

Coal Mine Safety Monitoring And Control Automation

C.Archana Priyadharshini¹, R.Kamala Rani², C.Kavitha³,
V.Uma Maheshwari⁴, M.S.Vandhana AP⁵

^{1, 2, 3, 4, 5}Dept of Electronics and Communication Engineering

^{1, 2} Parisutham Institute of Technology and Science,
Thanjavur, Tamilnadu, India

Abstract- Coal mining continues as an important economic activity today, but it also includes risk. Most working conditions of mines are rigorous, and their geological conditions are complex. With the rapid growth of mine production and the increasing difficulty in mining operation, major accidents such as water inrush, roof fall and so on, have occurred frequently. Effective safety management and risk control of mine is a critical part of prevention. The application of our system has achieved better results and it improves safety management efficiency of mine enterprise. In order to give first aid, oxygen pump is introduced

Keywords- Coal mine, gas, humidity, oxygen, safety

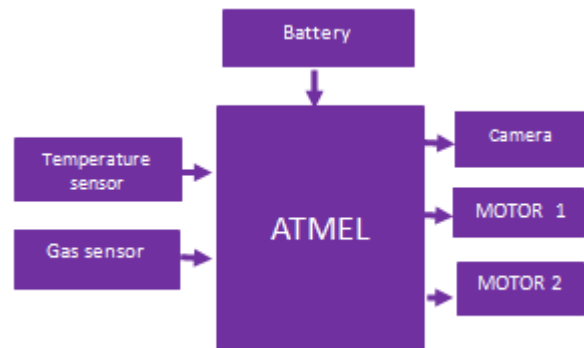
I. INTRODUCTION

Helmets with minimal protection and LED lighting are used in underground coal mines because of their light weight and low power consumption. Coal mining enterprises have accumulated a large amount of data in the safety impression. The proposed system uses two sensor modules to monitor the hazardous parameters in real time and feeds their data to the microcontroller. Microcontroller will analyzes these parameters and compares it with a set range and indicates working condition of mine area. The use of temperature sensor, humidity sensor and gas sensor ensures the light weight and power efficient circuit while the use of RF module helps in wireless communication between staff and ground control.

II. LITERATURE SURVEY

In existing system protection of mine worker remains uncertain. Human tracking by employing the scene information contains disadvantage of shadow removing mechanism Further methods like inserting the electrodes in coal mines to sense abnormality is found to be effective up to a certain level. In robot using mechanisms the probability of abnormality and its detection is found to be difficult because of straight viewed cameras. There exists greater chances of variation when the humans enter into mine. Leakage analysis of coal mine using the superposition theorem is found to be ineffective for analysis of larger networks.

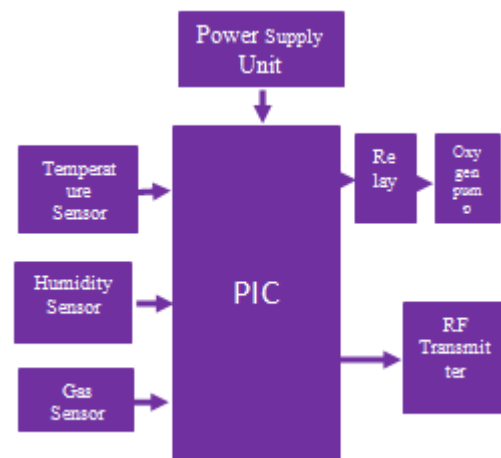
III. EXISTING SYSTEM



IV. DRAWBACKS OF EXISTING SYSTEM

In existing systems monitoring of live data is not possible. While using video camera for analysis it leads to unclear image processing. Information data scattering an isolation of data may occur in database management while using multi criterion parameters. The safeguarding and protection methods described in earlier methods is too complex to implement. To avoid noise disturbance the design becomes robust.

V. PROPOSED SYSTEM



VI. SPECIFICATION OF HARDWARE COMPONENTS

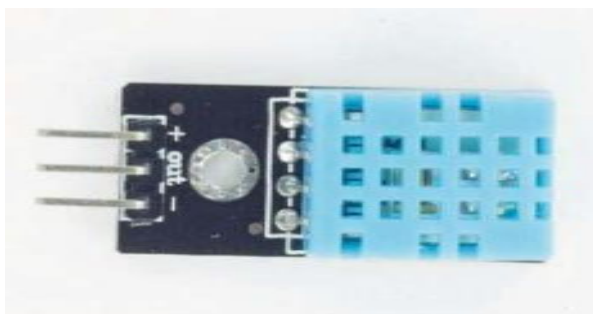
S.NO	NAME OF THE SENSOR	SPECIFICATION	RANGE
1	Temperature sensor	LM35	Vcc=5v RI=10K Imax=<3mA
2	Gas sensor	MQ309A	Vcc=5v RI=2K Imax=<1mA
3	Humidity sensor	DHT11	Vcc=3.5V RI=5K Imax=<1mA

A. Zigbee protocol:

In this proposed system, zigbee protocol is used. It consumes low power and has 6 months to 5 years battery life for most applications. It is low cost at least half the cost of Bluetooth solutions, high density of nodes per network of 250 nodes per network, multiple co-located networks, data rate requirements with few bits 250 kbps sufficient, simple protocol, global implementation. Zigbee protocol network, built on IEEE 802.15.4

B. Temperature sensor/humidity sensor

The low cost DHT11 sensor is used to detect the temperature and humidity. It senses the surrounding air and gives the output for every 80 microseconds.



C. Microcontroller unit

The microcontroller unit employed for helmet is pic controller. It receives the data from all the sensor in real time and simultaneously checks the predefined safety limit to the values. All the data is collected is transmitted to the ground

receiver and if the limit exceeds the safety limit, an indication signal will be sent to both ground control and worker.

D. RF transceiver

The transmitter is an NRF24L01 wireless module. It is an ultralow power, RF transceiver on 2.4 GHz ISM (Industrial, Scientific and Medical) band. Its ultralow power design grants it months of battery life as well as high range of 100m which can be further extended to more than which can be further extended to more than 500m if an antenna is used.

E. GAS SENSOR

MQ-4 Gas detector is being employed to measure. Methane gas in underground coal mine. The range is between 300 to 10000ppm. Quick response and recovery makes it ideal to use.



VII. ACKNOWLEDGEMENT



VIII. CONCLUSION

The proposed system has been successfully tested and has shown quick response to the hazardous parameters variation. We can conclude that this system will greatly help in reducing future casualties caused by sudden changes in these parameters and help make the work safer. The compact and efficient design ensures the practical implementation of

the system. The system was tested for following predetermined range.

REFERENCE

- [1] YANG Tao "DANG Guang-yuan" Research advance review on the early-warning system for production safety in the enterprises" Journal of Safety and Environment August 2014.
- [2] Laihua Fang, etc, "Integrated Monitoring and Management System for Heat-supplying Process", Proceedings of 2010 IEEE International Conference on Information and Automation, May 2010.
- [3] S. Wei, L. Li-li, "Multi-parameter Monitoring System for Coal Mine based on Wireless Sensor Network Technology", Proc. International IEEE Conference on Industrial Mechatronics and Automation, pp 225-27, 2009.
- [4] Tanmoy Maity, Partha Sarathi Das, MithuMukherjee, "A Wireless Surveillance and Safety System for Mine Workers based on Zigbee", First International Conference on Recent Advances in Information Technology, RAIT,