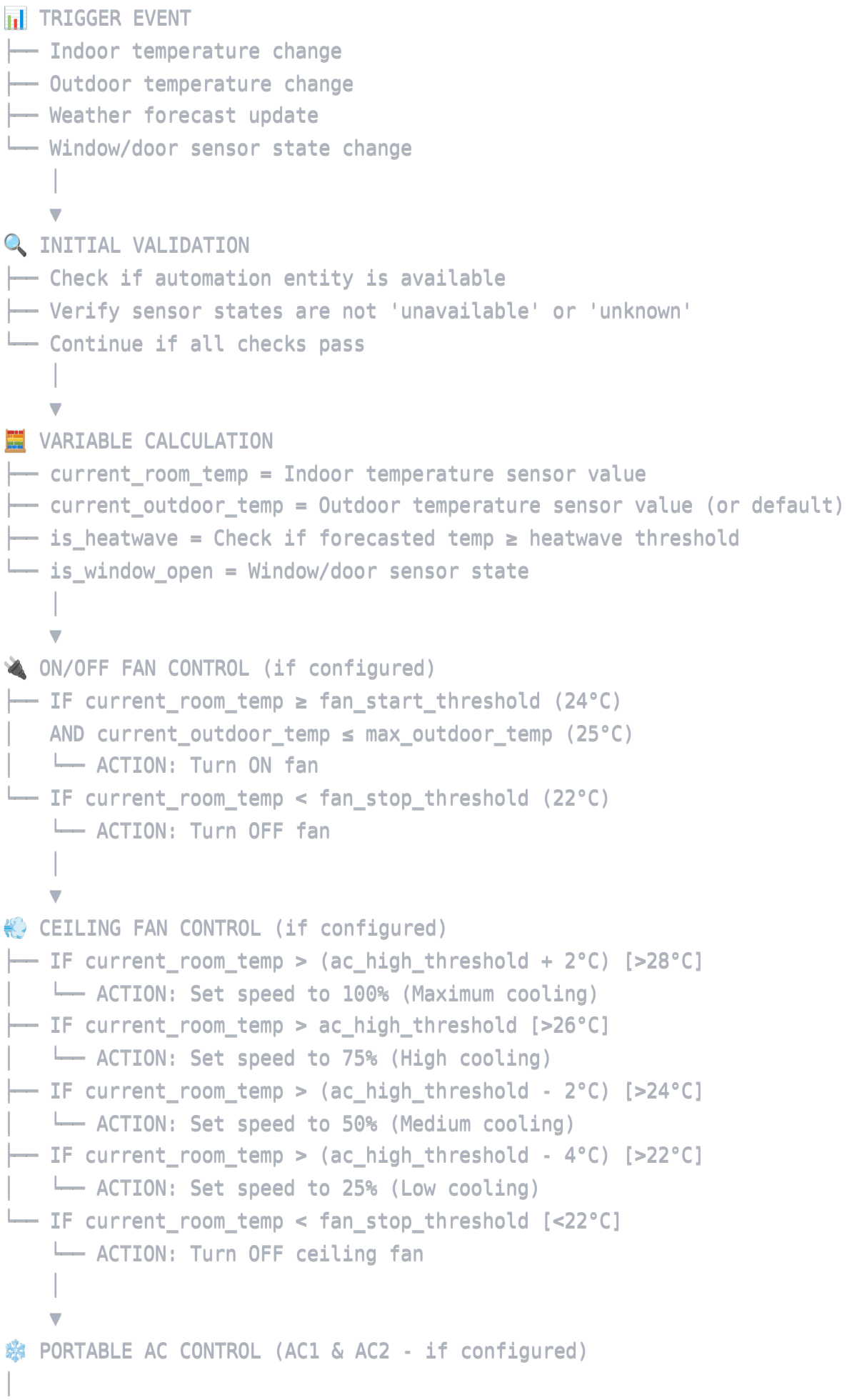
Decision Tree Documentation

Advanced Ventilation/AC Management Blueprint

Overview

This blueprint provides intelligent control of fans and air conditioners based on indoor temperature, outdoor conditions, forecasted heatwave alerts, and window/door sensor status.

Decision Flow Chart


📊 TRIGGER EVENT
├── Indoor temperature change
├── Outdoor temperature change
├── Weather forecast update
└── Window/door sensor state change
▼
🔍 INITIAL VALIDATION
├── Check if automation entity is available
├── Verify sensor states are not 'unavailable' or 'unknown'
└── Continue if all checks pass
▼
🧮 VARIABLE CALCULATION
├── current_room_temp = Indoor temperature sensor value
├── current_outdoor_temp = Outdoor temperature sensor value (or default)
├── is_heatwave = Check if forecasted temp ≥ heatwave threshold
└── is_window_open = Window/door sensor state
▼
🔌 ON/OFF FAN CONTROL (if configured)
├── IF current_room_temp ≥ fan_start_threshold (24°C)
│ AND current_outdoor_temp ≤ max_outdoor_temp (25°C)
│ └── ACTION: Turn ON fan
└── IF current_room_temp < fan_stop_threshold (22°C)
└── ACTION: Turn OFF fan
▼
💨 CEILING FAN CONTROL (if configured)
├── IF current_room_temp > (ac_high_threshold + 2°C) [>28°C]
│ └── ACTION: Set speed to 100% (Maximum cooling)
├── IF current_room_temp > ac_high_threshold [>26°C]
│ └── ACTION: Set speed to 75% (High cooling)
├── IF current_room_temp > (ac_high_threshold - 2°C) [>24°C]
│ └── ACTION: Set speed to 50% (Medium cooling)
├── IF current_room_temp > (ac_high_threshold - 4°C) [>22°C]
│ └── ACTION: Set speed to 25% (Low cooling)
└── IF current_room_temp < fan_stop_threshold [<22°C]
└── ACTION: Turn OFF ceiling fan
▼
❄️ PORTABLE AC CONTROL (AC1 & AC2 - if configured)


🚪 WINDOW/DOOR CHECK
IF is_window_open = TRUE AND turn_off_ac_on_window_open = TRUE
ACTION: Turn OFF AC immediately
REASON: Prevent energy waste with open window
IF is_window_open = FALSE
PROCEED TO TEMPERATURE CONTROL
🌡️ TEMPERATURE-BASED AC CONTROL
🌡️ HEATWAVE MODE (Priority)
IF is_heatwave = TRUE AND current_room_temp > heatwave_threshold (22°C)
ACTION: Set HVAC mode = 'cool', Fan mode = 'medium'
REASON: Proactive cooling during forecasted heatwave
🔴 EXTREME HEAT MODE
IF current_room_temp > (ac_high_threshold + 2°C) [>28°C]
ACTION: Set HVAC mode = 'cool', Fan mode = 'Full' (AC1) / 'high'
(AC2)
REASON: Maximum cooling power for extreme temperatures
🟠 HIGH HEAT MODE
IF current_room_temp > ac_high_threshold [>26°C]
ACTION: Set HVAC mode = 'cool', Fan mode = 'high'
REASON: Strong cooling for high temperatures
🟡 MODERATE HEAT MODE
IF current_room_temp > (ac_high_threshold - 1°C) [>25°C]
ACTION: Set HVAC mode = 'cool', Fan mode = 'medium'
REASON: Moderate cooling for warm temperatures
🟢 MILD HEAT MODE
IF current_room_temp > (ac_high_threshold - 2°C) [>24°C]
ACTION: Set HVAC mode = 'cool', Fan mode = 'low'
REASON: Gentle cooling for mildly warm temperatures
💨 FAN-ONLY MODE
IF current_room_temp ≤ (ac_high_threshold - 3°C) [≤23°C]
AND current_room_temp > fan_stop_threshold [>22°C]
ACTION: Set HVAC mode = 'fan_only', Fan mode = 'Auto'
REASON: Air circulation without cooling
❌ OFF MODE
IF current_room_temp < fan_stop_threshold [<22°C]

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    └── ACTION: Turn OFF AC
        └── REASON: Comfortable temperature reached
```

Configuration Parameters

Parameter	Default Value	Description
`threshold_temp_start_fan`	24.0°C	Temperature to start fans
`threshold_temp_stop_fan`	22.0°C	Temperature to stop fans
`threshold_temp_ac_high`	26.0°C	Temperature for AC high mode
`threshold_temp_ac_heatwave`	22.0°C	AC activation temp during heatwave
`outdoor_temp_max_for_vent`	25.0°C	Max outdoor temp for ventilation
`forecast_temp_heatwave_threshold`	30.0°C	Forecasted temp for heatwave alert
`turn_off_ac_on_window_open`	true	Turn off AC when window opens

Device-Specific Behavior

🔌 On/Off Fans

- Simple binary control (ON/OFF)
- Considers outdoor temperature to avoid bringing hot air inside
- Hysteresis: Start at 24°C, Stop at 22°C

💨 Ceiling Fans

- Variable speed control (25%, 50%, 75%, 100%)
- Gradual speed adjustment based on temperature intensity
- Supports both fan entities and dimmable light entities

❄️ Portable AC Units

AC1 (Advanced Modes)

- Fan modes: silent, low, medium, high, full, Auto
- Full range of temperature-based control

AC2 (Basic Modes)

- Fan modes: auto, low, medium, high

- Simplified control logic

Smart Features

🌡️ Heatwave Detection

- Uses weather forecast entity to predict high temperatures
- Proactively activates AC at lower indoor temperature (22°C vs 26°C)
- Helps maintain comfort before extreme heat arrives

🚪 Window/Door Integration

- Monitors window/door sensors to prevent energy waste
- Configurable behavior: immediate AC shutdown or prevent startup only
- Maintains safety and efficiency

🔄 Hysteresis Control

- Different thresholds for starting (24°C) and stopping (22°C) devices
- Prevents rapid on/off cycling
- Ensures stable operation

🌡️ Multi-Zone Logic

- Considers both indoor and outdoor temperatures
- Prevents inefficient ventilation when outdoor air is too hot
- Optimizes energy usage based on conditions

Automation Triggers

The automation responds to changes in:

1. **Indoor temperature sensor** - Primary control input
2. **Outdoor temperature sensor** - Ventilation efficiency check
3. **Weather forecast** - Heatwave prediction
4. **Window/door sensors** - Energy efficiency control

Example Scenarios

Scenario 1: Normal Day

- Indoor: 25°C, Outdoor: 23°C, No heatwave
- **Result**: Ceiling fan at 50%, AC in cool mode with medium fan

Scenario 2: Heatwave Predicted

- Indoor: 23°C, Outdoor: 35°C forecast, Heatwave detected
- **Result**: AC activates proactively in cool mode with medium fan

Scenario 3: Window Open

- Indoor: 27°C, Window sensor: Open
- **Result**: AC turns off immediately (if configured), fans continue

Scenario 4: Cool Evening

- Indoor: 21°C, Outdoor: 18°C
- **Result**: All devices turn off, comfortable temperature achieved

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This decision tree ensures optimal comfort while maximizing energy efficiency through intelligent automation.