

```
2 import numpy as np
3 import skfuzzy as fuzz
4 import matplotlib.pyplot as plt
5
6 temperature = np.arange(0, 41, 1)
7 fan_speed = np.arange(0, 11, 1)
8
9 temp_low = fuzz.trimf(temperature, [0, 0, 20])
10 temp_medium = fuzz.trimf(temperature, [10, 20,
11 30])
12 temp_high = fuzz.trimf(temperature, [20, 30, 40])
13
14 fan_low = fuzz.trimf(fan_speed, [0, 0, 5])
15 fan_medium = fuzz.trimf(fan_speed, [2, 5, 8])
16 fan_high = fuzz.trimf(fan_speed, [5, 10, 10])
17
18 plt.figure(figsize=(10, 6))
19
20 plt.subplot(2, 1, 1)
21 plt.plot(temperature, temp_low, label='Low')
22 plt.plot(temperature, temp_medium,
23 label='Medium')
24 plt.plot(temperature, temp_high, label='High')
25 plt.title("Temperature Membership Functions")
26 plt.xlabel("Temperature (°C)")
27 plt.ylabel("Membership Degree")
28 plt.legend()
29
30 plt.subplot(2, 1, 2)
31 plt.plot(fan_speed, fan_low, label='Low')
32 plt.plot(fan_speed, fan_medium, label='Medium')
33 plt.plot(fan_speed, fan_high, label='High')
34 plt.title("Fan Speed Membership Functions")
35 plt.xlabel("Fan Speed")
36 plt.ylabel("Membership Degree")
37 plt.legend()
```

```
36
37 plt.tight_layout()
38 plt.show()
39
40 temperature_input = 28
41
42 temp_low_level = fuzz.
  interp_membership(temperature, temp_low,
  temperature_input)
43 temp_medium_level = fuzz.
  interp_membership(temperature, temp_medium,
  temperature_input)
44 temp_high_level = fuzz.
  interp_membership(temperature, temp_high,
  temperature_input)
45
46 fan_activation_low = temp_low_level
47 fan_activation_medium = temp_medium_level
48 fan_activation_high = temp_high_level
49
50 aggregated = np.fmax(fan_activation_low *
  fan_low,
51      np.fmax(fan_activation_medium *
  fan_medium,
52      fan_activation_high * fan_high))
53
54 fan_output = fuzz.defuzz(fan_speed, aggregated,
  'centroid')
55
56 print(f"Temperature: {temperature_input} °C")
57 print(f"Fuzzified fan speed: {fan_output:.2f}")
```

```
/storage/emulated/0 $ cd Download/  
/storage/emulated/0/Download $ python newfile.py  
Temperature: 28 °C  
Fuzzified fan speed: 7.67  
/storage/emulated/0/Download $ █
```