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FIRE FIGHTING ROBOT USING ANDROID APPLICATION

Sumitra Motade[1], Aditi Suresh Bidwai [2], Komal Jaysing Kale[3] , Ankita Mahadev Mahajan[4]

Assistant Professor, Department of Electronics and Telecommunication engineering MAEER's MIT College of Engineering, Kothrud, Pune.[1]

Student, Department of Electronics and Telecommunication engineering MAEER's MIT College of Engineering, Kothrud, Pune.[2,3,4]

aditibidwai43@gmail.com, komalkale167@gmail.com, ankitamahajan2801@gmail.com

Abstract- Fire fighting is not only important but also dangerous occupation. Whenever fire mishap occurs anywhere it is important to reach there quickly in order to prevent damage. Now a days technology has grown at large extend that makes fire extinguishing more efficient. In this project, we are designing fire fighting robot using android application. The robot consists of water pump and raspberry pi for controlling the desired operation. Sensor module is used to sense fire within area by using temperature sensor, smoke sensor and flame sensor. Android app has buttons for controlling the movement of robot. The live video streaming is also provided on the app that helps to provide navigation to robot. The robot will reach location and spray water to extinguish fire completely.

Keywords- *Raspberry pi, Node mcu, Temperature sensor, Flame sensor, Smoke sensor, Water pump, Android application*

I INTRODUCTION

Fire accidents in the industries like fuel tanks, chemical compounds factories, petroleum, refineries, nuclear power plant are causing severe outcomes. Robots are broadly used for cause of safety because human interaction is reducing every day with advancement in area of robotics. The firefighting robot helps to stop fire immediately and safely extinguish fire and rescue the people from dangerous fire & amp move to the safer area. And the firefighting robot issued to locate and find the fire before it gets out of control. This firefighting robot is a replacement of fire fighters as it is not at a risk of getting injured. It is also useful for industrial, domestic and military area. This mission uses raspberry pi microcontroller and android application. Therefore, the raspberry pi based firefighting robot is designed to control fireplace via a robotic vehicle. In our project, we can move the robot upward, backward, right and left properly by using android application & there's additionally a start button to pump for fire extinguishing operation. The robot has water spray which is capable of sprinkling water. The sprinkler can be moved in all directions. Microcontroller, Wi-Fi transceiver modules are principle controlling devices of the entire system. water spray DC motor, buzzer and Pi camera are interfaced to microcontroller.

II COMPONENTS

1. Raspberry pi:

Figure.1 Raspberry pi

Raspberry pi 3 is a single, small board computer widely used in robotics. It is also used in research projects. Raspberry pi is low cost and portable. In this project, the raspberry pi is used for controlling movement of robot and also for spraying water when switch is pressed. The raspberry pi3 has CPU of 1.2GHZ, RAM 1GB, 802.11 wireless network, CSI camera port for connecting pi camera and display port to connect touch screen display etc. Also, raspberry pi has USB boot capabilities.

2. Node mcu:

Node mcu is an open source Iot platform. Node mcu is a firmware and low cost device. It is used to make prototype and also to build iot applications. Node mcu has ESP32 microcontroller along with wifi, Bluetooth and Ethernet. it has operating voltage of 7 to 12 volts. The wifi module uses IEEE 802.11 wireless network having clock speed of 240 Mhz and flash memory of 4MB.The data sensed by the sensors on the sensor module is received by node mcu and send it to robot. According to that action will be taken by the robot.

3. Temperature sensor:

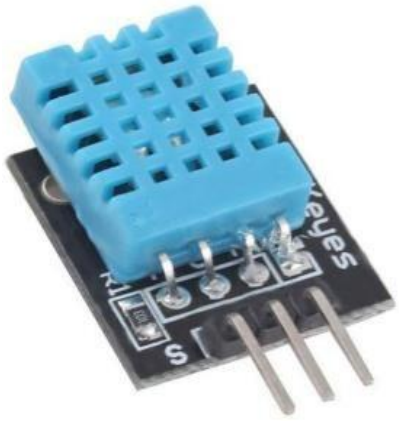

Figure. 2 DHT11

DHT11 is a low cost digital temperature sensor. It uses thermistor to monitor quality of air and covert it to digital signal. The digital signal is send by data pin. It is simple to use and requires careful handling. It requires 4.7k or 10k resistor to pull up from data pin to VCC.

Specification:

- Operating Voltage - 3.5V to 5.5V
- Operating Current – 2.5mA
- Temperature Range - 0 – 50C
- Accuracy - 1%

4. Flame sensor:

Figure.3 Flame sensor

Flame sensor is used to detect occurance of fire.This sensor is most sensitive to normal light hence known as flame sensor.This sensor detects fire in the range of 760nm to 1100nm.the output of sensor is digital.This sensor is used in robot like alarm.This sensor is easy to use and also it has very fast response time.

Specification:

- Operating Voltage -2 – 36V
- Temperature - -25 to 85C

5. Smoke Sensor:

Figure.4 MQ22

The smoke sensor MQ22 is high sensitive to smoke, PG, butane ,propane, methane, alcohol,hydrogen. Based on the type of the gas the resistance of the sensor is different .It consist of built in potentiometer

that allows you to adjust the sensitivity of the sensor. Due to that we can get the accurate reading. The huge gas concentration can gives us the accurate output voltage. This sensor having low cost, longer life and Simple drive circuit.

Specification:

- Measuring Range - -50 – 280C
- Accuracy – 2.5%
- Operating voltage – 5V

IV.BLOCK DIAGRAM

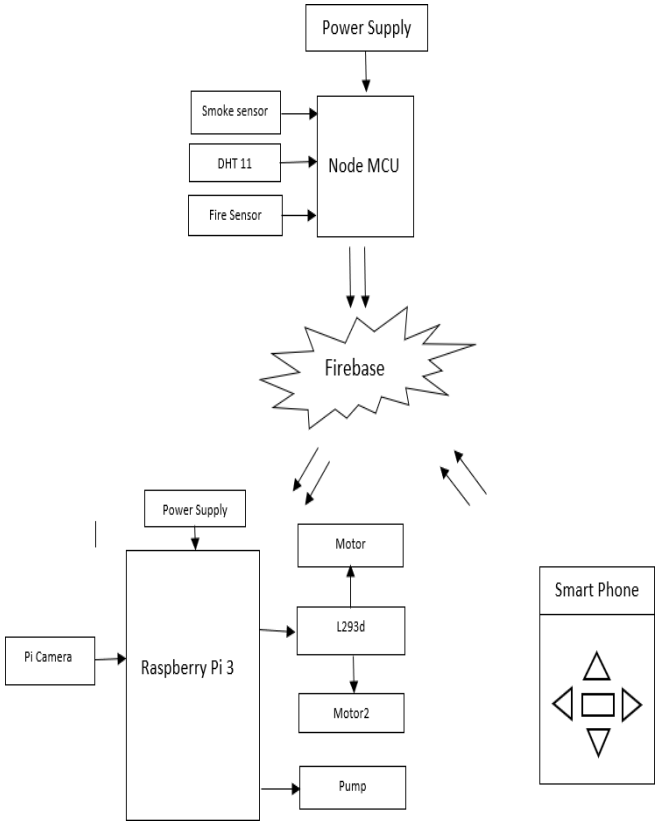

Figure 5 Block Diagram

V. WORKING PRINCIPAL

The sensor module is placed in where there is a possibility of a fire mishap. The module consists of flame sensor, temperature sensor, smoke sensor and Node mcu which performs the transmission of data. Once the fire is detected, node mcu will send data to firebase. The receiver consists of two parts, the first part constitutes a Raspberry pi and other is android application. The raspberry pi has input from pi camera used to show video on the android application. Android application consists of a WIFI module that is used to establish connection between the robot and android application. Commands to move forward, left, right and to extinguish fire are sent to the robot through the android application. The robotic vehicle is loaded with water tanker and a pump which is controlled over wireless communication to throw water. The transmitting end using android application device, commands are sent to the receiver to control the movement of the robot either to move forward, backward and left or right etc. At the receiving end three motors are interfaced to the raspberry pi where two of them are used for the movement of the vehicle and the remaining one to position the arm of the robot. Remote operation is achieved by any smart-phone.

VI FLOW CHART

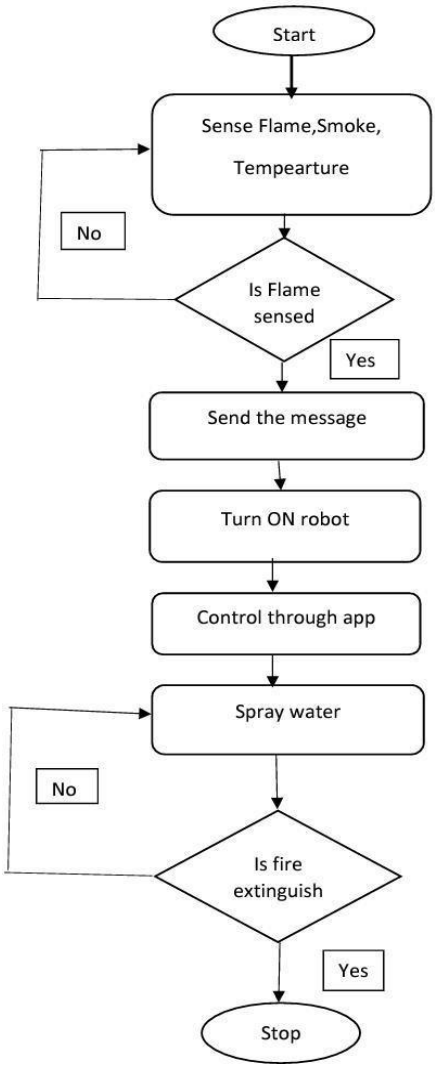

Figure.6 Flow Chart

VII APPLICATIONS

• It is used to extinguish fire where possibility of explosion is more.

• It used as home security application.

• It is used in server rooms in offices.

• It is useful in disaster area monitoring and rescue.

VIII CONCLUSION

This project describes about the real time firefighting robot controlled by using android application that extinguish the fire. The detection of fire is done by sensor module which uses temperature sensor, flame sensor and smoke sensor. The fire extinguishing is done by pumping mechanism that spray water on fire and extinguish it. The robot is connected with mobile phone through wifi module and processes data received from the sensors. All the hardware and software are successfully realized in this project.. However, in this project, extinguishing of fire is done with the water which is most suitable for both time and material work and also it makes project cost effective. This fire extinguishing process is very effective and safe.

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