

AUTOMATIC FIRE EXTINGUISHING ROBOTIC VEHICLE

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Abstract— Fire disaster is a common threat to lives and property. An automatic fire extinguishing strategy provides real time monitoring, exploration and programmed fire alarm. This paper present the design of a low cost, robust and secure fire protection system for buildings. Its sends early alarm when the fire occurs and help to reduce the fire damage. This system consist of a smoke detector and a temperature sensor whose outputs are connected to the controller. The system takes into account the density of smoke and thus the probability of false alarms can be avoided.

An ATMEGA 328 microcontroller is used here to control the total arrangement and the test results through hardware prototype show that the validity of proposed approach which achieves design requirements as well as increase system reliability

Index Terms—Analog to Digital Converter,Advanced Virtual RISC,Fire Fighting Mobile Robot,Infra Red,Local Oscillator

1. INTRODUCTION

THIS Robot is defined as a mechanical design that is capable of performing human tasks or behaving in a human like manner. Building a robot requires expertise and complex programming. It's about building system and putting together motors,ame sensor,wires among other important components.A firefighter robot is one that has a small fire extinguisher added to it.By attaching a small fire extinguisher to the robot,the automation put out the fire by human controlling.This paper covers the design and construction of a robot that is able to sense and extinguish fire.Fire fighters face risky situations when extinguishing fires and rescuing victims,it is an inevitable part of being a fire fighter.In contrast,a robot can function by it self or be controlled from a distance,which means that fire fighting and rescue activity could be executed with out putting fire fighters at risk by using robot technology instead.In other words,robot decrease the need for fire fightersto get into dangerous situations.This robot provides fire protection when there is are in tunnel or an industry by using automatic control of of robot by the use of micro controller in order to reduced loss of life and property damage.This Robot uses dc motors,caster wheel,micro controller,sensors,pump and sprinkler.

2. EXPERIMENTAL DESCRIPTION

2.1 Project Description

The proposed system is to design and construct an automatic fire extinguishing robotic vehicle using low cost and locally available materials. This is done by using a gas sensor ,IR module which senses the intensity of the fire.The robot senses the fire by using two sensors ,one gas sensor MQ6 to detect gas or smoke and sends the message to the ATMEGA328 which is the controlling part of robot and an IR module which transmit IR rays and according to the intensity,the flame is detected.An Ultrasonic sensor which generates an ultra sound waves is used as an obstacle detector which

detects the obstacle and sends a message to the ATMEGA IC.It gives a reply to avoid the obstacle and it moves on.The robot will check for the threshold voltage which is set in the programmable IC.If the threshold voltage is high, then the first robot will call the second robot to coordinate the fire extinguishing and if it is less,then the first robot will alone maintain the fire extinguishing.A water pump is also attached to the robot to spray the water in the fire location.The robot will continue working until all the fire portions are completely extinguished.The robot 1 and the robot 2 acts as a master slave relation.First robot will act as the master and the second as its slave.

2.2. BLOCK DIAGRAM

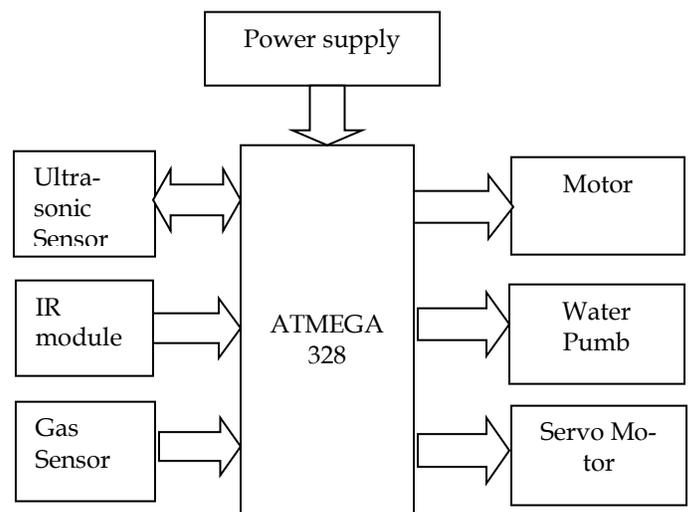


Fig1:Block Diagram

2.2.1. BLOCK DIAGRAM DESCRIPTION

Block Diagram consist of ATMEGA328, Ultra sonic sensor, Gas sensor, IR module, Motor, Water pump, Servo motor, Power supply... The main element of this project is ATMEGA 328, According to the sensor inputs the controller direct all other outputs. The ultrasonic module generate ultra sound waves. It is used as an obstacle detector. when an obstacle is detected it send a message to ATMEGA 328. An IR module is used to transmit IR rays and according to the light intensity the flame is detected. A gas sensor is used to detect the intensity of fire. MQ6 sensors is used here as gas sensor. When the power is switched on, it detects the gas or smoke and it sends a message to the ATMEGA IC. If the flame is detected, the robot starts moving towards the flame. It is done by a motor. After detecting the location of the flame, the robot comes closer to the location, and the pump is turned ON till the flame is extinguished. A water pump is used to extinguish the fire by sprinkling water on the detected area. A servo motor is attached to the robot. It can rotate in an angle between 40 degree and 120 degree and can spray water in the location of fire.

2.2.3 ALGORITHM

- Step1 : Start.
- Step2 : Initialize all ports.
- Step3 : Scan for fire.
- Step4 : If the fire is detected call for robot1. Otherwise go to step2
- Step5 : If the threshold voltage does not exceeds go to next Step. Otherwise go to next step7.
- Step6 : Robot1 moves to the location of fire.
- Step7 : Call for both robot1 and robot2.
- Step8 : Robot1 and robot2 moves the location of fire.
- Step9 : Pump1 is ON.
- Step10 : Fire extinguishing by pump1.
- Step11 : If the fire extinguished completely, jump to step2.
- Step12 : Pump2 is ON.
- Step13 : Fire extinguishing by pump2.
- Step14 : Stop.

3. CONCLUSION

The micro controller based adjustable fire extinguishing system has been introduced. Experimental result that is showed that the micro controller is a reliable instrument to control the fire extinguisher. This system is applicable to different size of fire extinguisher and high controlling capability over them. The simple design of its allows minimum of maintenance work. There is a greatly reduced of malfunction, as no moving part the risk of false alarm is also reduced. The price performance relationship is cost effective. The application of developed fire fighting robot is used in the petrochemical plants, hazardous area such as radio active environment unstable structure, and high pressure vessel. Currently, the development of fire fighting robot still not fully supported by local authority or fire department is to be implemented during critical scene and reduce the risk fire fighter. Effort need to be made to encourage the use of fire fighting robot by designing a low cost and good quality machine..

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REFERENCES

- [1] Taiser T.T. Brrros, Walter Fetter Lages, "Development of Fire fighting robot for educational competitions", RiE 2012, Prague
- [2] Ratnesh Malik, S.S. Kumbalkar, "Fire Fighting Robot: An Approach", Indian Streams Research Journal, Vol.2, Issue. II/ March; 12pp. 1-4
- [3] Chattanyakit S. Kondo T. and Nilkhamhangl. (2013), "Development of Robotic Platform for swarm Robots in Fire Detection Application", Kasetsart Journal Natural Science, 47, pp. 967-976
- [4] Tan, C.F., S.S.S. Ranjith, V.K. Kher and H.F. Kong, 2013. "Up-Scaling and Optimization of Fire Fighting Ground Vehicle Track System". Applied Mechanics and Materials, 315: 236-240.
- [5] Su, K.L. et al., "Automatic Fire Detection System Using Adaptive Fusion Algorithm for Fire Fighting Robot" Systems Man and Cybernetics, 2006. SMC'06. IEEE International Conference Publications Vol. 2, no. 7, Oct. 2006, pp: 966-971

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