COAL MINING SAFETY MONITORING SYSTEM

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ABSTRACT
At present, environmental monitoring system of mine is widely utilized in industrial bus, to attach underground monitoring system with ground data center by cable or fiber optic to represent a wire monitoring network. However, it continually exists cabling issues. During this paper, mine environment observation system based on wireless sensor networks (WSNs) exploitation ZigBee is intended. During this paper, we are able to monitor the temperature of the mine by employing a temperature sensing element, humidity of the mine by exploitation humidity sensing element, and additionally the extent of carbon monoxide gas by using gas sensing element. So as to provide proper security to mine, we are giving an ID card to the miners. To induce the immediate emergency services connecting GSM to the server to send the message to fire and hospitals departments.

Key words: WSN, ARM lpc2148, sensor.

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1. INTRODUCTION
Environmental monitoring system of mine is widely utilized in industrial bus, to attach underground monitoring system with ground info center by cable or fiber optic to represent a wire observance network. However, it continually exists cabling issues. WSN may be a technology that relies on low-power wireless communication technology, embedded computing, micro-sensor technology and integrated circuit technology. It's associate degree intelligent network system [1] that's cosmopolitan in bound region, terminal an outsized range tiny detector node that has wireless communication and computing skills and will severally complete the appointed tasks by self-organization according to the setting. WSNs have some characteristics of non-center, self-organisation, dynamic topology, and numbers of nodes, high density, and restricted hardware resources. These create WSNs have an honest potential within the environmental observance, medical aid, military then on. The mine setting
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observance system supported WSNs will solve the matter of routing and may deliver the goods the observance of multi-point to multipoint.

During this proposed paper, a remote mine setting observance system supported wireless sensor networks (WSNs) exploitation ZigBee is designed. The wireless a part of the underground are having the sensors for aggregation the knowledge. Sensor nodes square measure answerable for the gathering of environmental parameters, and causation the collected information. Sensor nodes were organized below metallic element mine flexibly. It transferred varied safety indicators at intervals the mine to the controller section, so via transmission network uploaded the information to the bottom observance center by the Zigbee communication. ARM Micro-processor module is that the laptop dominant core of WSNs nodes in this planned mine monitoring system. Collecting signals of environment parameters required high rate and enormous information volume, that was decisive in node style. Therefore its processor ought to meet tiny volume, high integration, low consumption and high performance. so as to enhance the protection within the mine, oftenness based mostly ID card is employed by the labours to for access. to induce the immediate emergency services connecting GSM to the server to send the message to fire and hospitals departments.

2. ARCHITECTURE

![Figure 1 Mine Section](image)

2.1. ARM Core

The ARM7 family includes the ARM7TDMI, ARM7TDMI-S, ARM720T, and ARM7EJ-S processors. The ARM7TDMI core is the industry’s most widely used 32-bit embedded RISC microprocessor solution. Optimized for cost and power-sensitive applications, the ARM7TDMI solution provides the low power consumption, small size, and high performance needed in portable, embedded applications.
2.2. LPC2148 Processor

LPC2148 Microcontroller design. The ARM7TDMI-S may be a general purpose 32-bit microchip, that offers high performance and extremely low power consumption. The ARM architecture relies on Reduced Instruction Set laptop (RISC) principles, and also the instruction set and connected decode mechanism are a lot of easier than those of small programmed complicated Instruction Set Computers (CISC). This simplicity ends up in a high instruction turnout and spectacular time period interrupt response from alittle and cost-efficient processor core.

Pipeline techniques are used in order that all components of the process and memory systems will operate endlessly. Typically, whereas one instruction is being executed, its successor is being decoded, and a 3rd instruction is being fetched from memory. The ARM7TDMI-S processor conjointly employs a novel architectural strategy referred to as Thumb, that makes it ideally suited to high-volume applications with memory restrictions, or applications wherever code density is a difficulty.

2.3. Temperature Sensor

![Temperature sensor LM35](image)

**Figure 2** Temperature sensor LM35

The LM35 pin diagram is shown within the figure 2. As a temperature sensor, the circuit can browse the temperature of the encompassing setting and relay temperature to us back in degrees celsius. The LM35 may be a low voltage IC that uses or so +5VDC of power. this is ideal as a result of the arduino's power pin gives out 5V of power.

The IC has simply 3 pins, two for the power supply and one for the analog output. The output pin provides associate degree analog voltage output that's linearly proportional to the celsius (centigrade) temperature. Pin 2 offers an output of one mV per 0.1°C (10mV per degree), therefore to induce the degree price in celsius, all that has to be done is to require the voltage output and divide it by 10- this offer out the worth degrees in celsius.

2.4. Humidity Sensor

![Humidity sensor](image)

**Figure 3** Humidity sensor
Humidity is that the presence of water in air, the quantity of water vapour in air will have an effect on human comfort as well as several producing processes in industries. The presence of water vapour conjointly influences varied physical, chemical, and biological processes. wetness measuring in industries is essential as a result of it's going to have an effect on the business price of the product and also the health and safety of the personnel. Hence, wetness sensing is incredibly necessary, particularly within the management systems for industrial processes and human comfort. Here we tend to are employing a resistive type of humidity sensing element.

2.5. Gas Sensor

![Figure 4 Gas sensor](image)

A gas sensor is a tool that detects the presence of gases in a region, usually as a part of a security system. This sort of kit is employed to notice a gas leak and interface with an impact system. Gas detector will discover flammable, inflammable and poisonous gases and oxygen depletion. A gas detector will sound associate degree alarm to operators within the space wherever the leak is happening, giving them the chance to go away. This sort of device is very important as a result of there are several gases which will be harmful to organic life, like humans or animals.

2.6. Voice Chip

This is a replacement and increased eight channel recordable voice module. Every channel will foot-dragging to one minute of recorded voice and/or music with a combined total record time of eight minutes. Just in case of any strength olympian of detector, parameter exceeds voice are compete by the voice chip supported GPIO programming

2.7. RFID Reader

An oftenness identification reader (RFID reader) may be a device accustomed gather info from an RFID tag that is employed to trace individual Labours stepping into the mine. In associate degree RD reader, the Radio waves are accustomed transfer information from tag to reader.

The RFID tag it should be at intervals the vary of an RFID reader, that ranges from 3 to 300 feet, so as to be read. RFID technology permits many things to be quickly scanned and permits quick identification of a specific product, even once it's enclosed by many alternative things. RFID technology uses digital information in associate degree RFID tag,that is formed from integrated circuits containing a small antenna for transferring info to an RFID transceiver. The bulk of RFID tags contain a minimum of a microcircuit for modulating associate degree demodulating oftenness and an antenna for transmission and receiving
signals. Frequency ranges vary from low frequencies of one hundred twenty five to 134 kHz and 140 to 148.5 kHz, and high frequencies of 850 to 950 mhz and 2.4 to 2.5 GHz.

2.8. GSM Overview
A GSM electronic equipment may be a wireless electronic equipment that works with a GSM wireless network. World system for mobile communication (GSM) may be a globally accepted normal for digital cellular communication. GSM is that the name of a normalization cluster established in 1982 to make a typical European mobile phone standard that will formulate specifications for a pan-European mobile cellular radio system operative at 900 rate. GSM modems support associate degree extended set of AT commands. These extended AT commands are outlined within the GSM standards.

2.9. Zigbee Module
ZigBee may be a specification for a high level protocol stack exploitation tiny, low-power and affordable radios. It supported IEEE 802.15.4 normal for private space Network. ZigBee normal maintained be ZigBee Alliance. sometimes vendors of ZigBee devices use system-on-chip (SoC) solutions with integrated radio and 60-250KB of non-volatile storage. ZigBee information transmission rate varies from twenty to 900kbits. Its low power consumption limits transmission distances to 10–100 meters & nbsp;line of sight. ZigBee devices will transmit information over long distances by passing information through a & nbsp; mesh network & nbsp; of intermediate devices to achieve a lot of distant ones.

2.10. VB Platform
During this system we tend to square measure employing a observance section to show whether or not the labours ID card are browse or not and to ascertain the detector parameters.. This output are displayed on the observance screen exploitation visual basic computer code. The communication is formed between the bottom level mine section and also the observance unit is formed through zigbee protocol.

3. DESIGN AND IMPLEMENTATION
In This Paper Mine Setting Observance System Supported Wireless Detector Networks (WSNs) Exploitation Zigbee Is Meant. So As to Present Correct Security to Mine, We Are Giving an ID card To the Miners. An RFID Reader's Perform Is To Interrogate RFID Tags. The Suggests That Of Interrogation Is Wireless And Since The Gap Is Comparatively Short; Line Of Sight Between The Reader And Tags Isn't Necessary. A Reader Contains An Rf Module, That Acts As Each A Transmitter And Receiver Of Oftenness Signals. The Transmitter Consists Of Associate Degree Generator To Make The Carrier Frequency; A Modulator To Impinge Information Commands Upon This Carrier Signal Associate Degreed An Electronic Equipment To Spice Up The Signal Enough To Awaken The Tag. The Receiver Contains A Detector To Extract The Came Back Information And Conjointly Contains An Electronic Equipment To Strengthen The Signal For Process. Arm Lpc2148, The Management Unit, That Employs A Software And Memory To Filter And Store The Information.

The data is currently able to be sent to the network through IEEE normal protocol. For observance purpose VB platform is introduced during this paper work. Temperature detector is employed to observe the temperature of the mine. Temperature man is connected to the lpc2148 processors ADC on chip peripheral. The ADC peripheral are designed through
program. The digital price of temperature detector are compared with the brink price set within the program.

**Figure 5** Hardware of Mine section paper

Resistive sort wetness sensing devices devour amendments within the resistance price of the sensor element in response to the change within the wetness. Thick film conductor of precious metals like gold, metallic element chemical compound is written associate degreed calcinated within the form of the comb to make a conductor. Then a chemical compound film is applied on the electrode; the film acts as a wetness sensing film attributable to the existence of movable ions. Amendment in electrical resistance happens attributable to the amendment within the range of movable ions. In movable ions causes amendment within the resistive metal that successively creates voltage change within the detector. This can be an awfully minute voltage amendment. This voltage are send to the ADC channel for the transmission. And conjointly GAS detector is connected to the lpc2148 it’ll sense the monoxide and it’ll send ppm level to the ADC channel for the transmission. If anybody or all the detector prices square measure exceeds the reference value then the program sets the voice alert. The detector detail and also the labour detail are updated within the room through the IEEE normal protocol. A person will operate this from the room. Continually the in time and out time of a labour are updated within the laptop. And GSM is additionally connected to laptop to send the message to fireside and hospital departments.
In The Flow Chart We Will Simply Analyze The Paper. It's The Flow Chart That Explains The Coalpit Paper. First Off after We Ought to Begin the Kit So It'll Initialize the Processor. Then The Sensors That Square Measure Within The Kit Can Sense The Values Of Temperature And Wetness. And Conjointly The Rfid Reader That Is Within The Kit It Reads The ID Cards Of Employees. If Rfid Cards Accessed Then It'll Continue and Update Employee Details within the Vb Observance Computer Code. And Also The Values Of Sensors Are Exceeds The Brink Values Then It'll Offer The Voice Alert And Update On Vb Observance Computer Code And It Follows The Step Of Causation Sms To The Hearth And Hospital Departments. If The Values Of Sensors Aren't Exceed The Brink Values It'll Return And Once More Sense The Values And Update Within The Vb Observance Show. Therefore It's the Continual Method
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Figure 7 Values of sensor and in time and out time of person RFID card 1

Figure 8 Values of sensor and in time and out time of person RFID card 2

4. CONCLUSIONS
In this paper we planned a mine monitoring system using wireless. That successively replace the cable association between the mine and control room. Wireless sensor networks (WSNs) exploitation ZigBee is meant to transmit the detector information to the monitor. Sensor nodes square measure answerable for the gathering of environmental parameters, and causation the collected information. Sensor nodes were organized below metallic element mine flexibly. So as to present correct security to mine, we tend to are giving associate degree ID card to the miners of these facilities improve mine safety effectively.

REFERENCES

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