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Arduino based Autonomous Fire Fighting Robot

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Abstract: ***Recently a survey is conducted on fire accidents and it says that so many people lost their lives in this pandemic situation. To prevent these incidents is also a tougher job for a human because the human tendency is more in making mistakes. If any little mistake is done it causes a huge loss to the people and property also. In computers there is no chance in doing mistakes. Based on this situation we want to build an Arduino based firefighting robot. When there is a fire accident happens in tenth floor building, it is not possible for a fire engine to put out the fire and there is a less possibilities to use a fire extinguisher for a human. The robot is useful to put out the fire where there is no way for a man to move. It detects the fire by a flame sensor and move towards the fire when the robot reaches the fire the robot halts and motor is activated then it sprinkles the water on it and put out the fire. This is the whole point of our project.***
Keywords: Arduino, Robot, Flame sensor

I. INTRODUCTION

Technology has advanced so much and still we are not using it up to the mark. With the advent of technology, we can put a checkmate to fire accidents. We cannot stop the situation but we can control the situation. How many precautions are taken are not count but the fire accidents occur in some way or the other. It is a natural calamity and of course manmade mistakes. When the fire accidents occur, we have to stop the fire to save the people and the assets. A small mistake happens it is going to be a loss for the people. To rescue the people, police risks their lives and sometimes they even lose their lives. Without risking anyone lives we have to use robots to put out the fire. We build an Arduino based autonomous firefighting robot to put out the fire. What our robot does? When there is a fire accident happen, it senses the fire by a sensor and moves towards the fire. When it reaches the fire, it puts out the fire.

II. BLOCK DIAGRAM & HARDWARE COMPONENTS

A. Block diagram

An Arduino uno microcontroller has both digital pins and analogue pins. A0 to A5 are analogue pins and 16 digital pins are present. Here in this program we use digital pins. Flame sensor has three pins. They are ground, output, 5v power supply. Ground is given common in breadboard and power supply is connected to v in pin Arduino uno board. Output pin is connected to one pin in digital pins according to our program. L293D driver module is used drive the two motors in any direction. It has four output pins. we connect pin 3,6 is given to left side motor and 5,10 pins is given to the right motor. This driver module ground pin is given to common and power supply is given from battery. Servo motor has three pins. They are ground, vin, digital pin. Ground is connected to the ground pin Arduino board. Vin is connected to 5v pin in the board. Motor has 5v pin and ground pin and those two are connected to the Arduino board. These are the connections of firefighting robot.

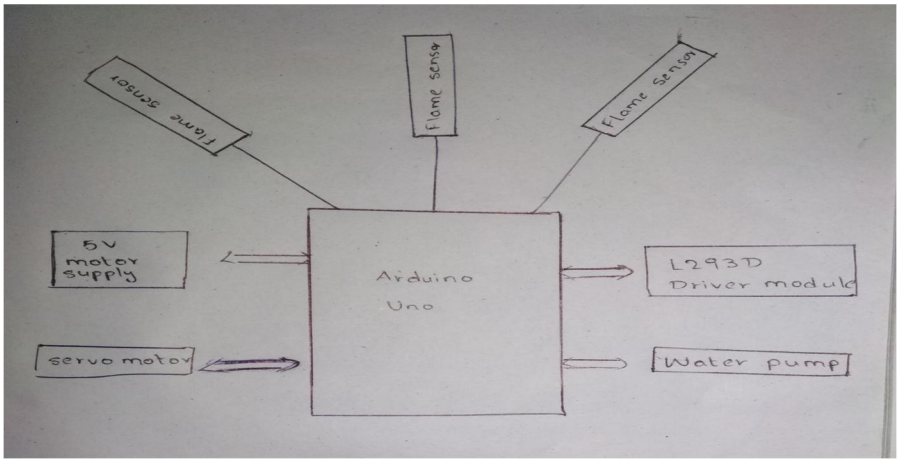


Fig: Block Diagram

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B. Hardware Components

1) Arduino Board

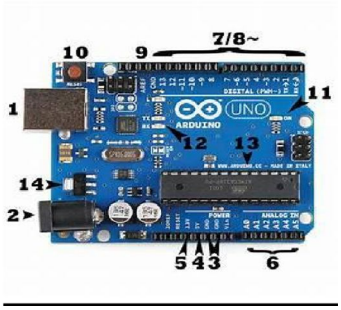


Fig: Arduino Board

Arduino board is considered to the brain of the project. It takes input from the flame sensor and according to the input it takes action in putting out the fire. It controls the total robot by the input it is given. In our project we use Arduino uno 328 microcontroller.

2) Flame Sensor: Flame sensor is used to detect the fire in its surroundings and send the input to the Arduino board. Whenever there is an increase in its temperature happens it sense the temperature and gives this information to the Arduino board. It is the major component used in our project.



Fig: Flame Sensor

*3) L293D driver Module***:** This driver module gives the power supply to the robot and hence it used to move the robot. It takes the instructions from the microcontroller and according to the instructions the robot moves from one direction to another.



Fig:L293D driver module

4) Servo Motor



Fig: Servo motor

Servo motor is used to rotate the water tank 180 degrees. When the robot reaches the fire and stops then this servo motor activates and rotates the water tank.

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5) *Motor:* Motor is used to pump the water from the water tank. Motor converts the electrical energy to the mechanical energy. It works on this principle



Fig: Motor

III. WORKING

The flame sensor senses the temperature and gives the information as an input to the Arduino board. According to the input, the Arduino board gets from the flame sensor it works. For example, our temperature varies between 25 to 30 degrees. When a fire accident occurs, the temperature reaches above 30 degrees and more. For suppose in the program, we set the temperature to 40 degrees then whenever the flame sensor senses the temperature 40 degrees and gives the information to the Arduino board. Arduino sense the temperature difference if it is 40 or more then it gives instructions to move the robot. Three flame sensors are set in three directions to the robot. When left sensor sense the temperature difference more, then the robot turns towards left side and when the centre flame senses the temperature more then the robot moves forward. It stops when it reaches the fire and then the motor activates and pump the water towards the fire. Simultaneously, servo motor rotates the water tank 180 degrees. Thus, the robot puts out the fire. This is how autonomous firefighting robot works.

IV. APPLICATIONS

Applications

A. It can used in server rooms and research institutes.
B. It can be used in high storey buildings.
C. It is portable and moves in very small places.

V. RESULTS & CONCLUSION

It automatically extinguishes the fire without using any man power. So, we cannot risk any policemen lives in fire accidents. And there are some places where we cannot send fire engines and unable to use fire extinguishers and there these robots play a major role to stop the fire.

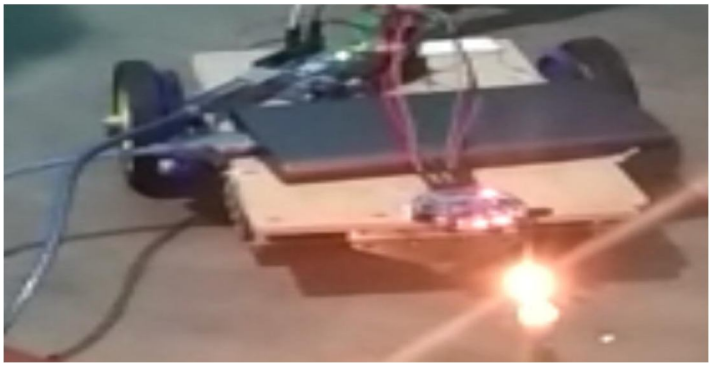
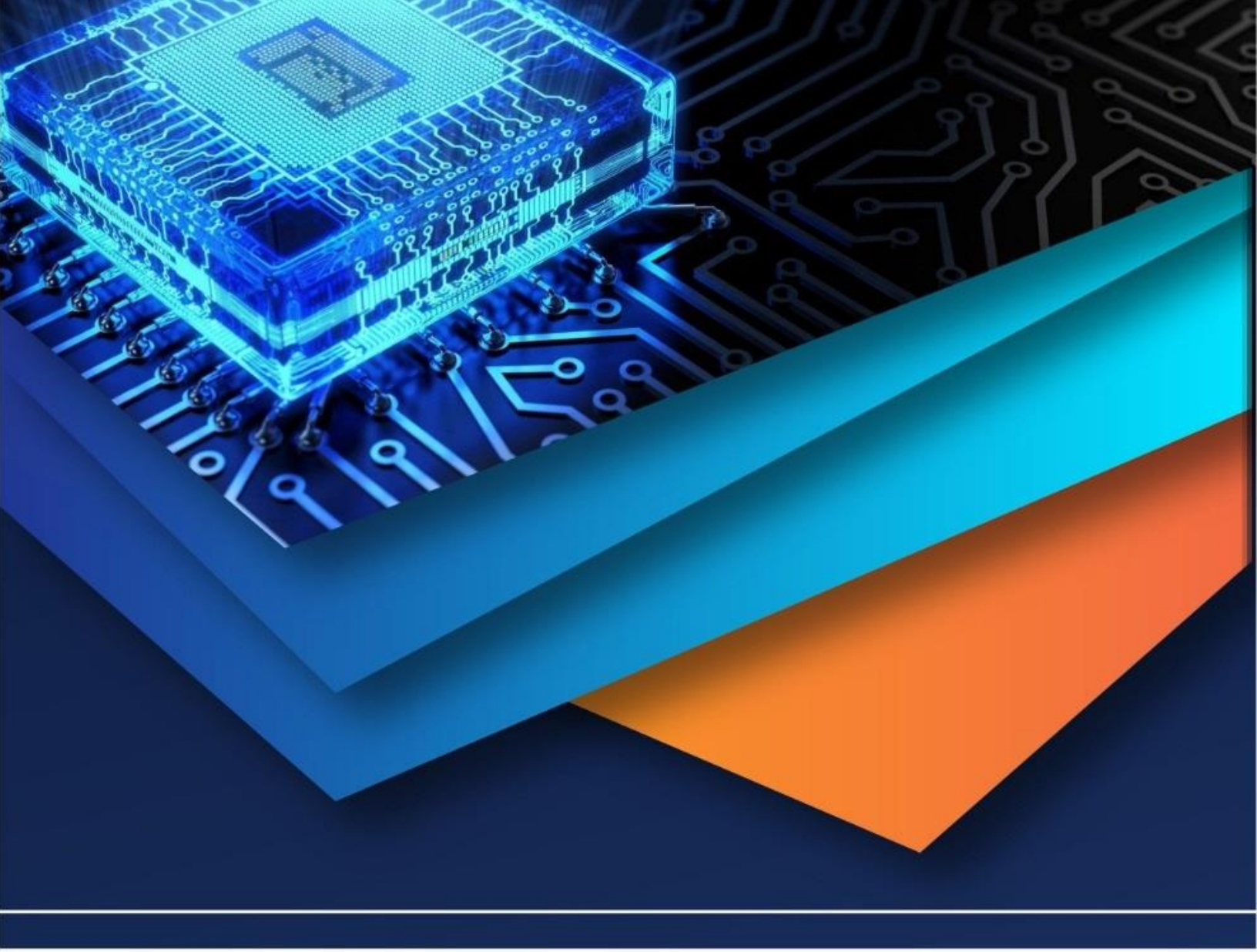


Fig: working module

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