International Journal of Pure and Applied Mathematics
Volume 118 No. 24 2018
ISSN: 1314-3395 (on-line version)
url: http://www.acadpubl.eu/hub/
Special Issue

http://www.acadpubl.eu/hub/

AUTOMATIC PATH FINDER CO-RELATED WITH CO &CH4 DETECTOR

Vijayalakshmi (APSRMIST)
of Electrical & Electronic Engineering,
SRM instution of science and technology,
Ramapuram,chennai,tamil nadu.
Vijik.rk@gmail.com
Akshai.k.n.b, Eshwar.p.m, Jeevanandham.s,
Ganesh kumaran,
of Electrical & Electronic Engineering,
SRM instution of science and technology,
Ramapuram,chennai,tamil nadu.
akshai065@gmail.com

May 9, 2018

Abstract

This paper discuss about the design considerations of automatic path finding using rover and other detection of poisonous gases, which creates hazardous effects in mines. The gas detection is done using respective sensors and data are saved for analysis. The temperature sensors are also used to indicate an alarm-based warning system to avoid unexpected accidents. In the existing model similar detection is done with the manual operation of the rover. In this proposed paper the combination of automatic path finding, detection of poisonous gases, distance and change in temperature are also performed. The results are simulated using Proteus 8 software and Arduino controller is used with embedded programming model.

***Key Words*:**Rover, CH4 sensor, CO sensor, PIR sensor, ATMEGA16, Ultrasonic sensor.

1 INTRODUCTION

The poisonous gas explosion in mines is very serious issues need to be addressed to save human lives and its economy. A automated analyzing method for underground coal mines are discussed in [1]. In this paper we have improved the analyzing accuracy and robustness in object and gas detection. We have used a ir array sensor to calculate and estimate the path belongings. In [2] the robot is named as automatic path finder which is operates on its own using ir, ultra-sonic sensors. Human safety should be given first priority so the system is designed according to that using sensor and ATmega16. Proteus software is used to simulate the results along with Arduino controller with its programming techniques. In [3] they have used manual control using Wi-Fi interface which limits the distance of its capability.

2 TECHNOLOGY TO REAL LIFE AND IMPLEMENT IT.

Nowadays technology play the important role in human life. Throughout birth to death. They some are good technology and some are bad, but everyone knows that its blamed because of the person use. In a good way we are here to produce a part of technology which can same lifes, we just made a slight change to the old thesis which brings the huge development to the work.

3 BLOCK DIAGRAM

A. EXISTING BLOCK DIAGRAM

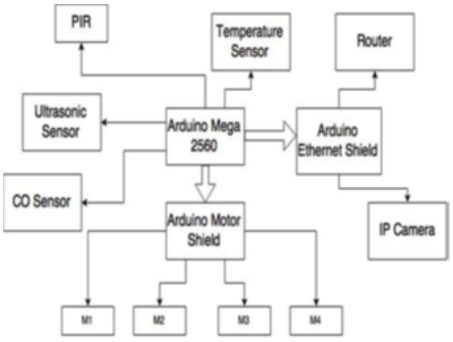

Fig.1. Existing block diagram

In proposed thesis the movement was controlled by Wi-Fi interference manually. using a web browser. and mq-4 sensor is used. and done in Arduino. Due to WIFI control the will be a delay when the its in the end of the WIFI coverage area. B. PROPOSED BLOCK DIAGRAM

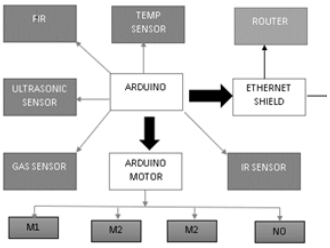

Fig. 2. Proposed model

In the proposed model the detection of gases are done and the path finding is done automatically.

4 WORKING SYSTEM

The detailed functioning of the systems will be discussed here with the description of all the subsystems. The functioning of every subsystem built with the necessary components will be described. The whole robotic system can be divided into three sections.

A. Robots Movement Control:

To control the Robots movement there are 2 DC motors which are controlled by l293d. The l293d is programmed in such a way that if it is instructed to drive the motors in a specific direction then it sends instructions to the motors to be rotated in that specific direction. There is necessity for an intermediate device between microcontroller and DC motors. This device is called L293D.

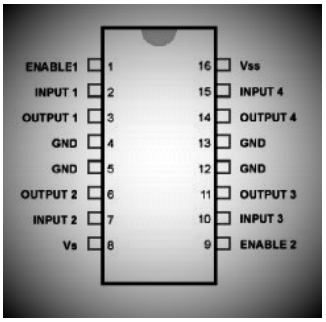

Fig. 3. Motor Driver Circuit layout

Motor driver ic receives that signal and drive the motors according to the instructed directions. Motor driver icCs L293D.

A motor driver IC is an integrated circuit chip which is usually used to control the operation of the motors in autonomous robots. Motor driver ICs plays a role of an interface between microprocessors in robots and the motors in the robot. The most commonly used motor driver ICs are rather L293 series such as L293D, L293NE, etc. In Arduino motor shield which has been used in this project consists of two293D motor driver ICs. The L293D ICs have the capability to control 2 DC motors simultaneously. These ICs are quadruple high-current half-H drivers which are fabricated in such a way that it can provide bidirectional drive currents of up to 600 MA at voltages from 4.5 V to 36 V. L293D has 16 pins. The pin configuration of L293D is shown below.

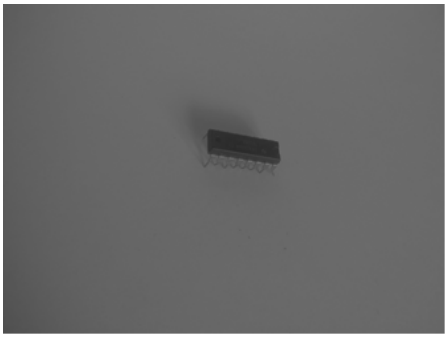

Fig. 4. Configuration of L293D Motor Driver IC.

Motor Driver ICs are primarily used in autonomous robotics only. Current cannot be delivered to the motors from the microcontroller directly. The intermediate device is the L293D ICs. It can receive instruction signal from the microcontroller which has very low power. As motors need very high power to be operated this power is provided by the L293D.The L293D IC receives signals from the microcontroller and transmits the relative signal to the motors. The L293D switches it output signal according to the input received from the microprocessor. If the microcontroller sends a 1(digital high) to the Input Pin of L293D, then the L293D transmits a 1(digital high) to the motor from its Output Pin. This Output signals actually, carries the power by which the motor will be driven. The L293D is a 16 pin IC, with eight pins, on each side, dedicated to the controlling of a motor. There are 2 INPUT pins, 2 OUTPUT pins and 1 ENABLE pin for each motor the power applied to the motor can be controlled by varying the width of these applied pulses and thereby varying the average DC voltage provided to the motors ends.

By modulating the timing of these pulses, the speed of the motor can be controlled, i.e., the longer the pulse is ON, the faster the motor will rotate and likewise, the shorter the pulse is ON the slower the motor will rotate.

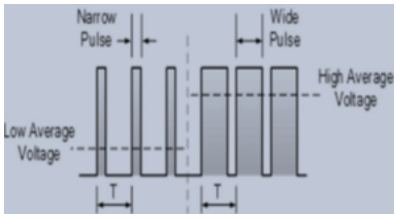

Fig. 5. Pulse Width Modulation.

The frequency of the pulses is controlled from the central microcontroller by transmitting instruction pulses to the motor driver IC as well as the motor shield. Thus, the motor is driven and the speed of the motor is also controlled.

B. Sensor System

4.1 Ultrasonic Distance Sensor:

It works on ultrasonic sounds. It measures the distance of the object or obstacles ahead of it. It sends an ultrasound signal to the object. This signal is reflected from the object and reaches the sensor again. The sensor detects the time between it emits a signal and receives the reflected signal. We know the speed of sound in air medium. So, from this time the distance of the object can be measured easily.

Fig. 7. Ultrasonic distance sensor.

4.2 PIR motion Sensor:

PIR (Passive Infra-Red) motion sensor detects any motion of objects in front of it. Typically motion sensor is consists of two slots.

Each slot is built with IR sensitive material. In normal mode that means if there is no motion in front of the sensor both slots sense the same? Amount of IR radiated from the surrounding environment. When any animal such as human passes by the sensor it covers the half of the sensor that means one slot of the sensor. So, one slot of the sensor senses a different amount of IR than the other slot senses. Thus, PIR sensor detects the motion.

Fig. 8. PIR motion sensor.

4.3 Temperature Sensor:

The temperature of surrounding environment will be sensed by temperature sensor. Its resistance is linearly dependent on the temperature. So, increase in the surrounding temperature changes its resistance and the microcontroller senses the changing in resistance. Depending on the changes it can give us the temperature reading.

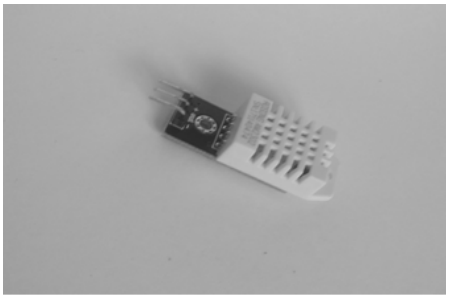

Fig. 9. LM 35 linear temperature sensor

4.4 CarbonMonoxidesensor:

The carbon monoxide sensormq-7 is manufactured with AL203 ceramic tube, Tin dioxide sensitive layer, measuring electrode and heater. When 5V is applied to the sensor the heater is heated and becomes sensitive to CO gas. The surface resistance changes with the changes in the density of CO gas. Thus, this sensor detects the amount of CO gas in the environment.

Fig. 10. MQ7 Carbon Monoxide Sensor

4.5 Meathane sensor:

The methane senor mq-4 is composed by micro AL2O3 ceramic tube, Tin Dioxide (SnO2) sensitive layer, measuring electrode and heater are fixed into a crust made by plastic and stainless-steel net. The heater provides necessary work conditions for work of sensitive components. The enveloped MQ-4 have 6 pins ,4 of them are used to fetch signals, and other 2 are used for providing heating current.

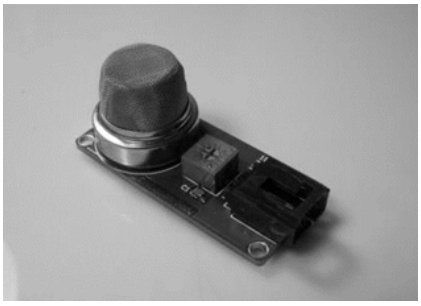

Fig. 11. MQ4 methane Sensor

All these sensors will be directly connected with the central microcontroller at mega 16 and send the output to the MCU.

4.6 Ir array sensor:

The IR sensor is used to find the obstacle in the path just like ultra-sonic sensor. It can switch place with ultra-sonic sensor.

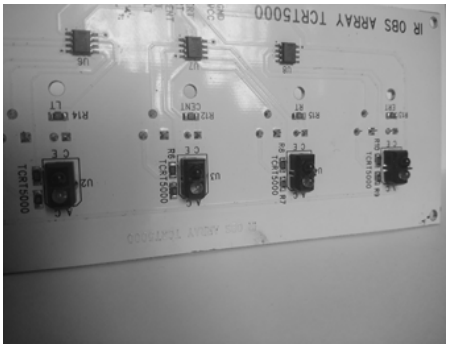

Fig. 11. IR array

C. Communication System

The designed robot is a rover so it should be controlled wirelessly. The design plan is to get the output with Wi-Fi. A web page is developed and all the sensors outputs are shown in the webpage. An Ethernet shields allows us to access this webpage. A router is also needed to create a Wireless PAN (Private Area Network). Ethernet shield is connected to router with UTP cable. The Ethernet shield is directly connected with the Arduino. This Ethernet shield is assigned an IP (Internet Protocol) address and a MAC (Media Access Control) address. From the client, PC/Smartphone it is possible to be connected with the PAN created by the router. Now the webpage can be accessed into the Ethernet Shield. From this webpage, the instructions will be given. Ethernet shield will receive these instructions through the router and will send these to the Arduino. Then Arduino will instruct Motor shield to operate the motors. The data collected by the sensors flows into the Arduino and Arduino sends these data to the client PC through the Ethernet shield and the router. A night vision IP camera will be in the robotic system. This camera will be assigned an IP address and will be connected to the PAN. The video images can be collected through the router. And an lcd display is also attached so that sensor readings will be displayed in robot itself.

5 SIMULATION AND GRAPH

The simulation is done using Proteus ISIS software

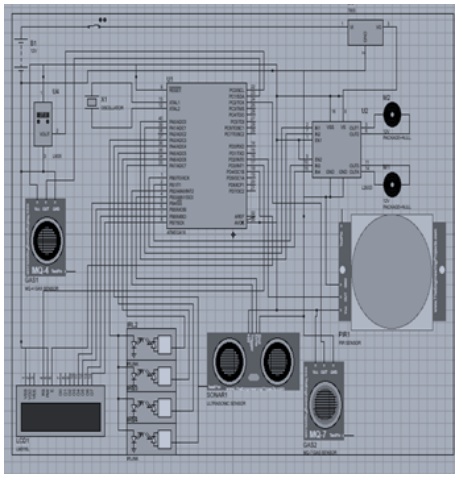

Fig. 11. Schematic Diagram

The above schematic circuit consist of the proposed circuit model. The results of the working model are then converted into graph and the following plots were obtained. The values were based on the test run in a construction site near a busy roadway.

5.1 Temperature variation

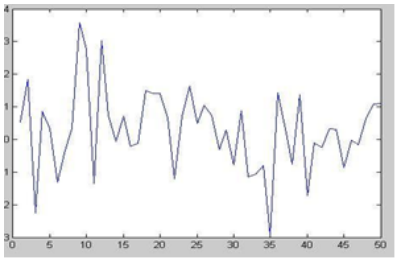

Fig. 12. Temperature plot

5.2 CO_2 variation and CO variation

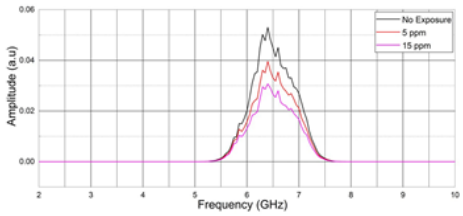

Fig. 13. CO2 and CO Plot

The finalized project might looks like the ones below

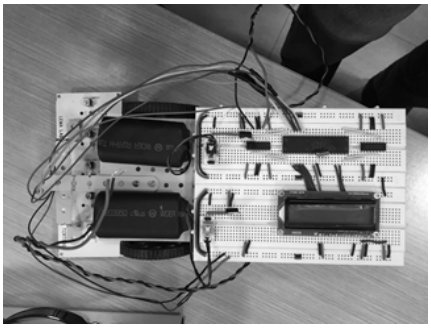

Fig. 14. Hardware top view

The final hardware is complete with a power supply of 18 volts (9+9) connected to two separate bread board with voltage regulators. The integrated IR panel was a curtesy of Lema labs from IIT Madras.

6 CONCLUSION

We have achieved our goal of implementing a cost effective surveillance rover system which can detect humans by monitoring their motion and detect poisonous gases so that it can help find helpless people in danger where humans cannot go and search for them. Multiple ways were found to implement the project but the best and effective method was chosen, where the main objective was to make a better and useful rover within a limited cost. The sensors used are carbon dioxide, carbon monoxide and hydrocarbons detecting sensors where carbon dioxide (CO2) emission is the major

cause for global warming. Whenever there is an increase in the level of these parameters the sensors detect the situation and an alarm or indication is given.

7 FUTUTE WORK

This system is monitoring only three parameters and hence can be expanded by considering more parameters that increases the risks. This system gives availability of viewing the sensor outputs through internet. It can be made to control the emissions by giving commands from distance. Many pollutants do not have sensors that sense them if available they are very expensive and hence building sensors for different parameters might be a future and very challenging task. Might give an holographic path output.

References

[1] D. Patrnabis. Sensors and transducers, Second edition.

[2] CunoPfister Getting Started with the Internet of Things First edition -17 May 2011

[3] MQ-7 Data Sheet

[4] MQ-2 Data Sheet

[5] MQ- 135 Data Sheet

[6] Olsthoorn X. CO2 emissions from international aviation: 19502050, Journal of Air Transportation Management, vol. 7, pp. 8793, 2001.

[7] Wikipedia,'Carbonmonoxide. https://en.wikipedia.org/wiki/Carbon_monoxide.

[8] http://www.ranaplaza-arrangement.org/.

[9] Labourbehindthelabel.org, 'Bangladesh building collapse kills over 1100workers: Primark and Mango labels found'.

[10] http://www.Labourbehindthelabel.org/news/item/1140-bangladeshbuilding- collapse-kills-over-80-workers-primark-and-mango-labelsfound.

[11] India-forums.com, 'One killed, several trapped in Bangladesh coal mine accident', 2010. http://www.india-forums.com/news/bangladesh/ 247744-one-killed-several-trapped-in-bangladesh-coal-mine-accident.html.

[12] J. K. Petersen, Handbook of Surveillance Technologies, 3rd ed. United States of America, 2012, pp. 495.

[13] J. K. Petersen, Handbook of Surveillance Technologies, 3rd ed. United States of America, 2012, pp. 494.

[14] A. Subramanian, Ramkumar, G. P. Rao, Sudarsan, and R. Jayabharathi, Semi-autonomous underwater surveillance robot, International Journal of Electronic and Electrical Engineering, vol. 7, no. 1, pp. 13-

[15] Atmega16 Data sheet.

[16] Lema labs, an extension of IIT Madras project inspiration