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# Monitoring Of Mining Workers at Higher Altitude - Iot

**Dr.T.Rammohan[1], S.Avanija[2], S.Raghavi[3], S.Lavanya[4]**

Professor[1,] Department of Electrical and Electronics Engineering,
Final Year Students[2,3,4], Department of Electrical and Electronics Engineering,
Karpagam College of Engineering, Coimbatore[1,2,3,4,5]
Mail ID :profdrrammohan@gmail.com[1]

**Abstract:**

Since mine workers face numerous health issues during their careers, this system is designed to monitor their health and physiological parameters. Environmental variables include ambient temperature and relative humidity, as well as physiological variables such as electrocardiogram, respiratory function, and body temperature. To achieve a working interface and optimal comfort for the users, the proposed system's non-invasive sensors are inserted throughout a T-shirt (first layer of protective clothing). The system can measure heart and respiration rates, air temperature and humidity, and chemical concentrations in human bodies on a continuous basis. When the sensor detects any abnormal behaviour in the human body, the LCD displays the issue with a buzzer tone. Using IOT, create a wireless data transfer to a central monitoring station.

**IndexTerms:**Arduino UNO Heart beat Sensor, RespirationSensor, Gas Sensor, Humidity Sensor,LCD16*2,Buzzer,Zigbee module.

## 1. INTRODUCTION

The workers in the materialistic production hazards such as mining chemical industry should go through many difficulties such as temperature changes,physiological changes. For the improvement of such people's health and safety measures the world is searching to enhance good equipment. The IoT is the network of physical objects that they are embedded with software, programming and helps to exchange data and communication with other devices. In an average we have 493 coal mines in India and yet no technological replacement for human is invented. So many humans risking their life in mines,chemical industries, building construction. Many workers lost their lives nd still losing due to hazards in these working areas. Diggers in the coal mines playing the most important role by putting their life in risk.This proposed project simultaneously monitoring the health and physiological changes in the hazardous area working people which is necessary.

## 2. EXISTING SYSTEM

In the existing system ZigBee module is used as collecting information from sensors and updating in PC and three sensors such as temperature, humidity and Pulse sensor. Three sensors will detect the change in parameters of the environment

## COMPONENTS, INTERFACING AND PROTOCOLS

- Arduino UNO
- Heart beat Sensor
- Respiration Sensor
- Gas sensor

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- Humidity sensor
- LCD(16*2)
- Buzzer
- ZigBee module

## 3. PROPOSED SYSTEM

In this proposed system the mines, chemical industries, building construction safety systems are fixed. Humidity sensor, temperature sensor, pulse sensor, microcontroller Arduino, gas sensor and IoT based application are all integrated to each other using IoT. In this monitoring system the pulse sensor monitors the pulse and compare to the average rate pulse termed in medications. So as also the same applies to the temperature and humidity sensor. As they are continuously monitored in case of any small change the notification will appear in mobile where the blink app is use which is PC as of now. The data is transferred through application which is updated in cloud thus in case of minor changes in human body where the sensors are fitted with feeder with the message as fever if the temperature is high, low pulse rate if pulse is low and humidity level is increased or decreased so that the same will be sent as notification to PC.

## PROPOSED BLOCK DIAGRAM

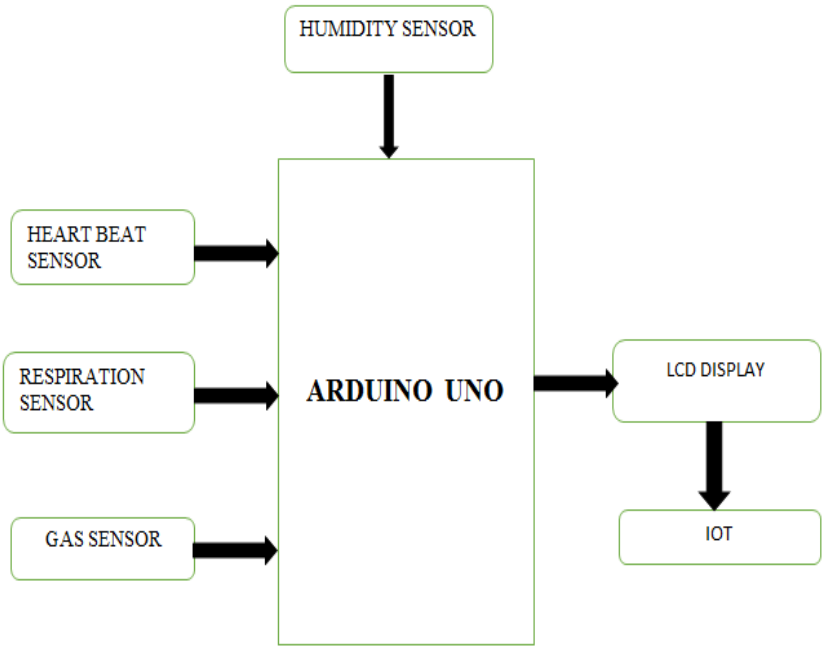


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**Fig. 1 – Block diagram**

In case of using ZigBee protocol so thus the data and information from the entire system is transferred to the pc. It is especially designed for control and sensor devices. It is used for personal area network in small circuits.Because of its three major USPs of being low-cost, low-power consumption and having faster wireless connectivity, the ZigBee protocol caters to a lot of applications like industrial automation, home automation, smart metering, smart grids etc. Also, with it low-power requirements, it ensures seamless operation

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of various sensor equipment offering years of battery-life. Here are some of the areas where ZigBee is widely used.

We are using IOT in a place of ZigBee module by transferring data and information to the cloud using a software system in form of application by this we can operate the entire system through mobile phone.

## IV. WORKING OF THE MODULE

- To measure physiological and environmental variables using a respiration sensor, a heart rate sensor, a gas sensor, and a humidity sensor that is observing value.
- The Arduino connects all of the sensors.
- If any are identifying the problem then LCD display shows that problem and produce the buzzer sound.
- This device easily prevents the Worker's by displaying the problem through the mobile.
- Arduino senses the world by receiving data from a variety of sensors and reacts to it.
- The Uno is unique in that it does not use the FTDI USB-to-serial driver chip used on previous boards.

## 5. RESULT OF WORKING SYSTEM

### i. ECG REPORT

Table 1- ECG data

| Value | 1–15 years of age | Adult male | Adult female |
|---|---|---|---|
| Normal | <440 ms | <430 ms | <450 ms |
| Borderline | 440–460 ms | 430–450 ms | 450–470 ms |
| Permanently prolonged | >460 ms | >450 ms | >470 ms |

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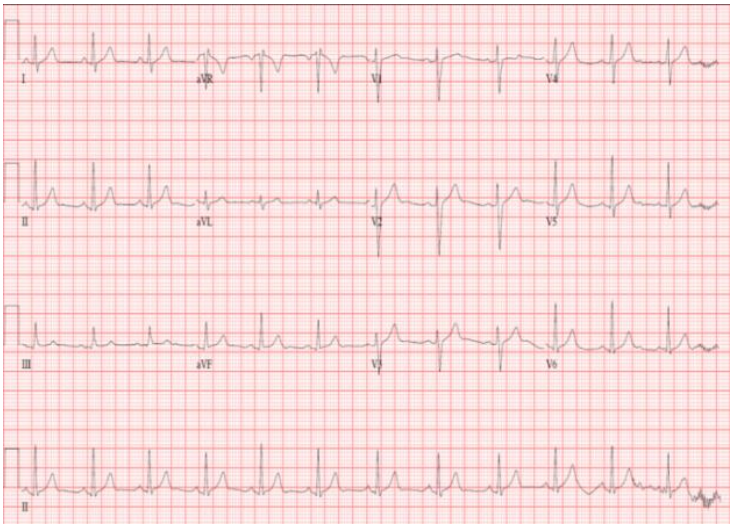

**Fig. 2 – ECG Sample**

**Normal intervals:**

There is a recognised normal range for such 'intervals':

- **PR interval** Normal range 120 – 200 ms.
- **QRS duration** Normal range up to 120 ms.
- **QT interval** Normal range up to 440 ms

**ii. Pressure Report**

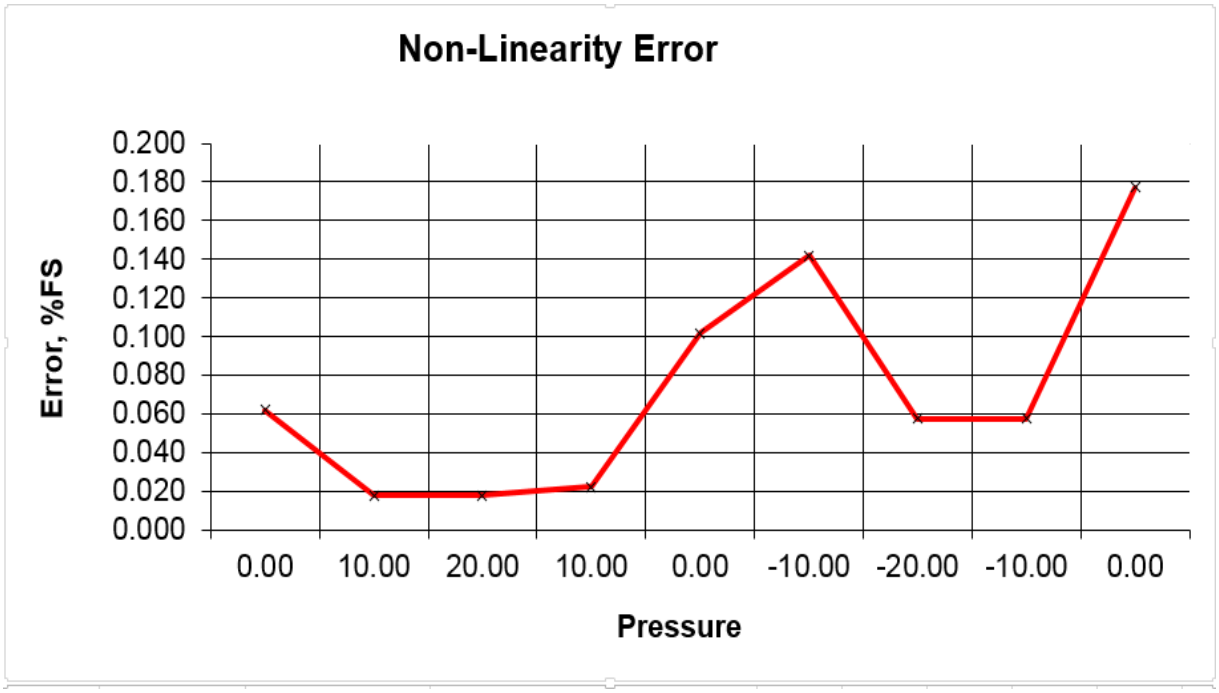


**Fig. 3 – Blood Pressure details**

For a normal reading, If blood pressure lies between 90 and less than 120 is called systolic pressure andif the same lies between 60 and less than 80is called diastolic pressure. Medical

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association recognises the above said conditions are normal.Blood pressure readings are expressed in millimetres of mercury. This unit is abbreviated as mm Hg. A normal reading would be any blood pressure below 120/80 mm Hg and above 90/60 mm Hg in an adult.

### iii.Temperature Report

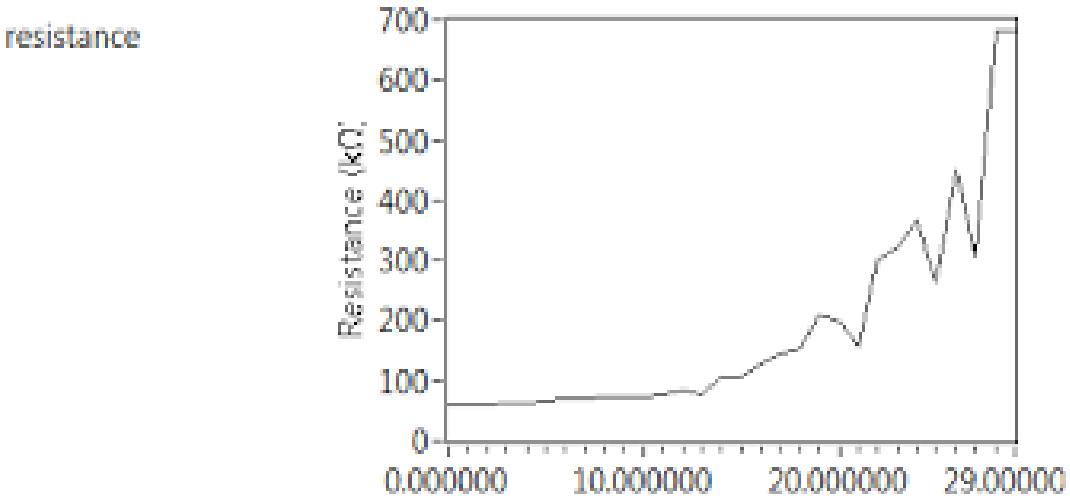


**Fig. 4 – Body Temperature details**

The ability of your body to produce and remove heat is measured by its temperature. Even as the temperature outside the body fluctuates a lot, the body is very good at maintaining a safe temperature range.

- When you're overheated, the skin's blood vessels dilate to allow the extra heat to escape to the surface. It's possible that you'll begin to perspire. Sweat helps cool the body when it evaporates.
- The blood vessels close when you are too cold. To save body heat, this decreases blood supply to the skin. It's possible that you'll feel a shiver start to run down your spine. It helps to make more heat as the muscles tremble in this manner.

### iv.HARDWARE MODEL

The working hardware model is shown in figure 5. The output is verified and found that it is working and more reliable.The details of patients is shown in Table 2 and also verified that the system is updating the data instantly.

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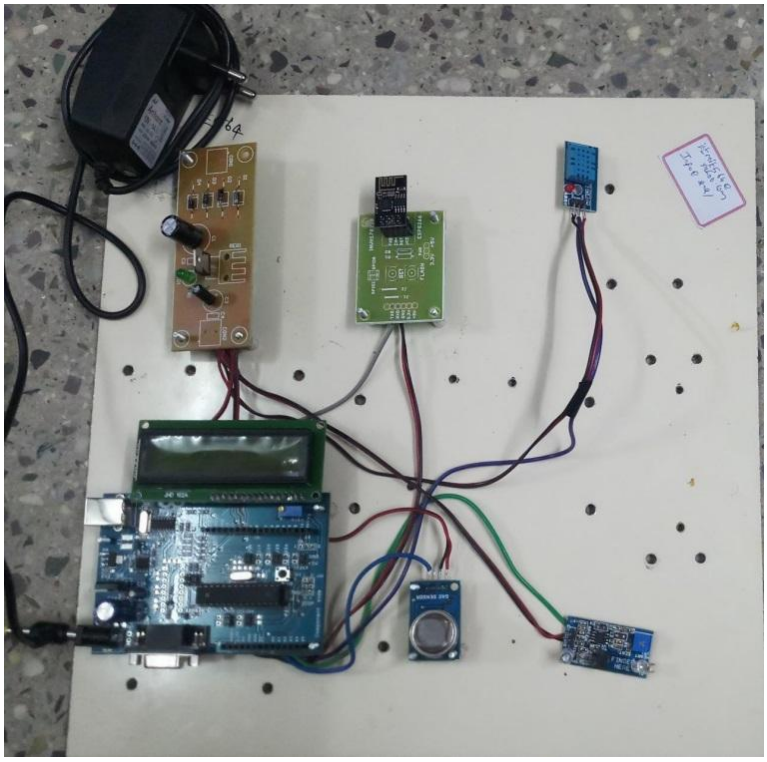

**Fig 5-Hardware Model**

**Table 2 Sample data**

Patient_Info

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Date and Time

| | A | B | C | D |
|---|---|---|---|---|
| 1 | | | | |
| 2 | Date and Time | | Pulse Rate (BPM) | Body Temp. (F) |
| 3 | June 25, 2018 at 03:11PM | Patient_Info | 217 | 51 |
| 4 | June 25, 2018 at 03:12PM | Patient_Info | 127 | 53 |
| 5 | June 25, 2018 at 03:18PM | Patient_Info | 220 | 50 |
| 6 | June 25, 2018 at 04:21PM | Patient_Info | 222 | 54 |
| 7 | June 25, 2018 at 04:25PM | Patient_Info | 209 | 62 |
| 8 | June 25, 2018 at 04:45PM | Patient_Info | 121 | 86.5 |
| 9 | June 25, 2018 at 04:46PM | Patient_Info | 103 | 83.9 |
| 10 | June 25, 2018 at 05:01PM | Patient_Info | 209 | 99.7 |
| 11 | June 25, 2018 at 05:01PM | Patient_Info | 212 | 83 |
| 12 | June 25, 2018 at 05:02PM | Patient_Info | 209 | 79.5 |
| 13 | | | | |
| 14 | | | | |
| 15 | | | | |

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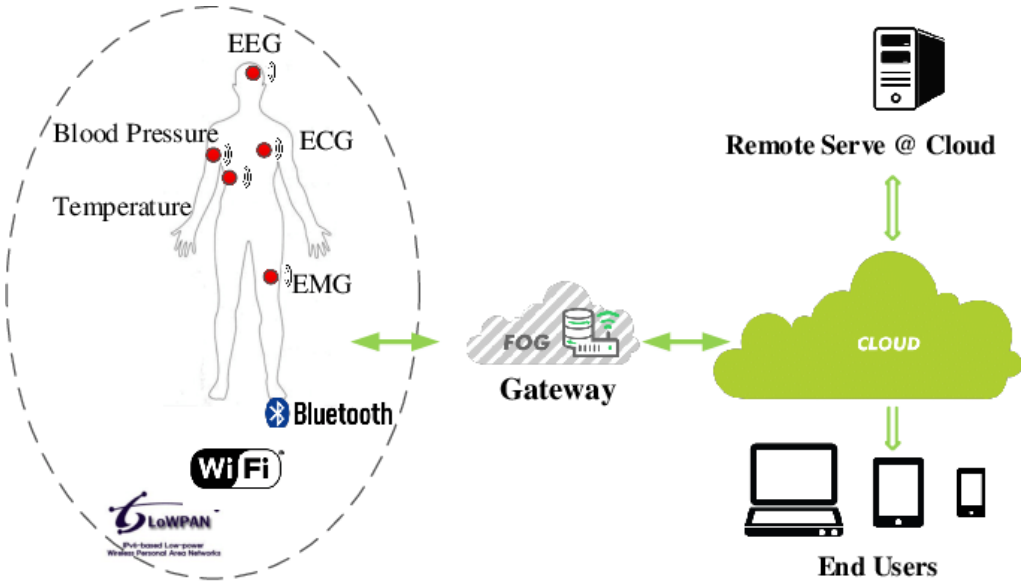


**Fig 6-Over all Representation of Hardware Model**

## 6. CONCLUSION

The development for the protection of hazardous place workers using Arduino,humidity sensor,pulse sensor,temperature sensor and Zigbee protocol which also includes the IoT ensures the safety of workers by updating information to mobile phone which is monitored for 24 hours.

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