PROJECT 1

Automatic Speed Control of motor depending upon temperature.

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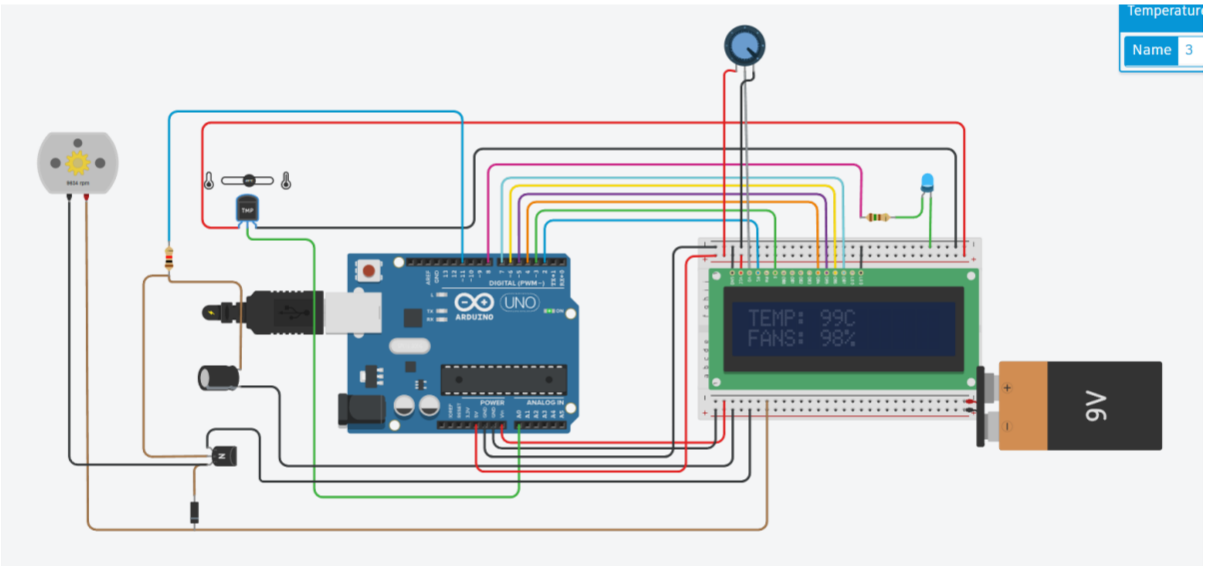
G11 ES & IOT

Automatic Speed Control of motor depending upon temperature Circuit Diagram:



List of Components Used:-

- Arduino UNO R3
- LCD 16 X 2
- 9V battery
- Temperature Sensor
- Capacitor (1microFarad)
- NPN bipolar Junction Transistor
- Resistors X 2 (1 Kohm)
- Jumping Wires
- Potentiometer (Variable Resistor)
- Bread Board
- LED
- Motor

Software Used for Simulation: TinkerCAD

Code of this Simulation:

```
#include<LiquidCrystal.h>

LiquidCrystal lcd(2,3,4,5,6,7);
int tempPin = A0;       // the output pin of LM35
int fan = 11;           // the pin where fan is
int led = 8;            // led pin
int temp;
int tempMin = 15;       // the temperature to start the fan at  0%
int tempMax = 100;      // the maximum temperature when fan is at 100%
int fanSpeed;
int fanLCD;

void setup()
{
  pinMode(fan, OUTPUT);
  pinMode(led, OUTPUT);
  pinMode(tempPin, INPUT);
  lcd.begin(16,2);
  Serial.begin(9600);
}

void loop()
{
  temp = readTemp();     // get or store the temperature
  Serial.print( temp );
  if(temp < tempMin)     // if temp is lower than minimum temp
  {
    fanSpeed = 0;
    analogWrite(fan, fanSpeed);
    fanLCD=0;
    digitalWrite(fan, LOW);
  }
  if((temp >= tempMin) && (temp <= tempMax)) // if temperature is higher than minimum temp
  {
```

```
    fanSpeed = temp;
    fanSpeed=1.5*fanSpeed;
    fanLCD = map(temp, tempMin, tempMax, 0, 100);      // speed of fan to display on LCD100
    analogWrite(fan, fanSpeed);                        // spin the fan at the fanSpeed speed
  }

  else if(temp > tempMax)     // if temp is higher than tempMax
  {
    digitalWrite(led, HIGH);
  }
  else
  {
    digitalWrite(led, LOW);
  }

  lcd.print("TEMP: ");
  lcd.print(temp);          // To display the temperature
  lcd.print("C ");
  lcd.setCursor(0,1);       // To move cursor to next line
  lcd.print("FANS: ");
  lcd.print(fanLCD);        // To display the fan speed
  lcd.print("%");
  delay(200);
  lcd.clear();
}

int readTemp()
{ // get the temperature and convert it to celsius
  temp = analogRead(tempPin);
  return temp*0.48828125;
}
```

Applications of this Project:

- ✓ **CPU Cooling fan:** This concept is used in Laptop to control the speed of the fan in accordance with the temperature of the CPU. If the temperature of CPU is high at that time the speed of Fan will be maximum and Vice and versa.

- ✓ **Invertor Cooling Fan:** This concept is also used in invertors to adjust the speed of cooling fan in accordance with the temperature of the board present in it.

- ✓ **HVAC Systems (Heating, Ventilation, and Air Conditioning):** In HVAC systems, controlling motor speeds of fans, blowers, or compressors based on ambient temperature ensures energy-efficient cooling or heating. This helps in maintaining desired room temperatures while optimizing power consumption, resulting in reduced operational costs.

- ✓ **Automotive Cooling Systems:** Automatic speed control can regulate fan motors in cars to cool the engine when the temperature rises. At high temperatures, the fan speed increases to enhance cooling, and at low temperatures, it slows down to save energy. It helps maintain engine temperature within an optimal range, thereby preventing engine overheating and improving fuel efficiency.

- ✓ **Data Centers and Server Rooms:** In data centers, cooling fans and ventilation systems adjust their speed based on room temperature or server rack temperature. Higher speeds are used to cool hot spots, and lower speeds are used when temperatures are within safe limits.

- ✓ **Medical Equipment and Laboratory Devices:** Devices like MRI machines, CT scanners, and lab equipment often require precise temperature control to function effectively. Motors in cooling systems can adjust speed based on temperature sensors to ensure stable and safe operating conditions.