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Mine wide correspondence system for perception and well-being of the diggers in underground coal mines

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Abstract:
A hybrid, mine wide communication system for online monitoring of miners during working hours is described. The developed system consists of surface computer with monitoring software, base stations and miner kits. RS235 is used as a wired link between surface computer & base stations whereas low frequency RF link is employed between miner's kit and base station. Based on the underground mine wireless propagation modeling and some communication facts, Sub 1GHz has been selected as operating frequency of the system. Software for the monitoring of the miners at surface computer has been developed. This software keeps track of the miners with the help of the received information from base stations and issues warning signals to the miners in any emergency condition.

Index Terms: Zegbee; Dustsensore; Co sensor; Gas Sensor; ARM; ARM7

1. INTRODUCTION:

At present, the situation of safe production is very serious in Chinese coal mine. Especially in the recent few years, disasters occur frequently in coal mine, which brings huge loss of possession and life. Therefore, the safety of underground mine become an important issue.

Management of the hazards in underground mines requires continuous monitoring of critical information: the presence and concentration of flammable and toxic gases and dust, the structural integrity and stability of the mine tunnels, water ingress, and the current locations and communication status of all underground mine personnel. In the aftermath of an accident, it can be vital to maintain communications with trapped miners and rescuers, and to establish and track their positions.

Current monitoring system in underground mine were cable based which play a key role in safe production. However, these systems have some disadvantages for coal mine monitoring. It is inconvenient to dispose in many areas such as abandoned laneway and exploiting areas for the trouble reconnection. But just in these areas, they
really have a lot of danger. To overcome shortcomings of wired systems, people proposed the Wireless Sensor Networks (WSN) to implement the wired monitoring system. But the WSN has its own limitations, such as not having enough bands to communicate and transfer image data efficiently. So, how to overcome the limitations and provide one communication system with wide band is concerned. The remainder of the article is arranged as follows. The next section we discuss the choice of working frequency for the wireless systems and the node deployment. Then, we introduce the wireless system that we invent using ZigBee and Wi-Fi technology which can satisfy the requirement of coalmine need.

2. OVERVIEW:

In this paper we are focus on the Hybrid mine wide communication system for surveillance and safety of the miners in underground coal mines during working hours with wireless monitoring.

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In the Existing system we have the RF Transmitter to propagate the EM Waves and these waves will reflect and these will gives the environment condition of the coal mine like whether any roof falls occur or not Due to these system we will get response with some delay. In this system there is a chance of the Data Loss Based on Reflected Echo's

In the proposed architecture we consists of the Gas sensor, Dust sensor and Smoke sensor for detecting the Toxic gases and Floods in the coal mine and fire occurrence in the coal mines and MEMS is used for the detection of the roof falls. To overcome the data loss we are using the Zigbee for the sake of the Continuous transmission without any data loss. We can provide miners safety during the working hours if any danger or accidents occur we can provide the buzzer or alarm with some Danger light indication then all the miners get alert and they will take their Safety precautions.

3. SYSTEM DESIGN:

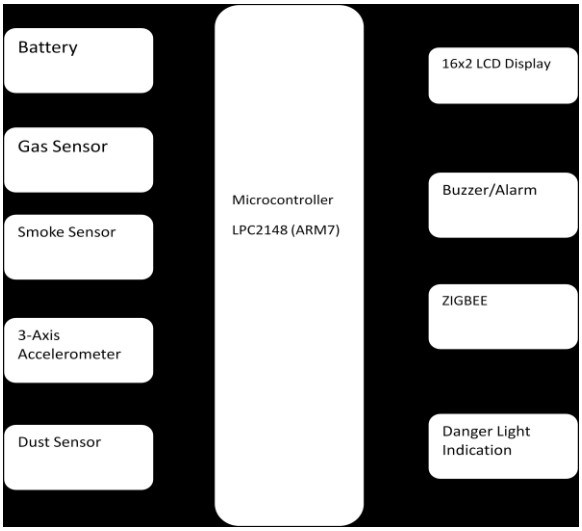

Fig 1:Block diagram

4. HARDWARE DESIGN:

4.1. ZIGBEE

Centralized Node Connected E EWS Node via Zigbee Module, To this node all the other nodes sends the data this data can be display on the Laptops or PC and send to ARM LPC 2148 Via Zigbee. After Login it displays all the devices & there current status. This data can be send via Internet/Zigbee & The Plant can be controlled from anywhere.

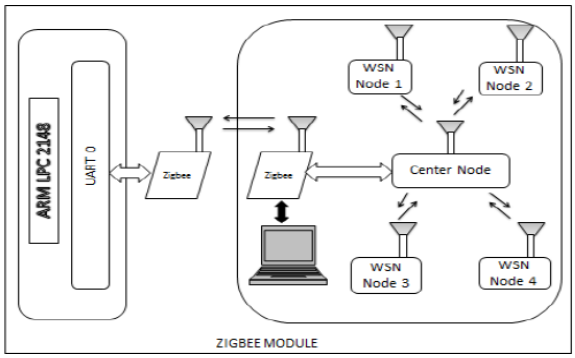

Fig 2: ZIGBEE module

4.2. Gas sensor:

The classification of the sensing technology is given based on the variation of electrical and other properties. Sensing technology has been widely investigated and utilized for gas detection This paper reviews the description, evaluation, comparison and recent development in existing as sensing technologies. Due to the different applicability and inherent limitations of different gas sensing technologies, researchers have been working on different scenarios with enhanced gas sensor calibration.

Fig. 3.Gas Sensor

This Methods based on other kinds of variations such as optical, calorimetric, acoustic and gas-chromatographic, are presented in a general way. Several suggestions related to future development are also discussed. Furthermore, this paper focuses on sensitivity and selectivity for performance indicators to compare different sensing technologies, analyzes the factors that influence these two indicators, and lists several corresponding improved approaches.

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4.3.Dust sensor:

Sharp optical dust sensor has an inner infrared diode and a phototransistor askew master minded. The diode tasks light and the phototransistor identifies the dim spots created by the fine particles going through. Notwithstanding this highlight, contingent upon the beat example yielded you can check whether is smoke or dust. This is the sensor you will require on the off chance that you need to gauge air particles, construct an air purifier framework, or recognize certain particles. Incorporates an uncommon link to interface with different applications.

Fig 4:.Dust Sensor

4.4.Smoke Sensor:

The CMOS MC145010 is a propelled smoke identifier segment containing refined low-control simple and advanced hardware. The IC is utilized with an infrared photoelectric chamber. Discovery is expert by sensing scattered light from moment smoke particles or different pressurized canned products. At the point when identification happens, a throbbing caution is sounded by means of on-chip push-pull drivers and an outer piezoelectric transducer. The variable-pick up photograph intensifier permits direct interface to IR identifiers (photodiodes). Two outside capacitors, C1 and C2, C1 being the bigger, focus the addition settings. Low pick up is chosen by the IC amid a large portion of the standby state. Medium addition is chosen amid a nearby smoke condition. High pick up is utilized amid push catch test. Amid standby, the uncommon screen circuit which occasionally checks for debased chamber affectability utilizes high pick up, moreover.

Fig 5: .Smoke Sensor

The I/O pin, in mix with VSS, can be utilized to interconnect up to 40 units for basic flagging. An on-chip current sink gives clamor safety when the I/ O is an info. A neighborhood smoke condition enacts the short out ensured I/O driver, in this way flagging remote smoke to the interconnected units. Also, the I/O pin can be utilized to initiate break lights, empower helper or remote cautions, and/or start auto-dialers. While in standby, the low-supply location hardware conducts intermittent checks utilizing a beat burden current from the LED pin. The outing point is situated utilizing two outer resistors.

The supply for the MC145010 can be a 9 V battery. An unmistakable LED blaze going with a throbbing perceptible alert shows a nearby smoke condition. A throbbing discernable alert with no LED blaze demonstrates a remote smoke condition. A beep or tweet happening for all intents and purposes all the while with a LED blaze demonstrates a low-supply condition. A beep happening most of the way between LED flashes demonstrates corrupted chamber affectability. A low-supply condition does not influence the smoke recognition capacity if VDD ≥ 6 V. Consequently, the low-supply condition and corrupted chamber affectability can be further recognized by performing a push catch (chamber) test. Highlights ï Circuit is intended to work in smoke locator frameworks that consent to UL217 and UL268 Specifications ï Operating Voltage Range: 6 to 12 V ï Operating Temperature Range: - 10 to 60°C ï Average Supply Current: 12 µA ï Power-On Reset Places IC in Standby Mode (Non-Alarm State) ï Electrostatic Discharge (ESD) and Latch Up Protection Circuitry on All Pins ï Chip Complexity: 2000 FETs, 12 NPNs, 16 Resistors, and 10 Capacitors ï Ideal for battery control.

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4.5. ARM (LPC2148):

The LPC2148 microcontrollers are focused around a 16-bit or 32-bit ARM7TDMI-S CPU with constant imitating and implanted follow help, which consolidate microcontroller with inserted high velocity streak memory extending. A 128-bit wide memory interface and one of a kind quickening agent building design empower 32-bit code execution at the most extreme clock rate. For discriminating code size applications, the option 16-bit Thumb mode decreases code by more than 30 percent with negligible execution punishment. Because of their little size and low power utilization, LPC2148 are perfect for applications where scaling down is a key prerequisite, for example, access control and purpose of-offer.

5. SOFTWARE

Keil IDE is used for implementation. Keil IDE is a windows operating system software program that runs on a PC to develop applications for ARM microcontroller and digital signal controller. It is also called Integrated Development Environment or IDE because it provides a single integrated environment to develop code for embedded microcontroller

Keil µVision4 IDE (Integrated Development Environment) is a Windows based front end for the C Compiler and assembler.

6.RESULTS:

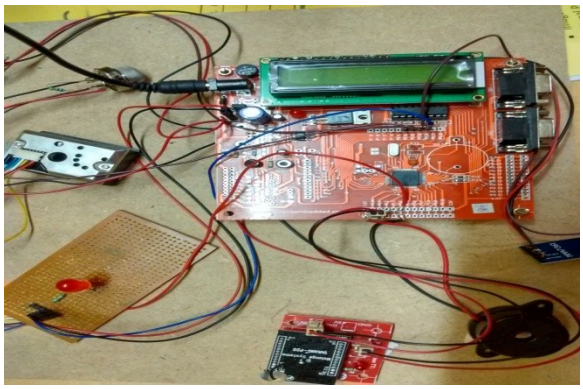

Fig 6: Project kit without power supply

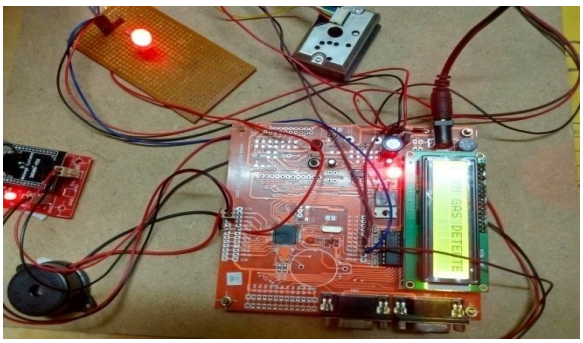

Fig 7**:** Harm gases detected is display on LCD

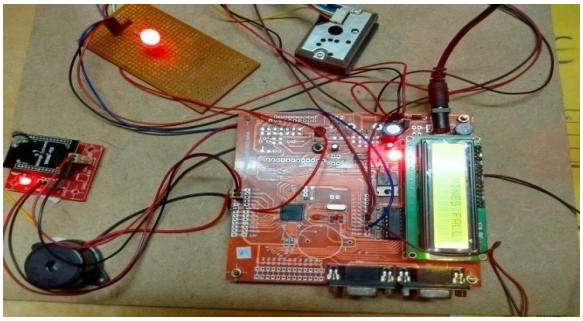

Fig 8**:** Mines fall detection display on LCD

7. CONCLUSION:

Traditional mine security system can be effectively replaced by the surveillance and safety system proposed in the paper. This paper gives a system related to safety and security of underground mines. The system is reliable, faithful, uninterrupted, economical and user friendly. A larger area and more depth inside hazardous underground mines are now can be covered and potential accidents can be controlled effectively. The system combined the low power, low cost Zigbee based high frequency wireless data transmission technology with modern age MEMES based small size sensors. The sensor and zigbee module can be preferably installed over the helmet of mine worker. Proper monitoring and conversation is possible between the workers and the ground staff which can help to take appropriate actions more rapidly and smartly. The system also can be easily extended with ZigBee wireless image transmission facility in future; it will improve scalability of underground environment and extend accurate position of miners.

REFERENCES

[1] E. K. Stanek, "Mine Electrotechnology Research: The Past 17 Years", *IEEE transactions on industry applications*, Vol. 24, No. 5, 1988, pp. 818-19.

[2] 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*, 2009, pp 225-27.

[3] Y.P. Zhang, G. X. Zheng, J. H. Sheng, "Radio Propagation at 900 MHz in Underground Coal Mines", *IEEE transactions on antennas and propagation*, Vol. 49, No.5, 2001, pp. 752-62.

[4] S. Jin-ling, G. Heng-wei, S. Yu-jun, "Research on Transceiver System of WSN Based on V-MIMO Underground Coal Mines", *Proc. International Conference on Communications and Mobile Computing*, 2010, pp 374-378.

[5] N. Chaamwe, W. Liu, H. Jiang, "Seismic Monitoring in Underground Mines: A case of Mufulira Mine in Zambia Using wireless Sensor Networks for Seismic Monitoring", *Proc. IEEE international Conference on Electronics and Information Engineering*, Vol. V1, 2010, pp 310-14.

[6] X. Ma, Y. Miao, Z. Zhao, H. Zhang, J. Zhang, "A novel approach to Coal and Gas Outburst Prediction Based on Multi-sensor Information Fusion", *Proc. IEEE international conference on automation and logistics*, 2008, pp 1613-18.

[7] D. Egan, "The Emergence of ZigBee in building automation and industrial controls", *J. IEE Computing &*