



SAFTY HELMET WITH HEALTH MONITORING

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ABSTRACT

A cost-effective ZigBee-based wireless mine supervising system is presented in this paper. This scheme uses intelligent helmets as voice terminal and ultra-low-power nodes of wireless sensor network. The program adopted ZigBee wireless technology to build wireless sensor networks, realized real-time surveillance with early-warning intelligence on methane, temperature, humidity in mining area, and used speech communication to reduce potential safety problems. If there is any hazardous situation in the mine the helmet gives the information to the control station through the ZigBee transmitter and the control station will alert the worker using the ZigBee receiver by making the buzzer active which is positioned in the helmet so that a miner can have a chance to rescue.

KEYWORDS

ZigBee, Intelligent helmet, Sensors, Early-Warning, Buzzer.

INTRODUCTION

This paper aims in designing a coal mine safety system, that is capable of detecting gas, temperature, humidity, and alerts the respected authorities at the control station through wireless Zigbee technology. And also, this system gives the auto alarm if the sensor data exceed threshold value.

This paper “**Safety Helmet with health monitoring**” using Arduino UNO and PIC Micro-controller is an exclusive work that makes capable of detecting methane gas, temperature, humidity, MQ6, MQ135 and alerting the control room if the sensor data exceed threshold value using Buzzer and LED through zigbee.

Zigbee is a PAN technology based on the IEEE 802.15.4 standard. Unlike Bluetooth or wireless USB devices, Zigbee devices have the ability to form a mesh network between nodes. Meshing is a type of daisy chaining from one device to another. This technique allows the limited range of an individual node to be expanded and multiplied, covering a much larger area. The safety Helmet is shown in the figure 1.

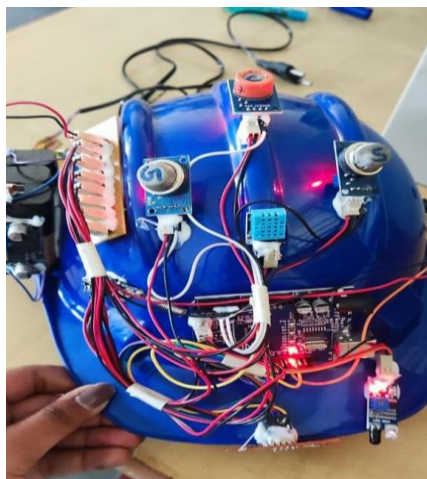


Figure.1 Safety Helmet with health monitoring

EXPERIMENTAL SECTION:**i. Equipment's/The main blocks of this paper are:**

- ❖ Power Supply
- ❖ PIC microcontroller
- ❖ LCD display
- ❖ Zigbee receiver modules
- ❖ Buzzer
- ❖ Battery Supply
- ❖ Arduino UNO
- ❖ Zigbee transmitter module
- ❖ METHANE SENSOR
- ❖ DHT11(Temperature &Humidity) sensor
- ❖ LED indicators
- ❖ Buzzer
- ❖ MQ6
- ❖ MQ135.

ii. Working:

For this helmet, the operation is divided into two sections

- a. Working at the Transmitter side of Helmet section
- b. Working at Receiver section

Working At the Transmitter side of Helmet Section:

- ❖ The main controlling device of this Safety Helmet is ARDUINO UNO microcontroller.
- ❖ Methane sensor, DHT11 sensor, zigbee transmitter, buzzer and three LEDs are interfaced to the Arduino microcontroller. All these components are placed to the helmet which operated by 3.7 V battery.
- ❖ Arduino continuously read the data from sensors and it will send this data to the control room through wireless zigbee.
- ❖ If the sensor data exceed threshold value it will active the buzzer and LED for alerts.

Software's Used at helmet:

- ❖ ARDUINO IDE compiler for dumping the code into the microcontroller.
- ❖ Embedded C programming.
- ❖ Express SCH for Circuit design.

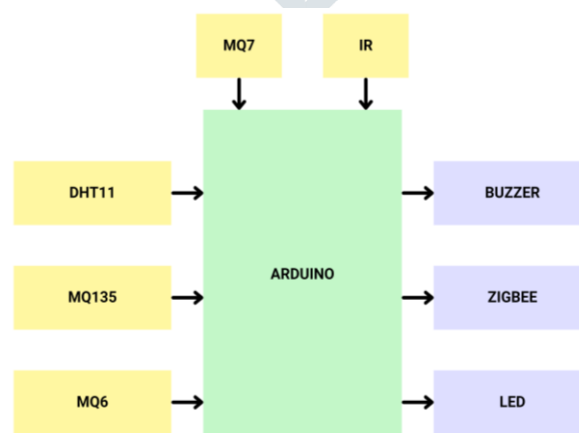


Figure.2 Block Diagram

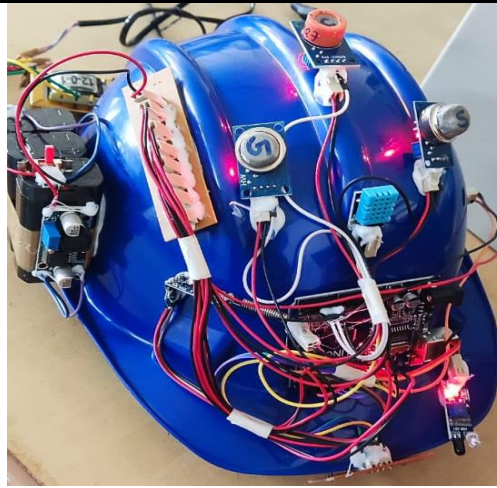


Figure.3 Safety Helmet with health monitoring during working

Figure.2 Projects the working of this safety helmet in block diagram, figure.3shows the employed of this helmet by detecting methane gas, temperature and humidity conditions.

FLOWCHART OF CODE AT TRANSMITTER END:

The flow chart of code at the Transmitter end is shown in figure.4

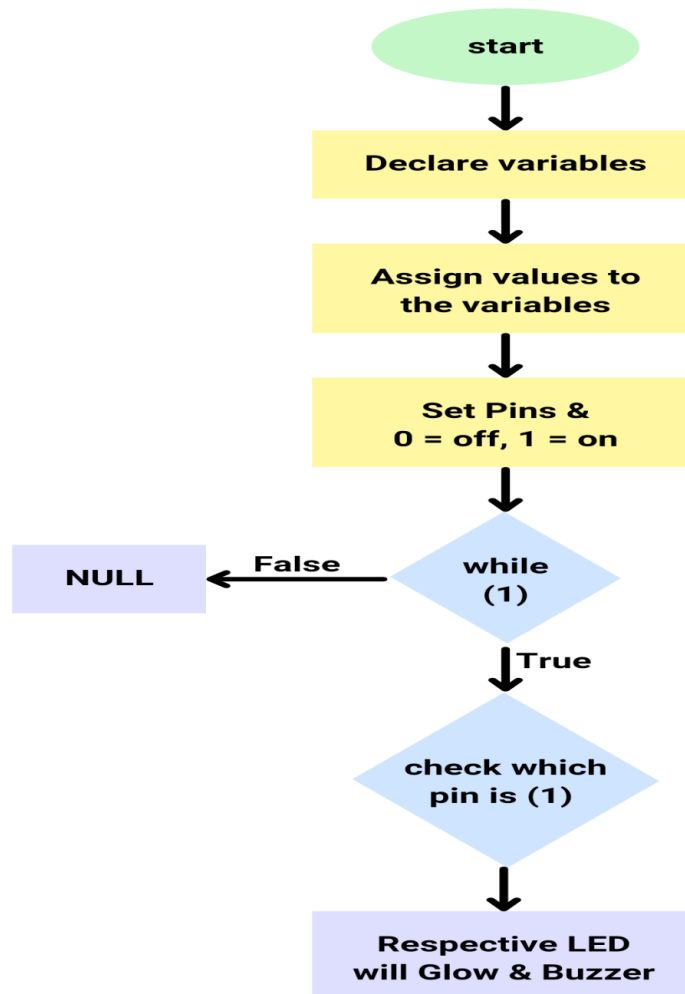


Figure.4 Code at Transmitter end

Working at Receiver Section:

- ❖ The main controlling device of the paper is PIC microcontroller.
- ❖ Zigbee receiver, buzzer and LCD display are interfaced to the microcontroller.

- ❖ Sensor data is received by ZIGBEE receiver module and fed as same to the microcontroller. Microcontroller will display the sensor data on LCD module and also active the buzzer if the sensor data exceed threshold value.

Software's used at control room/Receiver Section:

- ❖ PIC-C compiler for Embedded C programming.
- ❖ PIC kit 2 programmer for dumping code into Micro controller.
- ❖ Express SCH for Circuit design.

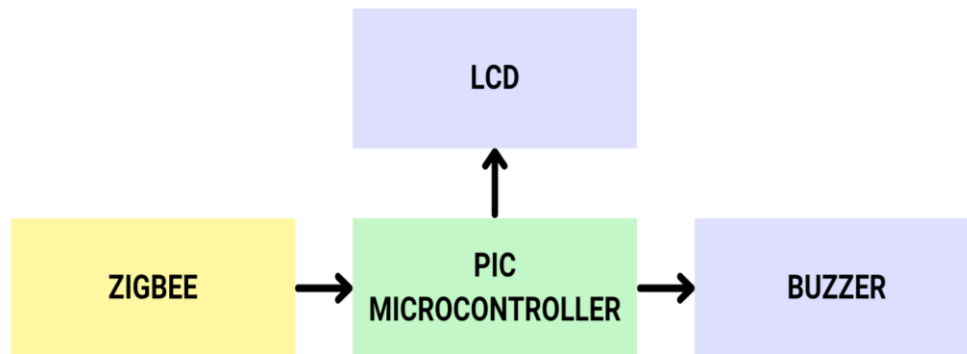


Figure.5 Block diagram of Receiver section

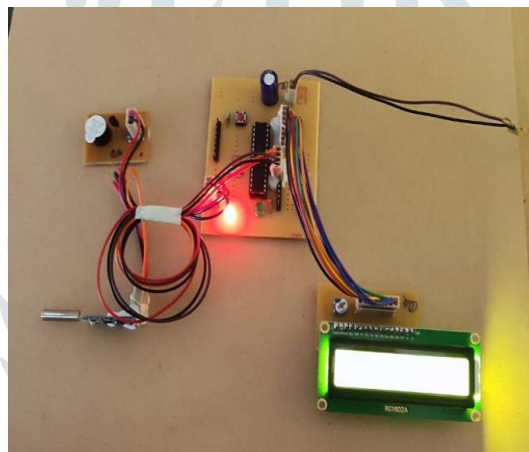


Figure.6 Display



Figure.7 Display with Monitoring started

Figure.5 demonstrates the block diagram of receiver section, for the PIC controller ZIGBEE is input and LCD and BUZZER are outputs. Figure.6&7 clearly illustrates the display.

FLOWCHART OF CODE AT RECEIVER END:

The flow chart of code at the Receiver end is shown in figure.8

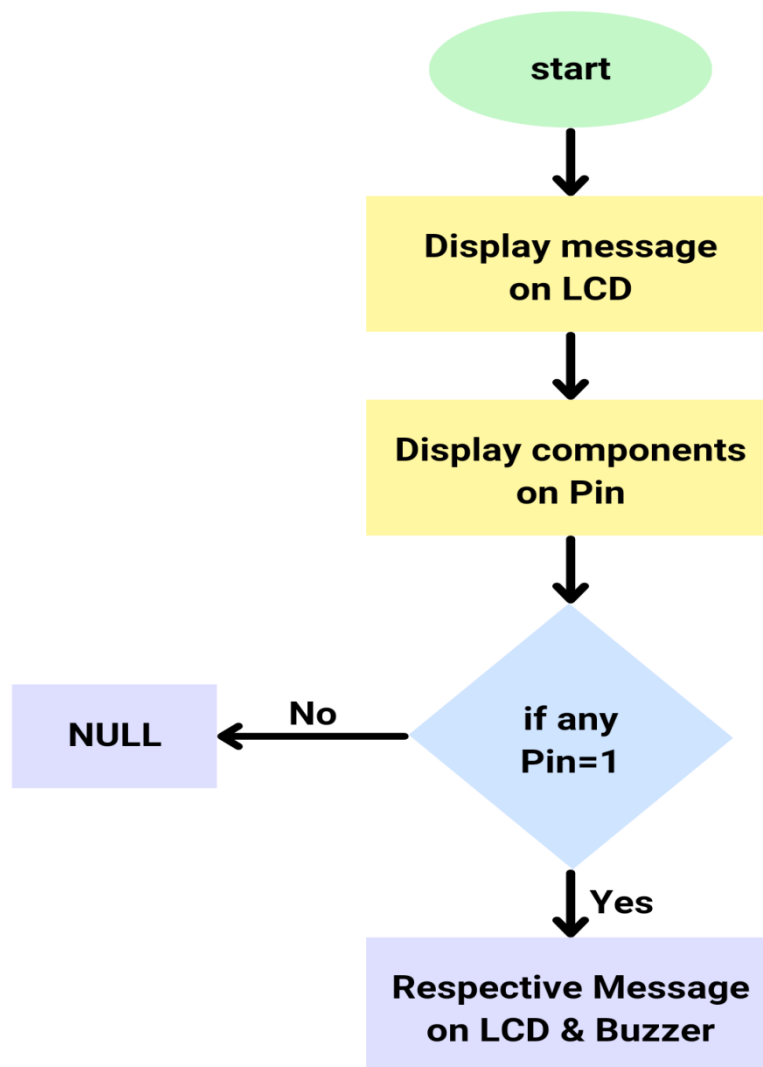


Figure.8 Code at Transmitter end

FLOW OF OPERATION:

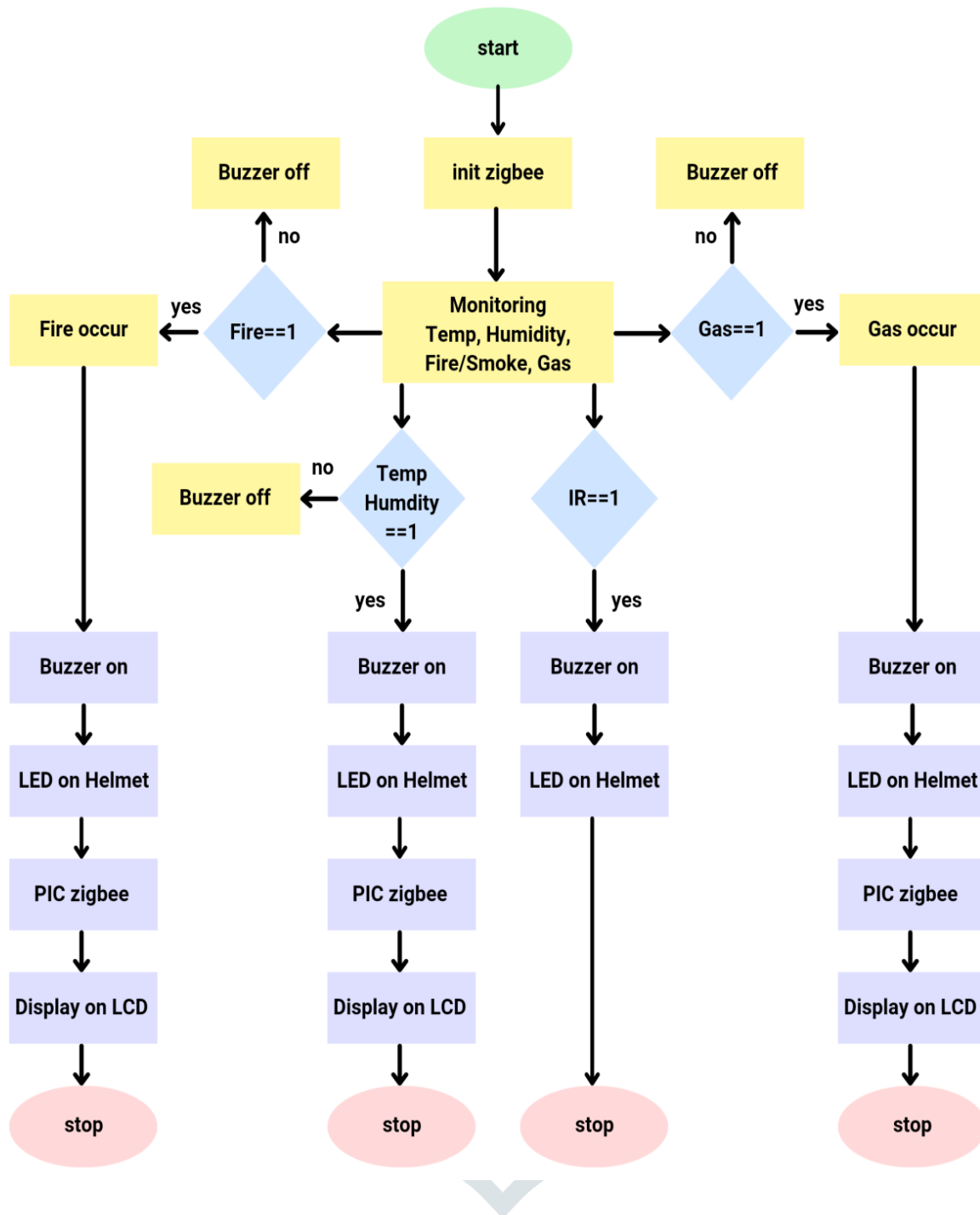


Figure.9 Complete flow of operation of safety Helmet with Health Monitoring

Figure.9 Enlightens the complete flow of operation, starts with the Zigbee at the transmitter end, when sensors get activated the respective LED glows at the helmet and at the receiver side, the receiver zigbee receives the data and message will be displayed saying which problem has occurred.

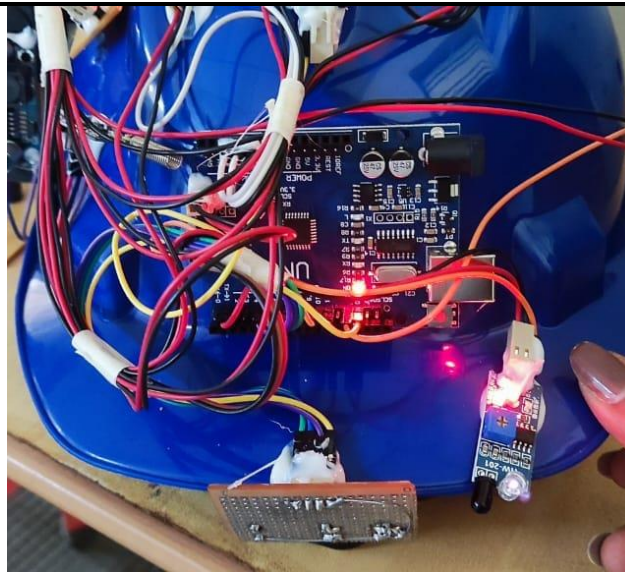


Figure.10 Complete view

CONCLUSION

It concludes that, safety plays a major role for well-being, and hence this “safety Helmet with Health Monitoring” supports to the lives of people working in the various risky zones like coal mines, underground works, dam construction areas and etc and providing complete monitoring to the nearest control panel area along with alarm during risk conditions by using different types of sensors at transmitter side and monitoring at receiving side.

FUTURE SCOPE

This “safety Helmet with Health Monitoring” can be updated in future by adding AWS, GPS and VOICE CONTROLLER

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