

# RSSI BASED UNDERGROUND COAL MINE MONITORING AND TRACING SYSTEM USING LABVIEW TECHNIQUE

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**ABSTRACT-**The main aim of this paper is to minimise the disasters of coal mine. This paper presents underground mine environment monitoring system, developed using the Indoor localization systems which is used to locate people inside mines using radio waves and rescue them when they are under threat. The system contains Temperature sensors, Pressure sensors, Heart Beat sensor, Gas sensor, PIC micro controller and NRF Transreceiver. This method is an advanced version of Coal mine monitoring system. The sensors are used to detect the human pulse level and Health conditions also.

**Keywords-** Heart Beat sensor, Pressure sensor, Gas sensor, Temperature sensor, PIC and NRF Transreceiver.

## I.INTRODUCTION

The safe production level of coal mine is still low, especially in recent years, disasters of coal mine occur frequently, which lead to great loss of possession and life, the safety problems of coal mine has gradually become to the focus that the nation and society concern on. The disasters of coal mine happening are due to the complexity of mine environment and the variety of work condition of coal mine, so it is very necessary to monitor mine working environment and also a distance. The various environmental parameters of mine safety monitoring and controlling system, such as methane, carbon monoxide, temperature, oxygen and so on, are currently using the traditional cable transmission.

In recent days monitoring the people has become very difficult in Underground coal mine Systems. By this paper the Human beings can be tracked exactly their locations and their movements can be tracked. If each People is given this device and locations different it will have different frequencies they can be tracked easily. In general we are using RSSI technique. And, Human beings body conditions are monitored by using LABVIEW technology in terms of Graphical Waveforms. This System has good flexibility, Effective and Efficient. RSSI technology, with a long distance, safe and reliable, you can use PIC 16F788A to collect the various parameters of the terminal transmitted to the sensor on the tunnel gateway .

**EXISTING SYSTEM**

**1. ZIGBEE BASED MINE SAFETY MONITORING SYSTEM WITH GSM :**

In this paper a coal mine safety monitoring system based on wireless sensor network, which can improve the level of monitoring productions safety and reduce accident in the coal mine. Zigbee technology provides a direction for scientists who commit to solve the safety monitoring problems of coal mine.

**2. COAL MINES MONITORING AND SECURITY SYSTEM:**

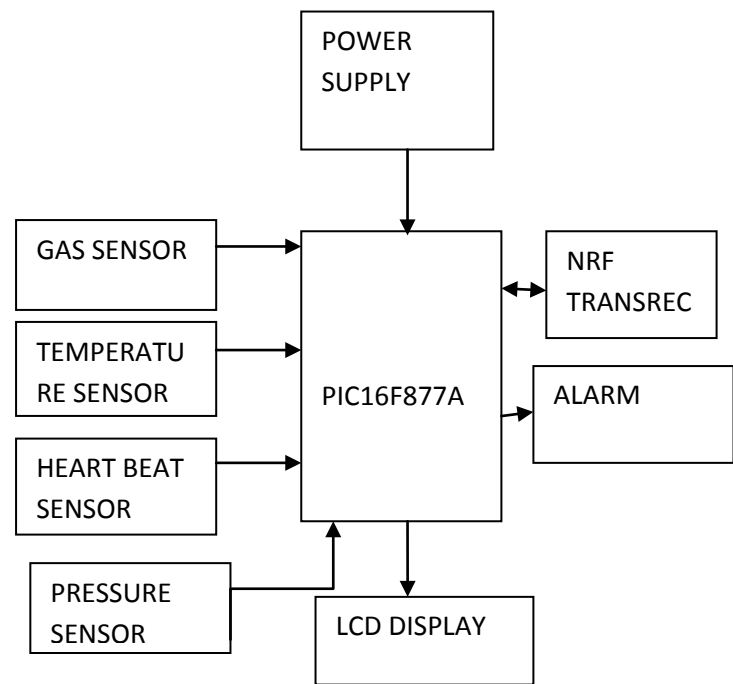
In this paper, ZIGBEE technology and RS485 interface are used to monitor system of coal mine. A wireless sensor network software, which is developed to trace and locate underground miners by sending the alert message to control stations.

**II. PROPOSED SYSTEM**

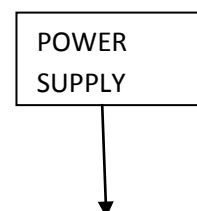
This paper provides a reliable indoor positioning estimates. The Received Signal Strength Indication (RSSI) is the measurement

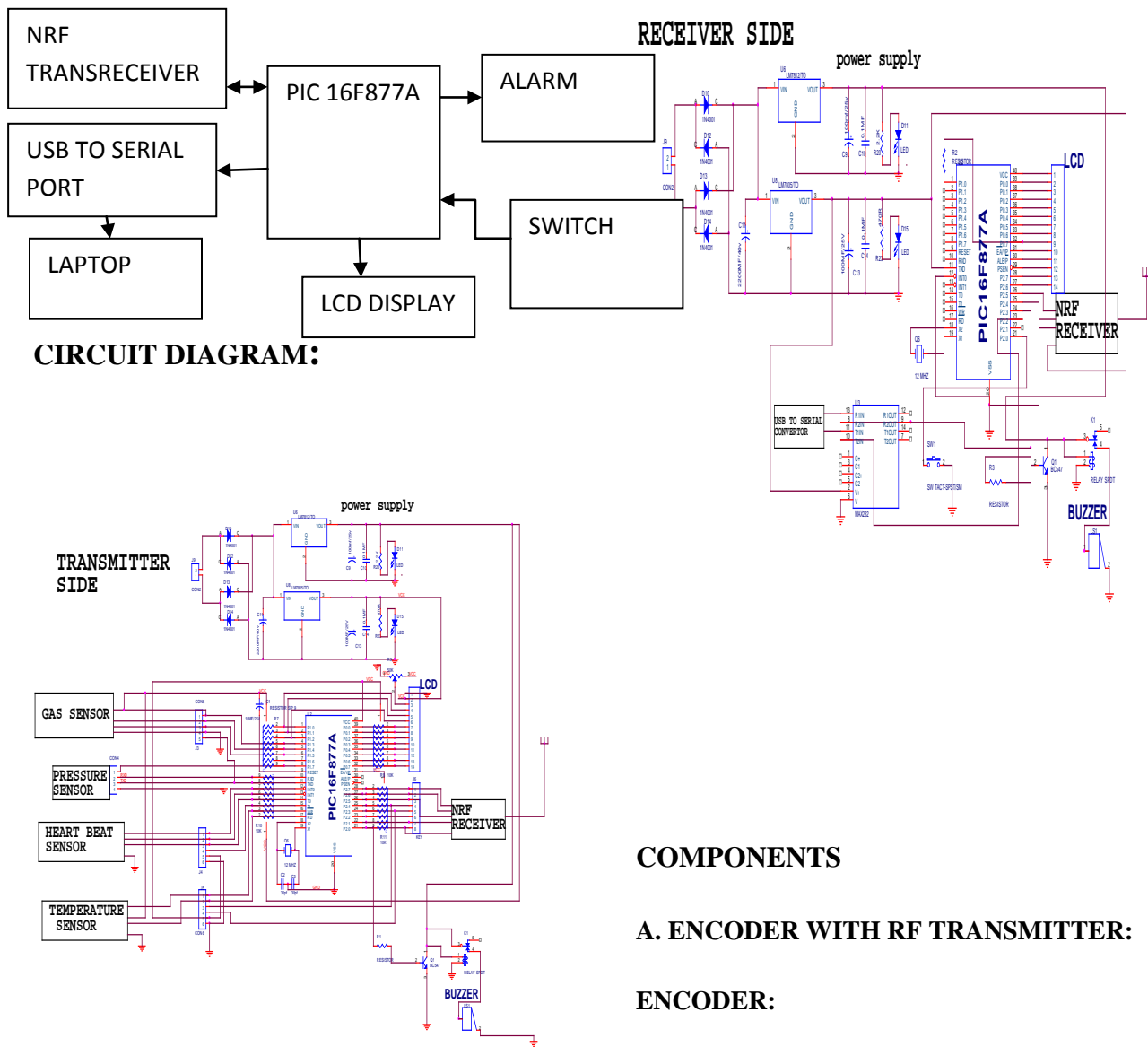
of the power present in a received radio signal. It has commonly been used to estimate the distance between nodes. **RSSI** is a specialised mapping algorithm that converts signal strength to corresponding distance. Decreasing the frequency increases distance and signal strength. Localisation of clients distance, path, using **RSSI** gives accurate measurements. Graphical waveforms are possible by using LABVIEW Technology. If the sensors values exceeds from the threshold value, then the miners are informed through the alarm.

**TRANSMITTER SIDE BLOCK DIAGRAM:**



**RECEIVER SIDE BLOCK DIAGRAM:**





## COMPONENTS

### A. ENCODER WITH RF TRANSMITTER:

#### ENCODER:

In this circuit HT 640 is used as encoder. The  $3^{18}$  encoders are a series of CMOS LSIs for remote control system application. They are capable of encoding 18 bits of information which consists of N address bit and 18-N data bits. Each address/data input is externally trinary programmable if bonded out. It is otherwise set floating internally. Various packages of the  $3^{18}$  encoders offer flexible combination of programmable address/data is transmitted together with the header bits via an RF or an infrared transmission medium upon receipt of a trigger signal. The capability to select a TE trigger type further enhances the

application flexibility of the  $3^{18}$  series of encoders.

### **RF TRANSMITTER:**

When ever the high output pulse is given to base of the transistor BF 494, the transistor is conducting so tank circuit is oscillated. The tank circuit is consists of L2 and C4 generating 433 MHz carrier signal. Then the modulated signal is given LC filter section. After the filtration the RF modulated signal is transmitted through antenna.

### **B.DECODER WITH RF RECEIVER:**

#### **RECEIVER:**

The RF receiver is used to receive the encoded data which is transmitted by the RF transmitter. Then the received data is given to transistor which acts as amplifier. Then the amplified signal is given to carrier demodulator section in which transistor Q1 is turn on and turn off conducting depends on the signal. Due to this the capacitor C14 is charged and discharged so carrier signal is removed and saw tooth signal is appears across the capacitor. Then this saw tooth signal is given to comparator. The comparator circuit is constructed by LM558. The comparator is used to convert the saw tooth signal to exact square pulse. Then the encoded signal is given to decoder in order to get the decoded original signal.

#### **DECODER:**

In this circuit HT648 is used as decoder. The  $3^{18}$  decoder are a series of CMOS LSIs for remote control system application. They are paired with  $3^{18}$  series of encoders. For proper operation a pair of encoder/decoder pair with the same number of address and data format should be selected. The  $3^{18}$  series of decoder receives serial address and data from that series of encoders that are transmitted by a carrier using

an RF or an IR transmission medium. It then compares the serial input data twice continuously with its local address. If no errors or unmatched codes are encountered, the input data codes are decoded and then transferred to the output pins. The VT pin also goes high to indicate a valid transmission.

### **C.THERMISTOR CIRCUIT:**

A thermistor is a type of resistor used to measure temperature changes, relying on the change in its resistance with changing temperature. Thermistor is a combination of the words thermal and resistor. The Thermistor was first invented by Samuel Ruben in 1930, and has U.S. Patent #2,021,491.

If we assume that the relationship between resistance and temperature is linear (i.e. we make a first-order approximation), then we can say that:

$$\Delta R = k\Delta T$$

Wheres

$$\Delta R = \text{change in resistance}$$

$$\Delta T = \text{change in temperature}$$

$$k = \text{first-order temperature coefficient of resistance}$$

Thermistors can be classified into two types depending on the sign of  $k$ . If  $k$  is positive, the resistance increases with increasing temperature, and the device is called a positive temperature coefficient (PTC) thermistor, **Posistor**. If  $k$  is negative, the resistance decreases with increasing temperature, and the device is called a negative temperature coefficient (NTC) thermistor.

### **D.RELAY:**

A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available.

#### **E.ALARM:**

A buzzer or beeper is a signalling device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or game shows. It most commonly consists of a number of switches or sensors connected to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the appropriate button or control panel, and sounds a warning in the form of a continuous or intermittent buzzing or beeping sound.

#### **F.PIC MICROCONTROLLER (16F877A):**

PIC is a general purpose device, which integrates a number of components of a microprocessor system on to single chip. They are smaller in size, consumes less power and inexpensive.

Various PICs offer different kinds of memories. EEPROM, EPROM, FLASH etc. are some of the memories of which FLASH is the most recently developed. Technology that is used in pic16F877A is flash technology, so that data is retained even when the power is switched off. Easy Programming and Erasing are other features of PIC 16F877.

#### **G.BATTERY (ELECTRICITY):**

In electricity, a **battery** is a device consisting of one or more electrochemical cells that convert stored chemical energy into electrical energy.<sup>[1]</sup> Since the invention of the first battery (or "voltaic pile") in 1800 by Alessandro Volta and especially since the technically improved Daniell cell in 1836, batteries have become a common power source for many household and industrial applications.

#### **H.MQ-4 METHANE GAS SENSOR:**

Sensitive material of MQ-4gas sensor is SnO<sub>2</sub>, which has lower conductivity in clean air. When the target combustible gas comes in contact, the sensor's conductivity increases with the gas concentration. Converts the change in conductivity to correspond output signal of gas concentration. MQ-4gas sensor has high sensitivity to Methane, also to Propane and Butane.

#### **I. NRF TRANSRECEIVER:**

NRF Transceiver is a Bi-directional device. It is used to monitor the distance of miners. It discovers the distance of 1000m and its range is 2.4GHz.

#### **WORKING PRINCIPLE:**

This paper presents an underground mine environment monitoring system, developed using indoor localization systems which is used to locate people inside mines using radio waves and rescue them when they are under threat. If any abnormal conditions occur, the switch is pressed to the mine workers on the Receiver side. On the transmitter side, that Danger signal will show on the LCD Display to the miners.

In this paper, an NRF Transceiver is used to measure the miners' distance by using RSSI Technology. It converts the signal strength to corresponding distance of mine workers. PIC16F877A microcontroller is used. The human body conditions detected by the sensors intimate the microcontroller; it sends the data to the NRF Transceiver. This paper's main objective is to minimize the disasters of coal mines.

#### **ADVANTAGES:**

- Life saving.
- Cost effective.
- Digital proof or recorded of entire path for everyone.
- It reduces the previous error and also measures a wide large area.

#### **APPLICATIONS:**

- Coal mining Systems.
- Underground management

- Climatological informations.

#### **SOFTWARE OUTPUT:**

## **II. CONCLUSION**

The objective of the paper is to design, simulate, and assemble a microcontroller-based using RSSI technique. In our paper, it is very useful for locating, measuring distance, and voice over communication. It reduces the previous error and also measures a wide large area and it is a life-saving. It is cost-effective.

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