Model Fire Detection and Extinguisher Bot

COURSE: MTE302 - ADVANCED MECHATRONICS ENGINEERING LAB

LAB GROUP 2:

SHAHARIYAR MARAZ

RAIYAAN ABDULLAH

NIYAMUL KARIM NILOY

ABDULLAH AL NOMAN

ABDULLAH AL MAMUN

SUBMITTED TO:

SHAMIM AHMED DEOWAN

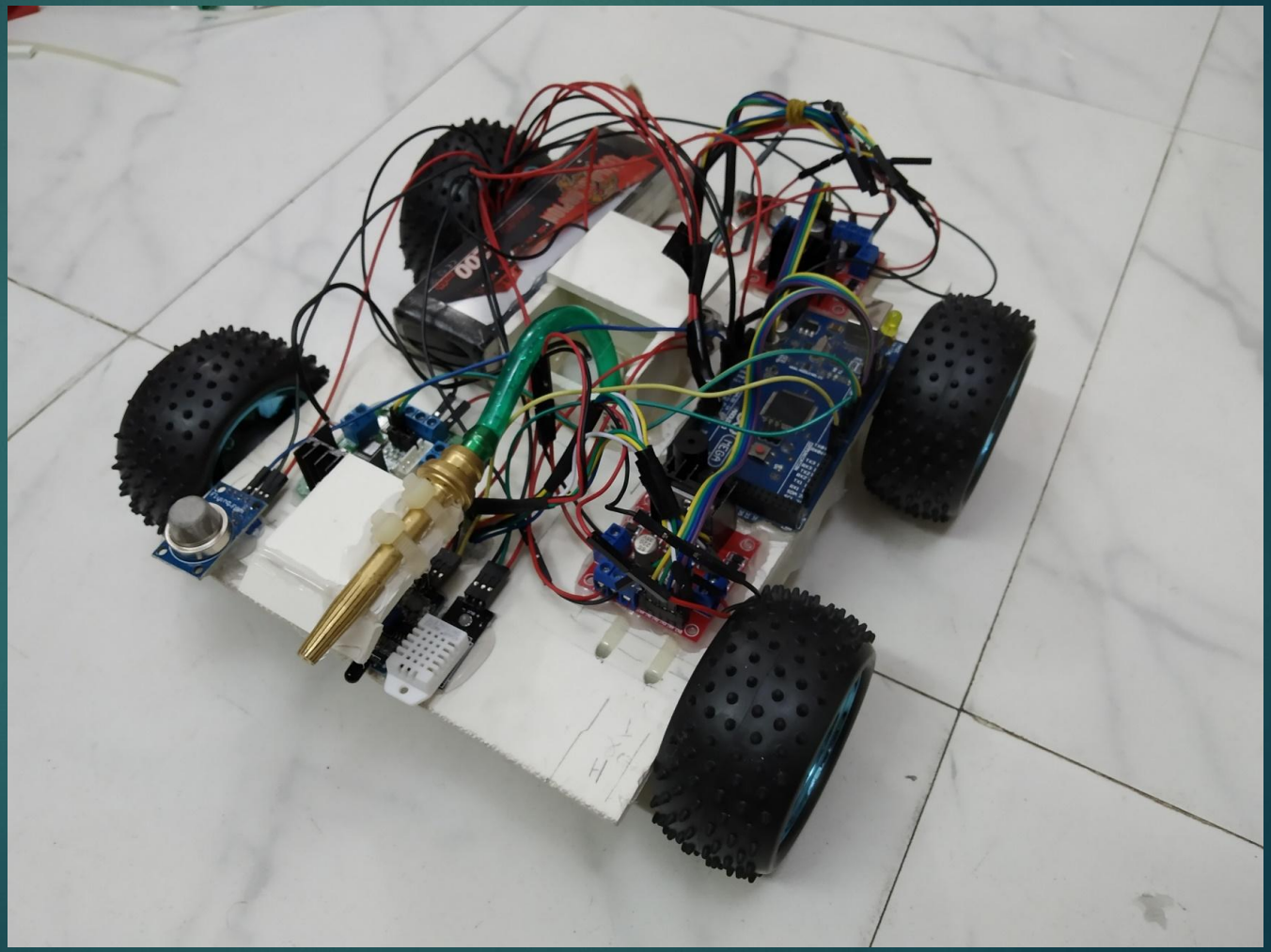
ASSISTANT PROFESSOR, RMEDU

Introduction

The name of our project is **Model Fire Detection and Extinguisher Bot**. As the name suggests, the bot is designed to perform two tasks.

1. Fire Detection
2. Fire Extinguish

Fire Detection and Extinguisher Bot



Why is this important ?

Firefighters tried to control a fire at a garment factory in Savar, Bangladesh, on Saturday.
Hasan Raza/Associated Press

Bangladesh fire kills more than 80, injures 50 in capital Dhaka

Updated 21 Feb 2019, 6:54pm

PHOTO: Officials say the number of critically injured victims will likely see the toll climb higher. (AP)

Fire at Gulshan-1 market

Published: 30 Mar 2019 13:03 BdST | **Updated:** 30 Mar 2019 19:03 BdST

A fire tore through about 150 stores at the makeshift market next to the DNCC Market in Dhaka's Gulshan-1 early on Saturday. Some stores at the five-storey Gulshan Shopping Centre next to the market were also damaged in the blaze.

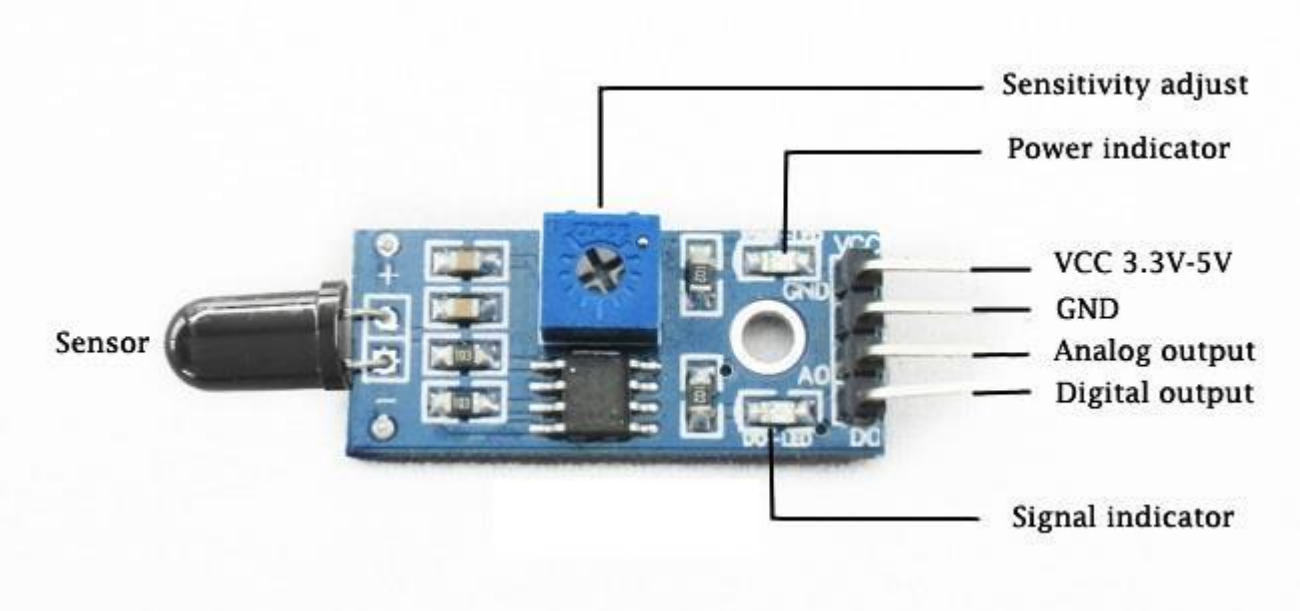
Working Principle

- The bot tries to detect if a fire will occur by using temperature and gas sensors and gives warning.
- People can take safety measures when the warning is given.
- The bot tries to locate the fire and moves towards it.
- It has a built-in water tank (which can be replaced with CO_2) and shoots at the fire with a nozzle, trying to extinguish it.

Sensors Used for Fire Detection

- Flame Sensor Module
- DHT22 Temperature and Humidity sensor
- MQ2 sensor

Flame Sensor Module

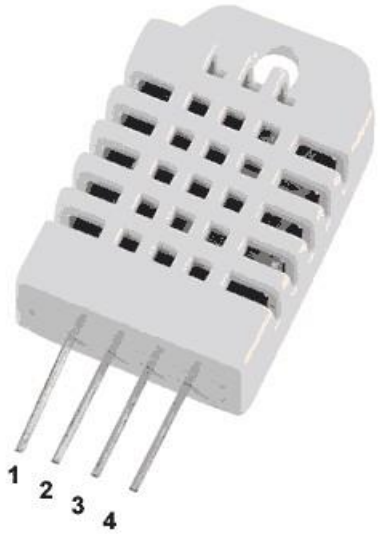


Flame Sensor

- A flame sensor module that consists of a flame sensor (IR receiver), resistor, capacitor, potentiometer, and comparator LM393 in an integrated circuit.
- It can detect infrared light with a wavelength ranging from 700nm to 1000nm.
- The far-infrared flame probe converts the light detected in the form of infrared light into current changes..
- Working voltage is between 3.3v and 5.2v DC, with a digital output to indicate the presence of a signal. Sensing is conditioned by an LM393 comparator.

DHT22 temperature-humidity sensor

DHT22 pins	
1	VCC
2	DATA
3	NC
4	GND



DHT22 temperature-humidity sensor

- The DHT22 is a basic digital temperature and humidity sensor.
- It uses a capacitive humidity sensor and a thermistor to measure the surrounding air, and spits out a digital signal on the data pin, no analog input pins needed.

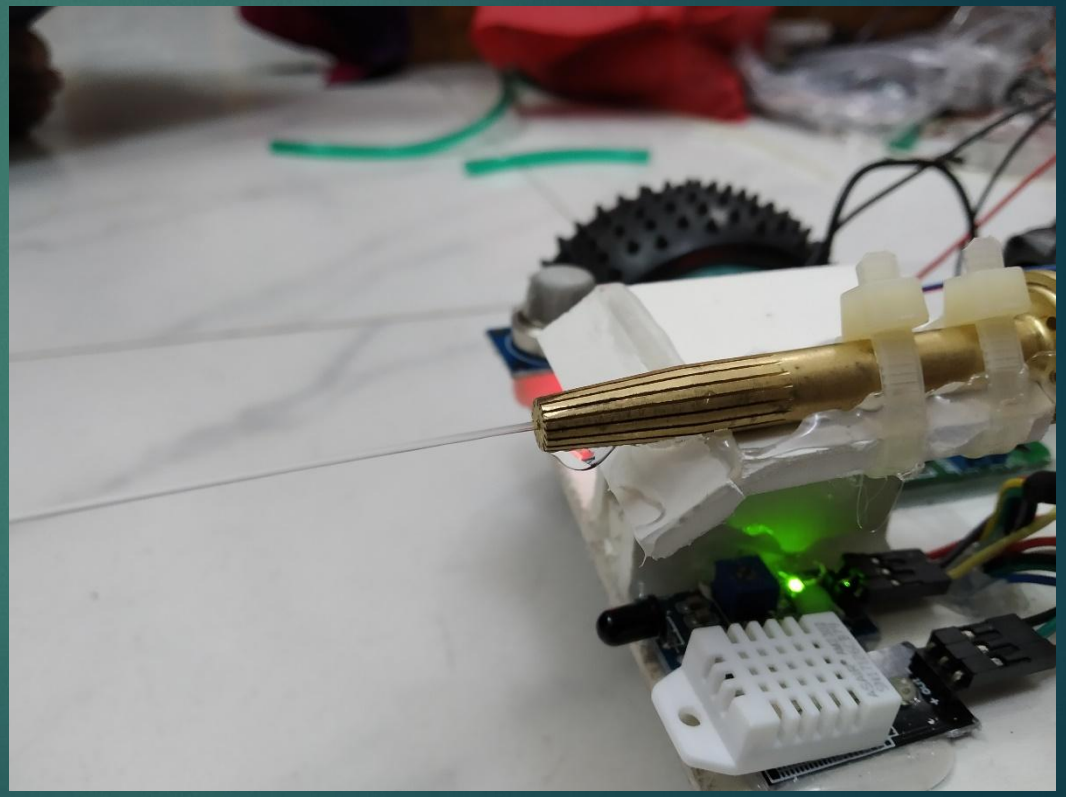
MQ2 Gas Sensor

MQ2 Gas Sensor

- Operating voltage is +5V.
- Can be used to measure or detect lpg, alcohol, propane, hydrogen, co and even methane.
- Analog output voltage: 0v to 5v.Digital output voltage: 0V or 5V (TTL logic).
- Preheat duration 20 seconds.Can be used as a digital or analog sensor.
- The sensitivity of digital pin can be varied using the potentiometer.

Fire Extinguisher

The bot has a water tank built inside around 0.5L. It can detect the position of the fire using Flame Sensor and shoots water at it. The water is pulled using a 6V DC Pump motor and shot through a nozzle.



Advantages

- Can detect fire early and alert so that people can evacuate.
- Stays close to the location of the incident so can response quickly to the fire.
- Replaces a human fire fighter to some extent.
- Helps stopping the spread of fire saving human lives and resources.
- Can be produced cost-efficiently.

Limitations

- Though this is just a model a real-life bot will have better hardware and software.
- The Flame sensor module can detect within 40cm but industrially we will need much more than that.
- The MQ2 Gas sensor and DHT22 Temperature sensor have a large response time which is not adequate for emergency situations.
- The real-life bot should have much larger capacity of water and may reserve CO_2 instead which is better at extinguishing fire.

Conclusion

Fire accidents are increasing at an alarming rate in our country. If every industry assigns multiple fire detection and extinguisher bots in important locations of their factory, the fire can be stopped before it becomes dangerous. There might be a question why factories should spend so much money in assigning so many bots. But it can be easily realized that it is much less than the damage that will happen if the fire spreads.

Thank You