

# Arduino Notebook 3

## Air Conditioning

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## Introduction

The task allocated to the team was to simulate an Air Conditioning system that could change the speed of the fan depending upon the room temperature.

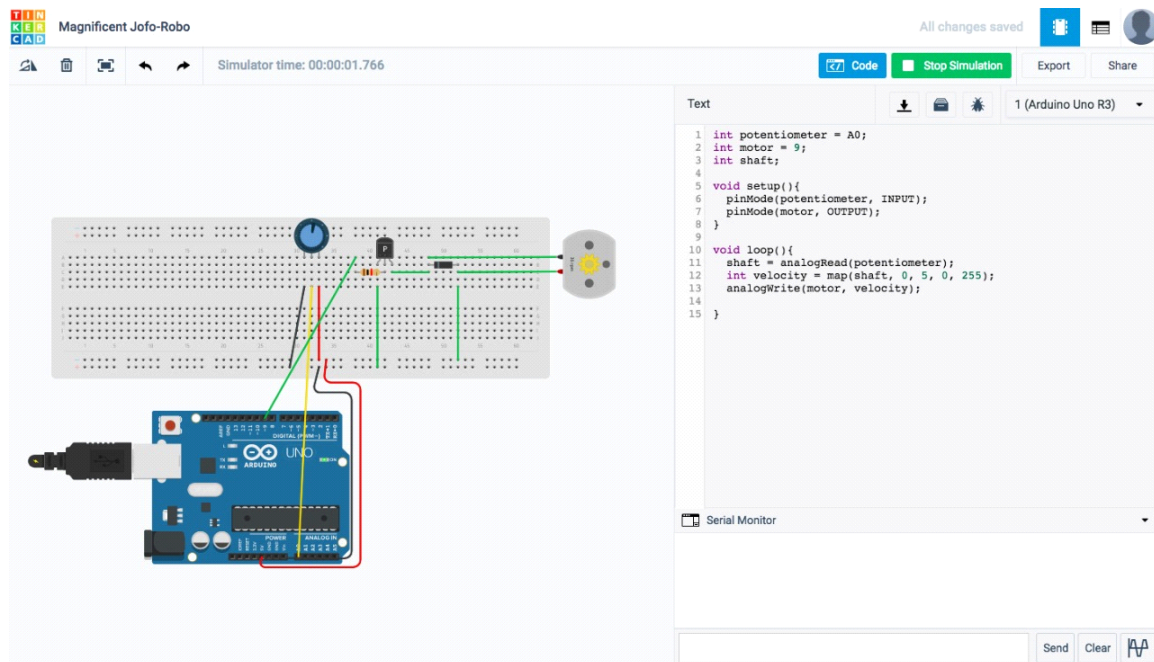
## Abstract

The system will include the functionality of changing the speed of the DC motor as the temperature of the room detected by the temperature sensor changes.

If a very low temperature is detected, the system shifts to its minimum mode, i.e, the fan speed is at its lowest. As the temperature sensed by the sensor gradually increases, the fan speed increases accordingly.

## Stage 1: Changing fan speed using potentiometer

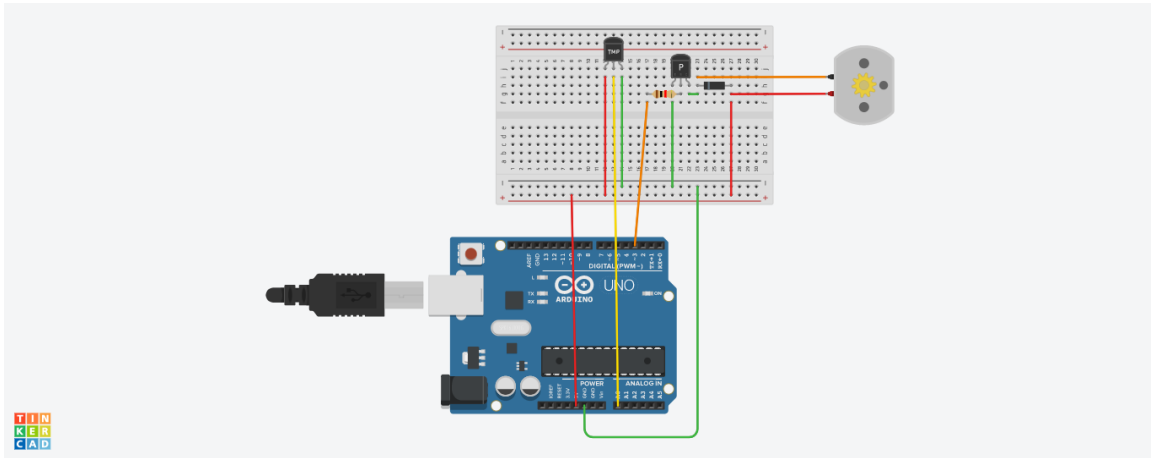
In the first stage, instead of using a temperature sensor, a potentiometer is used to simulate the readings of sensor. Depending upon the rotation of the potentiometer, fan speed is increased or decreased.



This stage enabled us to understand the mapping of rotational values of the potentiometer to the DC motor. A new component was introduced, i.e, the DC motor. The team understood and implemented the DC motor circuit.

## Stage 2: Changing fan speed using Temperature Sensor TMP36

In the second stage, we replaced the potentiometer with the temperature sensor-TMP36. It provides the readings according to the Celsius scale. The temperature sensor slider provided in the TinkerCad simulator was used to change the temperature readings. The fan speed was varied accordingly.



### CODE SNIPPET 1

Temperature Sensor [TMP36]  
Name 2

Code

Start Si

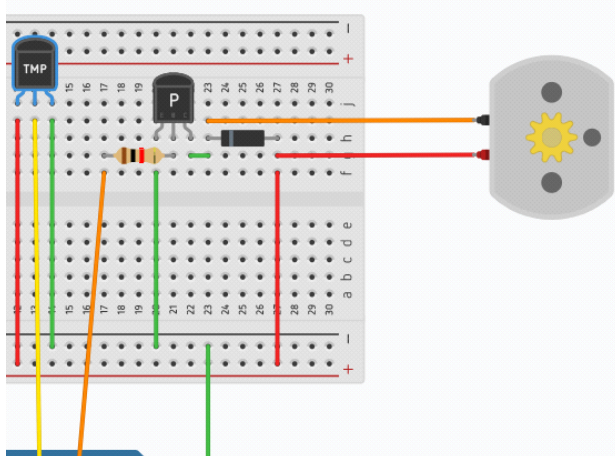
Text

1 int temp\_sensor = A0;  
2 int motor = 3;  
3 int shaft;  
4 int b = 3975;  
5 int c, velocity;  
6  
7 void setup()  
8 {  
9 Serial.begin(9600);  
10 pinMode(temp\_sensor, INPUT);  
11 pinMode(motor, OUTPUT);  
12 }  
13  
14 void loop()  
15 {  
16 shaft = analogRead(temp\_sensor);  
17  
18 if (shaft > 20 && shaft <= 25)  
19 {  
20 c = 4;  
21 velocity = map(c, 0, 5, 0, 255);  
22 }  
23 else if (shaft > 25 && shaft <= 30)  
24 {  
25 c = 3;  
26 velocity = map(c, 0, 5, 0, 255);  
27 }  
28 else if (shaft > 30)  
29 {  
30 }  
31 }  
32  
33 Serial Monitor

## CODE SNIPPET 2

Temperature Sensor [TMP36]

Name 2



Text

```
14 }
15 void loop()
16 {
17     shaft = analogRead(temp_sensor);
18     if (shaft > 20 && shaft <= 25)
19     {
20         c = 4;
21         velocity = map(c, 0, 5, 0, 255);
22     }
23     else if (shaft > 25 && shaft <= 30)
24     {
25         c = 3;
26         velocity = map(c, 0, 5, 0, 255);
27     }
28     else if (shaft > 30)
29     {
30         c = 2;
31         velocity = map(c, 0, 5, 0, 255);
32     }
33     else
34     {
35         Serial.println("Invalid temperature range");
36     }
37     analogWrite(motor, velocity);
38     Serial.println(shaft);
39 }
40 }
```

Serial Monitor

## TEST CASE 1: Temperature = 23°C (between 20-25°C)

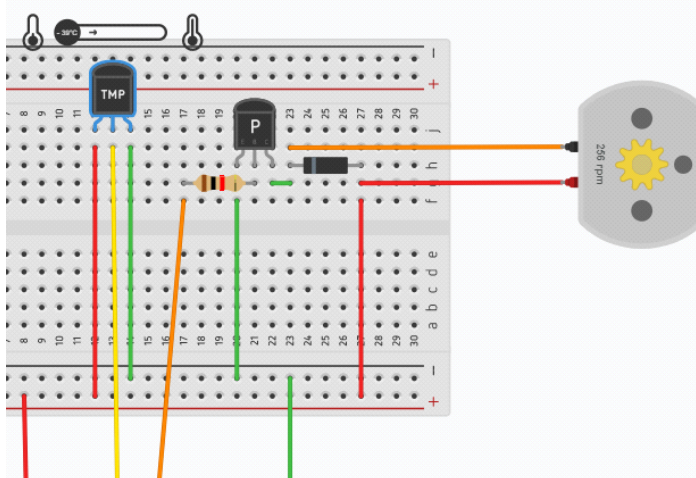
Result: Fan speed = 256 rpm

Simulator time: 00:00:11.475

Code Stop Si

Temperature Sensor [TMP36]

Name 2



Text

```
14 void loop()
15 {
16     shaft = analogRead(temp_sensor);
17     if (shaft > 20 && shaft <= 25)
18     {
19         c = 4;
20         velocity = map(c, 0, 5, 0, 255);
21     }
22     else if (shaft > 25 && shaft <= 30)
23     {
24         c = 3;
25         velocity = map(c, 0, 5, 0, 255);
26     }
27     else if (shaft > 30)
28     {
29         c = 2;
30         velocity = map(c, 0, 5, 0, 255);
31     }
32     else
33     {
34         Serial.println("Invalid temperature range");
35     }
36     analogWrite(motor, velocity);
37     Serial.println(shaft);
38 }
39 }
```

Serial Monitor

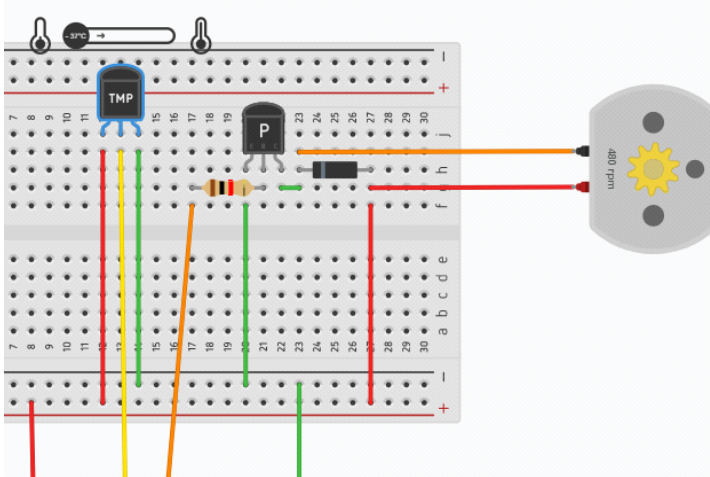
23  
23  
23  
23  
23  
23  
23  
2

## TEST CASE 2: Temperature = 27°C (between 25-30°C)

Result: Fan speed = 480 rpm

Simulator time: 00:00:05.457

Temperature Sensor [TMP36]  
Name 2



```
void loop()
{
  shaft = analogRead(temp_sensor);
  if (shaft > 20 && shaft <= 25)
  {
    c = 4;
    velocity = map(c, 0, 5, 0, 255);
  }
  else if (shaft > 25 && shaft <= 30)
  {
    c = 3;
    velocity = map(c, 0, 5, 0, 255);
  }
  else if (shaft > 30)
  {
    c = 2;
    velocity = map(c, 0, 5, 0, 255);
  }
}
```

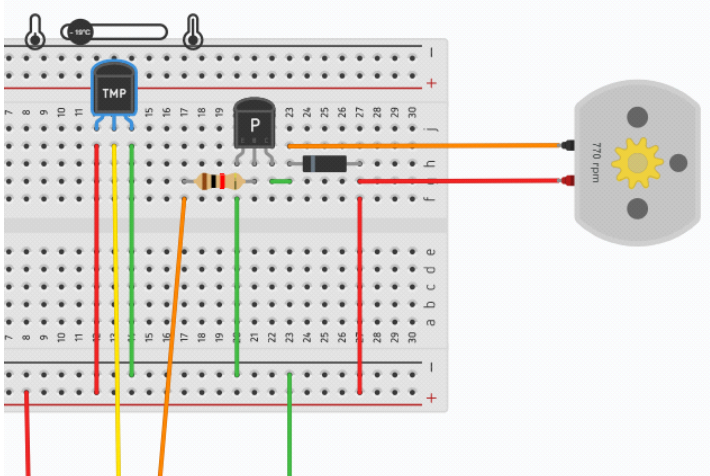
Serial Monitor

## TEST CASE 3: Temperature = 65°C (>30°C)

Result: Fan speed = 770 rpm

Simulator time: 00:00:08.048

Temperature Sensor [TMP36]  
Name 2



```
void loop()
{
  shaft = analogRead(temp_sensor);
  if (shaft > 20 && shaft <= 25)
  {
    c = 4;
    velocity = map(c, 0, 5, 0, 255);
  }
  else if (shaft > 25 && shaft <= 30)
  {
    c = 3;
    velocity = map(c, 0, 5, 0, 255);
  }
  else if (shaft > 30)
  {
    c = 2;
    velocity = map(c, 0, 5, 0, 255);
  }
}
```

Serial Monitor

The team successfully implemented variation in fan speeds according to the changing temperature using the temperature sensor TMP36.

## Dedicated Hours

Prakriti - 3 hours

Phanith - 1 hour

## Team Experience

The team enjoyed the experience of using new hardware devices and simulating the basic functionality of fan rotation speed. We aim to incorporate a few add-ons to this circuit in the future.