Coal Mine Detection using Embedded System

R.Aswini, Jyothi.K.G, Neethu Johny and Prof.R.Gayathri

***Abstract:*-Using embedded system this paper monitors the presence of human beings in the coal mines. The method utilizes PIR Sensors, Microcontroller, MIWI technology, Zigbee to realize the operational parameter and intelligent monitored management of entire mining area. Embedded systems are controlled by one or more main processing cores that are microcontrollers. The key characteristic, however, is being dedicated to handle a particular task, which may require very powerful processing systems. If the presence of any human being is detected, then the micro controller transfers the signals to the PC (control room).**

Keywords: **Micro controller, PIR sensors, MIWI, Human Detection.**

I .INTRODUCTION

In coal mine, security system is needed for human beings and for improving production because a coal enterprise is a high risk profession and technique. Here there is an unique example of mobile robots with embedded systems, from introductory to intermediate level. It is structured in three parts, dealing with embedded systems (hardware and software design, actuators, sensors, PID control, multitasking, mobile robot design (driving, balancing, walking and flying robots) and mobile robots applications. The embedded system is dedicated to specific tasks, design engineers can optimize it to reduce the size and cost of the product and increase the reliability and performance. This is the project which has been developed to detect the human in the restricted places, leakage of any hazardous gases and temperature sensors.

This paper was developed to monitor the presence of human beings. This is done by PIR sensors which are used to sense the human beings. There is also temperature sensor as well as gas sensors which are placed in the robot to improve the efficiency.

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In summary, coal mine detection using embedded system is a significant measure to safeguard the protection in a coal mine. It plays the role of disaster prevention and reduction in mine, as well as improves the productivity. The goal of this work is to summarize the existing solutions from various disciplines, to guide the creation of new system points towards future research directions.

II. SYSTEM SUMMARIZATION

Coal mine detection using embedded system mainly monitors the parameter in coal mine like gas, temperature as well as human beings. The author [5] has also proposed about the human count, location and track. Some major units involved are

1. Hardware part of the system comprises sensors, microcontroller (AT89S52), relay, robotic model.

2. Software part of the system is MC lab and Keil C.

III. SYSTEM HARDWARE STRUCTURE

The system hardware consists of a transmitter and receiver. Transmitter system involves power supply unit, sensors (pressure, PIR, temperature, gas), UART, MIWI, driver circuits. The received signal can be observed in PC.

A. BASIC STRUCTURE OF ROBOTIC MODEL

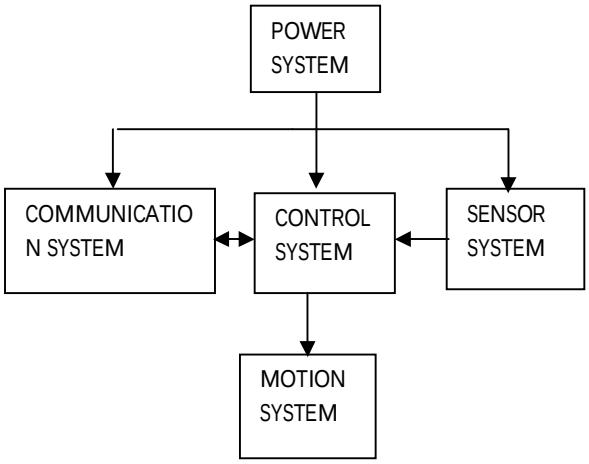

Fig.1 Basic structure of robotic model

Basically robotic model composed of power system, communication system, sensor system, control system, motion system [1].The authors have used this technology to derive the basic structure. Motion system is the trolley having all the components and a driver circuit. The

communication system mainly involves the ZIGBEE which is used for wireless communication with other robots or a base station, which is concluded in [4]. Through this, wireless communication information can be easily shared between the robots, which lead to efficient context awareness for a large scale region.

B. TRANSMITTER CIRCUIT

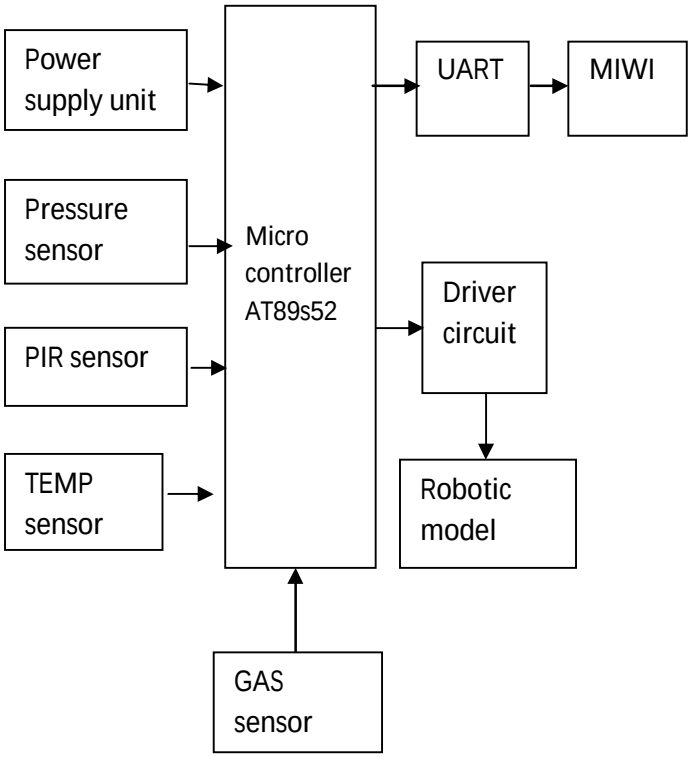

Fig.2. Transmitter

C. SENDING MESSAGES

The most important functionality of a wireless node is to communicate, or send and receive data. All protocols have reserved buffers for the data transfer, with the size equal or larger than TX_BUFFER_SIZE defined in the configuration file. Two functions are defined to manage the TX buffer in the stack: The function MiApp_FlushTx is used to reset the pointer of the transmission buffer in the stack. It has no parameter and no return value.

D. RECEIVER

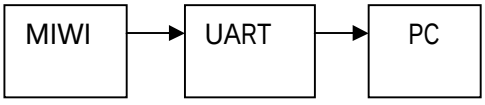

Fig.3. Receiver

E. RECEIVING MESSAGES

The other important functionality of the transceiver is to receive messages. The application layer needs to know when a message is received, the content of the message and, occasionally, how the message is received. The application layer also needs to discard the message so resources can be released and new messages can be received and processed.

IV. HARDWARE MODULE

A. ABOUT EMBEDDED TECHNOLOGY

Each day, our lives become more dependent on 'embedded system', digital information technology that is embedded in our environment. It includes not only safety-critical applications such as automotive devices and controls, railways, aircraft, aerospace and medical devices, but also communications, 'mobile worlds' and 'e-world', the 'smart' home, clothes, factories etc. All of these have wide-ranging impacts on society, including security, privacy and modes of working and living. More than 98% of processors applied today are in embedded systems, and are no longer visible to the customer as 'computers' in the ordinary sense. A new processor has been proposed[4] for the novel methods of processing, sensors, actuator, communication and infrastructures that are 'enabling' this pervasive computing. They are in a sense ubiquitous.

Embedded systems market will soon be larger than that for general purpose computing. The desktop market is stagnating; the embedded systems market is flourishing.

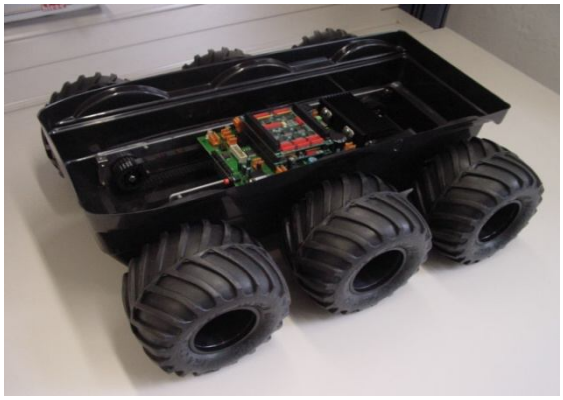

Fig.4.Trolley model

V. SOFTWARE MODULE

A. INTRODUCTION TO KEIL

The use of C language to program microcontrollers is becoming too common. And most of the time it's not easy to build an application in assembly which instead you can make easily in C. So it's important that you know C language for microcontroller which is commonly known as Embedded C.

Microcontroller Architecture support every level of software developer from the professional applications engineer to the student just learning about embedded software development. The industry-standard Keil C

Compilers, Macro Assemblers, Debuggers, Real-time Kernels, Single-board Computers, and Emulators support all 8051 derivatives and help you get your projects completed on schedule.

VI. SENSOR ALGORITHM

STEP1:

Start the program.

STEP2:

Assign the values for read, write,
Enable ports.

STEP3:

If enable=1 and set=0, condition is satisfied, first gas sensor operates for 100 seconds.

STEP4:

After 100 seconds reset occurs when enable=1 and set=1.

STEP5:

If enable=1 and set=0, condition is satisfied, at second temperature sensor operates for 100 second.

STEP6:

After 100 seconds reset occurs when enable=1 and set=1.

STEP7:

If enable=1 and set=0, condition is satisfied, at third PIR sensor operates for 100 seconds. It can sense for a distance of 5 to 6 meters.

STEP8:

After 100 seconds reset occurs when enable=1 and set=1.

STEP9:

If enable=1 and set=0, condition is satisfied, at last pressure sensor operates for 100 seconds.

STEP10:

After 100 seconds reset occurs when enable=1 and set=1.

STEP11:

In while loop four statements will be called i.e., initial, abnormal and normal.

STEP12:

If any one of the four sensors reaches the abnormal value, information will be sent to PC display.

STEP13:

The sensors again start their operation after a delay of 100 seconds by reset simultaneously after one another.

STEP14:

Stop the program.

VII. DISCUSSION

EXISTING SYSTEM:

TITLE	PROPOSED	METHOD	ADVANTAGE	OUTPUT
An intelligent coal mine security system using multi-view method	A novel monitors method for the middle and small scale coal mine.	Multiview method.	1.Real time data warning	It can distinguish security, warning and the dangerous situation with the form of sound animation, colour change and messages suggest managers to take timely measures.

Design of advanced computer controlled GPS assisted integrated unmanned robotic ground vehicle for defence operation	Self navigating system with robot to perform tasks where men cannot carry out.	Surveillance system with robotic plat form with self navigating method.	The paper delivers an entirely novel technique for nullifying the terror activities inside the building.	The designed robot vehicle has the potentialities to uproot terrorism instead of facing it and it is dedicated to save brave hearts to nation.
A rescue robot control architecture ensuring safe semi autonomous operation	The safe operation of robots under semi autonomous control of software architecture.	Standard internet/intra net technologies and cube system.	A good trade off between completely remotely operated devices and full autonomy.	All control and services are used to compute video compression.
Multi robot mapping strategy and localization	A simultaneous method of explorations which uses tactile sensors and inter robot distance measurement.	Embedded system with simulation.	1. The exploration technique expounded its independence of GPS, odometry and obstacle recognition.	1.Multitasking 2. Robots distribute themselves among obstacles in a complex environment.

PROPOSED SYSTEM:

Coal mine detection using Embedded system	**Using PIR sensors and MIWI wireless technology for sensing the presence of human in a coal mine**	**Embedded system**	**1. Affordable cost. 2. Easy to manufacture and maintain.**	**System is implemented in coal mines for rescue purpose.**

VIII. CONCLUSION

For wireless application developers who are looking for a short range, low data rate solution, the requirements differ from point to point communication to routing messages across several hops.

The MiApp specification from microchip provides a low-cost and low-complexity solution to address nearly all those applications. It enables the wireless application developer to use Microchip's proprietary wireless protocols with little or no modification in the migration path. Working with MiMAC at the lower layer indirectly enables developers to choose any existing and future RF transceivers supported by Microchip. It is highly recommended that the readers of this application note also read application note "Microchip Wireless (MiWi™) Media Access Controller – MiMAC" (AN1283) to understand the total solution available for wireless applications from Microchip. Standardization of the lower MAC layer as MiMAC and the higher application layer as MiApp offers wireless application developers maximum flexibility in the software development process.

REFERENCES

[1] C.D Bhos and Prof.J.G.Rana (2009) 'Coal Mine Rescue Robot' published in IEEE International Conference.

[2] Bejczy, A. K. 'Smart hand systems for robotics and tele operation', Proceedings of the Sixth CISM-IF To MM Symposium on Theory and Practice of Robots and Manipulators, Hermes Publishing.

[3] Ms.Warsha.M.Coudari 'An intelligent coal mine security system using multi view method-International journal of advanced engineering science and tech vol no.3.

[4] T.Karthick and S.Kohila 'The paradigm of GPS based Unmanned Robotic Ground Vehicle'-http:// www.springerlink.com /

[5] Andresa Savvides 'A survey of human sensing methods for detecting presence count, location, track and identity'-International journal vol no.2.

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