

Coal Miners Safety Monitoring System



Sk.Khaja Shareef, B. Anand Kumar, G.Suvarna, Mamilla Swathi

Abstract – Security and automation is a prime concern in our day to day life. In the last few years we can observe many such incidents where the workers in coal mines had lost their life due to the hazardous accidents in mining area. To avoid this problem we have developed a project “Coal miners safety monitoring system”. The system gives both audible and visual alerts using LCD and buzzer. The system also monitors the LPG gas leakages victimization gas detection device, fire using temperature sensor, in the mines and if it exceeds the brink level, it alerts through alarm victimization buzzer and conjointly displays on digital display to the user. The LDR sensor detects the light intensity and automatically controls the light using relay switch. This sensors output is given to the Arduino for further processing to send the monitored parameter value to the control station using Wi-Fi module. In this project we are also using GSM module to send alert message to the registered user about fire and gas leakages.

Keywords—Safety ,GSM module, Arduino, Security,

I. INTRODUCTION

The Internet of Things(IoT) is the system of "things" implanted with hardware, programming, sensors, and system availability, which empowers these articles to gather and trade the information. A "Thing" with regards to the Internet of things (IoT), is an element or physical item that has an extraordinary identifier, an implanted framework and the capacity to move information over a system. Heart checking inserts, Biochip transponders on ranch creatures, autos with inherent sensors. These gadgets gather valuable information with the assistance of different existing innovations and after that self-sufficiently stream the information between different gadgets. These gadgets, regularly called "associated" or "shrewd" gadgets, can some of the time converse with other related gadgets, a procedure called machine-to - machine (M2M) correspondence, and follow up on the data they get from each other.

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People can communicate with the devices to Set them up, give them guidelines or access the information, yet the gadgets do a large portion of the work alone without human intercession. Their reality has been made conceivable by all the modest portable parts that are accessible nowadays, just as the constantly online nature of over home and business systems. The IoT can be seen as an immense system comprising of systems of gadgets and PCs associated through a progression of moderate advancements like RFIDs, remote associations may go about as empowering influences of this availability.Coal excavators security recognition framework has its relevance in coal mines.In the blessing situation we can see that the sheltered generation level of mine keeps on being low, especially as of late, catastrophes of mine happened frequently, that reason pleasant loss of ownership and life. in order to thwart the misfortune our venture gives an opportunity to unendingly screen the climate of coal mining so we can spare the lives of coal miner's.

II. PROPOSED SYSTEM

In this paper, we proposed a system, which is different from the existing system. We can implement this system by using Arduino. The sensors are used to relay the information to the users when there is fire and gas leakages.

Three sensors:MQ6 gas sensor is used to detect harmful gases and LM3D5 sensor receives the data about temperature level , LDR sensor detects light intensity. It consist of wireless transmission of text based data so that people can be aware of it.

Advantages of Proposed system

- In proposed system we are sending voice and visual alerts to the control station.
- We are sending the sensors data to an application so that we can monitor the environmental parameters continuously.
- Data transmission can be done securely using wireless technology Wi-Fi.
- Light is an important parameter for the workers who are working inside the coal mines.
- We are considering light intensity which is also an important parameter for the safety of the workers. Using LDR sensor we can switch on or off the light bulb using relay switch.
- Using GSM module we are sending alert message to the registered user.
 - Using Arduino we can reduce the complexity of the circuit setup.

III. WORKING

This system has gas sensor, temperature sensor, LDR sensors which are interfaced to the microcontroller and the sensors information will be transmitted to the control station using the Wi-Fi module.

Coal Miners Safety Monitoring System

The system gives both audible and visual alerts using LCD and buzzer. The system additionally monitors the LPG gas leakages victimization gas detection detector, fire using temperature sensor, in the mines and if it exceeds the threshold level, it alerts through alarm victimization buzzer and additionally displays on LCD to the user. The LDR sensor detects the light intensity and automatically controls the light using relay switch. We are also using GSM module to send alert messages to the registered user when a fire or gas leakages occurs. This sensors output is given to the Microcontroller for further processing to send the monitored parameter value to the control station using Wi-Fi module.

A) Block diagram

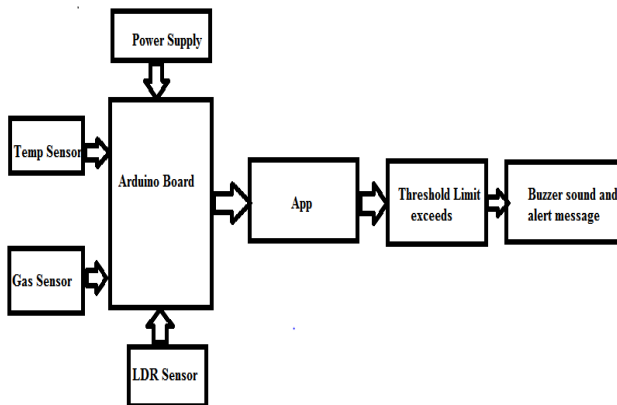


Fig 1: Block diagram of Coal miners safety monitoring system

B. Algorithm

- Let us consider variables temp, gas, ldr, relay .
- Initially the variable gas is assigned to off state.
- Temp, ldr are initially given low signal.
- We need to declare a variable buzzer which is in low state at the initial stage.
- if(temp>50)
 - then call beep() function
 - next gsm() function
- if(Gas sensor detects Poisonous gases)
 - then gas variable will be in On state
 - call beep() function
 - next gsm() function
- if(LDR sensor detects darkness)
 - call beep() function
 - call gsm() function
- Temp, gas, ldr values are continuously displayed in app
- Alert message will be sent to registered user by using gsm() function
- Repeat the same process when ever the threshold limit exceeds.

IV. RESULTS

A. Screenshots



Fig 2: Prototype Coal miners safety monitoring system execution



Fig 3: LCD displaying temperature, gas, LDR values

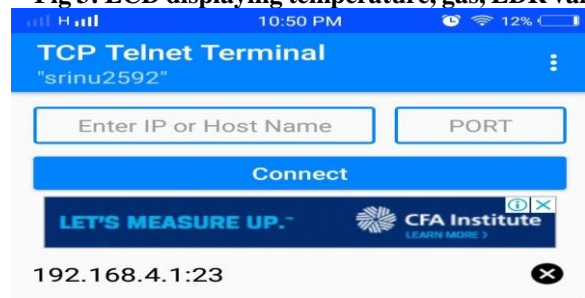


Fig 4: TCP telnet terminal

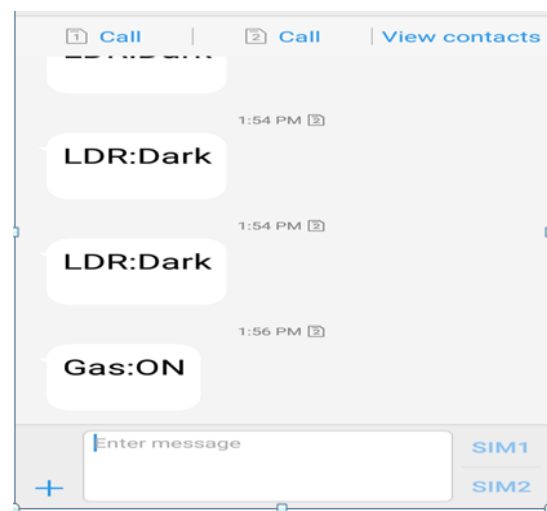


Fig 5: Sending message to the registered user using GSM module

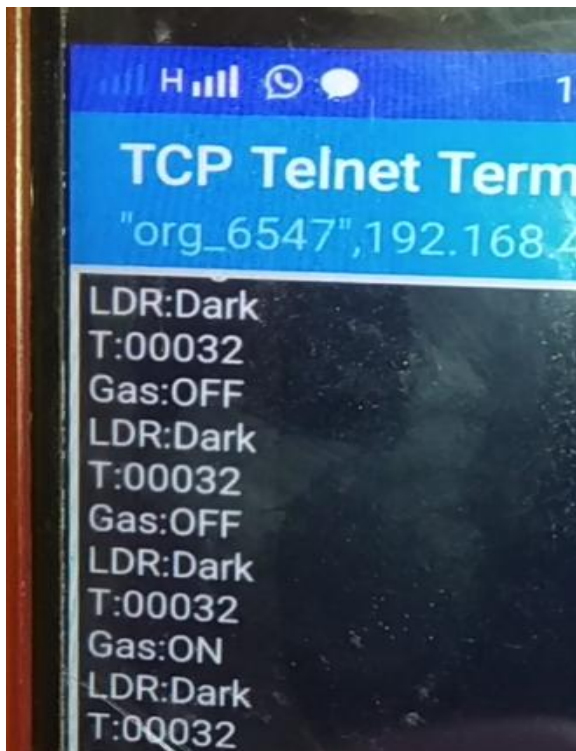


Fig:6 App Displaying Temperature, Gas, LDR values

B. Test Case

Test Case number	Test Case parameter	Test Case conditions	Action
TC 1	Temperature	If temp value exceeds more than 50	Beep sound and alert message will be sent to user
TC 2	Gas	Initial Gas sensor is in OFF state. If any poisonous gas is detected then it switches to ON state	Beep sound and alert message will be sent to user
TC 3	LDR	If LDR sensor detects darkness in surroundings.	Beep sound and alert message is sent to user. The light bulb will on automatically using relay switch.

V. LIMITATIONS AND ENHANCEMENT

Limitations

At present we can only alert the users when fire and gas leakages occurs but we cannot trace the location of workers where the fire and gas leakages occurred.

Future Enhancement

At present we have developed an application in such a way that the admin can see only the environmental parameters like temperature, gas and LDR sensors values so that he can alert the workers in the coal mines when threshold limit value exceeds and fire and gas leakages occurs in the coal mines. In future we can add the feature like location so that we can trace the location of workers where the fire and gas leakages occurs so that we can rescue the workers.

VI. CONCLUSION

In this paper, we proposed solutions to overcome the difficulties with the existing system. We proposed a coal miners safety monitoring system. This system is able to detect the fire and gas leakages and it can also detect the darkness in the coal mines using LDR sensor. When the fire and gas accidents occurs then the system sends alert message to the admin. The system is employed to scale back potential safety issues in coal production.

VII. APPENDIX

It is optional. Appendixes, if needed, appear before the acknowledgment.

ACKNOWLEDGMENT

It is optional. The preferred spelling of the word “acknowledgment” in American English is without an “e” after the “g.” Use the singular heading even if you have many acknowledgments. Avoid expressions such as “One of us (S.B.A.) would like to thank” Instead, write “F. A. Author thanks” Sponsor and financial support acknowledgments are placed in the unnumbered footnote on the first page.

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