IMPLEMENTION OF A FUZZY INFERENCE SYSTEM

SOURCE CODE:

```
import numpy as np
import skfuzzy as fuzz
import matplotlib.pyplot as plt
temperature = np.arange(0, 41, 1)  # Temperature from 0 to 40 degrees Celsius
fan_speed = np.arange(0, 11, 1)    # Fan speed from 0 to 10
temp_low = fuzz.trimf(temperature, [0, 0, 20])
temp_medium = fuzz.trimf(temperature, [10, 20, 30])
temp_high = fuzz.trimf(temperature, [20, 30, 40])
fan_low = fuzz.trimf(fan_speed, [0, 0, 5])
fan_medium = fuzz.trimf(fan_speed, [2, 5, 8])
fan_high = fuzz.trimf(fan_speed, [5, 10, 10])

plt.figure(figsize=(10, 6))

plt.subplot(2, 1, 1)
plt.plot(temperature, temp_low, label='Low')
plt.plot(temperature, temp_medium, label='Medium')
plt.plot(temperature, temp_high, label='High')
plt.title("Temperature Membership Functions")
plt.xlabel("Temperature (°C)")
plt.ylabel("Membership Degree")
plt.legend()

plt.subplot(2, 1, 2)
plt.plot(fan_speed, fan_low, label='Low')
plt.plot(fan_speed, fan_medium, label='Medium')
plt.plot(fan_speed, fan_high, label='High')
```

```
plt.title("Fan Speed Membership Functions")
plt.xlabel("Fan Speed")
plt.ylabel("Membership Degree")
plt.legend()

plt.tight_layout()
plt.show()
temperature_input = 28  # Example temperature

temp_low_level = fuzz.interp_membership(temperature, temp_low, temperature_input)
temp_medium_level = fuzz.interp_membership(temperature, temp_medium, temperature_input)
temp_high_level = fuzz.interp_membership(temperature, temp_high, temperature_input)



fan_activation = (
    fan_low * temp_low_level +
    fan_medium * temp_medium_level +
    fan_high * temp_high_level
)
fan_output = fuzz.defuzz(fan_speed, fan_activation, 'centroid')

print(f"Temperature: {temperature_input}°C")
print(f"Fuzzified fan speed: {fan_output:.2f}")
```

OUTPUT:

Temperature: 28°C

Fuzzified fan speed: 7.85