NETAJI SUBHAS UNIVERSITY OF TECHNOLOGY

CSE-2

Computer Hardware and Software

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TINY ML

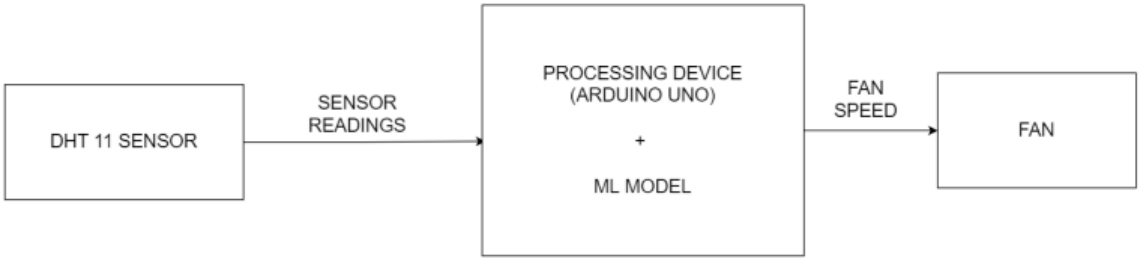
PROJECT TITLE : SMART FAN

AIM : Train a machine learning model such that it will intelligently predict the suitable fan speed based on two variables, i.e temperature and humidity readings.

EQUIPMENTS USED :

- Temperature and Humidity Sensor (DHT-11 Sensor)
- Arduino Uno
- 5V Fan
- JumperWires
- Bread Board

FLOW DIAGRAM :



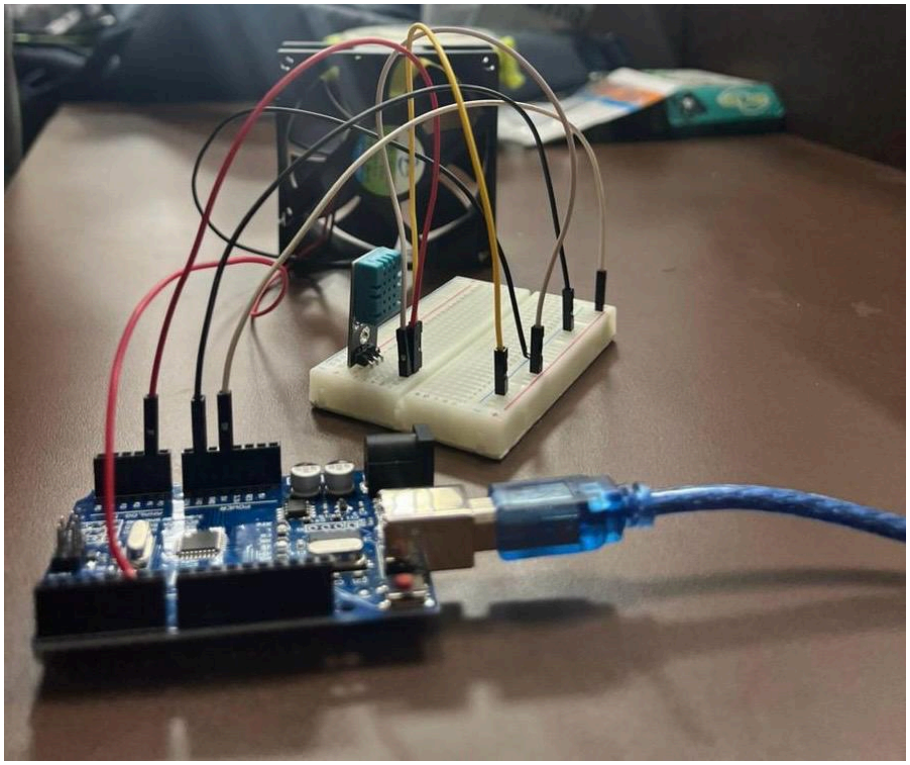
DATA:

We measured readings from the temperature sensor for humidity and temperature at various places. After that, we gave corresponding fan speed for each of the sensor readings. The data generated is basically for a simple model like a regression model.

A sample of data is as shown :

temperature	humidity	fan_speed
35	60	90
29	61	88
35	60	90
35	41	87
29	60	80
35	47	85
35	51	85
35	60	88
28	46	75
35	40	80

DIAGRAM :



ARDUINO CODE :

```
# include "dht.h"
#define dht_apin A1 // Analog Pin sensor is connected to
float temp,humidity;
dht DHT;
#define fan 9
void setup(){
Serial.begin(9600); //this is for the serial monitor
delay(500);//Delay to let system boot
Serial.println("DHT11 Humidity & temperature Sensor\n\n");
pinMode (fan,OUTPUT); // Giving Fan Current ….Making Fan Pin 9 For Output
}
void loop()
{
DHT.read11(dht_apin);
Serial.print("Current humidity = ");
Serial.print(DHT.humidity);
Serial.print("% ");
Serial.print("temperature = ");
```

```
Serial.print(DHT.temperature);
Serial.println("C ");
temp=DHT.temperature;
humidity=DHT.humidity;
float fan_speed = 2.07872844*temp + 0.19223429*humidity + 6.920076152644029;
fan_speed=((fan_speed)/(100))*255;
int speed = (int)fan_speed;
float per=(speed*1.0/255)*100;
Serial.print("fan speed ");
Serial.print(per);
Serial.println("%");
analogWrite(5,speed);
delay(5000); //wait for 5 seconds before accessing sensor again
}
```

PYTHON CODE :

```
[4]
from sklearn.linear_model import LinearRegression
import numpy as np
import pandas as pd
```

```
[10]
df = pd.read_csv("/Users/Dell/Desktop/content/TinyML.csv")
df.head()
```

	temperature	humidity	fan_speed
0	35	60	90
1	29	61	88
2	35	60	90
3	35	41	87
4	29	60	80

```
[11]
X=df[["temperature","humidity"]]
Y=df["fan_speed"]
print(X.shape)
print(Y.shape)
```

```
(10, 2)
(10,)
```

```
[12]
model=LinearRegression()
model.fit(X,Y)
```

```
LinearRegression
LinearRegression()
```

```
[13]
model.coef_
```

```
array([1.13370946, 0.37143895])
```

```
[14]
model.intercept_
```

```
27.736528507056946
```

RESULT : We have successfully implemented the smart fan using Linear Regression Model. It is one of the many novel solutions to this heating problem. Other models can also be used which are Deep Learning based, but it will require more Hardware power but then it can be out of budget for a general consumer.

VIDEO DEMONSTRATION : Click Here