Smart Wearable Health Monitoring Device Using IOT

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The present invention provides a Low-Cost Wearable Health Monitoring Device comprising plurality of sensors to measure the vital information of a old or disabled person; a module consisting pre-programmed controller which store the normal vital parameter to be monitored, during old age and based on comparison generating an alert signal which is transmitted through a transmitter to ambulance, doctor and family member; a communication device adapted for continuous establishment of network with the data storing means where the vital information gets stored; and output means from where the family member and doctor can access the information. The system has an advantage of creating proper data base of the old/disabled person and is cost-efficient and reliable.

The Link of the project is mentioned below :-
https://github.com/biprajit1999/SmartWearable.git

I. INTRODUCTION

The present invention relates to the field of electronics and communication, more particularly a low cost wearable health monitoring device which can be used to keep an eye on the vital information of an aged or disabled person and simultaneously communicate with the doctor in case of an emergency situation. The present invention provides a Low-Cost Wearable Health Monitoring Device comprising plurality of sensors to measure the vital information of a aged and disabled person; a module consisting pre-programmed controller which store the normal vital parameter to be, during disability or aging and based on comparison generating an alert signal which is transmitted through a transmitter to ambulance, doctor and family member; a communication device adapted for continuous establishment of network with the data storing means where the vital information gets stored; and output means from where the family member and doctor can access the information. The system has the advantage of creating a proper database of disabled persons and is cost-efficient and reliable.

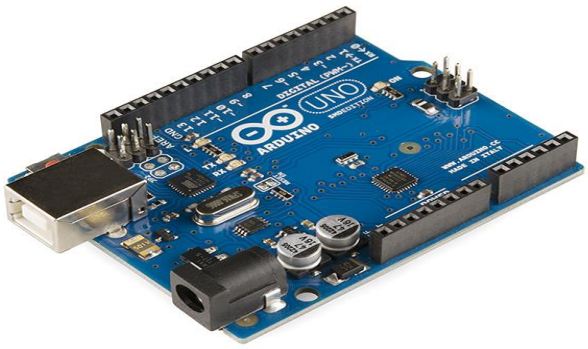
This paper presents a proposed project which uses temperature sensor and pulse rate sensor to measure temperature and pulse rate, which is an important parameter for a patient so that the doctor will monitor and can take immediate actions without delay if he finds any abnormality in the patient's heart beat and temperature. In the proposed system, the node from the temperature sensors and heart beat sensors are attached to the patient's body that finds the temperature and heartbeat of the patient and is fed to the microcontroller. The microcontroller used are Arduino Uno and Node MCU.

The Arduino and Node MCU process the data and the data is stored on database. These data are stored in the database. The doctor can access these data from the other side. IoT is implemented to share these health information's with the doctor. IoT is the interconnecting of devices and services that reduces human intervention to give a précised and better life.

II. HARDWARE

A. Arduino UNO

Arduino UNO is a microcontroller board based on the **ATmega328P**. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.



B. LM 35 Temperature Sensor

LM35 is a temperature sensor that outputs an analog signal which is proportional to the instantaneous temperature. The output voltage can easily be interpreted to obtain a temperature reading in Celsius. The advantage of lm35 over thermistor is it does not require any external calibration. The coat ing also protects it from self-heating. Low cost (approximately $0.95) and greater accuracy make it popular among hobbyists, DIY circuit makers, and students. Many low-end products take advantage of low cost, greater accuracy and used LM35 in their products. Its approximately 15+ years to its first release but the sensor is still surviving and is used in any products.

C. Heart Rate Sensor

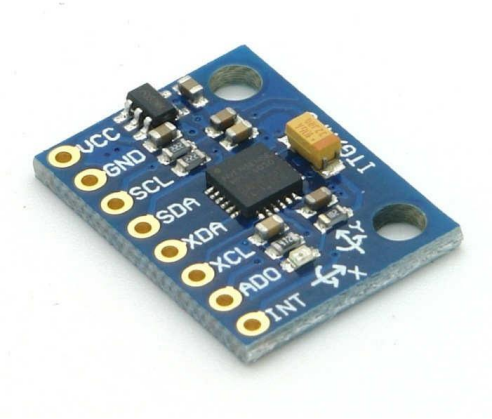
Heart beat sensor is used to measure the heartbeat of the patient. It works on the principle of Photo plethysmography (PPG) technique. This optical technical is used to detect the blood volume changes in the micro vascular bed of the tissue. It gives a digital output when a finger is placed on it. The working voltage is +5v DC. Heart beat sensor is used to measure heart beat normally between the ranges 60-100.

D. MPU6050 Gyroscope 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 Fusion output.



E. LDR Light Sensor

LDR (Light Dependent Resistor) as the name states is a special type of resistor that works on the photoconductivity principle means that resistance changes according to the intensity of light. Its resistance decreases with an increase in the intensity of light. It is often used as a light sensor, light meter, Automatic street light, and in areas where we need to have light sensitivity. It is also called a Light Sensor.

It works on the principle of photoconductivity whenever the light falls on its photoconductive material, it absorbs its energy and the electrons of that photoconductive material in the valence band get excited and go to the conduction band and thus increasing the conductivity as per the increase in light intensity.

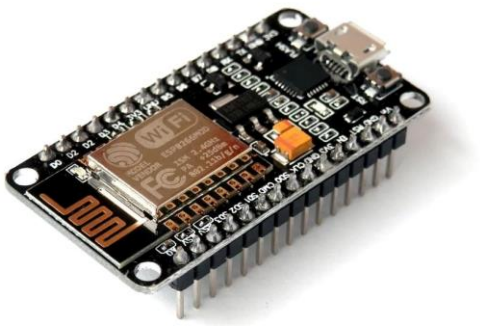
F. DHT 11 Humidity Sensor

This DHT11 Temperature & Humidity Sensor features a temperature & humidity sensor complex with a calibrated digital signal output. By using the exclusive digital-signal-acquisition technique and temperature & humidity sensing technology, it ensures high reliability and excellent long-term stability. This sensor includes a resistive-type humidity measurement component and an NTC temperature measurement component, and connects to a high-performance 8-bit microcontroller, offering excellent quality, fast response, anti-interference ability and cost-effectiveness.

G. NODE MCU ESP8266

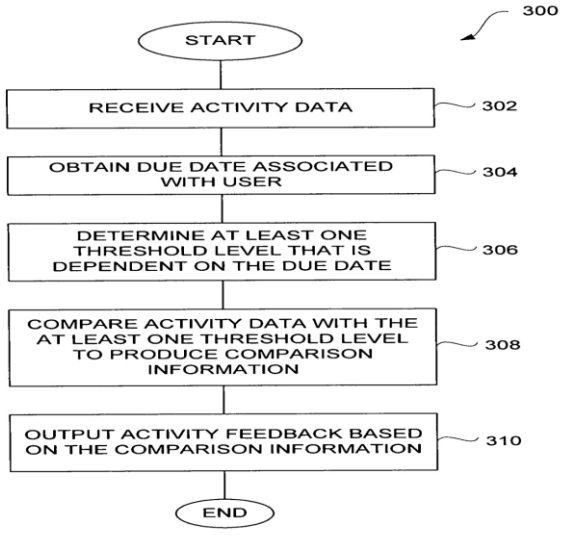
The ESP8266 NodeMCU CP2102 board has ESP8266 which is a highly integrated chip designed for the needs of a new connected world. It offers a complete and self-contained Wi-Fi networking solution, allowing it to either host the application or to offload all Wi-Fi networking functions from another application processor.

ESP8266 has powerful on-board processing and storage capabilities that allow it to be integrated with the sensors and other application-specific devices through its GPIOs with minimal development up-front and minimal loading during runtime. Its high degree of on-chip integration allows for minimal external circuitry, and the entire solution, including the front-end module, is designed to occupy minimal PCB area.



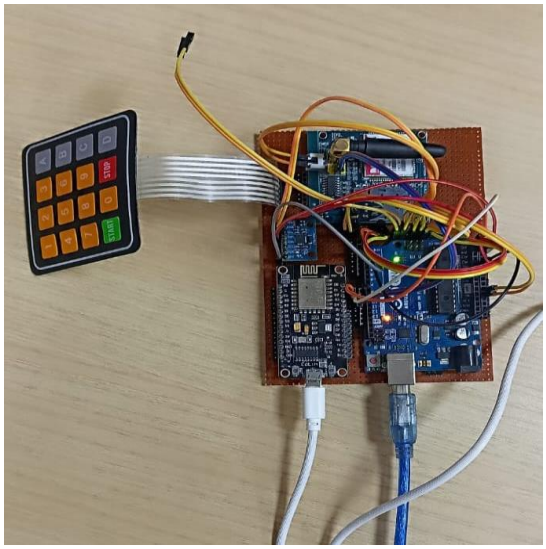
III. SYSTEM DESIGN

The system design of our project can be divided into two parts namely, hardware part which includes interfacing of temperature and pulse rate sensor with Arduino UNO and node mcu, and software part which includes coding which has to be done in embedded C Language on windows OS. In general, the work in our project goes like 1) data collection 2) data storage and 3) data transfer. The system will continuously monitor the body and collect the data like temperature and pulse rate with the time. All this data will be stored or updated into the database. There will an alert which will be sent to the doctor if the temperature goes above 37.2°C or if the pulse rate goes out of the range 60 to 100 per minute. This action will be taken care by the microcontroller i.e. Arduino uno in our project. On the other end, the doctor can access this data either in his computer or on his smart phone. The stored data base can be accessed by doctor in the graph form also.



IV. RESULTS

The results of the model are attached here: i) the data will be collected from the temperature and pulse rate sensor continuously. ii) If the condition of the patient goes abnormal notifications will be sent to the doctor immediately.



The IOT device is fixed on the safety jacket .This smart jacket is fixed with 7 useful sensors for monitoring the health of the aged person. These sensors are connected across the network through Wi-Fi under IEEE standard 802.11 b/g/n makes them more relevant and valuable than ever before. By turning sensor information into actions, real time data of personal health can be monitored and controlled remotely from anywhere. The information can be monitored through an ISO android app and personal computers remotely.

V. Conclusion

The project has proposed the idea of smart wearable that can support keeping a health track for a lot of aged people at a very cheap and affordable price. The smart wearable device contains a connection between wireless communication, several sensors, monitoring and tracking. In this project a smart and efficient approach for Smart Wearable AI IOT for Appliance Control was proposed and implemented.

Thus, the system health monitoring system based on IoT has been successfully implemented. We have analyzed how sensors which are interfaced to the raspberry pi are calculating the heartbeat and temperature of the patient's body and the values are updated on the database. The doctor can access the data, which is done by implementation of IoT. Thus, our system would save patients from critical loss of life and would help the doctor to take appropriate action at proper time.

VI. References

i. U.S. patent application Ser. No. 11/314,545, filed Dec. 20, 2005, entitled "BOTTLE OF LOTION WITH A SENSOR," and which is hereby incorporated herein by reference;

ii. U.S. patent application Ser. No. 11/451,781, filed Jun. 12, 2006, entitled "PERSONAL AND PORTABLE BOTTLE," and which is hereby incorporated herein by reference;

iii. U.S. patent application Ser. No. 11/451,780, filed Jun. 12, 2006, entitled "HEALTHCARE BASE," and which is hereby incorporated herein by reference;

iv. U.S. patent application Ser. No. 11/479,665, filed Jun. 30, 2006, entitled "MOISTURE SENSOR FOR SKIN," and which is hereby incorporated herein by reference;

v. U.S. patent application Ser. No. 11/491,774, filed Jul. 22, 2006, entitled "PORTABLE CONTAINER WITH SPEAKER ATTACHED," and which is hereby incorporated herein by reference;

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