
MOVING FIRE FIGHTER ROBOT

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ABSTRACT

The earlier type of fire fighter robot has four wheels attached to its chassis in which the front two wheels control the direction of the body of the chassis. And the fire fighter robots usually has a fixed water hose which is able to extinguish only a certain distance. The objective of our project is to operate the robot for detecting the fire with 360 degree rotatable wheel which helps in reaching out the fired place in a minimal time duration and prevents the spread of fire less than the usual time and the 360 degree water splashing hose. This project is very useful in manufacturing industries and fireworks industries, textiles and military applications for detecting the fire and controls it through water. This project also improves the security performance. Henceforth our idea of Fire Fighting Robot (FFR) is of compact size planned to build in compact size. which is portabale emergency responder robot, that assists firemen in fighting high rise fire, especially in highly dangerous environment where it is not safe for people to enter.

Keywords: extinguish, FFR-Fire Fighter Robot, splashing hose, 360 degree rotatable wheel.

1. Introduction

Objective:

The objective of this project is to operate the robot for detecting the fire.

Scope:

This project is very useful in manufacturing industries and fireworks industries, textiles than military applications for detecting the fire and control through water. This project also improves the security performance.

The project is designed by following blocks

- fire sensor
- Amplifier
- Microcontroller
- LCD display
- Motor with driver circuit (2)
- Robot model
- Driver circuit with relay
- Pump

1. Experimental Methods or Methodology

The fire sensor is using here to sense the fire. The fire sensor output is very low voltage so we amplified that voltage with help of differential amplifier. The amplified voltage is given to micro controller. The micro controller may be Atmel or PIC both is flash types reprogramable controller. Already we have programmed in microcontroller the microcontroller run according to our objective.

Therefore, it received the signal from amplifier and activates corresponding driver circuit. It any objectives related to smoke is there; the sensor detecting the smoke finds that one and gives the signal to micro controller. By which the robot movement is controlled now, the micro controller activates the alarm driver circuits. So the alarm makes sound for indication for fire. And the same

time microcontroller activates driver circuit for water pump. The keypad is used here to control the robot movement like as forward and reverse direction and left and direction control.

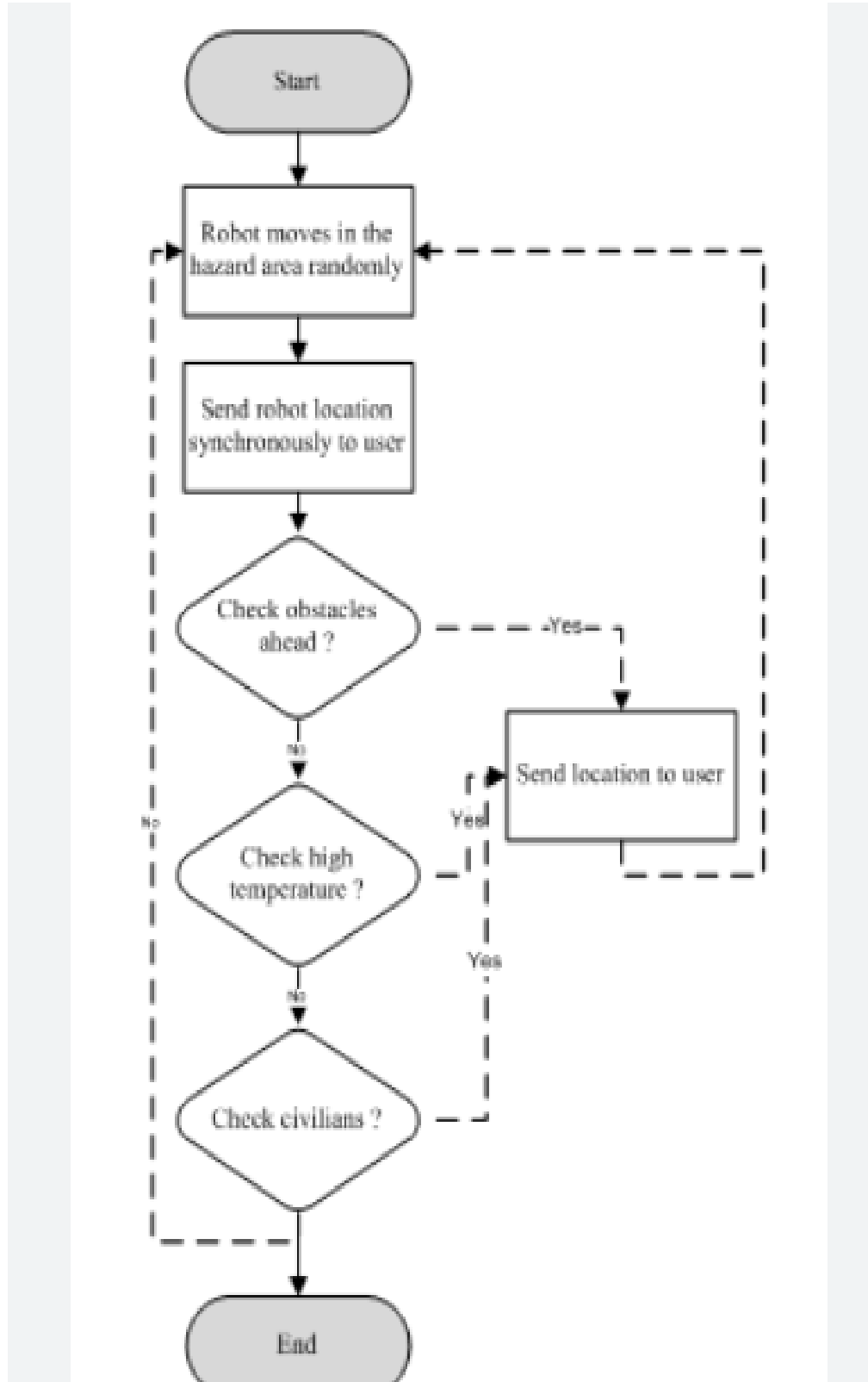
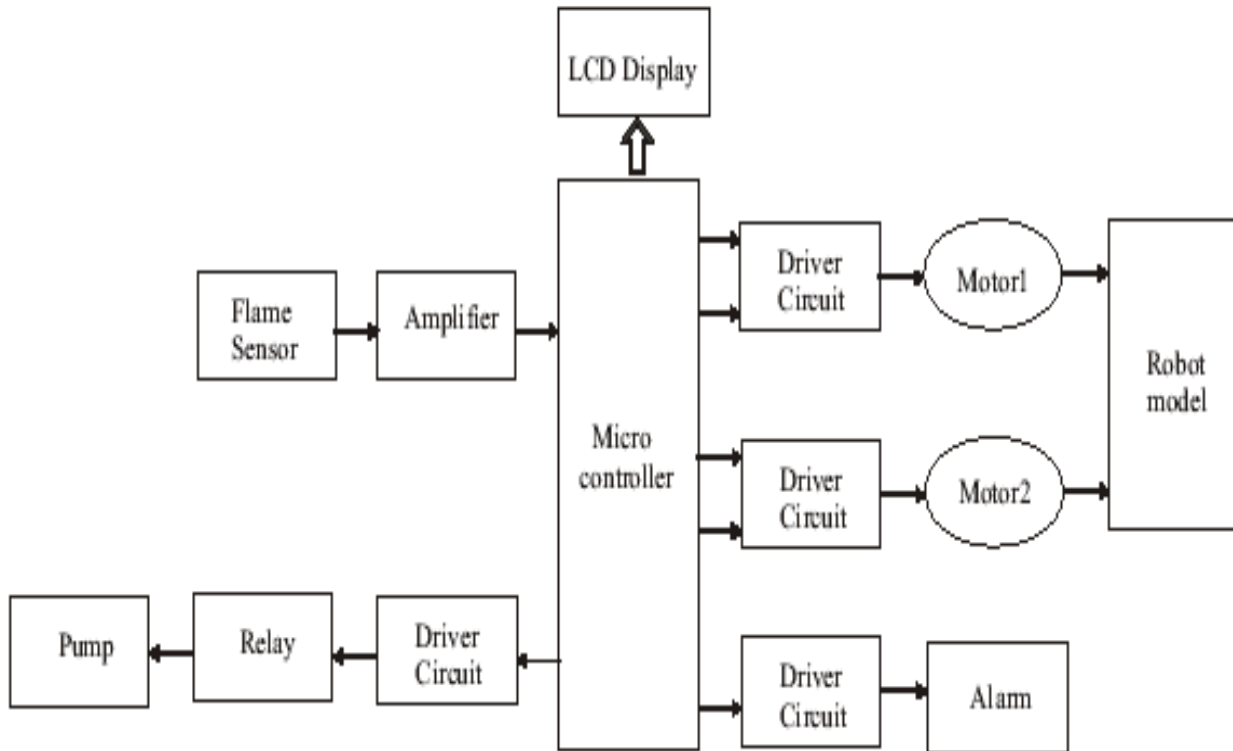


Fig 1 Methodology Proposed



2. Literature Review

Firefighting and rescue operations are regarded as risky missions. Robotic technology can use them as a perfect target to keep fire fighters out of harms way. Additionally, it makes it possible to save a lot more victims. The major points to be considered in a fire fighting robot is from the perspectives of ‘size and weight’ and ‘cost and performance, author takes them into consideration and analyses them[1]

Industry frequently uses the proportional integral derivative (PID) control scheme. A PID controller is used in around 90% of industrial machinery because it is simple to operate. The robots competing in the Indonesian Fire Extinguisher Robot Contest (IFERC) must trace the outlines of the walls. fire extinguisher robot was chosen for the competition arena since it had walls with several passageways and rooms.

The PID calculation generates angles for each servo motor, allowing the robot to navigate by choosing whether to move swiftly or slowly, turn right, turn left, or halt. The robot proximity sensor information and fire sensors make it possible to put out the flames[2].

firefighter robot was created by humans to protect human life because the number of mishaps that occur during the extinguishing of fires is uncountable. This robots movement and behavior will be fully controlled by a programmable raspberry pi. The infrared camera is used to give night vision imaging, which will provide live recording of the entire extinguishing operation, while the thermal camera is used to detect fire and measure temperature. This live recording is viewable in PC reference, which also includes a log-in mechanism[3]

One of the current key research questions for intelligent buildings is multisensor fire detection algorithm(MSFDA). For the intelligent building, we first create a firefighting robot with extinguish. The fire-fighting robots frame is made of aluminium.

The robot has a cylindrical shape. The height is roughly 80 cm, and the diameter is 40 cm. The implementation was made with the perspective of the fire detection system using fire fighting robot.[4]

this paper presents the development of a firefighting robot dubbed QRob that can extinguish fire without the need for fire fighters to be exposed to unnecessary danger. QRob is designed to be compact in size than other conventional fire-fighting robot in order to ease small location entry for deeper reach of extinguishing fire in narrow space. QRob is also equipped with an ultrasonic sensor to avoid it from hitting any obstacle and surrounding objects, while a flame sensor is attached for fire detection[5]

The security of home, laboratory, office, factory and building is important to human life. We develop an intelligent multisensor based security system that contains a fire fighting robot in our daily life. We create a general user interface (GUI) for touch screens and use them to show system status. Finally, we use fire fighting robots to create the fire detecting system. If the fire accident is real, the robot can locate the fire source using the suggested technique by the fire detection system and move to the fire source to extinguish the fire.[6]

Ladder tracks are utilised to fight high-rise building fires since there are many high-rise condominiums. Their height, however, is significantly greater than the height that ladders may be used to attain. Due to the abundance of high-rise condominiums, ladder tracks are used to put out flames in high-rise condominiums. However, they can reach heights that are substantially higher than theirs without the usage of ladders[7]

3. Components and its specification

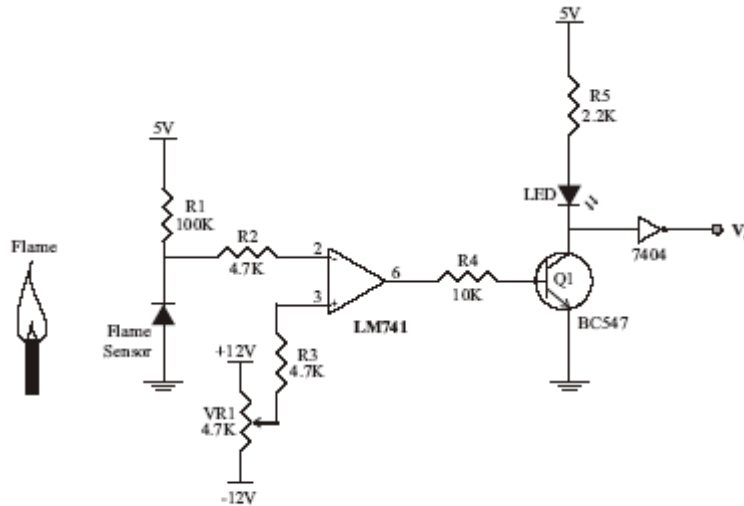
BLUETOOTH MODULE:

HC serial Bluetooth products consist of Bluetooth serial interface module and Bluetooth adapter, such as: (1) Bluetooth serial interface module: Industrial level: HC-03, HC-04(HC-04-M, HC-04-S) Civil level: HC-05, HC-06(HC-06-M, HC-06-S) HC-05-D, HC-06-D (with baseboard, for test and evaluation) (2) Bluetooth adapter: HC-M4 HC-M6 This document mainly introduces Bluetooth serial module. Bluetooth serial module is used for converting serial port to Bluetooth. These modules have two modes: master and slaver device. The device named after even number is defined to be master or slaver when out of factory and can't be changed to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device by AT commands. HC-04 specifically includes: Master device: HC-04-M, M=master Slave device: HC-04-S, S=slaver The default situation of HC-04 is slave mode. If you need master mode, please state it clearly or place an order for HC-04-M directly. The naming rule of HC-06 is same. When HC-03 and HC-05 are out of factory, one part of parameters are set for activating the device. The work mode is not set, since user can set the mode of HC-03, HC-05 as they want. The main function of Bluetooth serial module is replacing the serial port line, such as: 1. There are two MCUs want to communicate with each other. One connects to Bluetooth master device while the other one connects to slave device. Their connection can be built once the pair is made. This Bluetooth connection is equivalently liked to a serial port line connection including RXD, TXD signals. And they can use the Bluetooth serial module to communicate with each other. 2. When MCU has Bluetooth slave module, it can communicate with Bluetooth adapter of computers and smart phones. Then there is a virtual communicable serial port line between MCU and computer or smart phone. 3. The Bluetooth devices in the market mostly are slave devices, such as Bluetooth printer, Bluetooth GPS. So, we can use master module to make pair and communicate with them. Bluetooth Serial module's operation doesn't need drive, and can communicate with the other Bluetooth device who has the serial. But communication between two Bluetooth modules requires at least two conditions: (1) The communication must be between master and slave. (2) The password must be correct. However, the two conditions are not sufficient conditions. There are also some other conditions basing on different device model. Detailed information is provided in the following chapters. In the following chapters, we will repeatedly refer to Linvor's (Formerly known as Guangzhou HC Information Technology

Co., Ltd.) material and photos.

FIRE SENSOR CIRCUIT

FIRE DETECTION



Flame sensor:

The flame sensor is used to detect the flame occurrence. When the sensor detects the fire then it became short-circuit. When there is no fire the sensor become open circuit.

Circuit description:

The flame sensor is connected with resistor. This connection formed the voltage divider network which is connected with inverting input terminal of the comparator. The reference voltage is given to non inverting input terminal. The comparator is constructed with LM 741 operational amplifier.

When there is no fire, the flame sensor became open circuit. So the inverting input terminal voltage is greater than non inverting input terminal (reference voltage). Now the comparator output is -12V which is given to the base of the switching transistor BC547. So the transistor is cutoff region. The 5v is given to 7404 IC. The 7404 is the hex inverter with buffer. Hence zero voltage is given to microcontroller.

When there is fire occurred, the flame sensor became short circuit. So the inverting input terminal voltage is less than non inverting input terminal (reference voltage). Now the comparator output is +12V which is given to the base of the switching transistor BC547. So the transistor is turned ON. The zero voltage is given to 7404 IC. Hence +5v voltage is given to microcontroller. In the microcontroller we can detect the fire with the help of software.

Application:

It is mainly used to prevent the fire accident.



4. RESULT AND SIMULATION

The project is designed by following blocks fire sensor, Microcontroller, line tracking sensor (2nos), Motor with driver circuit (2), Robot model, and Driver circuit with relay and Pump.

The fire sensor is used here to sense the fire. The fire sensor output is very low voltage so we give that signals to signal conditioning unit. The signal conditioning unit gives the signal to micro controller. The micro controller used is flash type reprogrammable controller. Therefore, it receives the signal from signal conditioning unit and activates corresponding driver circuit. If the fire is sensed by the sensor it gives the signal to micro controller. By which the robot movement is controlled artificially, the micro controller activates the alarm driver circuits. So the alarm makes sound for indication of fire. And at the same time microcontroller activates driver circuit for water pump. The keypad is used here to control the robot movements like as forward and reverse direction and left and direction control. The line tracking sensor is used to sense the line just below the robot model. There are two sensors kept at the front of the robo model at a certain distance. The two sensors are used to sense the left or right directions for further move of the robo model.

5. CONCLUSION

The Putting out fires Robot is adequately viable to battle against fire on a limited scale. It can detect fire better at hazier places. It is made as a preventer robot. Since it can distinguish fire quickly and can douse it prior to spreading. This multisensory based robot might be an answer for all fire perils. Different sensors like fire, smoke sensors have been consolidated in this robot. In the event that the fire is identified, a water showering instrument is set off to smother the fire. Sound alarm is additionally given upon all occasions to caution the administrator. With enough financing and degree, this plan of robot can likewise battle against huge fire with bigger holding limit and a better detecting unit can give even an prior location of fire at all conditions. As an end, the task named "Putting out fires Robot".

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