WEARABLE HEALTHCARE MONITORING SYSTEM

Mrs.Ghule.V.S[1], Mr.Vyas.S.N[2], Vaishnavi Shivshetti[3] , Ashlesha Kadam[4] ,Akshata Wagadari[5], Vaishnavi Waghole[6],Pradnya Zende[7]

[1,2] *Lecturer in E&TC Engg. Dept, SSWP, Solapur*
[3,4,5,6,7] *Student, E&TC Engg. Dept, SSWP, Solapur*

Abstract - *The fundamental element of people's needs is health. Humans face a haul of surprising death and plenty of diseases because of varied diseases that are a result of lack oftreatment to the patients at right time. The main objective ofthis project is to develop a reliable sensible patient health observance system victimization IoT so the attention professionals will monitor their patients. The sensors will be either worn or be embedded into the body of the patients, to unendingly monitor their health. the knowledge collected in such a fashion will behold on, analyzed, and well-mined to tryand do the first prediction of diseases. A mobile device-based attention observance system is developed which may offer period on-line data regarding physiological conditions of a patient primarily consists of sensors, the information acquisition unit, Arduino, and programmed with code. The patient's temperature, heartbeat rate, pressure level, graph knowledge square measure monitored, displayed, and hold on by the system and sent to the doctor's and patient's mobile containing the appliance. The sensible Health observance System monitors health standing and saves it on the online page.*

Key Words: **IOT(thingspeak), arduino Uno, Wi-Fi module, USB, LCD.**

1.INTRODUCTION

In recent years, wearable health monitoring devices have revolutionized healthcare by providing continuous, non-invasive monitoring of vital signs and activity levels. This technology has immense potential, particularly for individuals with conditions such as badminton patients who require movement assistance due to various health issues. However, for individuals with conditions affecting their mobility, participating in such activities can be challenging without proper assistance and monitoring.

Wearable health monitoring devices offer a solution by providing real-time data on various physiological parameters, including temperature, humidity and movement patterns

2.IDEA OF PROJECT-

Bedridden patients with limited mobility face unique challenges in accessing healthcare monitoring. Traditional monitoring systems may not be suitable for them due to their restricted movement. This project proposes a wearable healthcare monitoring system tailored specifically for bedridden patients, enabling continuous monitoring and timely assistance when needed.

3.BLOCK DIAGRAM-

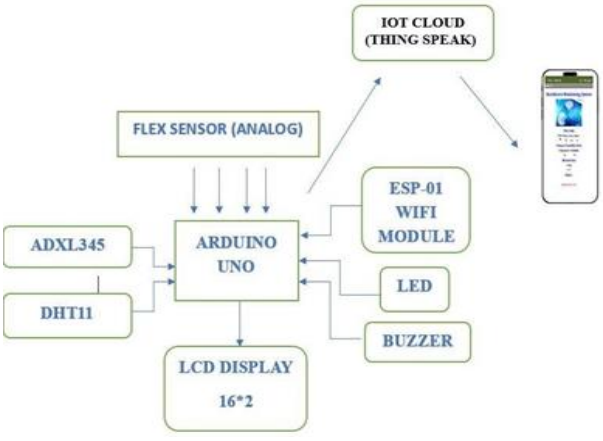

Fig 3.1: Block Diagram of Wearable Monitoring System

4.CIRCUIT DIAGRAM-

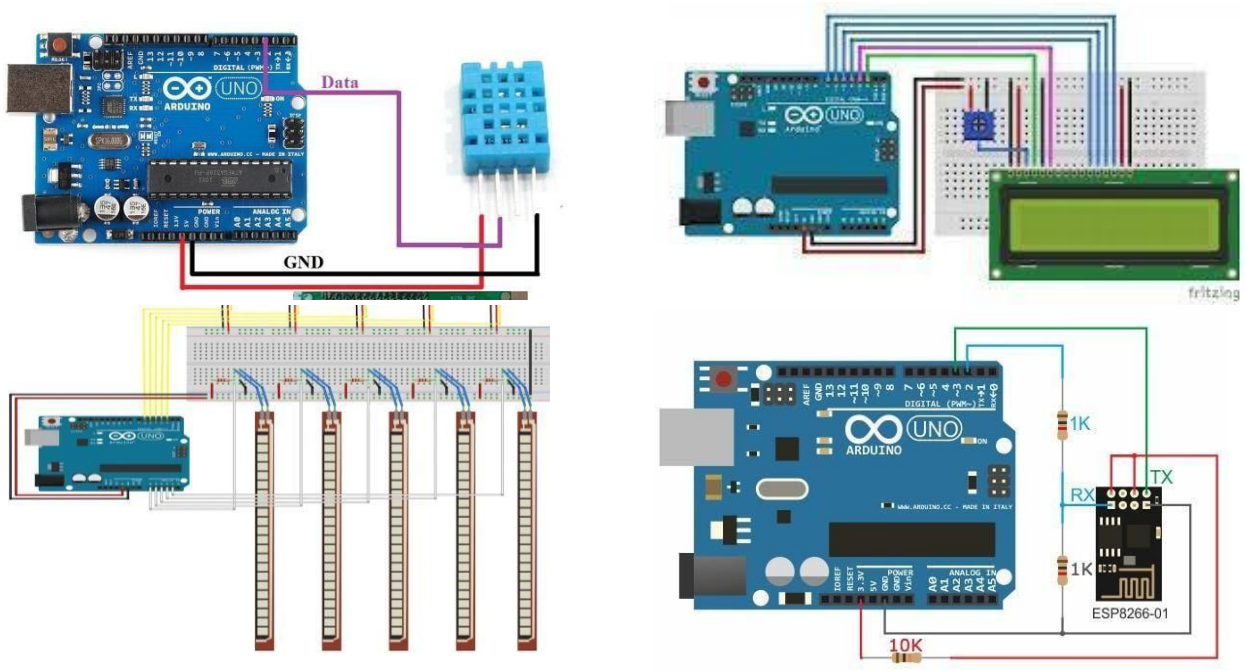

Fig 4.1 : Circuit Diagram of Wearable Monitoring System

5. Hardware Description-

ESP8266-01 WiFi Module:-

ESP is an abbreviation of "Espressif modules" and not an acronym. Espressif Systems is a multinational, fabless semiconductor company established in 2008, with headquarters in Shanghai and offices in Greater China, India and Europe. The ESP-01 ESP8266 Serial WIFI Wireless Transceiver Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor.

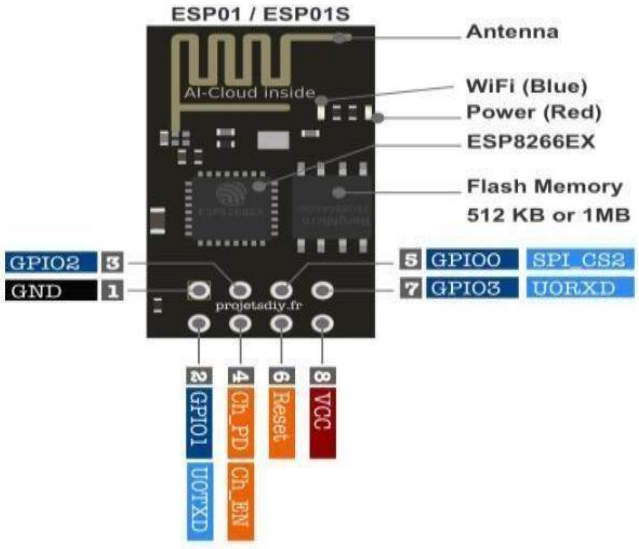

Fig 5.1 : ESP01

Features:-

- Integrated low power 32-bit MCU
- Integrated 10-bit ADC
- Integrated TCP/IP protocol stack
- Supports antenna diversity
- Wi-Fi 2.4 GHz, support WPA/WPA2
- Support STA/AP/STA+AP operation modess
- Support Smart Link Function for both Android and iOSdevices
- Support Smart Link Function for both Android and iOSdevices

Arduino Uno

The Arduino Uno is an open-source microcontroller board based on the Microchip ATmega328P microcontroller (MCU) and developed by Arduino.cc and initially released in 2010. We can directly connect the board to the computer via a USB Cable which performs the function of supplying the power as well as acting as a serial port. The microcontroller board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by a USB cable or a barrel connector that accepts voltages between 7 and 20 volts, such as a rectangular 9-volt battery. Memory is 2 KB SRAM , Storage is 32 KB Flash 1 KB EEPROM.

Fig 5.2 : Arduino Uno.

Flex sensor :-

A flex sensor or bend sensor is a sensor that measures the amount of deflection or bending. Usually, the sensor is stuckto the surface, and resistance of sensor element is varied by bending the surface. A flex sensor is a low-cost, easy-to-use variable resistor that is designed to measure the amount of deflection it experiences when bent. The sensor's resistance is lowest when it's flat on the surface, increases when we bend it slowly and reaches its maximum when it's at a 90- degree angle. Flex sensors are popular because they are used in many different applications like game controllers, data gloves, motion trackers, and even in biomedical devices to register static and dynamic postures. So in today's project, we will learn all about flex sensors, how it works, and how you can interface them with an Arduino.

Fig 5.3 : Flex Sensor

MPU6050 motion sensor

MPU6050 sensor module is complete 6-axis Motion Tracking Device. It combines 3-axis Gyroscope, 3-axis Accelerometer and Digital Motion Processor all in small package. Also, it has additional feature of on-chip Temperature sensor. It has I2C bus interface to communicate with the microcontrollers. It has Auxiliary I2C bus to communicate with other sensor devices like 3-axis Magnetometer, Pressure sensor etc. If 3-axis Magnetometer is connected to auxiliary I2C bus, then MPU6050 can provide complete 9-axis Motion Fusionoutput.

Fig 5.4 : DMP (Digital Motion Processor)

DMP (Digital Motion Processor):-The embedded Digital Motion Processor (DMP) is used to compute motion processing algorithms. It takes data from gyroscope, accelerometer and additional 3rd party sensor such as magnetometer and processes the data. It provides motion data like roll, pitch, yaw angles, landscape and portrait sense etc. It minimizes the processes of host in computingmotion data. The resulting data can be read from DMP registers.

DHT11–Temperature and Humidity Sensor: -

The DHT11 is a commonly used Temperature and humidity sensor that comes with a dedicated NTC to measure temperature and an 8-bit microcontroller to output the values of temperature and humidity as serialdata.

Fig 5.5 : DHT11–Temperature and Humidity Sensor

Specifications: -

- Operating Voltage: 3.5V to 5.5V
- Operating current: 0.3mA (measuring) 60uA (standby)
- Output: Serial data
- Temperature Range: 0°C to 50°C
- Humidity Range: 20% to 90%
- Resolution: Temperature and Humidity both are 16-bit
- Accuracy: ±1°C and ±1%

LCD Displays:-

Now a days we always use the devices which are made up of LCDs such as CD players, digital watches, computers, etc. These are commonly used in the screen industries to replace the utilization of CRTs. Cathode Ray Tubes use huge power when compared with LCDs, and CRTs heavier as well as bigger. These devices are thinner as well power consumption is extremely less. The LCD 20×4 working principle is, it blocks the light rather than dissipate. This article discusses an overview of LCD 20X4, pin configuration and its working. The liquid crystal display (LCD) panel is designed to project on-

screen information of a microcomputer onto a larger screen with the aid of a standard overhead projector, so that large audiences may view on-screen information without havingto crowd around the TV monitor.

Fig 5.6 : LCD Display

Features :-

- The operating voltage of this LCD is 4.7V-5.3V
- It includes two rows where each row can produce 16-characters.
- The utilization of current is 1mA with no backlight
- Every character can be built with a 5×8-pixel box
- The alphanumeric LCDs alphabets & numbers
- Is display can work on two modes like 4-bit & 8-bit
- These are obtainable in Blue & Green Backlight
- It displays a few custom generated characters

6. Working

The flex sensor and temperature sensor are connected to analog input pins of the Arduino Uno. The Arduino Uno reads analog voltage values from these sensors using its built-in Analog to Digital Converter (ADC). The microcontroller (Arduino Uno) processes the sensor data, potentially implementing algorithms to detect changes in body movements or abnormal temperature variations. When the flex sensor are bend the data is send on the cloud and we can monitor the data on the mobile or a laptop through the app whenever and whenever. And simultaneously abnormal condition is displayed on the LCD and buzzer will start to buzz.

- Temperature sensor and humidity sensor are used to monitor the condition of patient such as body temperature and restlessness. Also momentsensor is added to monitor the moment of the patient.
- On to the each strip of the flex sensor, individual message is allocated, for example when the first finger is bend patient need water is displayed inthe apps and value changes on the LCD.
- When the second finger is bend then patient needfood is displayed in the app and value changes onthe LCD.
- Third finger is bend patient need help is displayedin the app and value changes on the LCD.
- When 4th finger is bend patient need to go toiletis displayed in the app and value changes on the LCD.

7. ADVANTAGES:-

Remote monitoring: Patients can be monitored remotely, reducing the need for frequent hospital visits and improving accessibility to healthcare services.

Improved patient outcomes: Continuous monitoring can lead to better management of chronic conditions and overall improved patient outcomes.

Personalized care: Data collected from monitoring can beused to tailor treatment plans to individual patients, leading to more personalized care.

Real-time feedback: Healthcare professionals can receive real-time data and alerts, allowing for prompt responses to changes in a patient's condition.

Patient empowerment: Patients gain a better understanding of their health status and can take a more active role in managing their own health.

8. APPLICATION:-

Fall Detection and Prevention: Wearable devices equipped with accelerometers and gyroscopes can detect sudden movements or changes in orientation that may indicate a fall.

Remote Patient Monitoring: Continuous monitoring of vital signs such as heart rate, respiratory rate, and body temperature can be achieved through wearable sensors.

Activity Monitoring: By tracking movements and activity levels, wearable devices can provide insights into a patient'sdaily routine, including periods of restlessness or agitation.

9. FUTURE SCOPE:-

Remote Monitoring: Allowing patients to be monitored from home or other remote locations.

even detect movements
Alerts and Notifications: Sending alerts to healthcare providers or caregivers in case of abnormal readings or emergencies.

Integration with Electronic Health Records (EHR)*: Seamless integration with existing EHR systems to streamline data exchange and improve continuity of care. Patients typically involves sensors integrated into clothingor devices worn by the patient. These sensors can track vital signs like heart rate, respiratory rate, body temperature, and

10. CONCLUSIONS:-

A robust health care monitoring system plays a pivotal role in enhancing patient care, improving health outcomes, and optimizing healthcare delivery. By providing real-time monitoring, remote access to patient data, and proactive alerts, such systems enable early detection of health issues, timely interventions, and personalized care.

Moreover, integration with wearable devices, telemedicine platforms, and electronic health records fosters seamless communication among healthcare stakeholders, promoting efficient collaboration and informed decision- making. With stringent adherence to data security and privacy measures, along with continuous innovation and scalability, health care monitoring system.

It provides real-time data to healthcare providers, facilitating timely interventions and improving patient outcomes. Additionally, it empowers individuals to take control of their health by promoting proactive monitoring and preventive measures. Overall, the healthcare monitoring system plays a pivotal role in revolutionizing healthcare delivery, promoting wellness, and reducing healthcare costs.

11. REFERENCES:-

1. Smith, J., & Jones, A. (Year). "Advances in Healthcare Monitoring Systems: A Review." Journal of Medical Engineering & Technology.

2. Patel, R., & Gupta, S. (Year). "Design and Implementation of a Remote Healthcare Monitoring System." International Journal of Telemedicine and Applications.

3. Johnson, M., et al. (Year). "Integration of Wearable Devices in Healthcare Monitoring Systems." Proceedings of the IEEE International Conference on Healthcare Informatics.

12. PROJECT IMAGE-

Fig 12.1: Project Image