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Estimation and Monitoring of Vital Signs in Human Body by using Smart Device

K.Satwik, N. V. K. Ramesh, SK.Reshma

Abstract –Now a days because of progress in people groups living conditions medical issues have turned into a primary issue and the life expectancy of an individual additionally diminished steadily this expanded medical issues, still there are a few spots where a specialist can't proceed to visit the patients and in India there is a huge shortage of specialists. The proportion of specialist to tolerant in India is 0.62:1000. The endorsed proportion by 'WHO' is 1:1000. The proposed checking framework accumulates information utilizing sensors set on various pieces of the body. Utilizing Internet of Things in Medical field will enable the specialist to screen the patient remotely and has the high potential to screen old matured and sick patients at their home. This framework doesn't require high power we are utilizing Node MCU as Micro Controller and Wi-Fi module. It gathers the information from the sensors(heartbeat sensor, MEMS sensor ,temperature sensor, pressure sensor) and if those qualities are over the typical it sends a signal to the specialist. The information can be gotten to by just the individuals who interfaces are under the same network system from Node MCU. This is a utilization of proposed framework which screens the individuals vital signs.

***Keywords* –Node MCU, lifespan, Remotely, WHO (world health organization)**

I. INTRODUCTION

Internet of Things means devices connected over a network by using internet, each device connected to the internet has an IP Address. Internet of Things is combination of wireless sensor network, these wireless sensors are connected to Micro Controller using Internet. The sensors measure the physical and environmental parameters around it and transfer the data between the other nodes in a network.

In the health sector using of Internet of Things can be useful for doctors. Doctors can monitor different patients remotely. Some of the main parameters doctors mainly check are Temperature, Blood pressure, Heart rate, Movement. So we focused on this problem using sensor technology, single chip microprocessor technology we implemented this type of monitoring system. This monitoring system can be useful to patients who require continuous monitoring.

R.Kumar et al [1] they discussed about 4 parameters like ECG, Respiration rate, temperature, heartbeat, accelerometer.

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*****Correspondence Author(s)
K.Satwik, B.Tech Student, Department of Electronics& Computer Engineering, KoneruLakshmaiah Education Foundation, Vaddeswaram, AP, India.
N.V.K.Ramesh, AssociateProfessor, Department of Electronics& Computer Engineering, KoneruLakshmaiah Education Foundation, Vaddeswaram, AP, India.
SK.Reshma, B.Tech Student, Department of Electronics& Computer Engineering, KoneruLakshmaiah Education Foundation, Vaddeswaram, AP, India.

All these sensors are connected to Raspberry Pi which is further connected to internet collects the data from sensors and sends data to the IoT Website and in IoT website we have to add mac address and then we can see the values.Tanja Bratan et al [2] In this they have designed the optimum design for remote patient monitoring. Here the data is collected and send to the server where the data is further divided into urgent and non-urgent information. Initially the data is monitored by telecom and if the case is urgent the information is then send to healthcare professionals. It differentiates between routine data and unrelavent data. Analysis of data is done particularly. Immediate response is given to the patient.Shivamgupta et al[3]Different biomedical sensors like temperature, heart rate, blood pressure are monitored on singlechip. If there is any change in the values instant notification is sent which helps in saving patients from problems that arise in future. Concerned action is taken for the problem faced by the patient.Ahmed Abdelgawad et al[4]They proposed an architecture which collects the body temperature, ECG ,airflow , oxygen flow, light and data is sent to cloud. They have used indoor positioning module called BLE iBeacon which track the position of the user. They relay the data to the cloud .Feedback response for the decomposed data is sent to the user. The proposed architecture is low power wearable devices. This can be further continued by providing security and access to particular authorities.Sohail Shaikh et al[5]By using wireless sensor networks they proposed which MAC protocol have more transmission rate and which reduces the transmission time from patients to doctors. They have checked for CSMA, TDMA, 802.15.4, SMAC and said CSMA is good in transmission of data from source to destination.Yuan-Hsiang Lin et al [6] proposed prototype has PDA and WLAN technology integrated with the mobile patient monitoring system. By using WLAN all the patients data can be sent to authorized medical staffs and they can get the history of case.Simon Coulter et al[7]They have used FFT and R-peak alogarithms and gathered information about respiration and heart rate by using EPIC sensors. Quality of information has been improved.A.Raji et a1 [8] This paper proposes a module for chronic diseases due to the low percentage of doctors this proposes aniot system which gathers the vital signs and for any other symptoms.MoeenHassanalieragh et a1[9] Internet of things and smart sensors gather information from the body of the patient and helps in great research which can be saved to the cloud for the future purposes.Sabin Banuleasa, Radu Munteanu Jr. et a1[10] This papers describes about the decrease in the life span of human beings and proposes an system to gather vital signs to give warnings of any symptoms.

II. IOT IN SMART HEALTH

IOT, Embedded systems and wearable body sensors can help for the Solution of health problems.

Sensors can track vital signs, energy levels, physical conditions of human beings. These devices monitor and process the data and can be connected to the internet and can be controlled by internet remotely. There are still researches going on these IOT and Sensor devices to improve accuracy. Future sensors can be inserted into the body by using nano-technology which can interact directly with neural network. IOT devices can be used to gather feedback from these sensors and use it improvement purposes.

III. METHODOLOGY

This method uses NodeMCU as micro controller which is connected to Temperature Sensor, Pressure Sensor, Heartbeat Sensor, and Mems Sensor. All sensors will be in sensing state to gather vital signs of the patient. Patient condition will be recorded constantly and if the data shows any if the data is above the critical value buzzer is alerted. The users can see the data of the patients by accessing to the URL of the network they have connected. Mostly this can be used for the people who stay constant at bed and for elders who are to be monitored continuously.

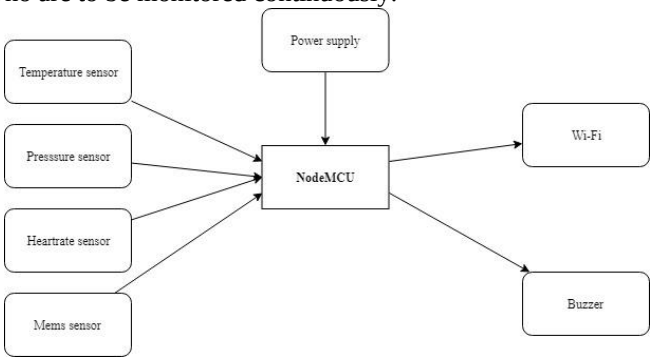


Figure-1. Block Diagram

NodeMCU:

The microcontroller used is NodeMCU which has an inbuilt Wi-Fi module that creates a Network to monitor the condition of the patient. It consumes less power of 3.3v and it is less cost than other micro controllers / processors like Arduino and Raspberry bi.

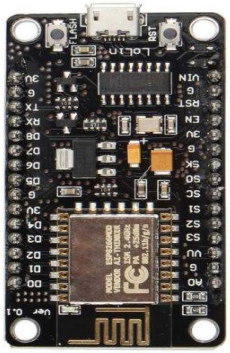


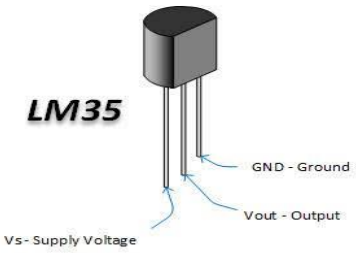
Figure-2. NodeMCU

NodeMCU is acceptable for this implementation. NodeMCU is connected to Temperature sensor, Pressure sensor, Heart rate sensor and Mems sensor. Initiating a Wi-Fi connection with just small bits of code, Plug and play operations. Programmable Wi-Fi module and Arduino IDE software and I/O made NodeMCU an IoT Tool and best compatible for various operations based on Internet of Things. It has a deep sleep mode which uses less power.

Temperature Sensor: The temperature sensor measures the heat or cold released from the patient body allows observing any physical change of that temperature generating either an analog or digital output. We are using an LM35 for this project. The output voltage of LM35 is directly compared to the centigrade temperature. The accuracy provided by LM35in ±32.45 °F and -17.3611 °F temperature range without any need of other computation. When operating LM35 has normal warming temperatures which is under 32.18 °F and hence uses less current (0.06mA). The advantages of using this sensor are that it has linear output, low output impedance and provides accurate values inbuilt calibration. LM35can be operated by a single power supply.LM35 It has high processing capabilities

Figure-3. Temperature Sensor

Blood pressure sensor:



Blood pressure is circulating blood on the walls of arteries and veins this is due to the pumping of blood round the circulation by the heart. Blood pressure is one of the vital signs.It is affected by cardiac output and changes based on condition, emotional state, activity, and relative health/disease states. Continuous hypertension is a cause for many diseases including heart disease, heart stroke and kidney failure. In the normal condition blood pressure is higher this is called systolic the lower reading is called diastolic and measures the pressure between heartbeats. Blood pressure sensors are installed within respiratory devices, or be utilized with drug delivery systems. There are two types of Blood pressure sensors 1.invasive 2.non-invasive. Non-invasive blood pressure sensor is used for continuous monitoring.

Figure-4. Pressure Sensor

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Heart Rate Sensor:

The heartbeat sensor is based on the hypothesis of photograph plethysmography. It watches the adjustments in volume of blood through any organ of the body which causes an adjustments in the light entry through that organ. In case of applying where heart beat rate is to be watched time of heartbeat is basic. The stream of blood volume is picked by the rate of heart beat and since light is devoured by blood, the beats are equivalent to the heart beat rate. The heartbeat sensor contains of a light delivering diode and a light distinctive resistor or a photodiode. The heart beat heartbeats makes changes in the stream of blood to different organs of the body. Right when a tissue is lit up with the light source it transmits the light . A bit of the light is devoured by the blood and the transmitted or the reflected light is gotten by the light finder. The measure of light expended relies on the blood volume in that tissue. The yield is as electric heartbeat and is with respect to heart beat rate.

Figure-5. Heart Rate Sensor

Mems Sensor:

MEMS or Micro Electro Mechanical Systems are Semiconductor ICs which is the blending of electrical and mechanical properties of Silicon. There are moving mass, springs, depressions, and dampers inside a MEMS structure. MEMS can recognize sudden movements, for example, increasing velocities for which we are utilizing in this venture. An accelerometer is otherwise called electromechanical gadget which is utilized to calculate quickening and the power causing it. Sorts of accelerometers accessible can be part as indicated by the power (static or dynamic. The most over and over utilized one is the piezoelectric accelerometer. Be that as it may, since they are massive and can't be utilized for all activities, a littler and exceptionally practical gadget like the MEMS accelerometer was created, in light of the fact that its little in size and power full detecting highlight, they are additionally created to get multi-pivot detecting.

Figure-6. Mems Sensor

IV. Results and Discussion:

The image shows the vital signs (temperature, heart rate, blood pressure and body movements) of the patient. This data can be accessed by the doctor for analysis.

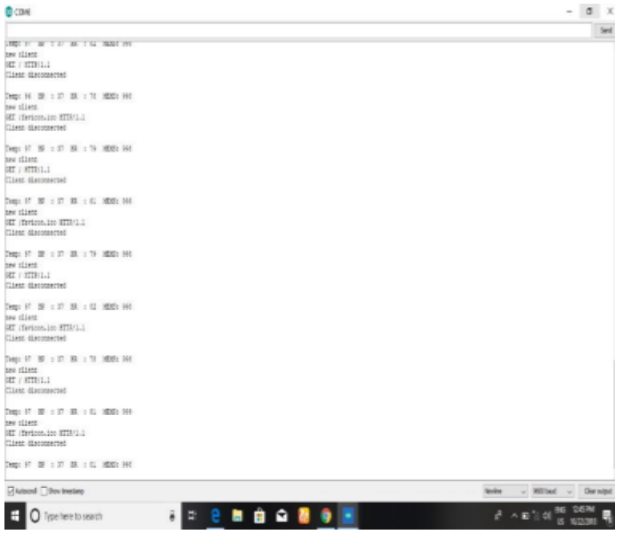

Figure-7. Sensor values

V. Conclusion and Future Scope

We have arranged the model to get the values of the proposed framework. The created framework is of low effort and expends less power because of the use of NodeMCU as small scale controller. This framework is fixed and increasingly valuable for the aged people and individuals or for those whose wellbeing is wrong and ceaselessly checked. Any place we stay we can check the qualities through web. Time is spared in this framework since Doctors can't remain at the patient's bed for checking so this framework is useful. This framework can be further increasingly adjusted by including versatile application and by not sending the every one of the information except if the signs are over the normal values.

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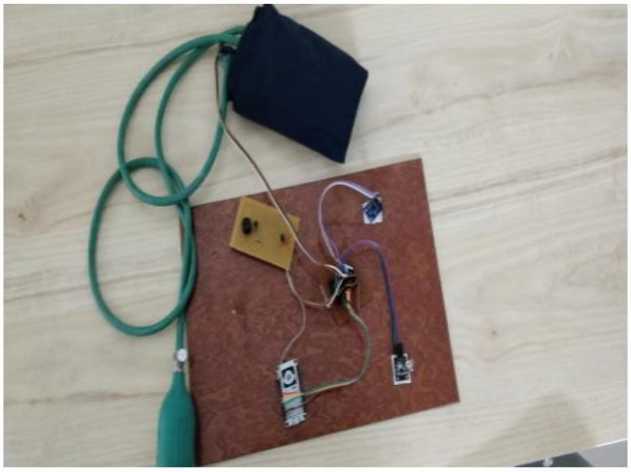

Figure-8. Prototype of the system

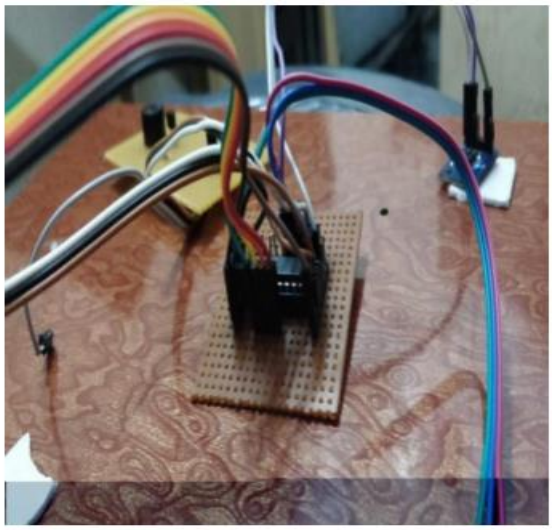

Figure-9 Implementation of Proposed system

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AUTHOR PROFILE

Dr. N.V.K. Ramesh received MSC degree in electronics from Nagarjuna University in 1990. He also received M.Phil degree in electronics from Bharatidasam University in 2006. He received M.Tech degree in electronics and Communication engineering from K L University in 2011 and Ph.D. in the field communications in the year 2017. He worked as a head of the department at Sarada college from 1990 to 2008. He is currently working as an associate professor in electronics and computer engineering at K L University. His contribution has appeared in various journals and his research interest includes antennas and wireless communications.

K.SATHWIK is a UG Student in K L University and belongs to the branch Electronics and Computer Engineering. His areas of interests are Internet of Things.

SK RESHMA is a UG Student in K L University and belongs to the branch Electronics and Computer Engineering. His areas of interests are Internet of Things.

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