

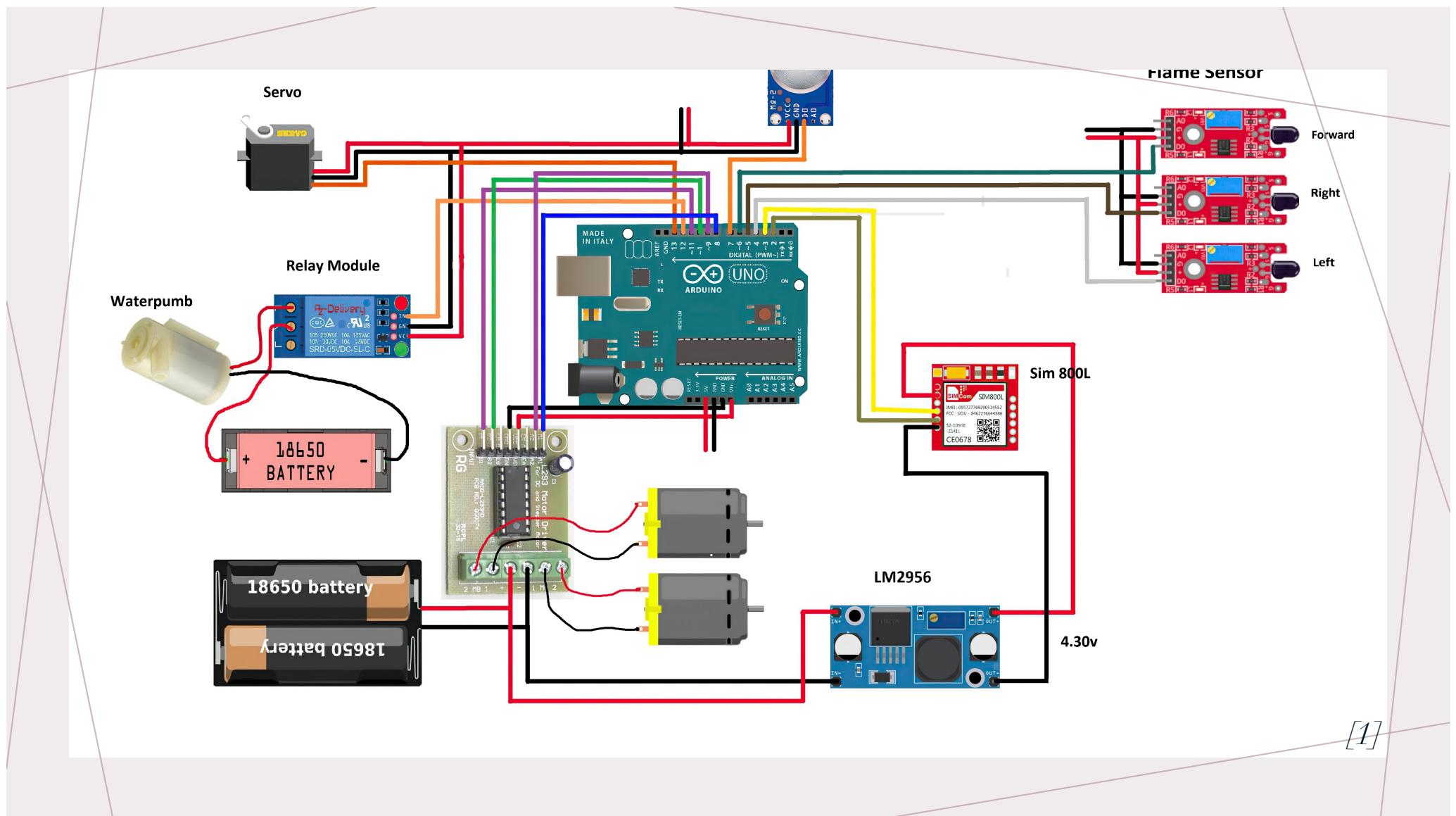
# *FIRE DROID*

Like fire alarms and automatic sprinklers, fixed fire fighting robots are used in hazardous and populated areas to **extinguish small flames** before they spiral out of control. These robots rely on simpler systems relying on infrared and ultraviolet detectors to detect fires.



# *WHY THE FIRE FIGHTING ROBOT CAR?*

In our day-to-day life, fire accidents have become common and sometimes may lead to hazards that make it hard for the firemen to protect human life. In such cases, a fire fighting robot is used to guard human lives, wealth, and surroundings from the fire accidents .According to the National Fire Protection Association, there were 29,130 injuries reported while fighting fire in 2020. These injuries are also coupled with 68 on-duty deaths which refers to the fire fighters who risk their life to save peoples lives and end up losing their own lives. Injuries and casualties are the reason which inspired me to design this prototype.



[1]

# *IMPORTANT CONCEPTS OF COMPONENTS USED IN THIS PROJECT*

## 1.FLAME SENSOR

- A Flame Sensor is a device that can be used to detect presence of a fire source or any other bright light sources.
- There are two types of implementations of Flame Sensors: one is with both Analog Output and Digital Output while the other is with only the Digital Output.
- It has 4 pins : VCC, Ground, D0, A0



## *2.GAS SENSOR*

- MQ2 gas sensor is an electronic sensor used for sensing the concentration of gases in the air such as LPG, propane, methane, hydrogen, alcohol, smoke and carbon monoxide. MQ2 is a metal oxide semiconductor type gas sensor.

Concentrations of gas in the gas is measured using a voltage divider network present in the sensor. This sensor works on 5V DC voltage. It can detect gases in the concentration of range 200 to 10000ppm.

[3]

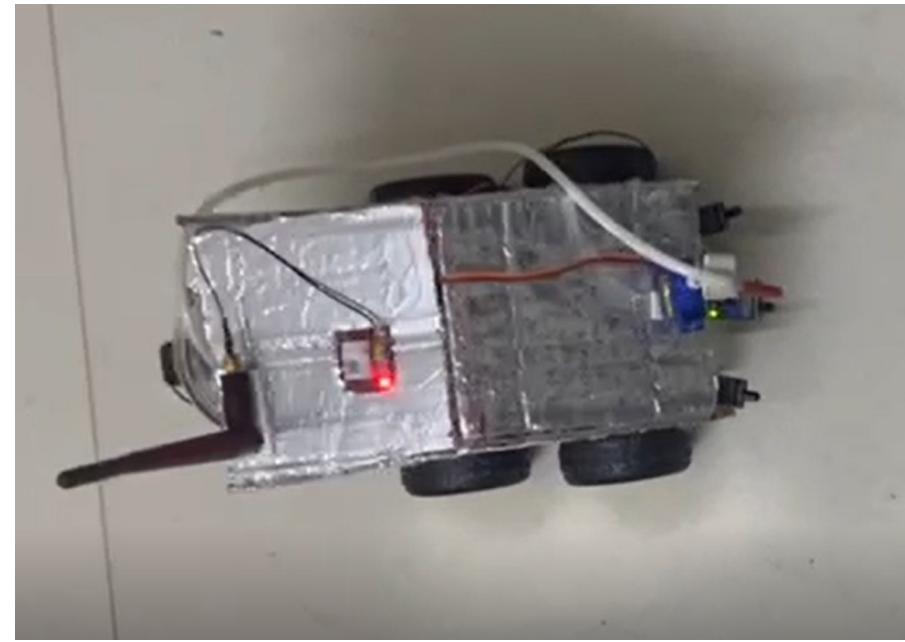
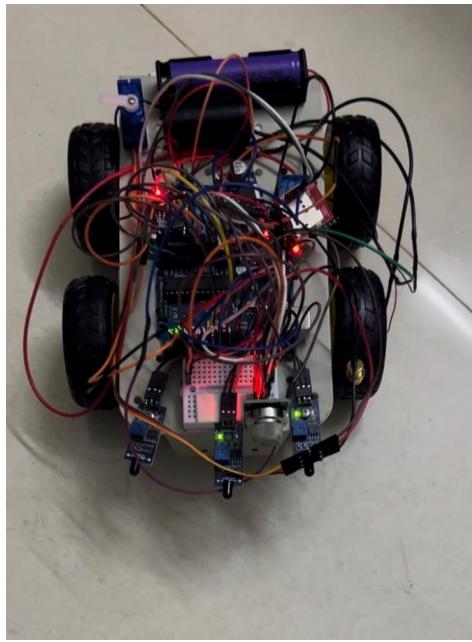


## **WORKING OF THE PROJECT**

-WHEN THE TEMPERATURE RISES OR IF THERE IS A FIRE NEARBY THE PHOTO TRANSISTOR DETECTS IT RADIATION AND THE D0 PIN GOES HIGH.

-ARDUINO GETS THE OUTPUT OF FLAME SENSOR WHICH SENDS SIGNALS TO THE RELAY MODULE MAKING IT CLOSE THE CIRCUIT, SO RELAY MODULE CLOSES CIRCUIT AND THIS ACTIVATES THE WATER PUMP. WATER IS EXITED THROUGH THE PIPE ATTACHED TO THE PUMP AND FIRE IS EXTINGUISHED.

THIS WHOLE PROCESS WHICH TAKES PLACE IS AUTONOMOUS



*WORKING PHOTOS*

# *PROBLEMS FACED*



Distance  
Measurement



Wire Complexity



Improper Movement  
of Wheels(Driving)



Flame sensor  
Alignment



Complexity in Stability



Amount of water  
used(increasing the  
weight in the  
prototype , decreasing  
the stability)

# Problems Resolved



Distance Measurement-Triangulation Method ,Ultrasonic Detection



Flame sensor Alignment-Resolved using 2 Flame sensors



Wire Complexity-Resolved using Sleeves



Complexity in Stability-Resolved with aluminium coated acrylic sheets



Improper Movement of Wheels(Driving)-Resolved with the  
TRIANGULATION FORMULA



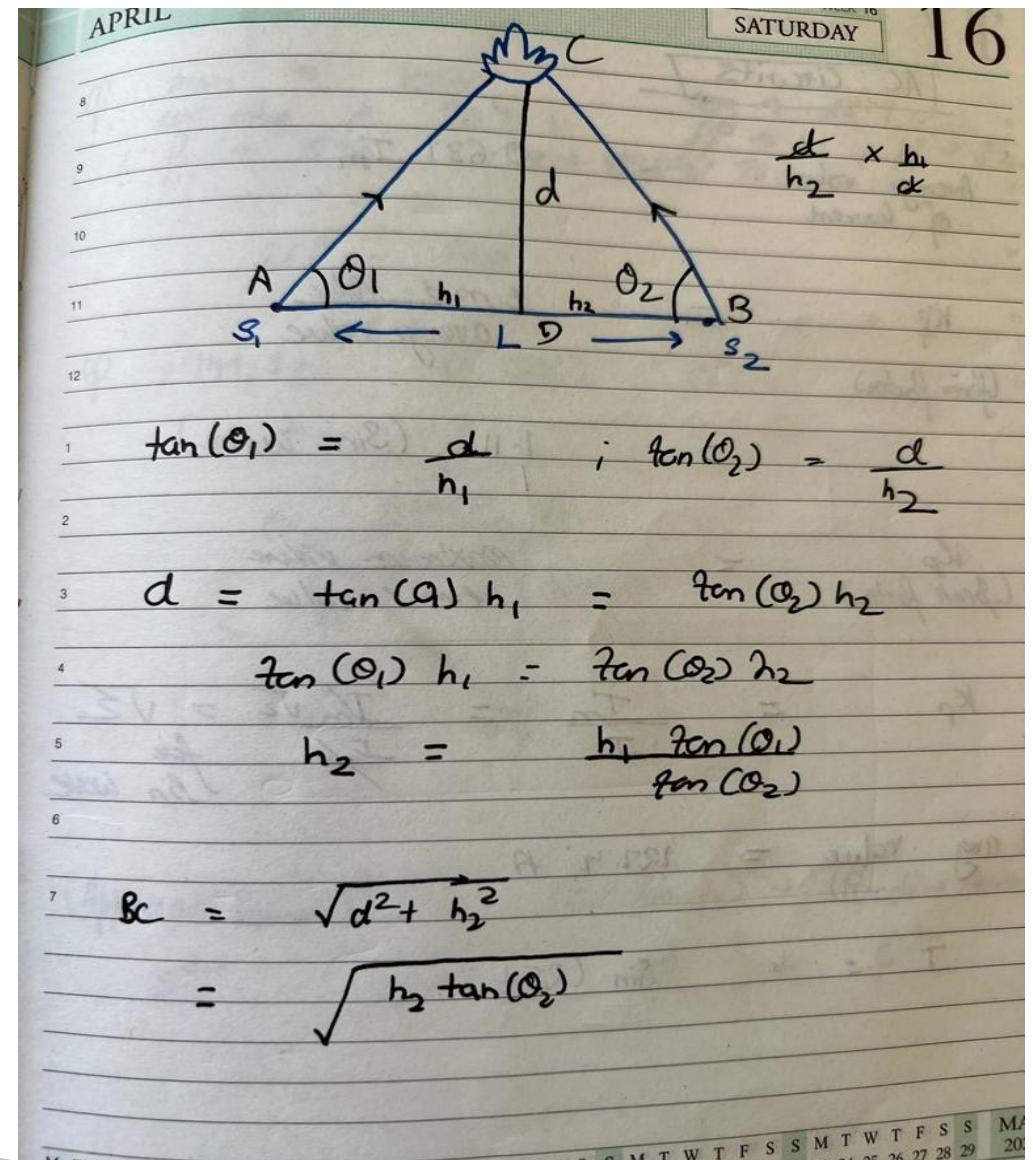
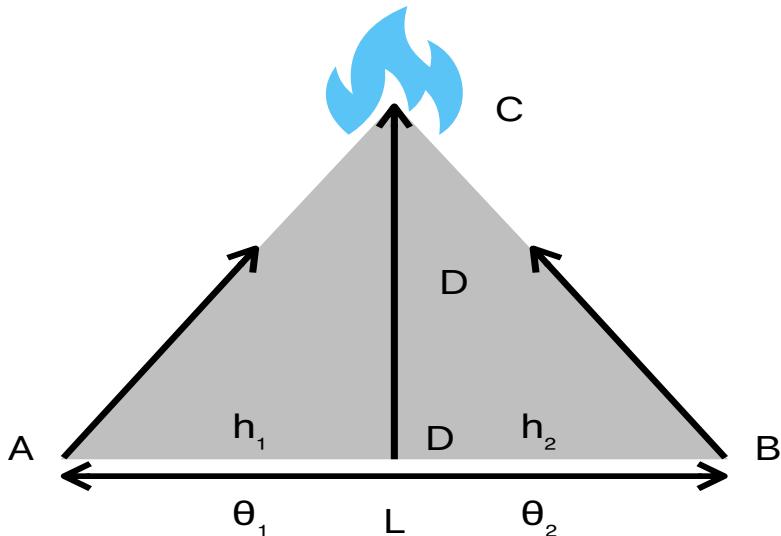
Amount of water used(increasing the weight in the prototype , decreasing the stability)-  
Resolved with water and air mixed sprayer

# Triangulation Method

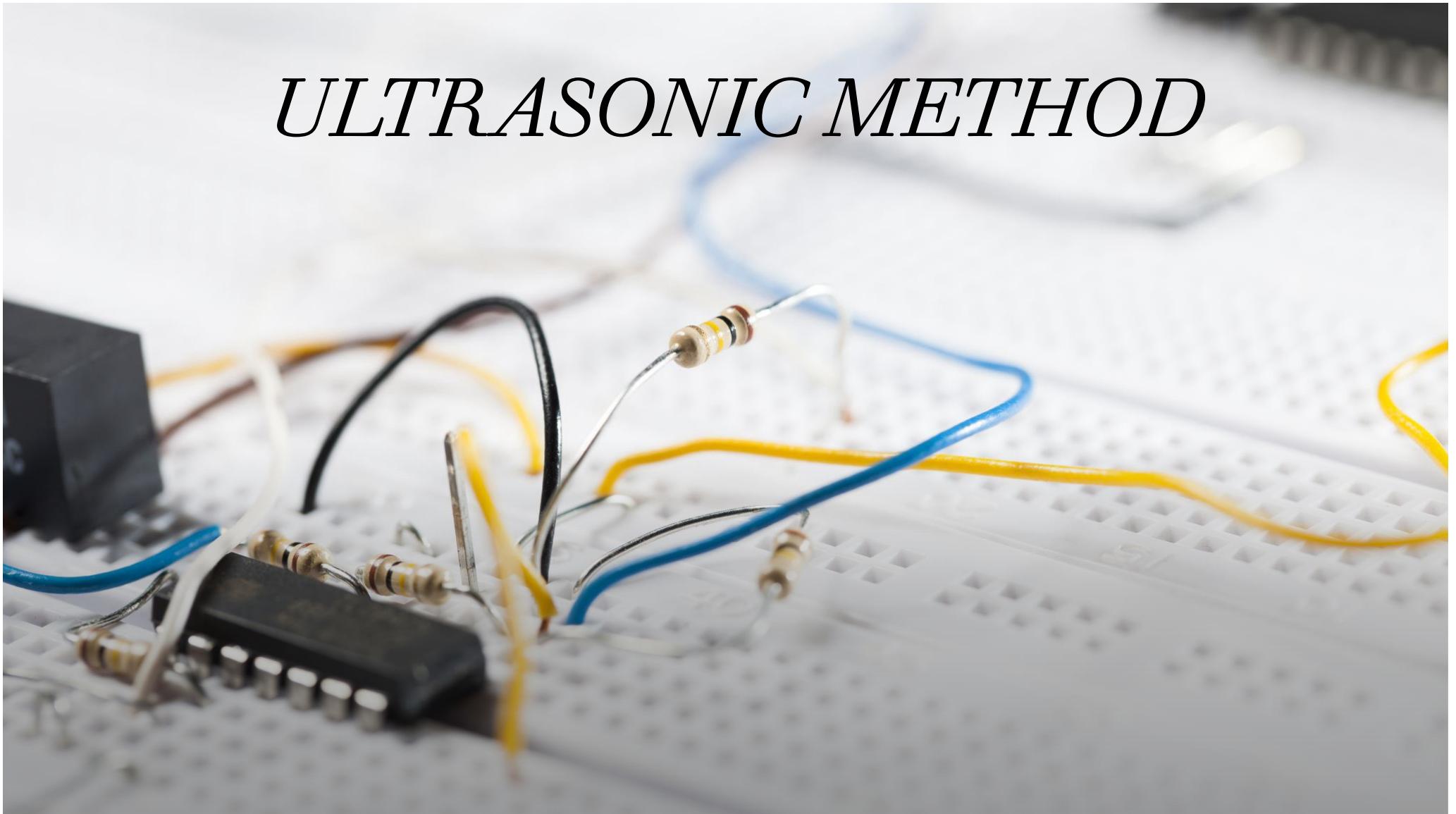
$$\begin{aligned}\text{distance} &= (L * \tan(\theta_1)) / (\tan(\theta_2) + 1/\tan(\theta_1)) \\ &= (L * \tan(\theta_1)) / (\tan(\theta_2) + \tan(\theta_1))\end{aligned}$$

Triangulation method is used to detect the distance from the fire

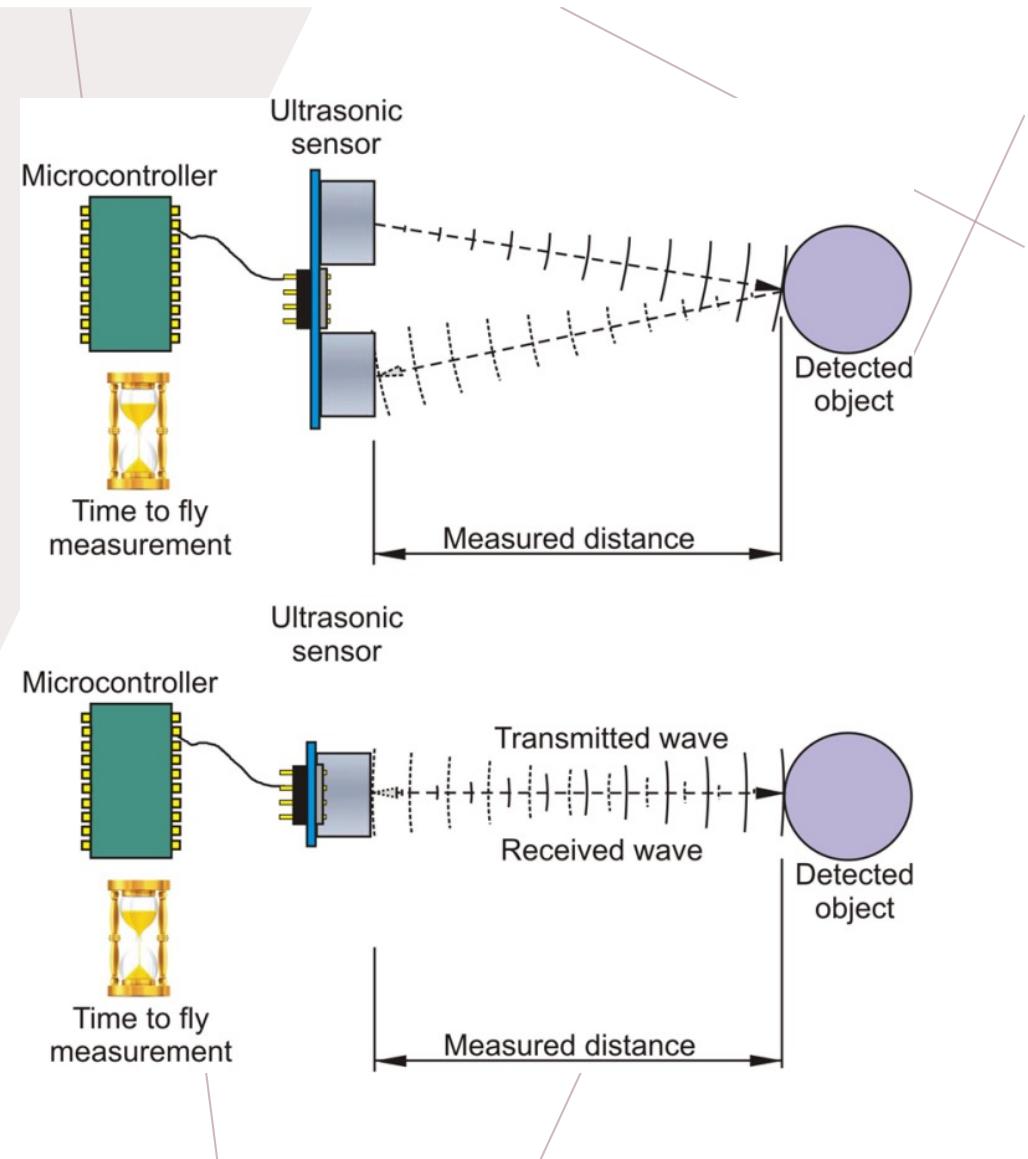
### TRIANGULATION METHOD



# *ULTRASONIC METHOD*



# WORKING



# *REFERENCES*

- [1] "v19kwZ4ReT0," *YouTube*, [Online]. Available: <https://www.youtube.com/watch?v=v19kwZ4ReT0>
- [2] "MQ-2 Smoke LPG Butane Hydrogen Gas Sensor Detector Module," *Robu*, [Online]. Available: <https://robu.in/product/mq-2-mq2-smoke-gas-lpg-butane-hydrogen-gas-sensor-detector-module/>.
- [3] "KY-026 Flame Sensor Module Feuerdetektor für Arduino," *bec-lb.com*, [Online]. Available: [https://bec-lb.com/cdn/shop/products/1\\_Main\\_1x\\_FlammensensorKY-026ModulFeuerdetektorfurArduino.png\\_1024x\\_4f085132-9ac5-4db7-8c5a-4a4f3b0bbd3a.jpg\>](https://bec-lb.com/cdn/shop/products/1_Main_1x_FlammensensorKY-026ModulFeuerdetektorfurArduino.png_1024x_4f085132-9ac5-4db7-8c5a-4a4f3b0bbd3a.jpg\)