for operating systems for instance MAC, Windows, Linux, and runs on the java software. A range of Arduino modules, consist of Arduino Uno, Arduino Mega, Arduino Leonardo, Arduino Micro etc. Every module contains a microcontroller on the board which is in build by default.

V. CONCLUSION & FUTURE WORK

In this paper, we have found the importance and fruitful benefits of implementation of IOT in remote health monitoring systems. The compact sensors with IOT will make a huge impact on every patient's life, that even though they are away from home and physician, this helps them to reduce the fear of danger. The sensory data can be acquired in home or work environments. Also, the challenges in sensing, analytics and prediction of the disease are also highlighted and those can be addressed to provide a seamless integration into the medical field. This system is implemented using a wearable sensor. The improved version of this project will work on the security and encryption of the data accumulated from the patient by using an android Blynk app.

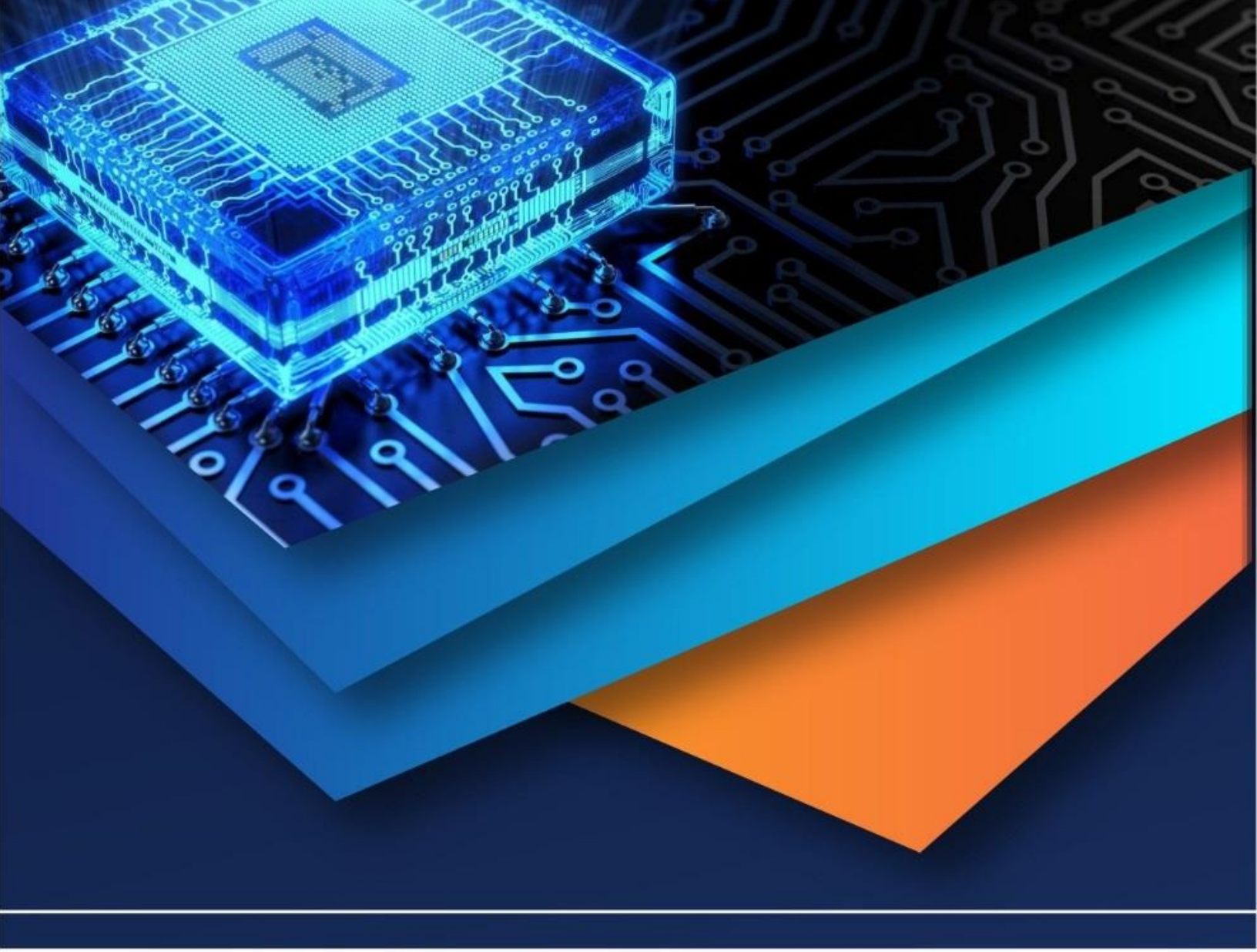
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