Assignment 1 - Group 3 - Fuzzy Control System for Smart Home Climate Control

Task Description

Design and implement a fuzzy control system for an automated climate control system in a smart home. The system should adjust the temperature and humidity levels in the home based on external weather conditions and occupant preferences.

Requirements

Programming in Python with the skfuzzy library. Understanding of fuzzy logic, sets, membership functions, and control rules.

Specifics of the Assignment

External Weather Conditions

Define fuzzy sets for different weather conditions (e.g., Sunny, Cloudy, Rainy, Snowy) and their impact on indoor climate.

Occupant Preferences

Create fuzzy sets for occupant comfort levels regarding temperature (e.g., Cold, Warm, Hot) and humidity (e.g., Dry, Comfortable, Humid).

Climate Control

Develop output fuzzy sets for HVAC actions (e.g., Heat, Cool, Dehumidify, Humidify).

Rule Creation

Formulate fuzzy rules that combine external weather conditions and occupant preferences to control the HVAC system effectively.

Simulation

Implement the system in Python using the skfuzzy library. Simulate different weather scenarios and occupant preferences to demonstrate the system's effectiveness.

Visualization

Provide visual representations of your membership functions and system responses to varying inputs.