

AUTOMATED FIRE DETECTING AND EXTINGUISHING CAR

By

Group-05

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A project report submitted to the Institute of Information Technology
in partial fulfillment of the requirements for the 3rd year 2nd semester

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CANDIDATE’S DECLARATION

This project report is submitted to the Institute of Information Technology, Jahangirnagar University, Savar, Dhaka in partial fulfillment of the requirements for having the B.Sc. (Hons.) degree in Information and Communication Technology.

We now declare that this report is based on our results. Materials of work found by other researchers are mentioned by reference. This report, neither in whole nor in part, has been previously submitted for any degree.

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CERTIFICATE

The project titled “AUTOMATED FIRE DETECTING AND EXTINGUISHING CAR” submitted by **Mst. Sumiya Siddika** (Roll-1975), **Md. Shakil Ahmed** (Roll-2013), **Md. Masud Rana** (Roll-2015), **Amit Azim Amit** (Roll-2090) Session: 2018-19, has been accepted as satisfactory in partial fulfillment of the requirement for the 3rd year 2nd semester in Information Technology on the Date of 30-03-23.

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ABSTRACT

A firefighter's work entails detecting and extinguishing fires. In this rapidly evolving technological age, the world is gradually moving toward automated systems. Firefighters, on the other hand, are often in danger of losing their lives. As a result, to resolve these issues, our system was developed. In our system, there is no need for a human being to put out the fire.

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CHAPTER 1

Introduction

1.1 Motivation

The project is focused on a firefighting car. This system is capable of performing tasks in a more efficient, cost-effective, and accurate manner than humans. The firefighting car is programmed to detect and extinguish fires in affected areas. The robotic vehicle is equipped with water tanks and a pump that is operated automatically. As a result of a fire outbreak (or) fire explosion, we are demanding that we use human resources that are not secure to put out the fire. It is very much possible to replace human work in putting out a fire in a dangerous environment by using higher technology, specifically robotics. This strategy would free firefighters from dangerous tasks, increase their efficiency, and reduce the number of fires. we'll create an Arduino-based firefighting car that will detect the fire and it will begin to pump water into the fire-detected area using a sprinkler.

1.2 Objective

The main objective of our project is-

- **Safety:** The system should be designed to be safe for the occupants of the car, and not cause harm or injury.
- **Rapid response:** The system should act quickly to extinguish the fire, using the appropriate fire suppression agent.
- **Minimal human intervention:** The system should be designed to operate with minimal human intervention, as people may not be able to respond quickly enough in an emergency.

CHAPTER 2

Methodology

2.1 Overview

Firstly, we need a 18650 battery. Then connect the battery to the Arduino UNO of the car. Then put the car on the ground and bring fire in front of the car. The car takes input through its sensors and as output the vehicle will move towards the fire. Finally, the car pumps the water pump and sprinkles water on the fire.

2.2 System Model

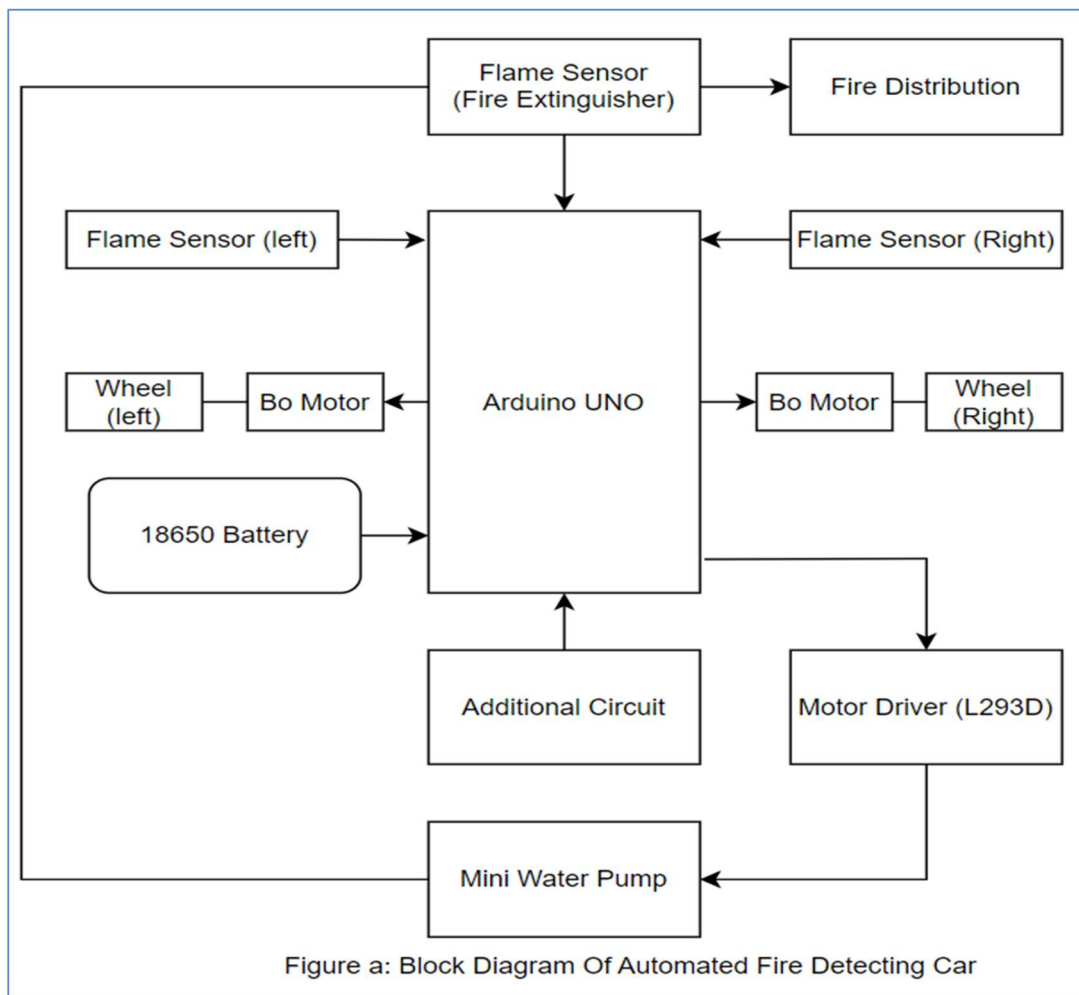


Figure (a) shows the block diagram for Automated Fire Detecting Car. This block diagram shows how an Autonomous fire Detecting Car is implemented. Sensors use as input and this input control by Arduino UNO and an additional circuit. With this input, the main board set the references and uses this data to apply it to the output where the output is a brushless motor, that will go to an object and sprinkle water.

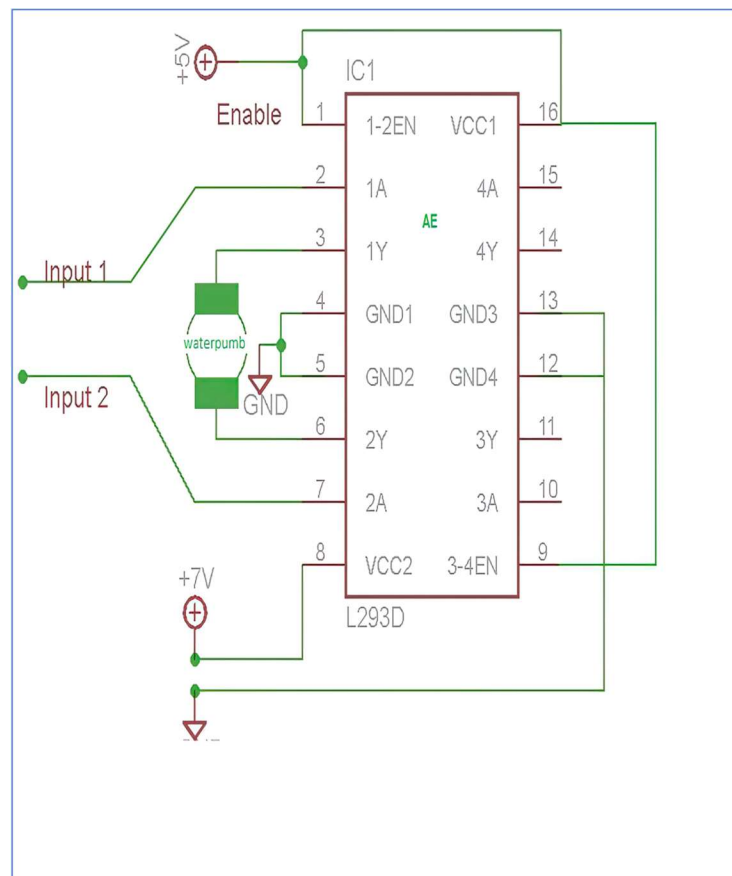


Figure b: L293 Water pump Connection

Figure (b) shows the circuit diagram of the L293 Water pump connection.

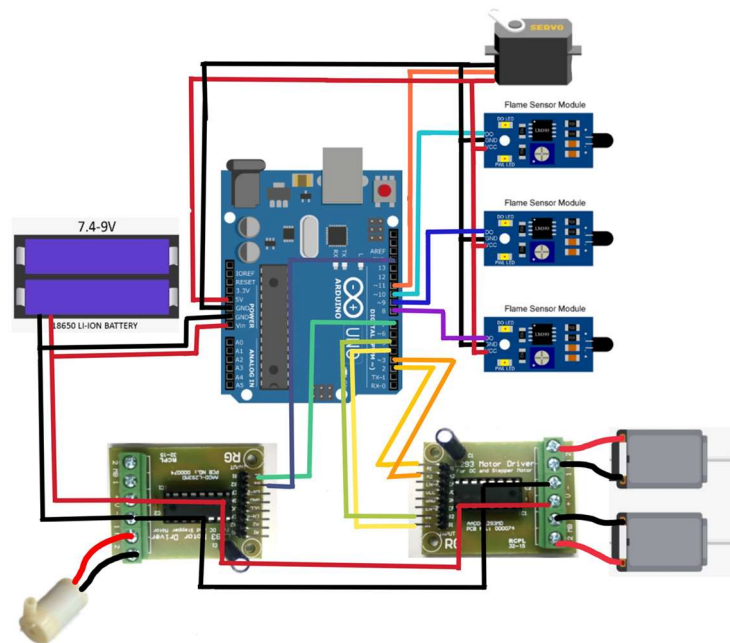


Figure c: Circuit Diagram

Figure (c) shows the circuit diagram of the Automated Fire Detecting Car.

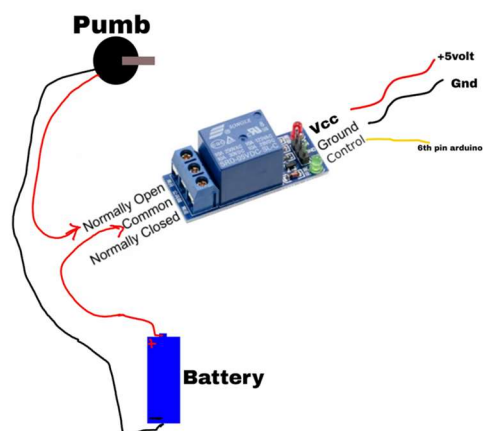


Figure d: Relay Connection

Figure (d) shows the Relay connection.

2.3 Flow Chart

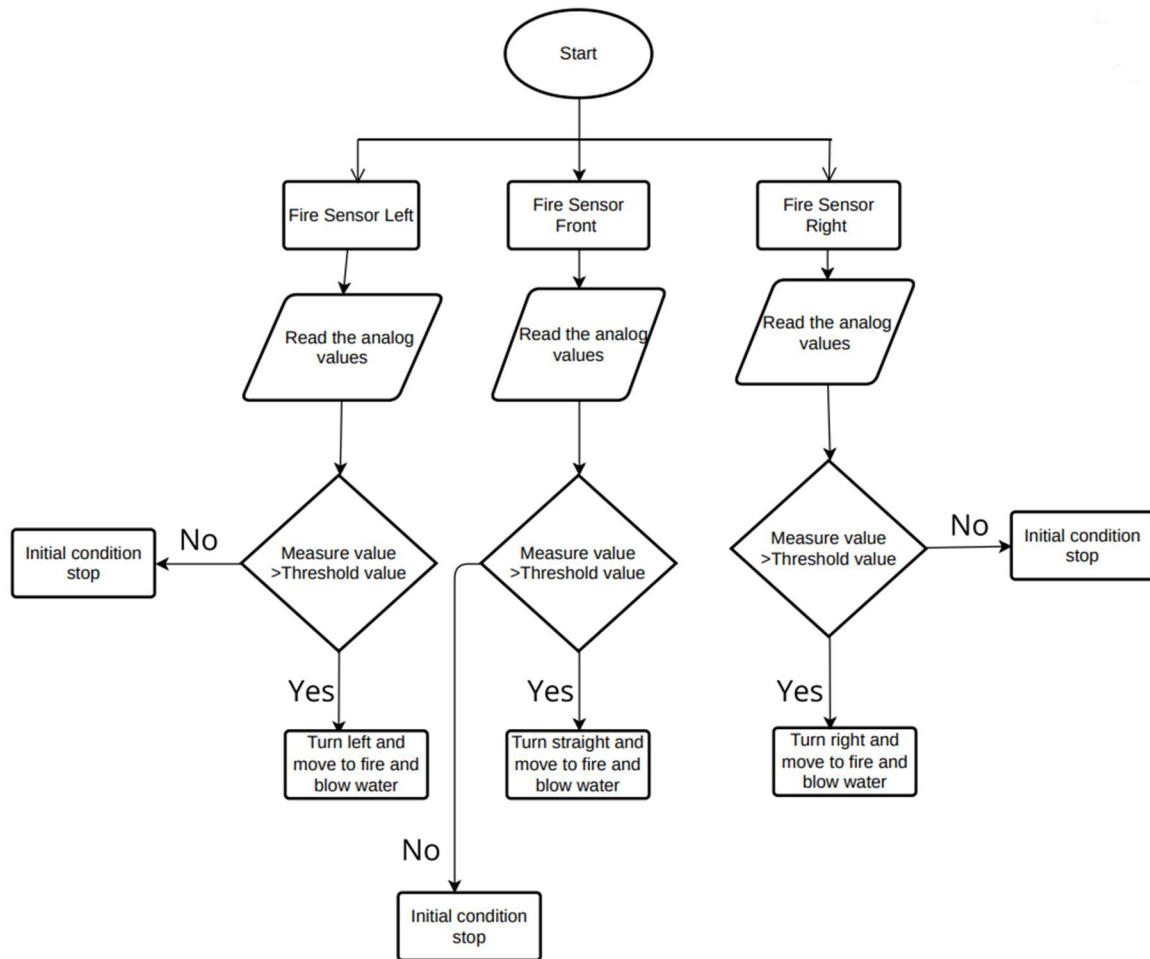


Figure e: Flow chart of Automated Fire Detecting and Extinguishing car

CHAPTER 3

Result and Limitations

3.1 Initialization of Automated Car

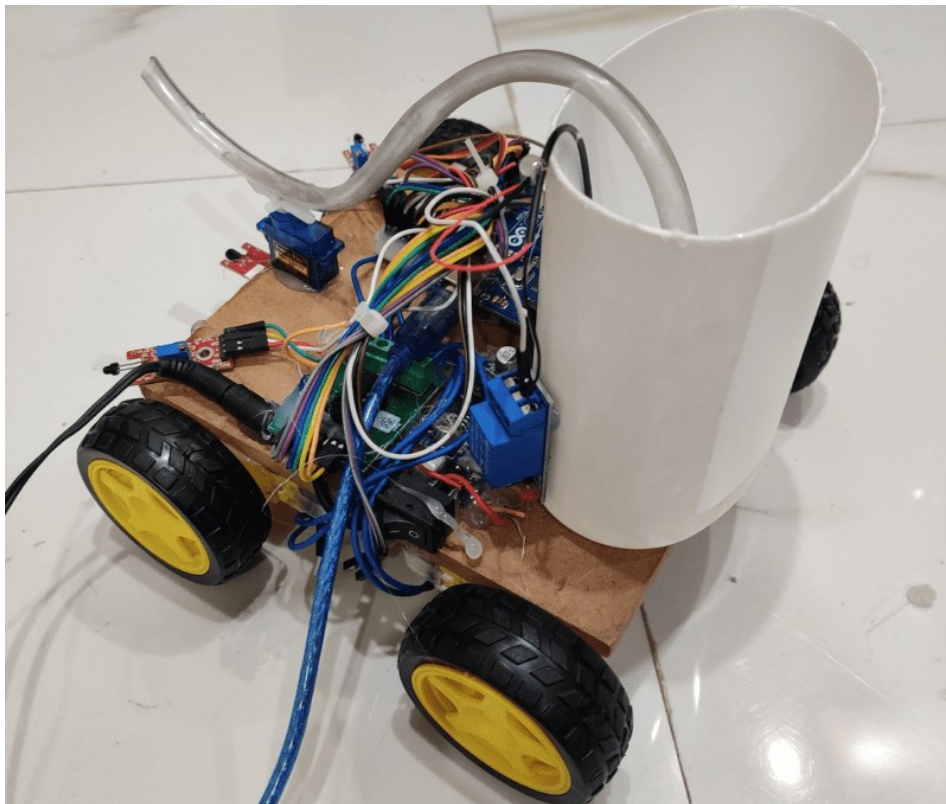


Figure f: Initialization

Firstly, connect the 18650 battery to the automated fire detection car. When the car is on then it is put down on level ground.

3.2 Detection of fire by Automated Car

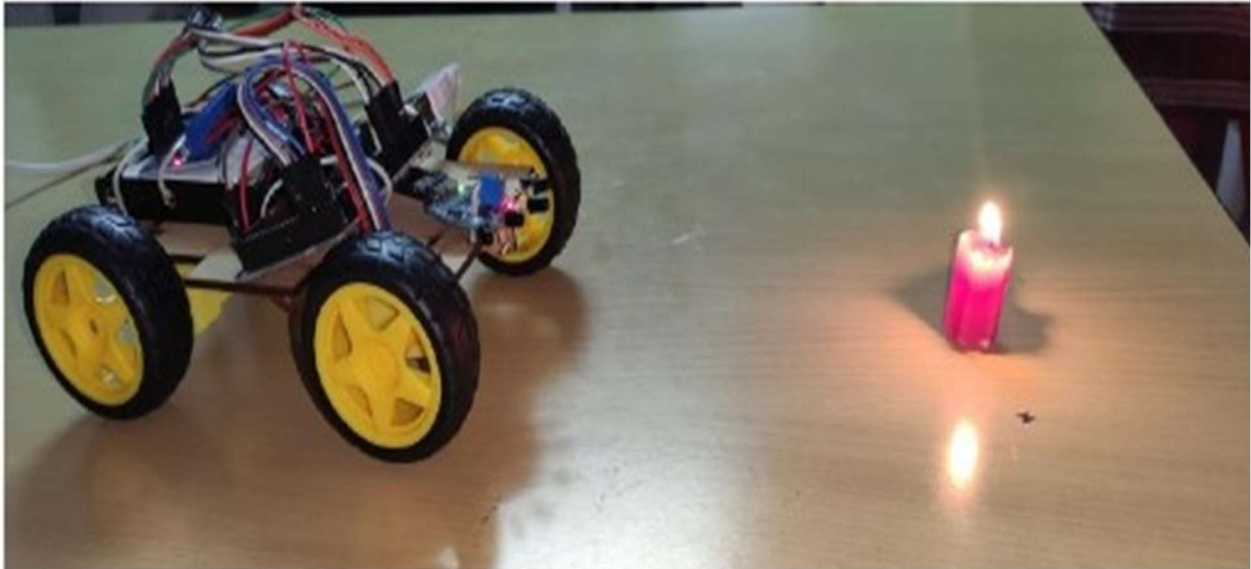


Figure g: Fire Detection

Bring flame in front of the car. The car takes input through its sensors and as output the vehicle will move towards the fire. Finally, the car instructs the water pump and sprinkles water on the fire until the fire has stopped.

3.3 Limitations

- In sunlight flame sensor cannot provide well performance.
- This system will work only in a limited area.

CHAPTER 4

Future work and Conclusion

4.1 Future work

- In the Future, we will work with a high-performance flame sensor that shows good performance in sunlight.
- Automated water sprinklers can be added to this system.
- Some interfacing applications which can be made are controlling home appliances, robotics movements, Speech Assisted technologies, etc.
- By making it GPS enabled, the robot can be controlled from remote stations also.
- It can be further expanded with a voice interactive system facility.

4.2 Conclusion

This project describes a real-time firefighting car that moves at a constant speed, identifies the fire, and then extinguishes it with the help of a pumping mechanism. It has advantageous features such as the ability to detect the location of fire automatically in a certain range besides having a compact body and lightweight structure. The car can be used at a place that has a small entrance or in small spaces because it has a compact structure. The system can potentially be useful to accompany firefighters and prevent an outbreak. From the experimental results, the robot can sense fire accurately in a short time.

References

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- [2] Khalid, W., Sattar, A., Qureshi, M. A., Amin, A., Malik, M. A., & HUSSAIN, K. (2019). A smart wireless sensor network node for fire detection. Turkish Journal of Electrical Engineering & Computer Sciences, 27(4), 2541-2556.