

# INTRODUCTION TO EMBEDDED SYSTEMS

## PROJECT REPORT

### **Project - 1:**

Aim- To control the DC fan using an Arduino, a touch sensor and a relay module.

Components used- Arduino board, cable, bread board, touch sensor(TTP223) , relay module,9V battery, DC fan and jumper wires.

### Procedure-

1. Connect the arduino pins as following:
  - a. DO of touch sensor to pin 8.
  - b. Vcc of touch sensor to 5v.
  - c. GND of touch sensor to GND.
  - d. IO pin of relay to pin 6.
2. Connect the relay module as follows:
  - a. Connect COM of relay to -ve of battery.
  - b. Connect NO of relay to -ve of fan.
  - c. Connect +ve of battery to +ve of fan.
  - d. Connect IO pin of relay to arduino's digital pin.
  - e. Connect Vcc of relay to 5v of arduino.
  - f. Connect the ground GND of relay to GND of arduino.
3. Write the Arduino code.
4. Upload the code to the Arduino using a cable and IDE.
5. Power the circuit using a 9V battery and touch the sensor.

### Code-

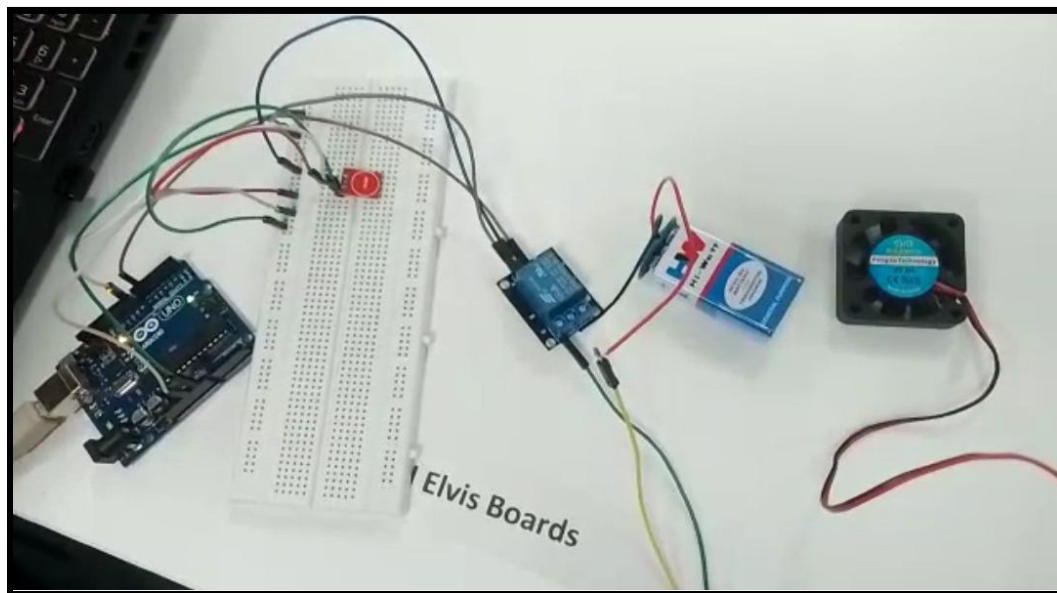
```
#define fanpin = 6;  
#define touchpin = 8;  
void setup() {  
  Serial.begin(9600)  
  // Set fanpin as an output pin
```

```

pinMode(fanpin, OUTPUT);
// Set touchpin as input pin
pinMode(touchpin, INPUT);
}
void loop() {
  // Reading the state of the touchpin
  int state = digitalRead(touchpin);
  // Turning on fan if touchpin is high
  if(state == HIGH){
    digitalWrite(fanpin, HIGH);
  }
  // Turning off the fan if touchpin is low
  if(state == LOW){
    digitalWrite(fanpin, LOW);
  }
  delay(200);
}

```

Circuit image-



Working-

- When the touch sensor is touched, it sends a signal to the Arduino which reads it using a digital input pin.
- If the signal is high, indicating that the touch sensor has been touched, the Arduino sends a signal to the relay using a digital

output pin. The signal activates the relay, which switches the DC fan on.

- In contrast, if the signal is low, indicating that the touch sensor has not been touched, Arduino sends a signal to the relay to turn it off and the fan turns off.

### Practical applications-

Few of the applications include

- Home/office ventilation- Turning the fan ON and OFF with a touch. Relay module helps in ensuring the fan is facilitated with ON and OFF correctly.
- Power conservation - Turning the fan ON or OFF when the person steps into the room at

### **Project - 2:**

Aim-Using temperature and humidity sensor(DHT11), detect the temperature of the flame and if the temperature is greater than 30, turn on the buzzer and if the temperature is greater than 32, turn on the water pump.

Components used- Arduino board, Bread board, lighter, Temperature sensor, buzzer, water pump, 9V battery, relay module and jumper wires.

### Procedure-

1. Connect the arduino pins as following:
  - a. Vcc of temperature sensor to 5v.
  - b. DO of temperature sensor to pin 4.
  - c. GND of temperature sensor to GND.
  - d. Vcc of buzzer to pin 2.
  - e. GND of buzzer to GND.
  - f. Connect Positive terminal of pump through relay to pin 6.

- g. Connect Negative terminal of the pump through the relay to pin GND.
2. Connect the Relay Module as following:
  - a. Connect NO of relay to Positive terminal of water pump.
  - b. Connect COM of relay to Positive terminal of battery.
  - c. Connect Negative terminal of water pump to Negative terminal of battery
  - d. Connect IO of relay to digital pin of arduino.
  - e. Connect Vcc of relay to 5v of arduino.
  - f. Connect the GND of the relay to the GND of the arduino.
3. Write the Arduino code.
4. Upload the code to the Arduino using a cable and IDE.

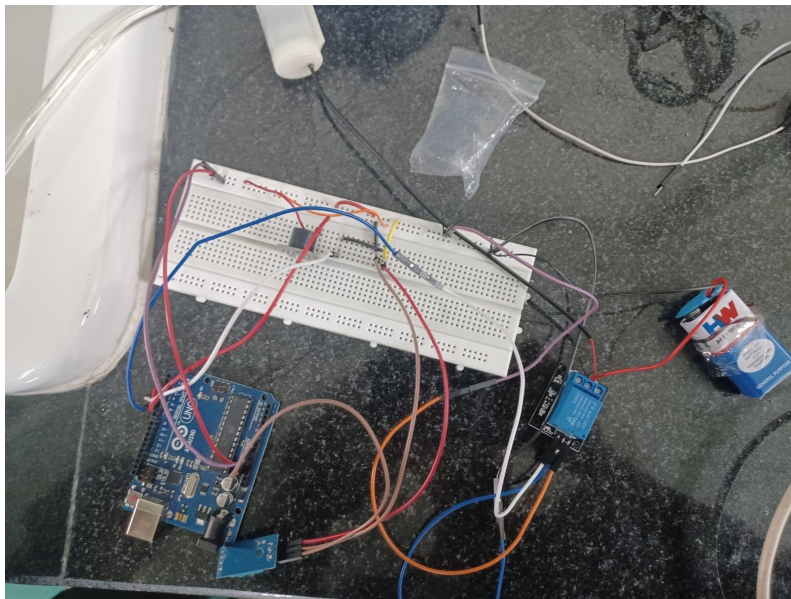
#### Code-

```
#include<dht11.h>
#define sensor 4
#define Buzzer 2
#define Pump 6
// Set the threshold values
#define threshold1 33
#define threshold2 38
dht11 DHT11;
void setup() {
  Serial.begin(9600);
  // Set Buzzer as an output pin
  pinMode(Buzzer,OUTPUT);
  // Set Pump as an output pin
  pinMode(Pump,OUTPUT);
}

void loop() {
  Serial.println();
  //Reads the data from the sensor
  int chk = DHT11.read(Sensor);
  Serial.print("Temparture in C: ");
  //Gets the temperature from the sensor
```

```
float temp = DHT11.temperature;
Serial.println(temp);
//Turns the buzzer ON if temperature is greater than 1st threshold
if(temp>=threshold1){
    digitalWrite(Buzzer,HIGH);
}
//Turns the buzzer OFF if temperature is lesser than 1st threshold
else{
    digitalWrite(Buzzer,LOW);
}
//Turns on the pump if temperature is greater than the 2nd threshold
if(temp>=threshold2){
    digitalWrite(Pump,HIGH);
}
//Turns off the pump if temperature is lesser than the 2nd threshold
else{
    digitalWrite(Pump,LOW);
}
}
```

Circuit image-



Working-

- Once the lighter is ignited, the temperature sensor reads the temperature value and stores it in a variable.

- As the temperature keeps rising, if it exceeds 30 degrees Celsius, the buzzer is turned ON and if it exceeds 32 degrees Celsius, the water pump is activated.

#### Practical applications-

- Hydroponics and Aquaponics- Maintaining optimal conditions is very important for the growth of plants. The temperature can be automatically detected by the temperature sensor and at a certain threshold, it can give an alert and further turn on the water pump to cool it down.
- Alert system- In various industries, it can serve as a warning system if values cross thresholds set up for particular processes that deal with flame/heat.