IOSR Journal of Engineering (IOSR JEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 22-26

Mine Detecting Robot Using Wireless Tecchonology And IOT

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Abstract: *This paper describes a robot using the Wireless technology to detect the coal mine. As the coal mine is a dangerous field, various fatal factors threaten people. Predominantly, it is very dangerous to enter into the tunnel without detecting the environment ahead in time, because the explosion may occur at any time. Aiming to the task, here the rescue robot can be sent to explosion environment and detect gas content and temperature, etc. Meanwhile, the environmental data detected by the robot are sent to the rescuers through SMS using GSM module. Here the Bluetooth wireless technology is used for data communication .Thus the rescuers can make the plan to save the life of miners as soon as possible. So the coal mine detect and rescue robot is a very useful robot in the coal mine disaster.*

Keywords: *Wireless technology, robot, GSM module, SMS, Bluetooth.*

I. Introduction

The robotics is an interdisciplinary branch of engineering and science that includes electronic engineering, mechanical engineering, information engineering, computer engineering and others. A variety of models of an android application controlled robots are made but the problem was always their complexity, their expensive components and their use in productive domains. The most recent researches in robots and prototypes building are directed to far distant controlled technologies using microcontroller and android applications instead of autonomous robots for being more dynamic and their easy maneuverability. The use of robots in the mine detection field from distance can improve gigantically the process, while the beat frequency oscillator for the mine detection mechanism is a new innovation that haven't been explored yet.

In this paper a complete framework presentation of building a low cost robot prototyping based on microcontroller controlled and capable of detecting mines by a designed Beat frequency oscillator system. An underground mining operation proves to be a risky venture as far as the safety and health of workers are concerned. These risks are due to different techniques used for extracting different minerals. The deeper the mine, the greater is the risk. These safety issues are of grave concern especially in case of coal industries. Thus, safety of workers should always be of major consideration in any form of mining, whether it is coal or any other minerals. Underground coal mining involves a higher risk than open pit mining due to the problems of ventilation and potential for collapse. However, the utilization of heavy machinery and the methods performed during excavations result into safety risks in all types of mining. Modern mines often implement several safety procedures, education and training for workers, health and safety standards, which lead to substantial improvements in safety, level both in opencast and underground mining.

A worker in a mine should be able to work under conditions which are safe and healthy for his body. At the same time the environmental conditions should be such as will not impair his working efficiency. This is possible if mine air is nearly the same as on the surface without toxic and inflammable gases. The gases present in the underground mines are flammable gas (CH4), Noxious gases (NO2, NO3, N2O5), Carbon Monoxide (CO), Carbon Dioxide (CO2). Hydrogen Sulphide (H2S), Sulphur Dioxide (SO2). The permissible limit set for these gases are as follows. Underground air should not have more than 0.5% CO2 or other noxious gases. Inflammable gas should be below 0.75% in the general body of return air and below 1.25% at any place in the mine. The general air on road must not normally contain more than 0.005% of CO.

A wired communication system inside underground mines is not effective, efficient, economic and reliable. Due to unexpected roof fall at any moment the entire communication system of the total network may collapse. Effective communication is critical to the success of response and rescue operations; however, unreliable operation of communication systems in high-stress environments is a significant obstacle to achieving this. To improve security, protection and productivity in underground mines, a consistent communication system must be established between personnel, working in the premises of underground mine, and the control room.

A wireless communication system is must for the safety point of view of the personal working inside the underground mines. Therefore a fast, accurate, flexible, and reliable micro controller Wireless network technology is used in our work. The key issue of researches on wireless sensor networks is to balance the energy costs across the whole network and to enhance the robustness in order to extend the survival time of the whole sensor network. 8051 micro controller technology is given preference over others such as Wi-Fi or Li-Fi for establishing of wireless network because it provides a large range of coverage and less fluctuation in the signals.

II. Block Diagram

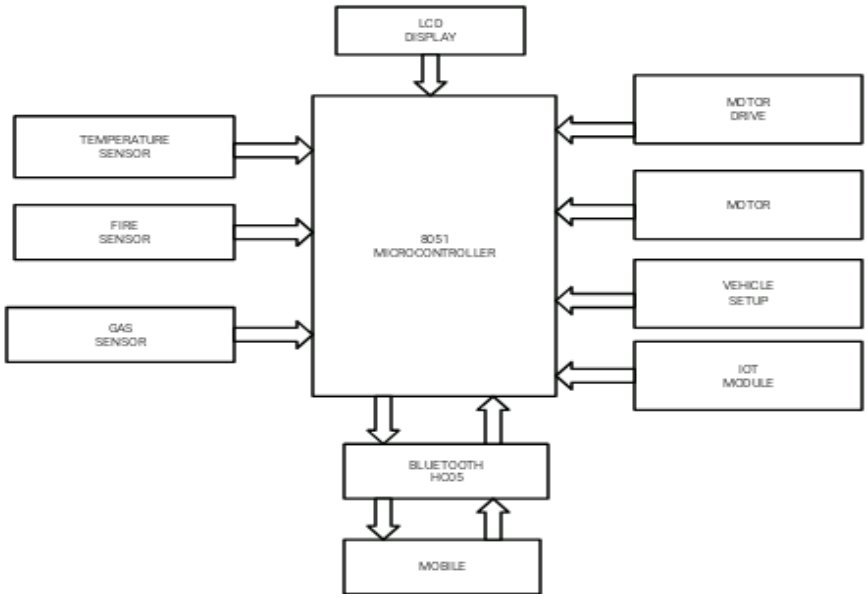


Fig.1: Proposed Block Diagram

2.1 Explanation of Block Diagram

The gas and temperature details are sensed through corresponding sensors, and fed through ADC to the microcontroller unit then the microcontroller unit in turn sends that digital data to control section through Bluetooth communication. Then movements are done through keypad unit, using microcontroller According to the keypad- input the robot is controlled by microcontroller in the robot section. Relays are used to activate the motor according to the give input from the microcontroller. It is shown in Fig.1.

III. Main Block with 8051 Microcontroller

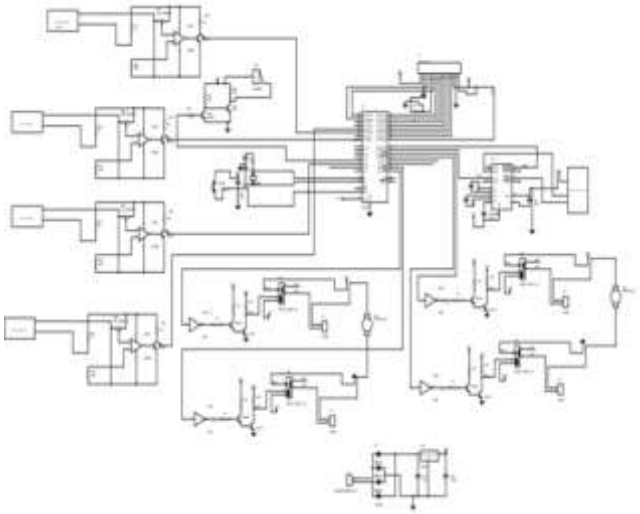


Fig.2: 8051 Microcontroller

3.1 8051 Microcontroller

The 8051 microcontroller is an 8 bit microcontroller it is built with 40 dual inline package microcontrollers are used for variety of applications where it replaces the computer. The usage of this microcomputer for a specific application, in which the microcontrollers as a part of application, is called embedded systems. Embedded systems are used for real time applications with high reliability, accuracy and precision, embedded systems are operated with Real Time Operating systems like WinCE, RT Linux, VxWorks, PSOS, etc. It is shown in Fig.2.

3.2 KEIL C The Keil c software used for 8051 microcontroller, keil Cx51 translates c source files into relocatable object modules which contain full symbolic information for debugging with the µVision Debugger or an in-circuit emulator.

IV. Requirments

4.1 16x2LCD MODULE

Liquid crystal displays (LCDs) have materials which combine the properties of both liquids and crystals. It consists of two glass panels, with the liquid crystal material sand witched in between them. The inner surface of the glass plates is coated with transparent electrodes which define the character, symbols or patterns to be displayed.

4.2 MQ6 GAS MODULE

It is highly sensitive to LPG, iso-butane, propane and less sensitive to alcohol, cooking fume and cigarette smoke. The resistance of the sensitive component changes as the concentration of the target gas changes. The module is shown in fig.3.

Fig.3: MQ6 Gas Module

4.3 Temperature Sensor

Temperature sensor is very important for coal mine worker to have proper temperature to work safely and effectively inside the mines. During working hour due to drilling or blasting inside mines, new surfaces are get opened up which may cause increase or decrease in temperature, so it is very much important to monitor temperature inside the mines. Sensor is shown in Fig.4.

Fig.4: Temperature Sensor

4.4 Bluetooth Module HC-05

HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. The HC-05 Bluetooth Module can be used in a Master or Slave configuration, making it a great solution for wireless communication. This serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Blue core 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

The Bluetooth module HC-05 is a MASTER/SLAVE module. By default the factory setting is SLAVE. The Role of the module (Master or Slave) can be configured only by AT COMMANDS. The slave modules cannot initiate a connection to another Bluetooth device, but can accept connections. Master module can initiate a connection to other devices. The user can use it simply for a serial port replacement to establish connection between MCU and GPS, PC to your embedded project, etc.Bluetooth module is shown in Fig.5.

Fig.5: Bluetooth Module Hc-05

V. DC Motor

A DC motor is designed to run on DC electric power. The most common DC motor types are the brushed and brushless types, which use internal and external commutation respectively to create an oscillating AC current from the DC source—so they are not purely DC machines in a strict sense.

5.1 L293D

The L293D is a quadruple half H-bridge bidirectional motor driver IC that can drive current of up to 600mA with voltage range of 4.5 to 36 volts. It is suitable to drive small DC-Geared motors, bipolar stepper motor etc.

5.2 Voltage Regulator

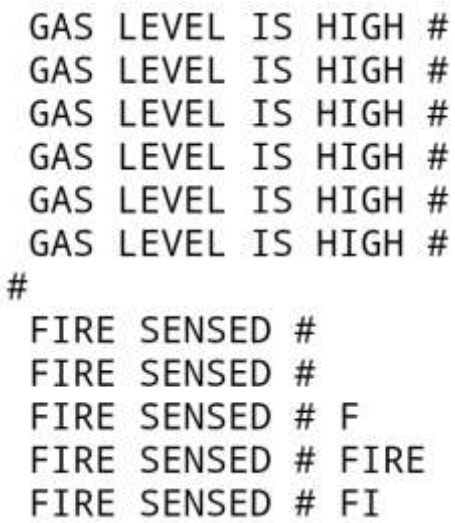
A voltage regulator is an electronic circuit that provides a stable DC voltage independent of the load current, temperature and AC line voltage variations. A voltage regulator may use a simple feed-forward design or may include negative feedback. It may use an electromechanical mechanism, or electronic components. Depending on the design, it may be used to regulate one or more AC or DC voltages. It is shown in Fig.6.

Fig.6: Voltage regulator

VI. Conclusion

In this paper, a framework for designing mine detection units based on a Temperature sensor and Gas sensor is explained. Prototype of a scan and search robots using the Mine detection units is also explained. Then we build an Android application compatible with Smartphone capable of controlling the robot from distance. The robot also includes a servomotor that is placed in the mine detection unit so we can expand the range of search by exploring various angles, and an HC: 05 which is capable of controlling two DC motors in the same time making the wheels of the robot move.

VII. Output Screen



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