Design & Implementation Of Fire Fighting Robot Using Wireless Camera

Tushar Rane[1], Nilesh Gupta[2], Jidnyesh Shinde[3], Shubham Kharate[4], Prof.Prabhakar Mhadse (HOD EXTC)

Electronics & Telecommunication, Bharat College Of Engineering, University Of Mumbai, Opposite Gajanan Maharaj Temple, Badlapur West, Kanhor, Maharashtra 421503

DOI: 10.29322/IJSRP.10.03.2020.p99110
http://dx.doi.org/10.29322/IJSRP.10.03.2020.p99110

Abstract- This paper shows how to overcome from the fire disaster problems. Now a day's fire disaster can occur at any place and anytime with a huge loss of lives, products and materials. As we all know robots are intelligent machines that can be controlled as per need. Robot makes work more easier, save time and save man power. Formerly robots are not much used but now a day's robots are used in many industries for manufacturing, packaging, testing etc. To overcome this loss we can use robot which called as 'Fire Fighting Robot'. With the help of this robot we can save many lives, products and materials. The robot will detect fire and start his work for which it was made. In industries we can use such robots to prevent fire, damage and loss. Instead of human we can use robot so it will become more easier to go closer to the fire. To improve the safety precautions in industries, 'Fire Fighting Robot is essential'.

Index Terms- Remote control, Sensors, Wireless camera, Arduino uno.

I. INTRODUCTION

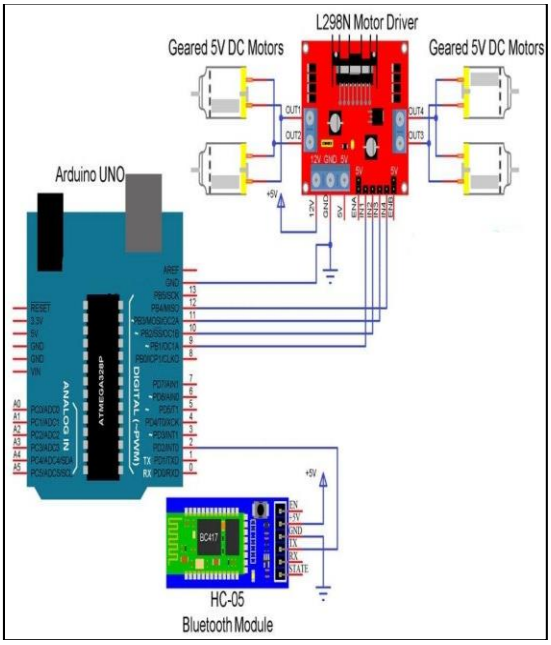
The purpose of this paper is to develop 'Fire Fighting Robot Using Wireless Camera' to extinguish fire. In this project we have construct a robot which can be controlled using android application to control the actions of robot.The development and conduct of this robot is completely controlled by the programmable Arduino Uno. All types of flag gotten by the arduino uno will be prepared and executed to achieve the mission of the robot. Robot will screen the work zone by performing arbitrary developments, it as an elective medium utilized by people, particularly the fire fighter to battle fire. We have used two arduino uno in this robot. One arduino uno is used to control motor driver circuit. This arduino uno is connected to bluetooth module to communicate between android device and robot. This communication takes place using android application. Which transmit signals to receiving bluetooth module. This bluetooth module gives the input to arduino uno which provides input to the motor driver circuit & starts the motor as per their received input. Another arduino uno is used for water pump to extinguish fire. In this circuit we have used three sensors which is connected to arduino uno. This sensors are digital sensors and used as a input to arduino. We have used relay to control the water pump. The movement of this water pump is 0 to 180^0 with the help of metal gear servo motor. The movement of the servo motor is controlled by arduino. The water pump will cover 2 meter range so there is no need to go in fire.

We have used wireless camera for live streaming which will show the live location where the actual fire is, so we can move our robot in that direction. It is the brownie point and plays a important role so the handler can see where the fire is and how much it is. In industries it will be more helpful for saving human lives, materials and products. A fire fighting robot will decrease the need of fire fighters to get into dangerous situations. Further the robot will reduce the load of fire fighters. It is impossible to extinguish fire and rescue many victims at a time of huge disaster. Robot technology can be very efficiently used in such cases to rescue much more victims. Thus robotics makes human life easier and safe as well as save a lot of time(1). The respective objectives for the problem stated above the first objective is to make utilization of robots is one of the elective routes for decreasing fire fighters hazardous life and upgrading fire fighters abilities.

The 'Fire Fighting Robot' is a futuristic robot which is made for security. In case of emergency the 'Fire Fighting Robot' comes in picture. The camera which we used will show live streaming of fire. And our robot will move towards the direction of fire to prevent it. The sensor which we used will sense the fire and then water pump will start to extinguish fire.

II. HARDWARE DESIGN

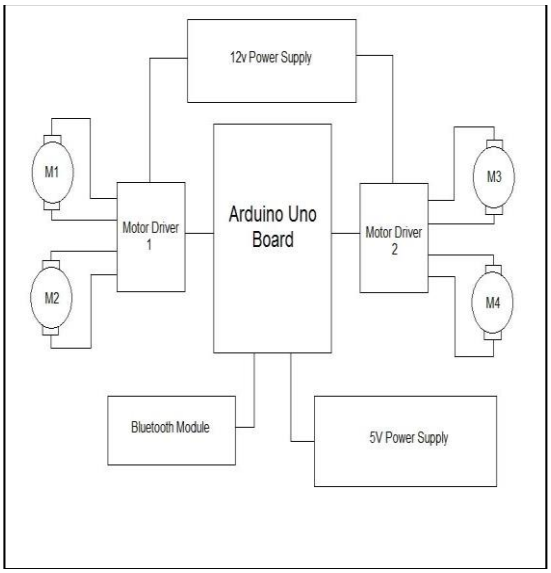
In this section we are presenting the hardware part which we used for this robot.



Above circuit is a driver circuit which is used to drive the robot and this robot is control by android application. As shown in fig arduino uno is used to control motor driver circuit. This arduino uno is connected to bluetooth module to communicate between android device and robot. This communication takes place using android application. Which transmit signals to receiving bluetooth module. This bluetooth module gives the input to arduino uno which provides input to the motor driver circuit & starts the motor as per their received input.

The arduino uno is connected to motor driver and motor driver is connected to DC motors as shown in fig.

Arduino uno and bluetooth module is powered with 5V supply and motor driver is powered with 12V supply.



A. Ardunio Uno

The Arduino Uno R3 is a microcontroller board based on a removable, dual-inline-package (DIP) ATmega328 AVR microcontroller. It has 20 digital input/output pins (of which 6 can be used as PWM outputs and 6 can be used as analog inputs). Programs can be loaded on to it from the easy-to-use Arduino computer program. The Arduino has an extensive support community, which makes it a very easy way to get started working with embedded electronics

B. L298N Motor Driver

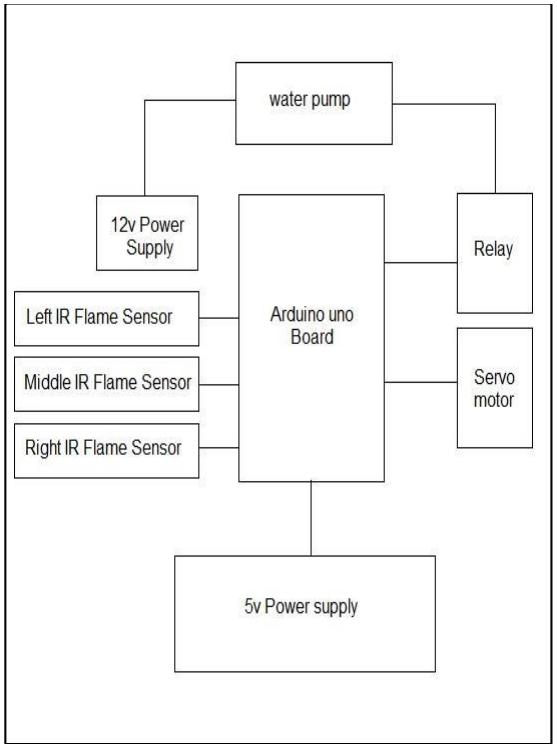
Double H driver module uses ST L298N dual full-bridge driver, an integrated monolithic circuit in a 15- lead Multiwatt and PowerSO20 packages. It is a high voltage, high current dual full-bridge driver designed to accept standard TTL logic levels and drive inductive loads such as relays, solenoids, DC and stepping motors. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistors of each bridge are connected together and the corresponding external terminal can be used for the con-nection of an external sensing resistor. An additional supply input is provided so that the logic works at a lower voltage.

C. DC motor

A DC motor is a mechanical rotating device which converts electrical energy into mechanical energy. DC gear motor is a combination of DC motor plus a gearbox (motor reducer) in order to reduce the speed (RPM) of the motor, with a corresponding increase in torque. The planetary motor performance is stable and can be used in high torque environments. outer diameter 20mm planetary gearbox is equipped with outer diameter 21mm DC motor, it can be customized with torque, material, shaft, gear ratios,

D. Bluetooth Module

Controlling an Arduino using a smartphone, let's take a closer look at the HC-05 Bluetooth module. Comparing it to the HC-06 module, which can only be set as a Slave, the HC-05 can be set as Master as well which enables making a communication between two separate Arduino Boards. There are several different versions of this this module but I recommend the one that comes on a breakout board because in that way it's much easier to be connected. The HC-05 module is a Bluetooth SPP (Serial Port Protocol) module, which means it communicates with the Arduino via the Serial Communication.



A. Relay

A relay is nothing but a switch which is operated by an electromagnet. The electromagnet requires a small voltage to get activated which we will give from the Arduino and once it is activated, it will pull the contact to make the high voltage circuit

B. Servo Motor

The Servo Motor basically consists of a DC Motor, a Gear system, a position sensor and a control circuit. The DC motors get powered from a battery and run at high speed and low torque. The Gear and shaft assembly connected to the DC motors lower this speed into sufficient speed and higher torque. The position sensor senses the position of the shaft from its definite position and feeds the information to the control circuit. The control circuit accordingly decodes the signals from the position sensor and compares the actual position of the motors with the desired position and accordingly controls the direction of rotation of the DC motor to get the required position. The Servo Motor generally requires DC supply of 4.8V to 6 V.

C. Flame Sensor

A Flame Sensor is a device that can be used to detect presence of a fire source or any other bright light sources. There are several ways to implement a Flame Sensor but the module used in this project is an Infrared Radiation Sensitive Sensor.

III. Result

In today's world fire fighting is a dangerous issue there are many chances of losing. The robot is constructed to extinguish fire and it is fully autonomous. Fire Fighting Robot are ran through many tests like flame detection, running of servo motor, pressure of water pump, transmission and reception of bluetooth module. The robot is sensing the fire and water pump is extinguishing the fire. Motor driver driving the robot smoothly and as per given directions. Wireless camera is giving live streaming. The robot was successfully accomplished with all the test.

IV. Conclusion

Implemented sensors are used to sense temperature so that device itself can protect from heat and focus water pressure on fire. Camera installed on robot will send live video streaming which could be seen on mobile screen through Bluetooth. Water pump will be focussed depending on heat sensed by sensors.

References

[1] Http://www.ijirset.com/upload/2015/november/51_7_A_Survey.pdf.

[2] Lakshay Arora, Prof.AmolJoglekar, "Cell Phone Controlled Robot with Fire Detection Sensors", (IJCSIT) International Journal of Computer Science and Information Technologies 2015.

[3] Davide Gironi, Design of cheap CO2 Monitor Using MQ135 Sensor Using AVR ATMega, (2014).

[4] Omar Ismael Al Sanjary , Semi-automatic Methods in Video Forgery Detection Based on Multi-view Dimension. 2017.

[5] Flores KO, Butaslac IM, Gonzales JEM, Dumlao SMG & Reyes, RS, "Precision agriculture monitoring system using wireless sensor network and Raspberry Pi local server", Region 10 Conference (TENCON), (2016), pp.3018-3021.

[6] Oza N & Gohil NB, "Implementation of Cloud Based Live Streaming for Surveillance", International Conference on Communication and Signal Processing, (2016).

[7] Mohammed Hazim Alkawaz, Detection of copy-move image forgery based on discrete cosine transform, 2016.

[8] Olimex Ltd,MQ-135 Gas Sensor Technical Data Sheet.

[9] Krasnov, D. Bagaev, "Conceptual analysis of firefighting robots' control systems", IV International Conference "Problems of Cybernetics and Informatics" 2012.

[10] Henriques V & Malekian R, "Mine safety system using wireless sensor network", IEEE Access, Vol.4, (2016), pp.3511-3521.

Authors

First Author – Tushar Rane, Electronics & Telecommunication, Bharat College Of Engineering, University Of Mumbai, Opposite Gajanan Maharaj Temple, Badlapur West, Kanhor, Maharashtra 421503
Second Author – Nilesh Gupta, Electronics & Telecommunication, Bharat College Of Engineering, University Of Mumbai, Opposite Gajanan Maharaj Temple, Badlapur West, Kanhor, Maharashtra 421503
Third Author – Jidnyesh Shinde, Electronics & Telecommunication, Bharat College Of Engineering, University Of Mumbai, Opposite Gajanan Maharaj Temple, Badlapur West, Kanhor, Maharashtra 421503
Fourth Author – Shubham Kharate, Electronics & Telecommunication, Bharat College Of Engineering, University Of Mumbai, Opposite Gajanan Maharaj Temple, Badlapur West, Kanhor, Maharashtra 421503
Fifth Author – Prof.Prabhakar Mhadse (HOD EXTC), Electronics & Telecommunication, Bharat College Of Engineering, University Of Mumbai, Opposite Gajanan Maharaj Temple, Badlapur West, Kanhor, Maharashtra 421503