International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

COPY RIGHT

IJIEMR Transactions, online available on 17th Apr 2018. Link
:http://www.ijiemr.org/downloads.php?vol=Volume-7&issue=ISSUE-04

Title: **SURVEILLANCE OF COAL MINES USING RASPBERRY-PI**

Volume 07, Issue 04, Pages: 73–80.
Paper Authors

SAMSANI.N.V.D.LAKSHMI PRIYANKA,
Mr.K.RAJA SEKHAR M.Tech, Prof.A.PRAVIN, Prof.V.DHANA RAJ
BVC Engineering college, Odalarevu

USE THIS BARCODE TO ACCESS YOUR ONLINE PAPER

To Secure Your Paper As Per UGC Guidelines We Are Providing A Electronic Bar Code

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

SURVEILLANCE OF COAL MINES USING RASPBERRY-PI

[1]SAMSANI.N.V.D.LAKSHMI PRIYANKA, [2]Mr.K.RAJA SEKHAR M.Tech,[3]Prof.A.PRAVIN
[4]Prof.V.DHANA RAJ

[1]PG scholar, M.Tech (EMBEDDED SYSTEM) BVC Engineering college, Odalarevu
[2]ASSOCIATE PROFESSOR Dept of ECE, BVC Engineering college, Odalarevu
[3]ASSOCIATE PROFESSOR Dept of ECE, BVC Engineering college, Odalarevu
[4]PROFESSOR Dept of ECE, BVC Engineering college, Odalarevu

ABSTRACT

Mining in the under coal mines is very difficult due to increase in temperature it is very difficult for the people to work under the coal mines while going in to the deep mine they does not know where the gas will leaks and where the temperature increases in order to make system resemble we are placing the gas sensors and temperature and humidity sensor to the cap in order to monitor the surroundings. In my proposed system we are placing the camera to the cap in order to observe what is happening under the coal mine and also to alert the person by observing from the base station. The gas sensor will detect all poisonous gas that was released from the coal mines. The temperature and humidity sensor will detect sudden changes in the mines. The GPRS will trace the location and send the latitude and longitude values to the base station. There is a one special future i.e. when the rescue team wants to trace the location of the person if they send one message to that particular person then system immediately traces the location and sends acknowledgement of that particular person When any action is occurred the rescue team will saves the person's life. In order to implement this system we are using raspberry-pi with ARM 11 processor the advantage of the system is it consists of in built camera slot and WI-FI. By using this system we can give protection who is working in the coal mines and also we can save their lives when they are in dangerous situations.

INTRODUCTION

Mining is one of the most important activities at high altitude and in underground. Thus, Mining workers must handle extreme climatic and physiological hazards. Underground mining operations around the world pose similar risks to worker safety and health. Though different techniques are used to extract base metals, precious metals, non-metallic minerals, diamonds and coal, the hazards do not differ that much. The deeper the mine, however, the greater the risk. Several activities that take place in these locations expose miners and other employees to health and safety issues. Rise in exports, economy growth and globalization through commodities stock exchange markets promoted the rapid growing of mining industry that have thousands of people working above 2,000 m.a.s.l. around the world [1]. According to the United States Department of Labour, Mining Health and Safety Administration

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

(MHSA), 70 percent of mine accidents in the U.S, are related to using heavy machinery and other equipment at the worksite. Among the top ten most cited causal factors contributing to accidents in 2012 were: lack of safety training; hazard communication; machine guarding; lockout/tag out precautions; and electrical wiring. In addition, Occupational Safety and Health (OS&H) programs currently used in mining Sites only consider a periodical medical examination on a once-per year basis to assess the health condition of the staff. This medical evaluation allows detecting risk factors and defining the groups that require medical assistance because of medical illness or labor's disease. According to the Department of Mining Safety of the National Service of Geology and Mining (SERNAGEOMIN), in Chile about 80% of mining sites are located above 3,000 m.a.s.l. [2].Therefore, it is necessary to develop new mechanisms to improve the occupational safety and health programs for people working in mining at coal mining [5]. At the onset, the goal of the project is to implement security precautions for the persons who are working in the coal mines and to take safety measurements to save their lives.

LITERATURE SURVEY

Conducting literature survey prior to begin a research project is vital in understanding an Surveillance of coal mines, as this will supply the researcher with much needed additional information on the methodologies and technologies available and used by other research counterparts around the world. This chapter provides a condensed summary of literature reviews on key topics related to surveillance of coal mines and the comparison between the present project and the related topics of the existing information will also be discussed.

• In the paper "**Wireless sensor network survey**", the authors **J. Yick, B. Mukherjee, and D.Ghosal**, has described that a wireless sensor network (WSN) has important applications such as remote environmental monitoring and target tracking. This has been enabled by the availability, particularly in recent years, of sensors that are smaller, cheaper, and intelligent. These sensors are equipped with wireless interfaces with which they can communicate with one another to form a network.

• In the paper "**Adding sense to the Internet of Things an architecture framework for smart Object systems**" the authors **T. S. Lopez, D. C. Ranasinghe, M. Harrison, and D. McFarlane** has described that the Internet of Things (IoT) concept is being widely presented as the next revolution toward massively distributed information, where any real-world object can automatically participate in the Internet and thus be globally discovered and queried.

In the paper "**Human-centric sensing**", the authors **M. Srivastava, T. Abdelzaher, and B. Szymanski** has described that the first decade of the century witnessed a proliferation of devices with sensing and communication capabilities in the possession of the average individual.

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

Examples range from camera phones and wireless GPS units to sensor-equipped, networked fitness devices and entertainment platforms (such as Wii). Social networking platforms emerged,
such as Twitter, that allow sharing information in real time.

• In the paper "**Good Practice Guidance on Occupational Health Risk Assessment**." Has Described that at coal mining safety measurements should be taken, mining safety ,ventilation Safety , underground mines .

PROPOSED SYSTEM

Our embedded project is designed to overcome the drawbacks present in existing method. It Linux drivers for various types of sensors in the Intelligent Monitoring System project, achieving the combination of Qt/Embedded and the Linux system programming. Our proposed project eliminates the need of separate computer system connected to microcontroller board. Our Proposed project is the sensor board plus a full flag computer system. The sensors like Gas sensor, Temperature sensors are connected to ARM11 processor board. In this the rescue team can save the people who are entering into the coal mine by sending message to the system,then the system resends the acknowledgement along with latitude and longitude values.

Coal mine safety using raspberry pi:

By using the Raspberry pi we can access the coal mine through the internet by the concept of Internet of Things and this Raspberry pi also the very efficient when compared to other technology. Through which we can connecting the sensors in the GPIO pin layout .It is also a mini CPU where we can interface with audio and video. So under the mine it will be monitor through the system. It can also be useful transmit the data where we want. We can also extend the memory by giving the external memory as SD card.This is the main block diagram used in the propose system. While using the three sensors that can be detected and given to raspberry pi, it is used to control under the mine which will be connected to raspberry pi and camera is connected to visualize the area when the person enters the coal mine. The raspberry pi will be monitor through the system. The three sensors as the input to the raspberry pi.

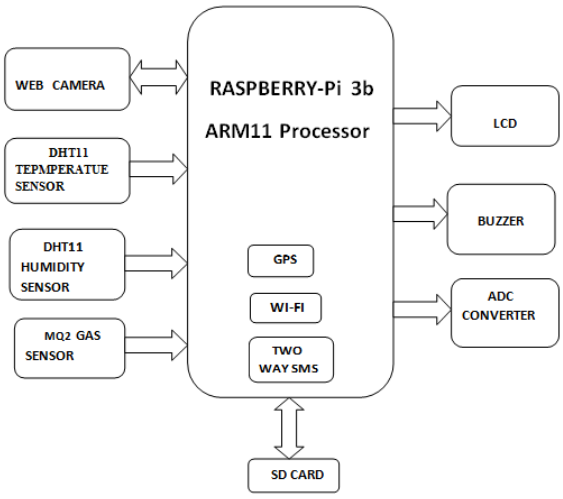


Fig 1. Block Diagram of raspberry pi

A) RASPBERRY PI

The Raspberry is a computer it uses a different kind of processor. The Raspberry pi is used to surf the internet, send an email or write a letter using a word processor. If it was connect the Pi directly to a PC or laptop, it won't be able to connect out onto the Internet by default. To

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

do so, should be need to configure the PC to bridge the wired Ethernet port and another (typically wireless) connection. But if it was completely unable to connect the Pi to the Internet in any other way, that can try searching your operating systems helps file for "bridge network" to find more guidance. With a cable connected, the Pi will automatically receive the details it needs to access the Internet when it loads its operating system through the Dynamic Host Configuration Protocol (DHCP). This assigns the Pi an Internet Protocol (IP) address on the network, and tells it the gateway it needs to use to access the Internet (typically the IP address of your router or modem).For some networks, there is no DHCP server to provide the Pi with an IP address.

B) GAS SENSOR

The intent of this reference guide is to describe in detail the Gas Sensor Platform with Bluetooth® Low-Energy Reference Design from Texas Instruments. After reading this reference design, a user should better understand the features and usage of this reference design platform. The Gas Sensor Platform with Bluetooth Low-Energy (BLE) is intended as a reference design that customers can use to develop end products for consumer and industrial applications to monitor gases like Carbon Monoxide (CO), oxygen (O2), ammonia, fluorine, chlorine dioxide and others.

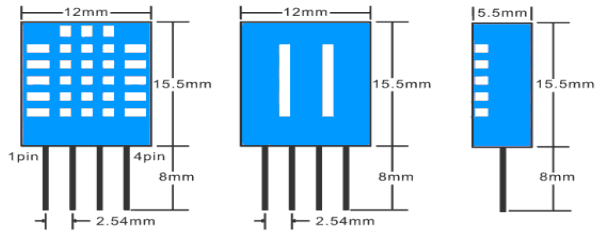
Fig 2. Gas sensor

C) DHT11 TEMPARATURE AND HUMIDITY SENSOR

The DHT11 is a low-cost temperature and humidity sensor. It isn't the fastest sensor around but it's cheap price makes it useful for experimenting or projects where you don't require new readings multiple times a second. The device only requires three connections to the Pi. +3.3v, ground and one GPIO pin.

DHT11 Specifications:

The device itself has four pins but one of these is not used. You can buy the 4-pin device on its own or as part of a 3-pin module.



The modules have three pins and are easy to connect directly to the Pi's GPIO header.

- Humidity : 20-80% (5% accuracy)
- Temperature : 0-50°C (±2°C accuracy)

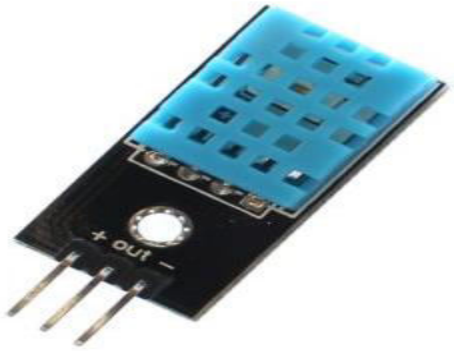
The manufacturers do not recommended that you read data from this device more than

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

once per 2 seconds. If you do you may get incorrect readings.

Hardware Setup

The 4-pin device will require a resistor (4.7K-10K) to be placed between Pin 1 (3.3V) and Pin 2 (Data).The 3-pin modules will usually have this resistor included which makes the wiring a bit easier. For this reason I got hold of the module which I could then attach to the Pi with a piece of 3-way Dupont cable.Different suppliers may wire the module pins differently so check the PCB markings to identify Vcc (+), data and Ground (-).



The 3 pins should be connected to the Pi as shown in the table below :

DHT Pin	Signal	Pi Pin
1	3.3V	1
2	Data/Out	11 (GPIO17)
3	not used	–
4	Ground	6 or 9

Your data pin can be attached to any GPIO pin you prefer. In my example I am using physical pin 11 which is GPIO 17. Here is a 4-pin sensor connected to the Pi's GPIO header. It has a 10K resistor between pin 1 (3.3V) and 2 (Data/Out).

WORKING PROCESS

we are placing the gas sensors and temperature and humidity sensor to the cap in order to monitor the surroundings. These three sensors are be connected to the raspberry pi when their will be change in the mine of any gases are temperature. we are placing the camera to the cap in order to visualize what is happening under the coal mine and also to alert the person by observing from the base station. The gas sensor will detect all poisonous gas that was released from the coal mines. The temperature and humidity sensor will detect sudden changes in the mines. The GPRS will trace the location and send the latitude and longitude values to the base station. There is a one special future i.e. when the rescue team wants to trace the location of the person if they send one message to that particular person then system immediately traces the location and sends acknowledgement of that particular person When any action is occurred the rescue team will saves the person's life. In order to implement this system we are using raspberry-pie with ARM 11 processor the advantage of the system is it consists of in built camera slot and WI-FI. If any action is occurred the raspberry-pi sends acknowledgement link to the base station. The sensor detecting also be monitor. Protection can be takes towards the persons

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

who is working in the coal mines and also we can save their lives when they are in dangerous situations.

RESULTS

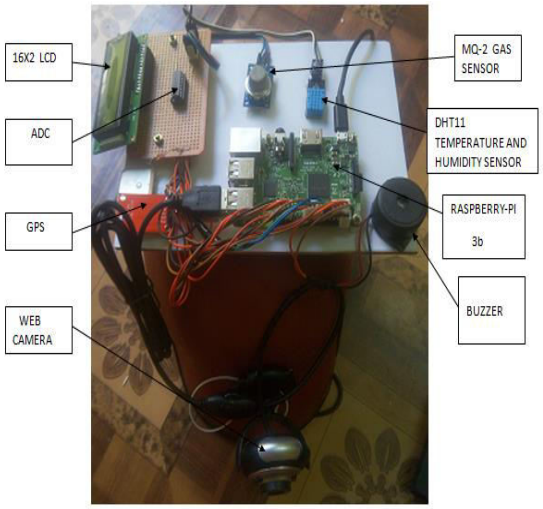


FIGURE 1:HARDWARE DESCRIPTION

FIGURE 2:Starting of the system

The above figure refers the starting of the system.

FIGURE 3: Before entering into the coalmine temperature, humidity, gas, location detection

The above figure refers Before entering into the coalmine temperature, humidity, gas, location detection.

FIGURE 4:After detection of the temperature, humidity, gas, location at coal mine

The above figure refers after detection of the temperature, humidity, gas, location at coal mine.

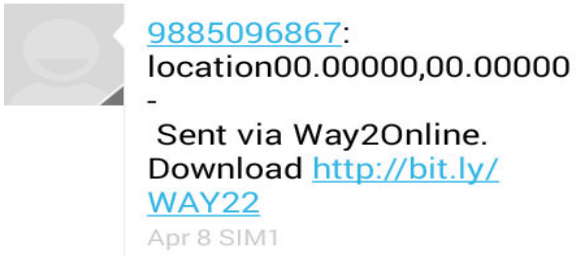


FIGURE 5:Alert message to the rescue team

Alert and gps location is sent through way2sms to the rescue team

FIGURE 6:Visualization part through web camera

International Journal for Innovative Engineering and Management Research
A Peer Revieved Open Access International Journal
www.ijiemr.org

The above figure shows the visualization of the area through web camera.The below three graphs shows results when entering into the coalmine when temperature, humidity, and gas sensors are activated, because of dangerous gases detected in the coalmine.

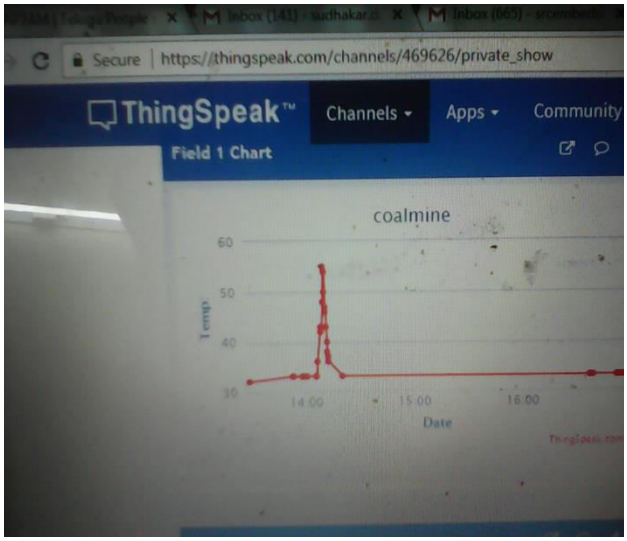


FIGURE (a) :Graphical representation of Temperature sensing process.

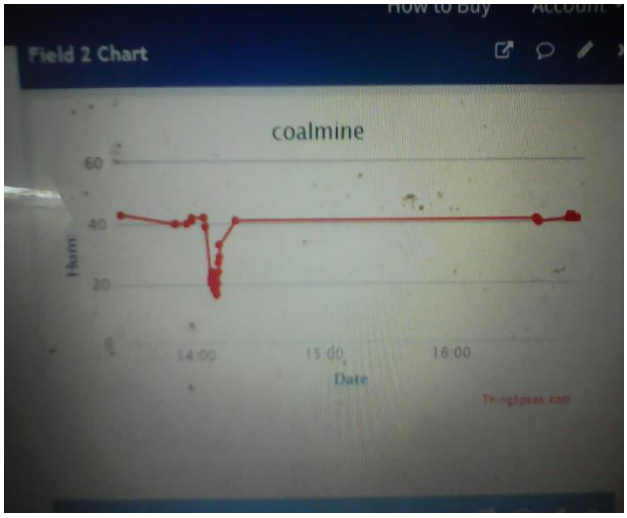


FIGURE (b): Graphical representation of humidity sensing process.

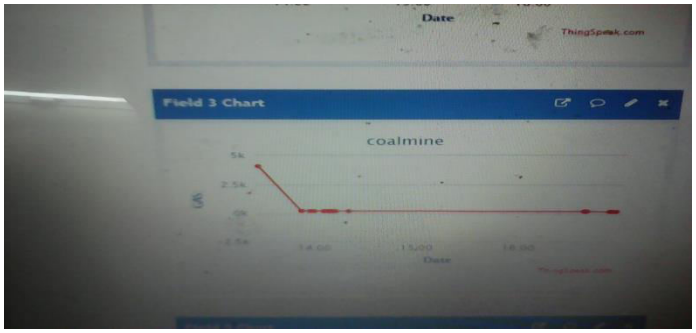


FIGURE (c): Graphical representation of gas sensing process.

CONCLUSION

This paper offers a fundamental study on the design and implementation of the remote network monitoring system of coal mine. In this work, we discussed the design and research of hardware architecture and software platform based on Raspberry Pi microprocessor. The embedded microprocessor provides the needed flexibility and scalability in lower computer terminals design. The embedded solution scheme and technology makes the hardware circuits easy to realize in practice, and ensures the monitoring system has higher viability in harsh environment. The proposed architecture and results demonstrate the feasibility of using Industrial Ethernet to communicate effectively with lower computer terminals with respect to both functions, of monitoring and control. It can adapt to the complex production environment in underground coal mine. Sensor nodes can reconfigure remotely over a wireless network and most of the processing done in software on computer side. The study on real time monitoring of toxic gases and other parameters present in underground mine has analyzed using wireless sensor network. A real time monitoring system is developed to

provide clearer and more point to point perspective of the underground mine. Alarm triggers when sensor values cross the threshold level. This system also stores all the data in the computer for future inspection.

REFERENCES

[1] B. Siliverstovs, D. Herzer, "Manufacturing exports, mining exports and growth: conintegration and causality analysis for Chile (1960 – 2001)", *Applied Economics*, 2007, pp. 153–167.

[2] "Annual Report of Chilean Mining 2014", National Service of Geology and mining, Chile. ISSN: 0066-5096, 2014.

[3] D. Jimenez, "High altitude intermittent chronic exposure: Andean miners", *Hypoxia and the Brain*, 1995, pp.284-91.

[4] H.-Y. Chiu, "Early morning awakening and nonrestorative sleep are associated with increased minor non-fatal accidents during work and leisure time", Accid. Anal. Prev., vol. 71C, pp. 10-14, 2014.

[5] EJ Pino, A Dorner De la Paz, P Equivoque, "Noninvasive monitoring device to evaluate sleep quality at mining facilities", IEEE Transactions on Industry Applications, 51 (1), pp.101-108, 2015

[8] J. B. West, "Oxygen enrichment of room air to improve well-being and productivity at high altitude", *International journal of occupational and environmental health*, 1999,pp. 187-193.

[9] P. Cerretelli, "Gas exchange at high altitude", Pulmonary Gas Exchange vol. 2, 1980, pp.97-147.

[10]C.K.Cowan,A.Bergman ,Determining the camera and light source location for a visual task,IEEE ,10.1109/ADCOM.2015.13.

[11] Cal Lili, Wei Pingjun, GAO hui. A study recovery mechanism using Secondary path in ad-hoc network for coal mine[j]. Communication Technology, 2008, 41(4):149-151. [12] Toby Berger. Spatial channel reuse in wireless sensor network[j]. Wireless Network, 2008,14(2):133-146. [13] YANG Wei, FENG Xisheng, CHENG Shixin, et al. The theories and Key technologies for the new generator mine wireless information System[j]. journal of china coal society, 2004,29(4):506-509. [14] H. Aniss, P.-M.Tardif, et al. Communications network for underground mines based on the IEEE802.1 I and DOCSIS standards[C]. 2004, 5(26):3605-3609. [15] Liubin Li, Guoyi Li, Du Peng, et al. Embedded design of precise Positioning system based in ZigBee and ARM[J]. Electronic Engineer, 2012, 5(1):82-84.

[16] Wanbo Zheng, Yanqing Wu, Chengliang Xie, et al. Research on the key technology of a new mine emergency rescue command and Communication system[j].coal socience and technology. 2009, 37(8): 100-103. [17] N Siemons, A Busch. Measurement and interpretation of Supercritical C02 Sorption on Various Coals[J]. International journal of Coal Geology. 2007, 6(4):229-242.