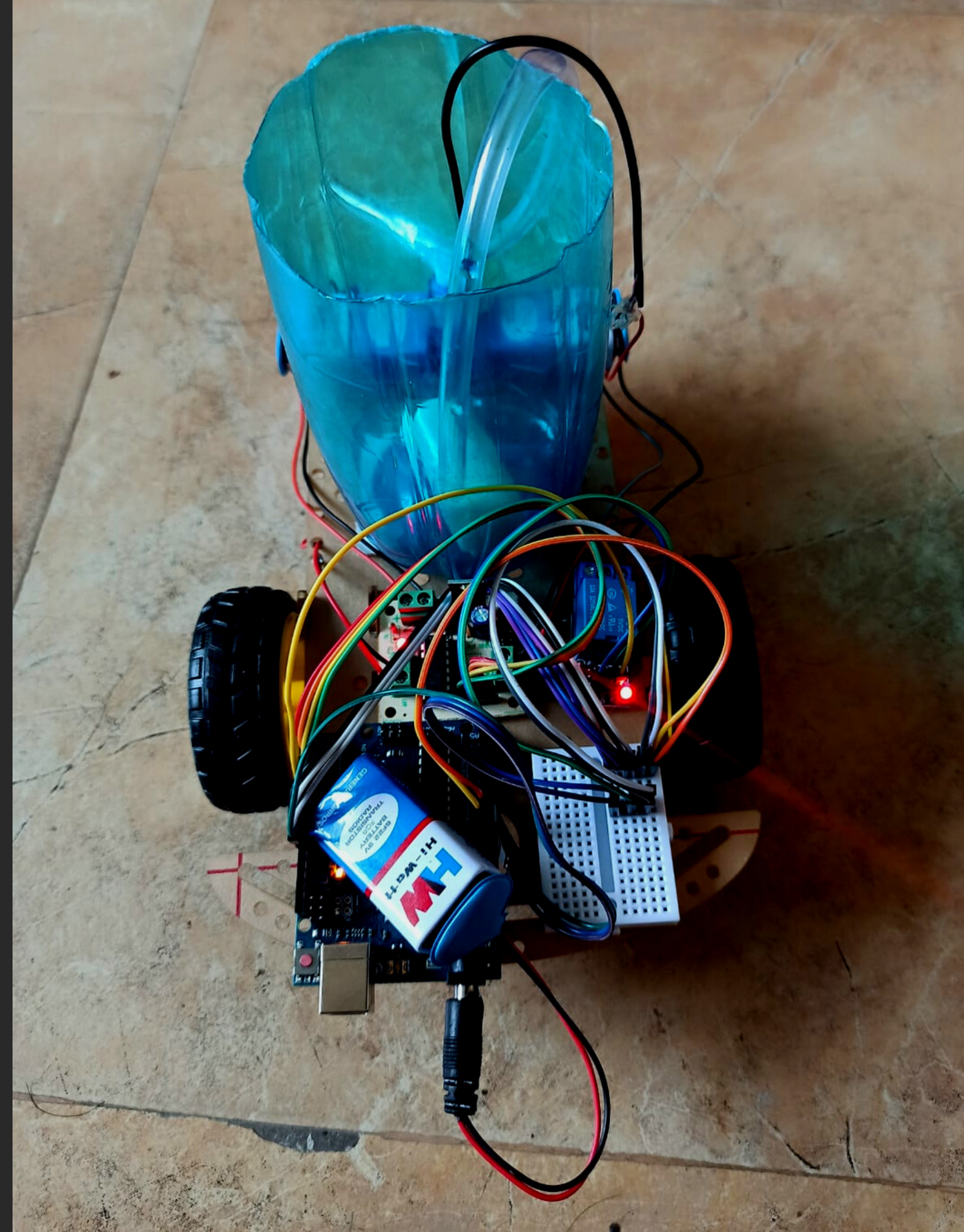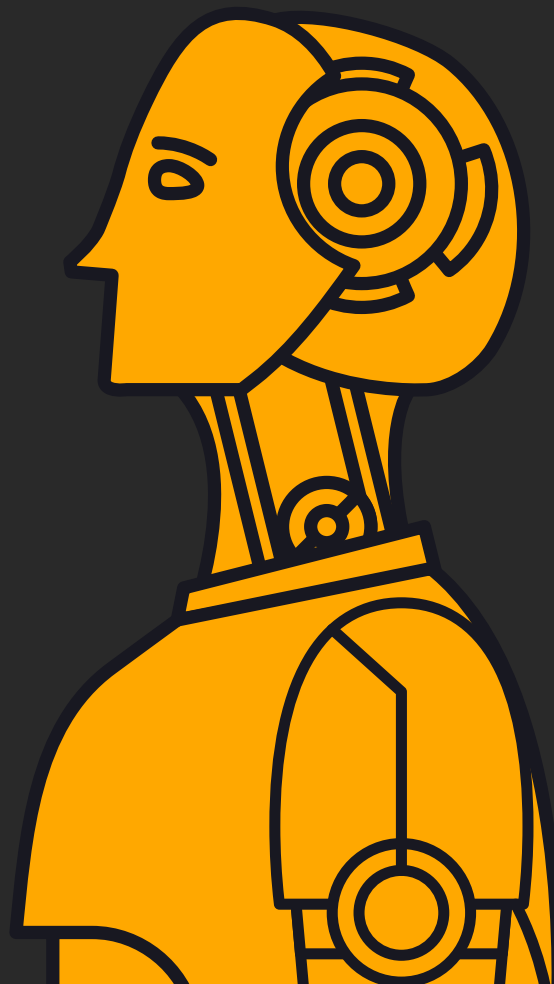# AUTOMATIC FIRE DETECTING AND EXTINGUISHING ROBOT
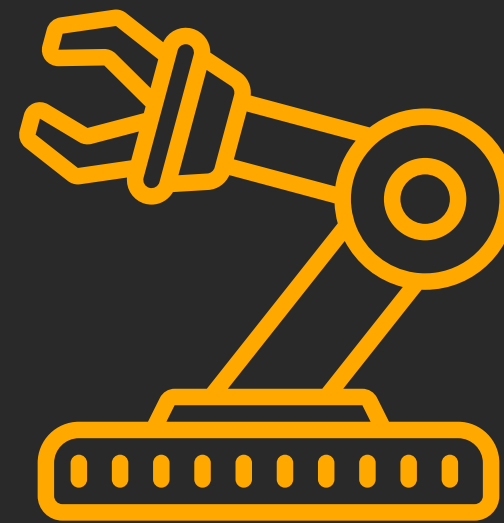
SUBMITTED BY:

ISHU CHOUBEY
ASHUTOSH MISHRA
UTSAV MISHRA

CONTENT

ABSTRACT

Our motive is to build a LOW-COST robot which can detect fire automatically and then put it out on its own. This is a self-acting robot able to move on its own using motors if it detects any kind of fire using flame sensor and then it automatically put out fires using a water storage tank and pump onboard, everything is controlled by a microcontroller that is ARDUINO UNO R3, using data from three different flame sensors it moves in the direction of fire spot and follows the trail of fire detected afterwards.
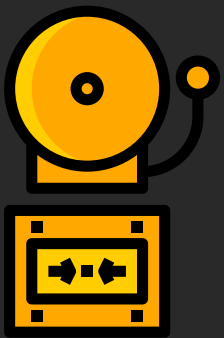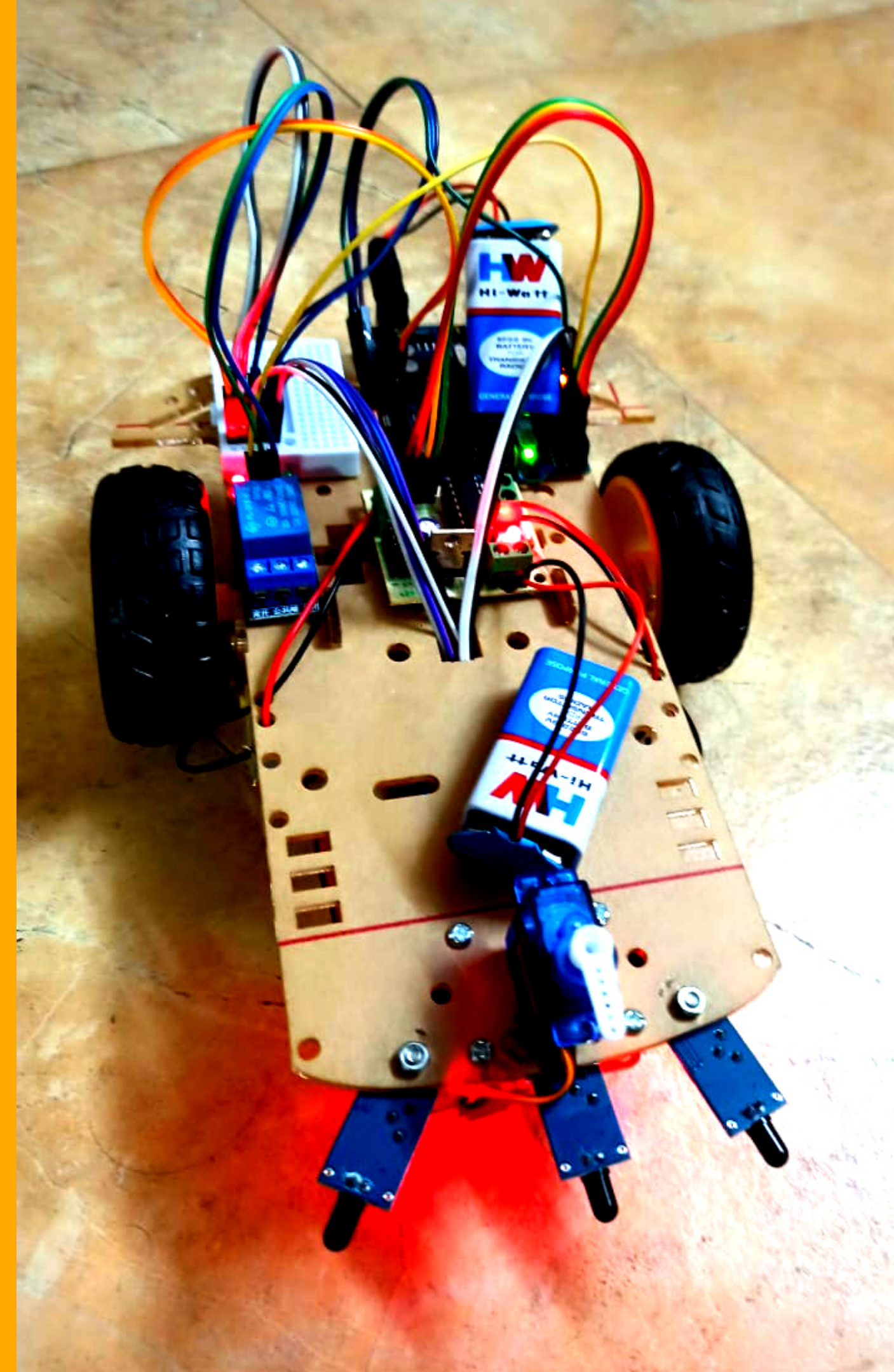
INTRODUCTION

From time to time, we hear a lot of bad news about fire accidents in India.Another similar incident that illustrates how dangerous fire hazards can be is the Haryana School Fire Accident (23 December 1995). It has been recorded as one of the Dabwali Extreme Fire Disasters that cost more than 400 lives. The fire was caused by a short circuit on a generator during a school event. It was 7 minutes to put the crowd at risk as the event tent tent burned down. Only the exit area was also blocked, leaving a small space to avoid the tent. According to the National Crime Records Bureau (NCRB), it is estimated that more than 1.2 lakh people have died in fire accidents in India from 2010-2014. Although there are many safety precautions taken by Fire hazards, these natural / man-made disasters occur from time to time. In the event of a fire, rescue and firefighting we are forced to use unsafe human resources. With the advancement of technology especially for Robots it is very likely that in place of humans fire-fighting robots will be replaced. This will improve the efficiency of firefighters and prevent them from putting people's lives at risk. In this project we have created a Fire Fighting Robot using Arduino, which will automatically detect the fire and start a water pump.

THEORY

In this project, we will learn how to build a simple robot using Arduino that could move towards the fire and pump out water around it to put down the fire. Here ARDUINO UNO R3, is the main controlling unit. Apart from this, major components are flame sensors, stepper and servo motors and water pump. The direction of movement of the robot are described by the motor driver board. Simple DC motor is used for the rotation of the wheel which are responsible for the movement of the robot. DC motors usually convert electrical energy into mechanical energy. To extinguish the fire a pump is used. The pump changes the energy flow from mechanical to the fluid, which picks up water from low-pressure level to high-pressure level. We also have a single channel Relay which makes the switching and connection easier and act as indicators to show if the module is powered and if the relay is active.
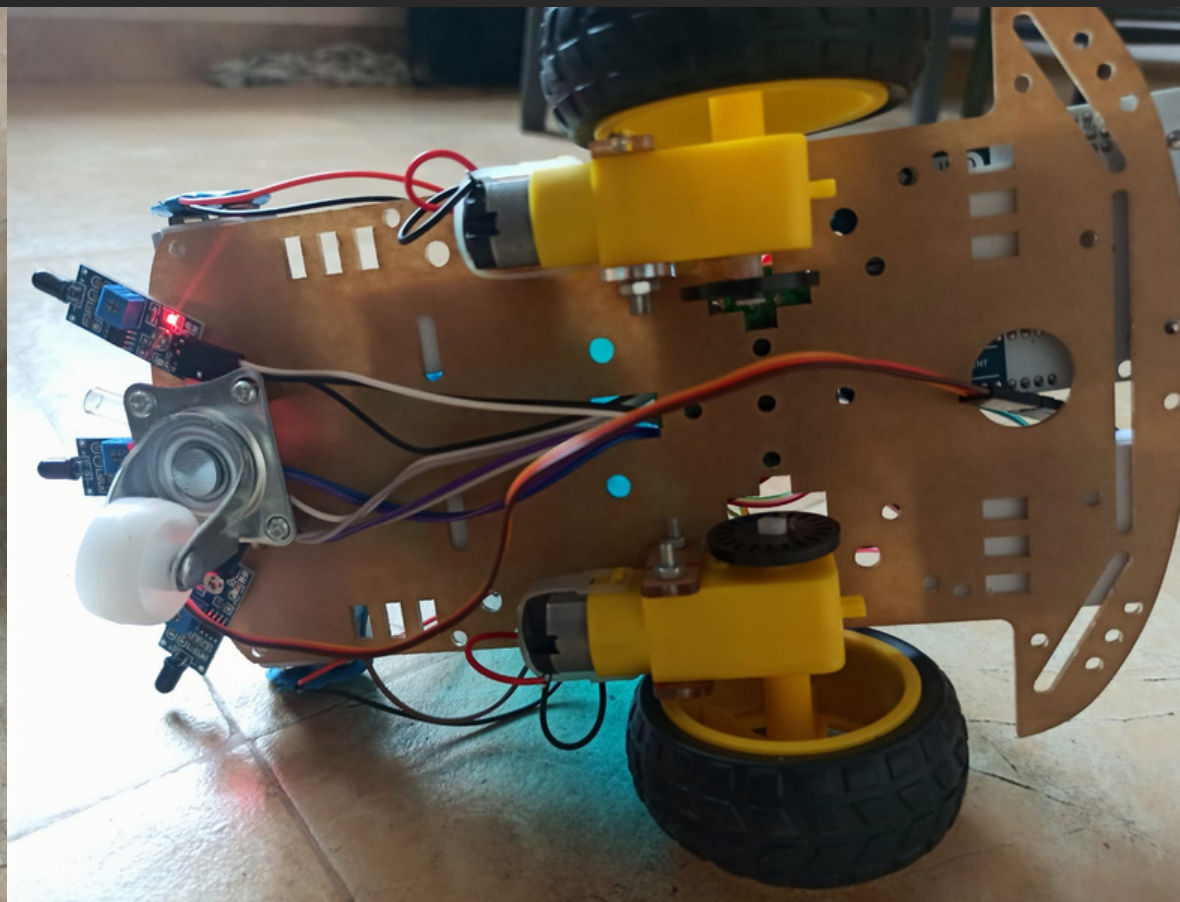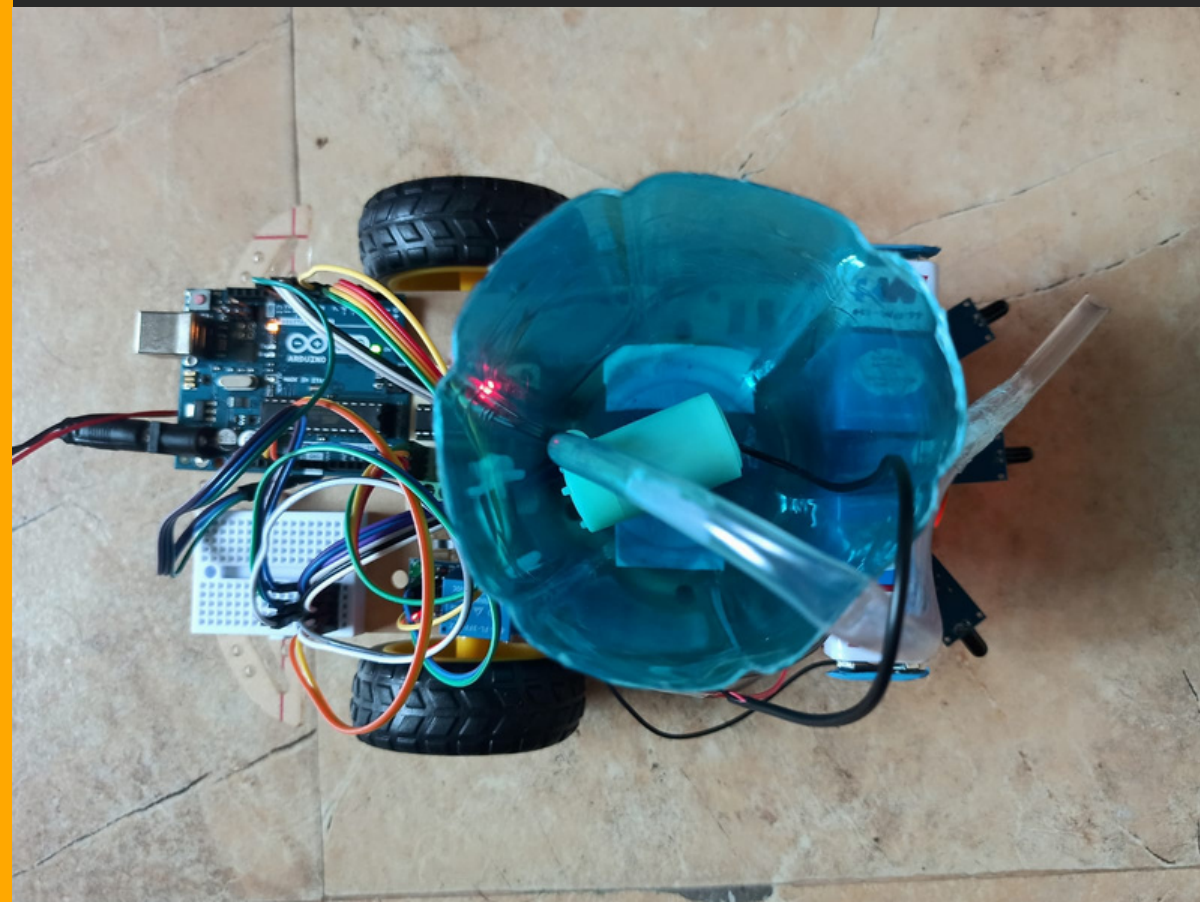
FIRE IS TRAVELLNG

WORKING

- The Arduino UNO Microcontroller board ATmega328P is used which can be used for real time fire extinguishing.
- The direction of movement of the robot are described by the motor driver board.

- Motor Driver is used to give high voltage and high current is given as an output to run the motors which are used in the project for the movement of the robot.

- DC motor is used for the rotation of the wheel which are responsible for the movement of the robot. DC motors usually convert electrical energy into mechanical energy.

- To extinguish the fire a pump is used to pump the water on to the flame.

- A simple single channel relay module is used to pump the water and a servo motor is mounted on pipe's head so that it can sprinkle water over more area. The pumping motor in extinguishing system controls the flow of water coming out of pumping.
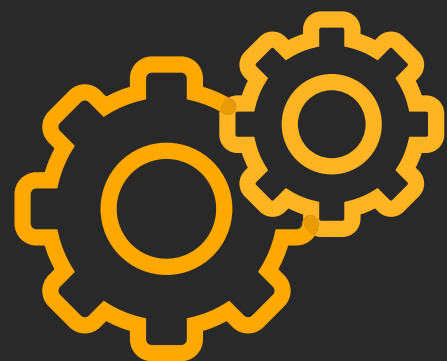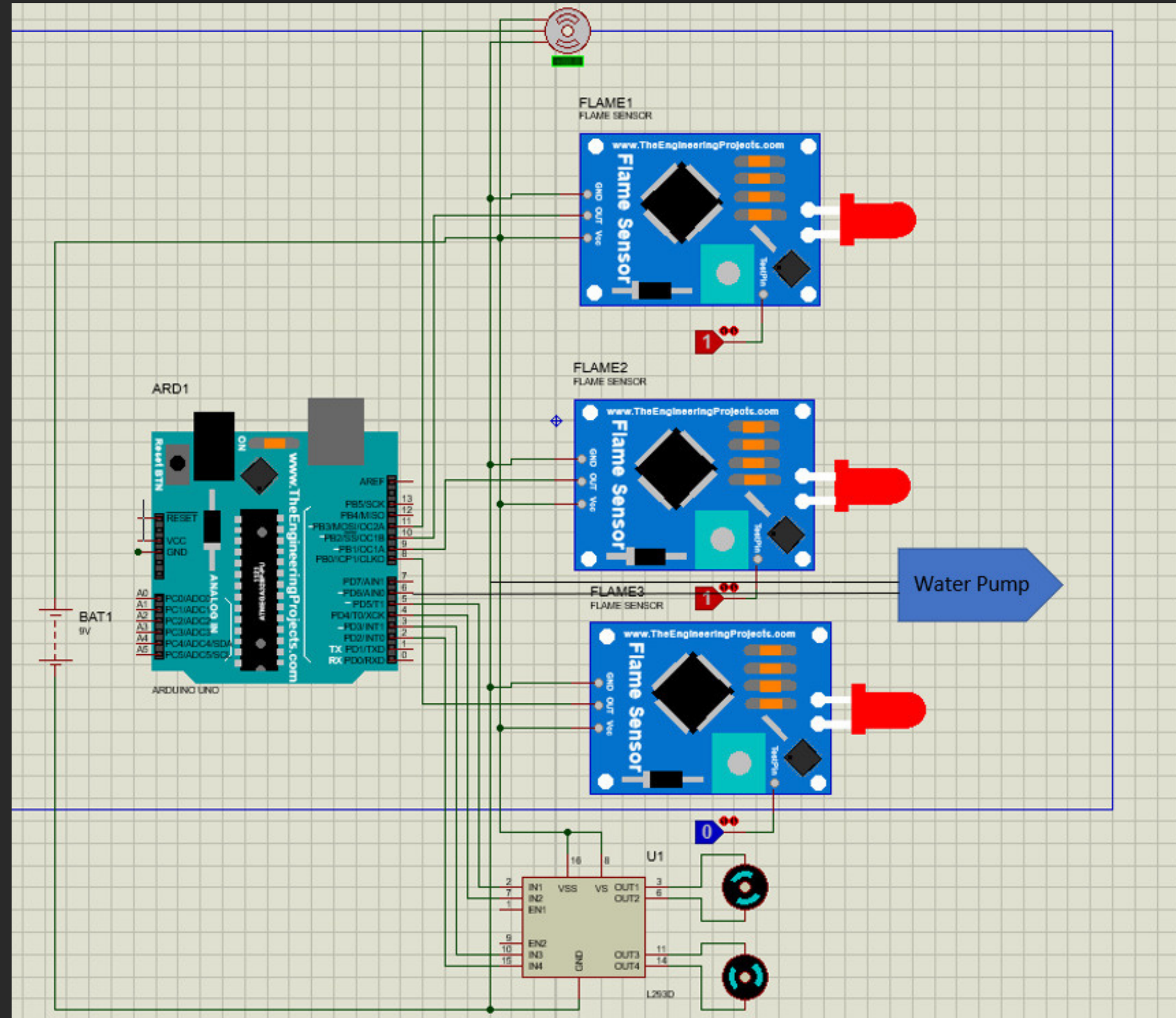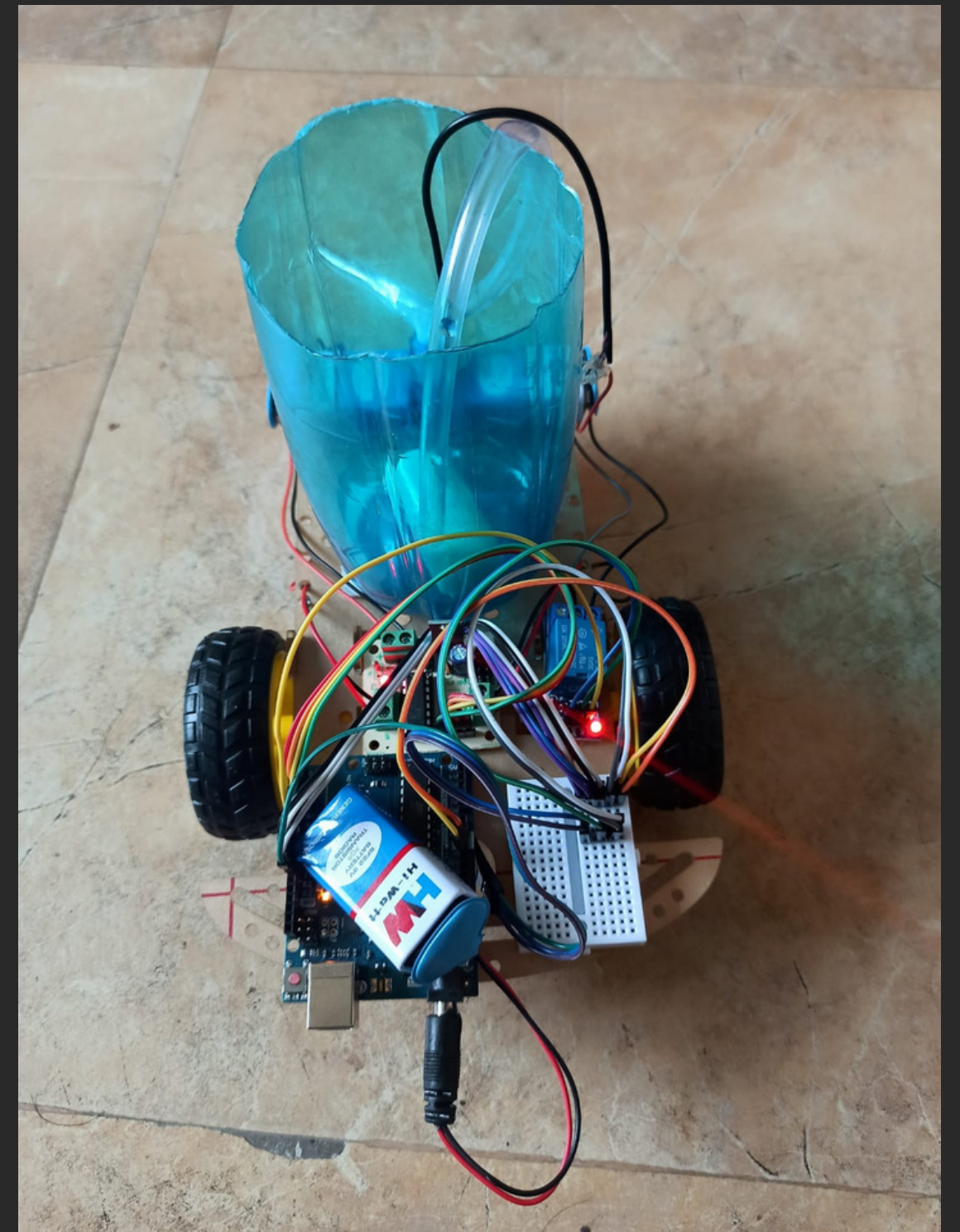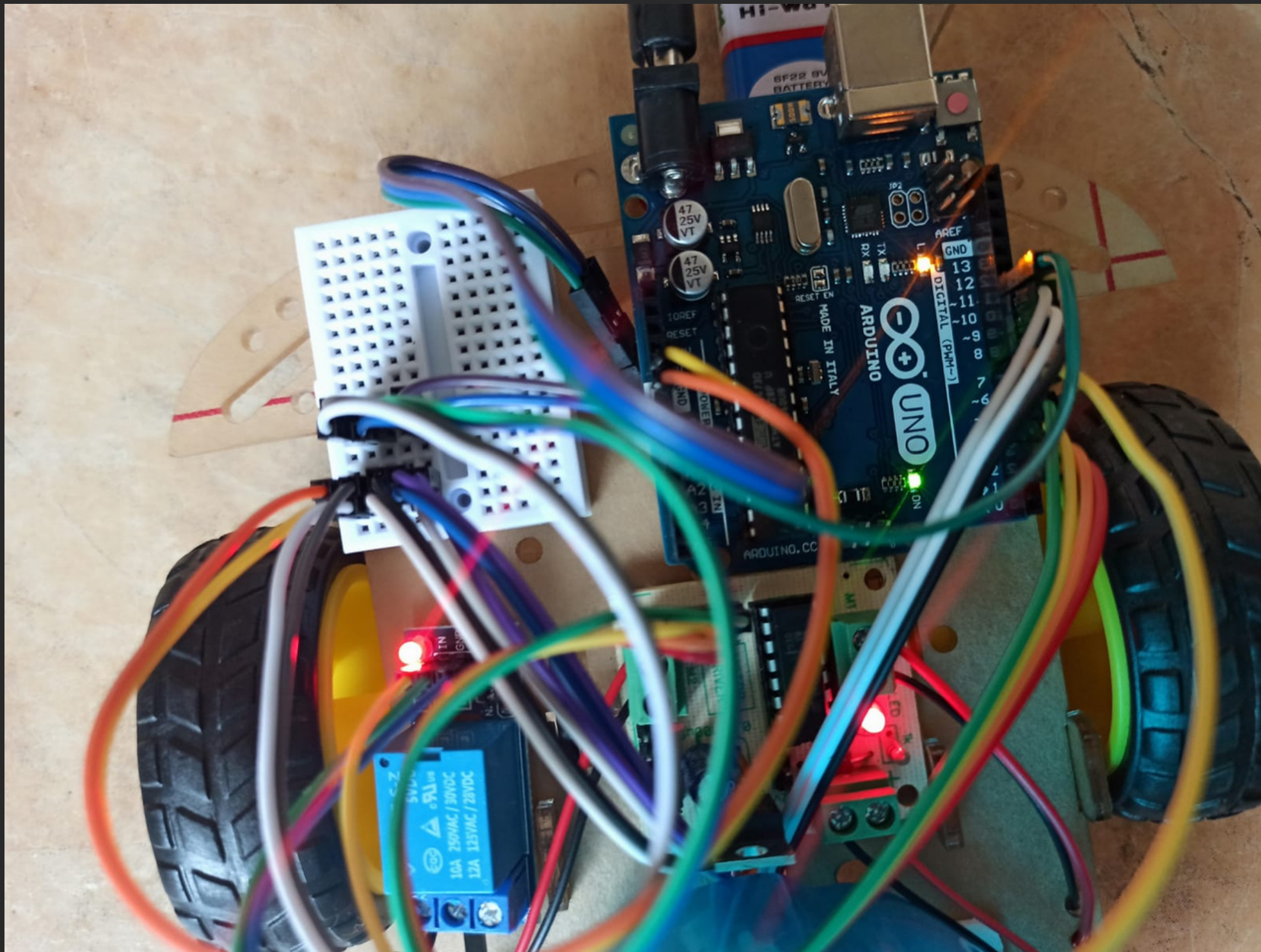
BLOCK DIAGRAM

Fire ROBOT 1.0

Ashutosh Mishra | February 1, 2022
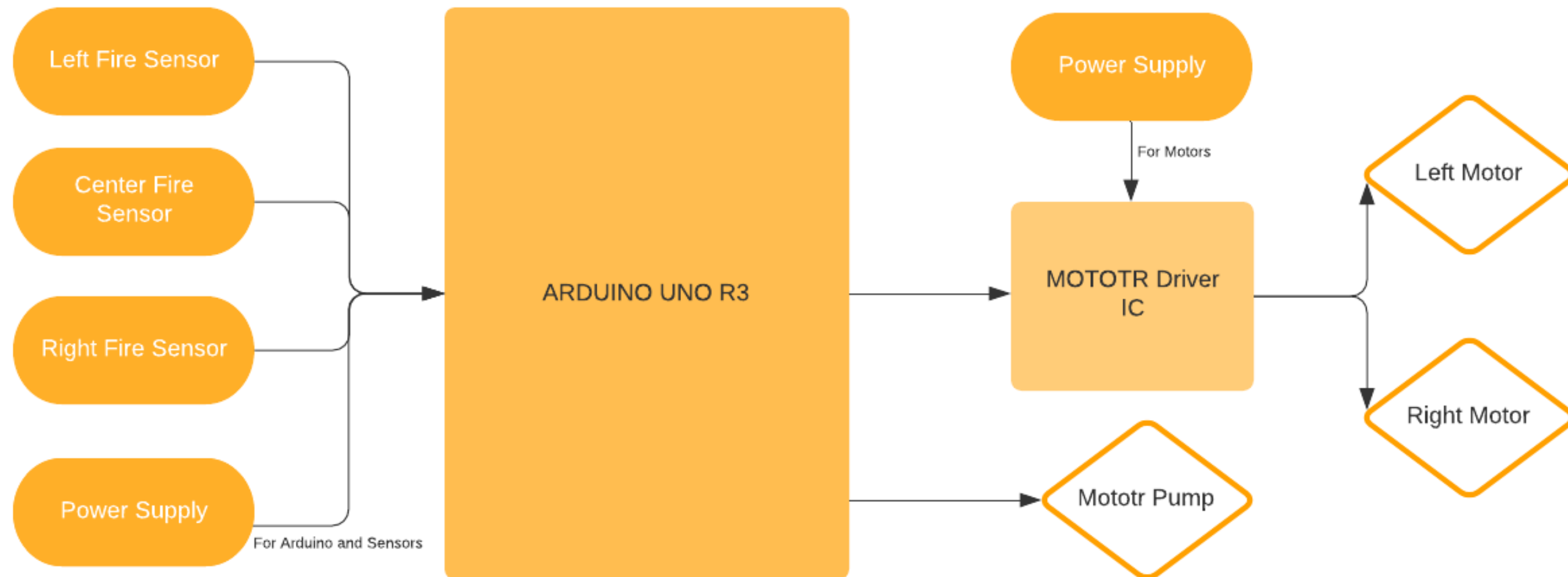
CIRCUIT DIAGRAM

HARDWARE IMPLEMENTATION

HARDWARE IMPLEMENTATION

Working clip 1:

https://drive.google.com/file/d/1DvYI7w-taS5JYH84RZLqDp6nTD8JBcJt/view

RESULTS AND DISCUSSION

The robot works exactly as expected in both software as well as in hardware, in case of software, due to heavy load on local machine's processor (laptop in this case), the simulation is not real time, but the circuit responds to signals accordingly. In case of hardware simulation, the robot detects a flame around 1meter from it and move accordingly, for example is left sensor detects a flame then right side motor gets activated and robot just shifts itself in direction of fire, similarly if right sensor detects a flame then left side motor gets activated and robot just shifts itself in direction of fire. Once the robot is automatically aligned with the fire source it checks for fire again and this time when front flame senor detects fire, the robot moves forward in the direction of fire, then it stops automatically at a safe distance from fire and after stopping the water pump and servo motor gets activated and fire gets extinguished.

CONCLUSION

The robot is best suited for operating in an environment where humans cannot go, for example forest fire. Also, with the help of this idea we can save many human lives, using this robot properly we can put out fire in very short time, the robot efficiently detects fire then align itself in direction of fire then moves towards it, and after stopping at a very safe distance from fire the robot stops and then sprinkle water on fire source till it extinguishes.