

Fire rescue bot

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Abstract -

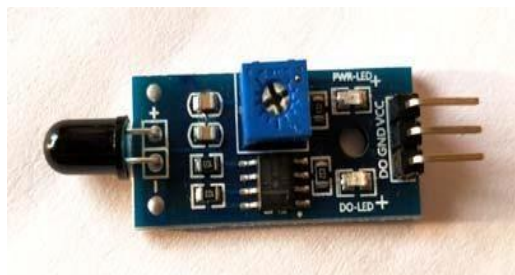
The NODE MCU's (multi control unit) fire boat is used for rescue operations. With the help of a "portable spectrum analyzer," or spectrum analyzer, produced by the firm, it demodulates using a crystal detector and identifies signals before a fire alarm control panel. A Test Light and wireless router acting as a wireless access point in home networks are also used to evaluate the voltage. The Fleming value and the electromagnetic wireless principle govern how the bot functions. It conserves energy through wireless multimedia extensions.

1. INTRODUCTION

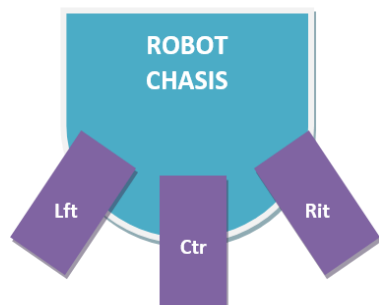
An antenna placed throughout the building and a basic computer linked to a wireless signal processing device can be used to establish an intruder detection system. The users in this wireless detection initially develop the operational policies using the right kind of various operating systems. The service set IDs that are posted for the access point are linked to the authentication types. using wireless

1.1 WORKING CONCEPT OF FIRE RESCUE BOT:

The main brain of this project is the Arduino, but in-order to sense fire we use the Fire sensor module (flame sensor) that is shown below.

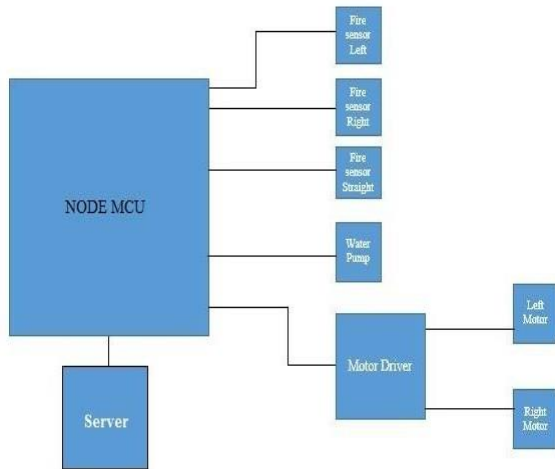


As you can see these sensors have an IR Receiver (Photodiode) which is used to detect the fire. How is this possible? When fire burns it emits a small amount of Infra-red light, this light will be received by the IR receiver on the sensor module. Then we use an Op- Amp to check for change in voltage across the IR Receiver, so that if a fire is detected the output pin (DO) will give 0V (LOW) and if there is no fire the output pin will be 5V (HIGH). So, we place three such sensors in three directions of the robot to sense on which direction the fire is burning.



We detect the direction of the fire we can use the motors to move near the fire by driving our motors through the L293D module. When near a fire we have to put it out using water. Using a small container we can carry water, a 5V pump is also placed in the container and the whole container is placed on top of a servo motor so that we can control the direction in which the water has to be sprayed. Let's proceed with the connections now.

2. BLOCK DIAGRAM:



2.1 NODE MCU:

Node MCU is an open source IOT platform which created shortly after ESP8266 came out. It includes firmware which runs on the ESP8266(CPU) WIFI soc from Espressif system, and hardware which is based on the ESP-12 module. The term Node MCU by default refers to firmware rather than the development kits. The firmware uses the Lua scripting language. It is based on the eLua project, and built on the

Espressif Non-OS skill development kit for ESP. It uses many open source projects. ESP8266 is an open source community with XTOS using Memory 128KB and storage is 4MB.



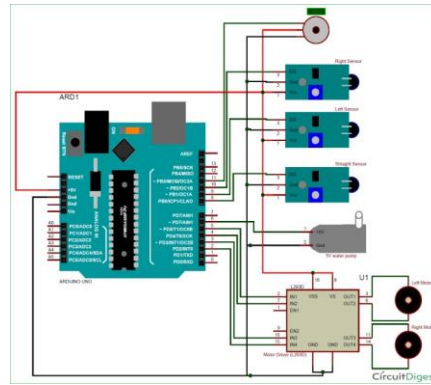
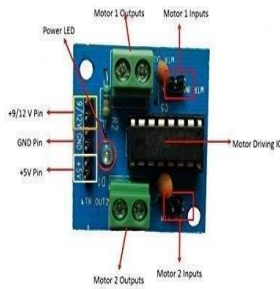
2.2 MOTOR DRIVERS:

It is a little current amplifier, the function or motor drivers is to take a low current control signal and then to return it into a



higher current signal that can drive a motor. It is a electrical or mechanical device that can create a motion. When stepper motors are brushless DC electric motor that converts electrical pulses into discrete mechanical motions. L293D is a typical motor driver. It is a 16-pin IC which can control a set of DC motors I any directions. L293D IC is dual H-bridge driver IC. water. As we can simply place a servo fin to top of container using got glue and have fixed servo motor with chassis using nuts and bolts. So, it can trigger the pump inside it to pump water outside the tube. The whole container rotated using the servo to control the direction of water.

3. SCHEMATIC DIAGRAM:



2.3 WATER PUMP:

Based on the robotic chassis that you are using you might not be able to use the same type of container that are using. In that case we can use your own creativity to setup the pumping system. However, the code will remain same, such that here we use a small aluminium can to set the pump inside it and poured water inside it. Then we assembled the whole can on top of a servo motor to control the direction of You can either connect all the shown connections for uploading the program to check the working or you can assemble the bot completely and then proceed with the connections. Both ways the connections are very simple and you should be able to get it right. Based on the robotic chassis that you are using you might not be able to use the same type of container that I am using. In that case use your own creativity to set up the pumping system. However the code will remain same. I used a small aluminium can (cool drinks

can) to set the pump inside it and poured water inside it. I then assembled the whole can on top of a servo motor to control the direction of water. My robot looks something like this after assembly.

As you can see, I have fixed the servo fin to the bottom of the container using got glue and have fixed the servo motor with chassis using nuts and bolts. We can simply place the container on top of the motor and trigger the pump inside it to pump water outside through the tube. The whole container can then be rotated using the servo to control the direction of the water.

3.1 FUNCTIONAL THEORY ON CODING:

As we know the fire sensor will output a HIGH when there is fire and will output a LOW when there is fire. So we have to keep checking these sensor if any fire has occurred. If no fire is there we ask the motors to remain stop by making all the pins high.

```
if (digitalRead(Left_S) ==1 && digitalRead(Right_S)==1 && digitalRead(Forward_S) ==1) //If Fire not detected all sensors are zero{//Do not move the robot digitalWrite(LM1, HIGH); digitalWrite(LM2, HIGH); digitalWrite(RM1, HIGH); digitalWrite(RM2, HIGH);}
```

Similarly, if there is any fire we can ask the robot to move in that direction by rotating the respective motor. Once it reaches the fire the left and right sensor will not detect the fire as it would be standing straight ahead of the fire. Now we use the variable named "fire" that would execute the function to put off the fire.else if (digitalRead(Forward_S) ==0) //If Fire is straight ahead{//Move the robot forward digitalWrite(LM1, HIGH); digitalWrite(LM2, LOW); digitalWrite(RM1, HIGH); digitalWrite(RM2, LOW); fire = true;}

Once the variable fire becomes true, the firefighting robot code will execute the put_off_fire function until the fire is put off. while (fire == true){put_off_fire(); Inside the put_off_fire() we just have to stop the robot by making all the pins high. Then turn on the pump to push water outside the container, while this is done we can also use the servo motor to rotate the container so that the water is split all over uniformly.

```
void put_off_fire () {delay (500); digitalWrite (LM1, HIGH); digitalWrite (LM2, HIGH); digitalWrite (RM1, HIGH); digitalWrite (RM2, HIGH); digitalWrite (pump, HIGH); delay (500);for (pos = 50; pos <= 130; pos += 1) {myservo.write(pos); delay (10);} for (pos = 130; pos >= 50; pos -= 1) {myservo.write(pos); delay (10);} digitalWrite (pump, LOW); servo.write (90); fire=false;}
```

3. ADVANTAGES & DIS-ADVANTAGES:

3.1. ADVANTAGES:

- To detect the exact direction of fire source.
- Reduce human effort.
- Capability of sensing accurately
- Increased flexibility.
- Longer range.
- Can reach all around itself.
- Wireless makes ease of operation.
- We can use bots only everywhere.

3.2. DIS-ADVANTAGES:

- To establish the entire network, it is quite acostly task.
- It cannot be worked beyond limit.
- Components may have dier consequences.

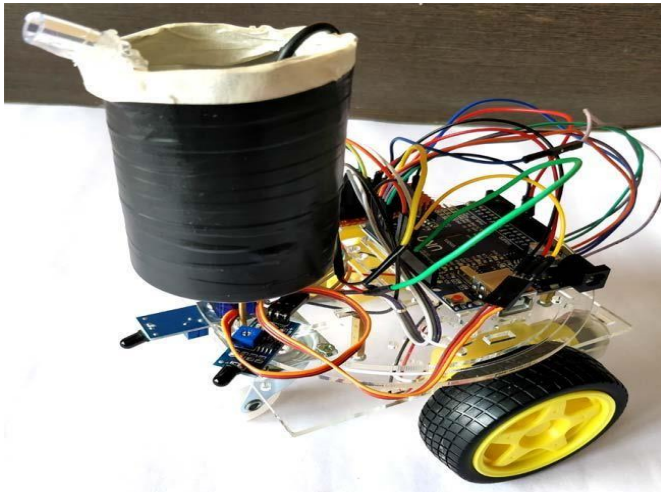
4. APPLICATIONS & USES:

4.1 APPLICATIONS:

- The main intention of this project is to design a fire fighting robot using Android application for remote operation.
- a water tanker to pump water and spray it onfire through wireless communication.
- It Can be used in server rooms.
- Disaster area monitoring and rescue.

4.2 USES:

- Long distance travelling.
- Controlling through software development.
- Extension to this we can use web cam andcontrol it through anywhere.



5.RESULT:

6.CONCLUSION:

Here we successfully, developed the fire rescue bot. Robot detects the smoke and flames at the site wherethe

robot exists. This movement of this robot vehicle is controlled by node mcu as per the program. This robot is helpful in those areas where natural calamity and bomb explosions occurred.

7. REFERENCES

- [1] ieeexplore.ieee.org/document/7251507/Fire rescue bot
- [2] https://www.researchgate.net/publication/26940629_Fire_rescue_bot.
- [3] <https://www.slideshare.net/vibs1893/fire-rescue-bot-using-nodemcu>.