

Fire-Fighting Robot

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Abstract

The security of home, laboratory, office, factory and building is important to human life. We are developing an intelligent multi sensor based fire fighting robot in our daily life. We design the fire detection system using four flame sensors in the fire fighting robot, and program the fire detection and fighting procedure using sensor based method. The fire fighting robot can get detection signals. If fire accident is true, the fire fighting robot can uses four flame sensors to find out fire source by the proposed method, and move to fire source to fight the fire using extinguisher.

It is more advantageous than a smoke detector as it can extinguish the fire at the inception than waiting for an object to burn and produce smoke. When a smoke detector detects fire it, sprays water all over the place, instead of that particular point of source. It voluntarily detects and extinguishes fire without human aid.

The fire sensor used is IRD 300 while the micro- controller used is PIC16F877. Here we use two motor driving units; one for the movement of robot & other for the water pump. 2 Stepper motors of VEGA Robo Kit having a rating of 100rpm/12V is at the sides and 1 free ball in ball bearing wheel at front of robot; while a 12V DC motor for pumping water.

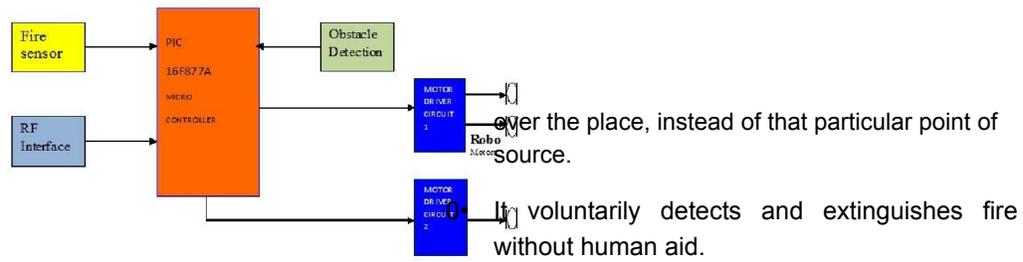
Here the robot detects fire by the fire sensor and moves towards it. After reaching a certain distance from the fire, it sprays water at the fire, thereby extinguishing it. It then comes back to its initial position.

Objectives

- 0• The security of home, laboratory, office, factory and building is important to human life. We are developing an intelligent multi sensor based fire fighting robot in our daily life.
- 0• We design the fire detection system using four flame sensors which is programmed for fire detection and fighting procedure using sensor based method.
- 0• We design a low cost based obstacle detection module using IR sensors and ultrasonic sensors in the mobile robot. The is true, fire fighting robot can get detection signals. If fire accident the fire fighting robot can uses four flame sensors to find out fire source by the proposed method, and move to fire source to fight the fire using extinguisher.

Justification

- 0• It is more advantageous than a smoke detector as it can extinguish the fire at the inception than waiting for an object to burn and produce smoke.
- 0• When a smoke detector detects fire, it sprays water all



over the place, instead of that particular point of source.

It voluntarily detects and extinguishes fire without human aid.

3. Methodology

Fire Sensor (IRD300)

It is a photo diode which detects flame having radiation flux density $5\text{Mw}/\text{cm}^2$ and color temperature 2870K . This sensor has a range upto 1 meter.

Micro-Controller (PIC16F877A)

It has the name "Peripheral Interface Controller". The PIC uses the Harvard architecture. The 16F87X series Micro Controller contains flash memory. Harvard architecture has the program and data memory as separate memories and is accessed from separate busses; this improves speed over the traditional Von Neumann architecture.

Motor Driving Units

Here we use two motor driving units; one for the movement of robot & other for the water pump.

The motor driving IC used for movement is L293D and for pumping water is ULN2003.

Buzzer

It gives out an alarm when fire is detected by the robot.

LCD display

16X2 line display, used to display name of room where fire broke out.

Applications

Different kinds of accidents are possible in a tunnel but, accidents involving fire are the most dangerous of all. If it is not possible to extinguish the fire in minutes, it would be so hot that human life will be at risk. But, one of the biggest fears among emergency personnel who should respond to tunnel fires is the possibility of finding hazardous material fuelling fire! In such a situation it is best to leave the job to robots.

Conclusions

- 0• If we do this innovative project on large scale it will surely save many lives.

- 0• As we go into the Future, we will be entering a Technological Era where humans and robots are going to co-exist.

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