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Surveillance of Coal Mine Based On Smart Wireless Network

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ABSTRACT: This paper present about the accidents have been taking place in the coal mines and steps taken to avoid them by the government is immense, yet cannot be controlled . We have designed a system which can prevent these accidents. The aim of this project is to design a system to study on underground Mine workers safety & security measures. The application is well equipped with android application for monitoring and controlling the coal mine and taking certain precautions respectively. Thus we a system named as surveillance of coal mine workers based on smart wireless network.

KEYWORDS: Accidents, underground mining, safety and security, surveillance.

I. INTRODUCTION

Coal is mined in every country which is mainly used to generate electricity. Thousands of mine workers were killed every year. These disasters are takes place in underground coal mine. These disasters are caused mainly due to the leakage of poisonous gas present in the coal. In Coal mines underground condition is poor and mining depth is deep, and also the coal dust, flood, fire, and other which causes serious problems trouble in the development of the mining industry. Coal industry is not only an important pillar of the national energy, but a high-risk industry in the world. Especially developing countries face a poor safety system for mine workers. Hence it requires a system provides which provides a safety factors and good decision making basis for underground environment also motivation for better development of communication infrastructure comes from coal mine accidents. At any time of emergency for the mine workers accurate information of the environmental condition will provide great ease to the rescue team & it can be achieved by proper communication.

II. RELATED WORK

Authors used to acquire the information present in the coal mine and also identified the problems present in the coal mine and identified the system already present and the death rate in the coal mine is not reduced so that the authors design a proposed design already present system is ventilation system, gas pipeline system and there is no alert system so that the proposed design contains the alert design and also the medical emergency system

III. PROBLEM IDENTIFICATION

Coal mining deep underground involves a higher safety risk than coal mined in open cast pits. Primarily the problems associated with mine ventilation, dangerous gasses and the potential for mining collapse. However, there are safety risks associated with all forms of coal mining. Dangerous gas released from the coal seam and surrounding rock strata during the process of mining can present a high risk of explosion. By in healing the dangerous gas workers are dying and also their lung are spoiling by in healing smoke. Not only this but there are many mining accidents are taking place while breaking the coal. Ventilation in coal mine is one of the dangerous situations in the coal mine To solve those problems we proposed a system named as surveillance of coal mine based on smart wireless network

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IV. METHODOLOGY

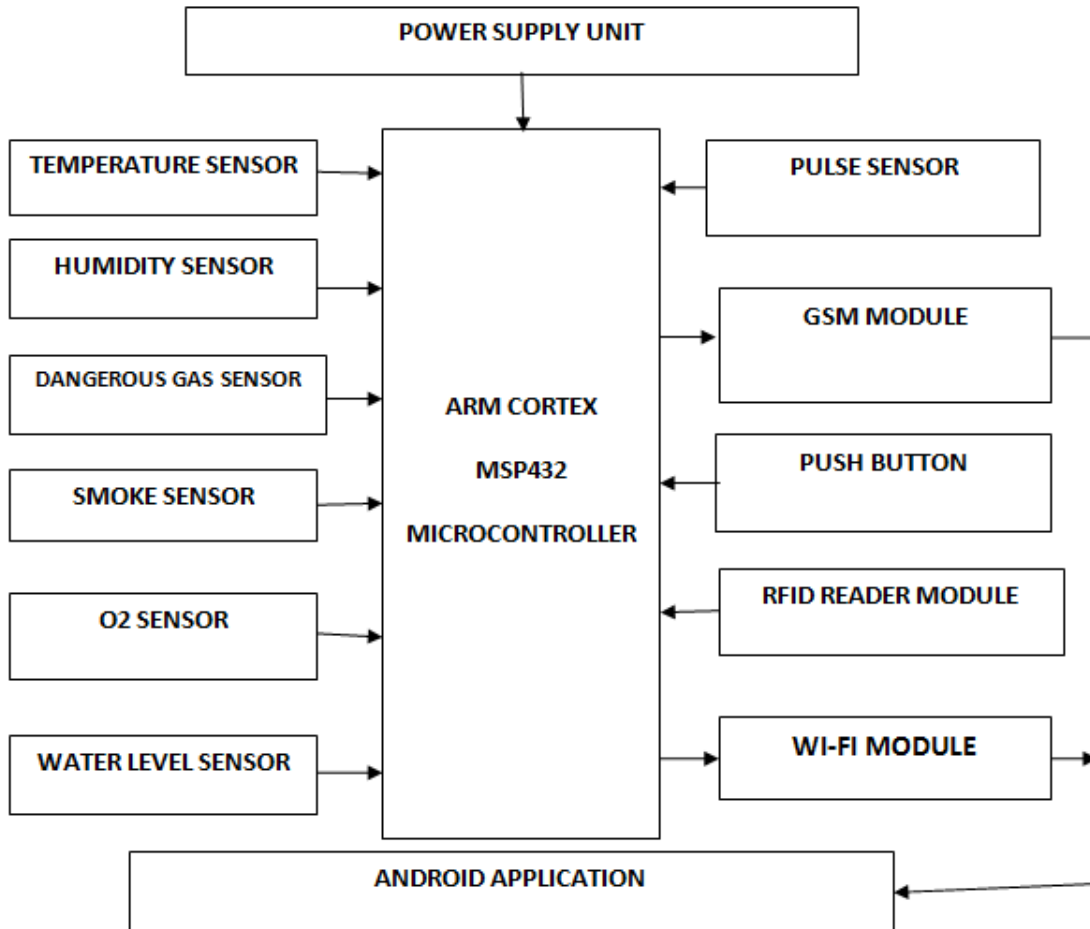


Figure 1 Shows the Methodology of the proposed design.

A. ARM CORTEX MSP432 MICRO CONTROLLER:

The ARM Cortex MSP432 MC is developed by TEXAS instrumentation. The MSP-EXP432P401R Launch Pad developed kit is easy-to-use module for the MSP432P401R microcontroller. It contains everything to start developing on the MSP432 Low- Power, high Performance ARM 32-bit Cortex-M4F microcontroller

(MCU), including onboard debugging programming, debugging, and energy measurements. The MSP432P401R device supports low-power applications that require high increased CPU speed, large memory, and 32-bit performance speed.

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Figure 2 shows the MSP432 Microcontroller.

B. GSM MODEM SIM 900:

GSM/GPRS Modem is Dual Band GSM/GPRS engine- SIM900A, works on operating frequencies 900/ 1800 MHz The Modem is coming with serial interface pins which allow you connect PC as well as microcontroller to connect. The baud rate is configurable from 9600-115200 through AT command. The GSM/GPRS Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS, Voice and DATA transfer application in machine to machine interface. The onboard Regulated Power supply 5v allows you to connect wide range unregulated power supply. Using this modem, you can make audio calls, SMS, Read SMS and internet ect through simple AT commands.

C. SOFTWARE USED IN PROGRAMMING THE PROPOSED DESIGN:

The software used is energia software which is used to develop various embedded c applications. The energia is an open source software. The energia software consists of various launch pads like MSP430, MSP432, CC3200 etc and all these are launch by Texas instrumentation. Energia contains high level libraries and it is IDE software to developed various embedded c applications. In this project software is used to developed for coding the equipment to run according to our use age USB to serial driver are also available

D. DETAILED EXPLAINING ABOUT THE FUNCTIONING OF THE PROPOSED DESIGN :

The project mainly elaborates the design of hardware and software about smart system. The hardware includes a variety of sensors like Gas sensor, water level sensor, O2 sensors, pulse sensor, environment temperature and humidity sensors for automatic system. All these sensors are connected to ARM Cortex Microcontroller – MSP432. The software running on the microcontroller continuously reads the sensor values and compare with threshold values. If any of the parameters are crossing the safety limits, the information needs to be passed outside the mine and also alert has to be made so that the workers can be evacuated. It is not reliable to depend on GSM signals in an underground environment so we create wireless network to communicate the information outside the mine. Also in the medical emergency situation of any worker, the workers can send a service request message outside by simply pressing a push button provided in the system. All this can be view by using android application.

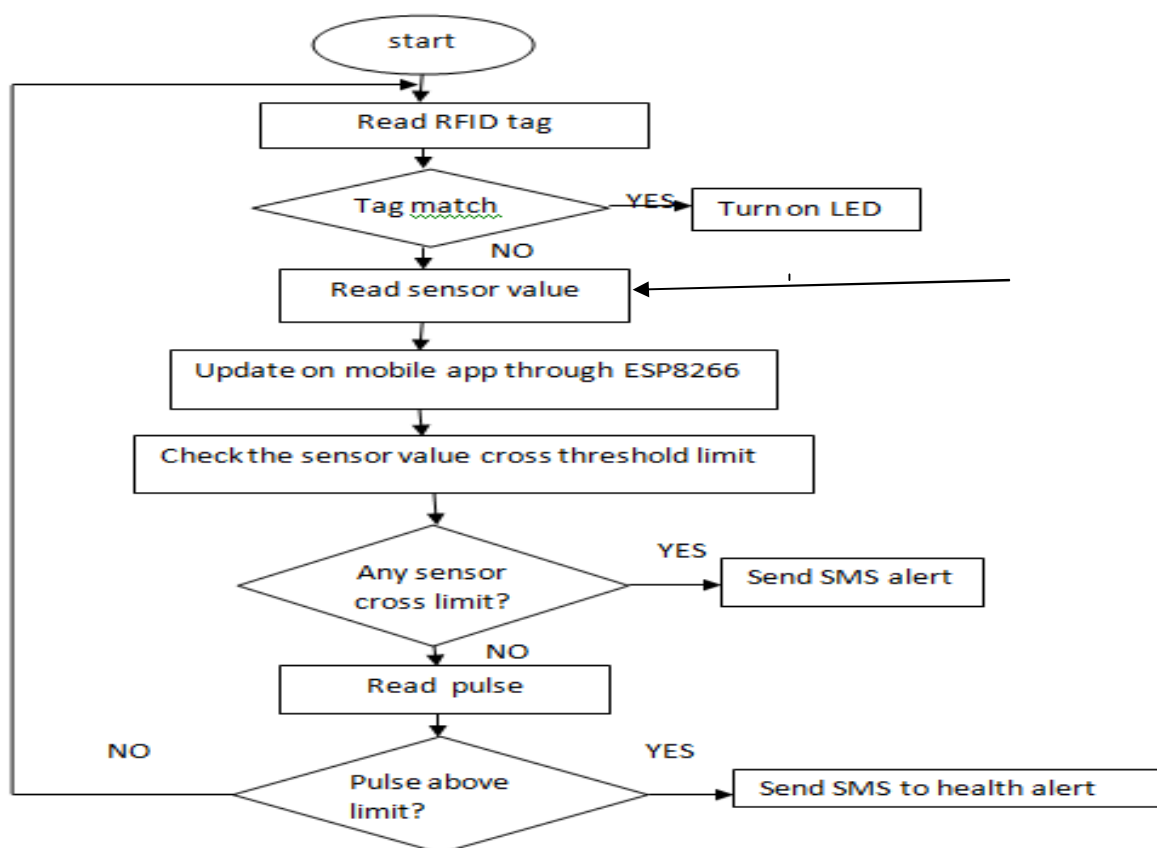
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V. PROPOSED DESIGN FLOW CHART



VI. RESULT

The proposed design it consists of several modules interfaced with microcontroller shown in figure 3(a). Here the first process is we want to keep RFID Tag near to the RFID READER module then it accepts 12 character memory from rd id due to EM waves. Then the green light LED will glow then sensors readings will be continuously updated through mobile app by using ESP8266 .If any parameter cross its limit immediately the message send through coal mine monitoring people. If worker need any emergency immediately the message send through nearby ambulance including coal mine monitoring worker.

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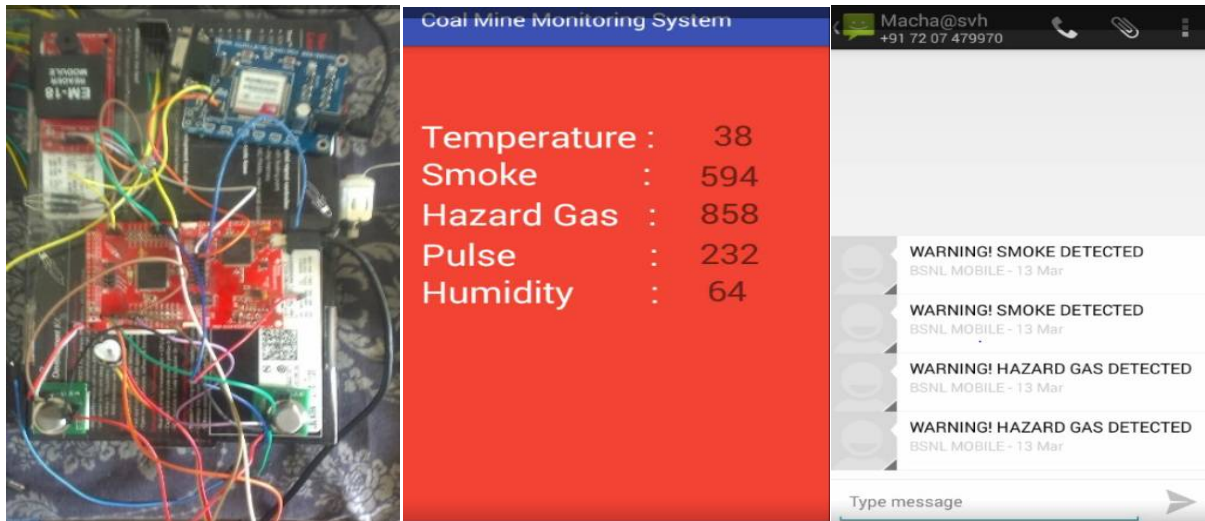


Figure 3(a)

Figure 3(b)

Figure 3(c)

Figure 3(a), 3(b), 3(c) shows the result of the proposed design. Figure 3(a) shows the resulting kit for the proposed design. Figure 3(b) shows the result in the android application. All sensor value will update very frequently and fast if any parameter cross the limit the message will sent through the mobile which was shown in figure 3(c).

VII. CONCLUSION

The Project that we design about to solve the problem in the under coal mine. Power is also one of the factor in increasing of technology mainly power is generated by using coal. people working in coal mine faces several problem like breathing, environment condition mostly in underground coal mine. our project mainly concentrate upon those above problems. To reduce those problems we design a system named as surveillance of coal mine.

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