

Finite State Machine (FSM) in Game AI

What Is an FSM?

Let's first explain what "state" is. Real things have different states, for example, an automatic door has two states: open and closed. The state machine we usually refer to is a finite state machine, which means that the number of states of the thing being described is finite, for example, the state of an automatic door is two open and closed states.

A **Finite State Machine (FSM)** is one of the simplest and most widely used AI architectures in games.

It defines:

- A set of **states**
- **Transitions** between states
- **Rules** that determine when the AI switches states

FSMs are ideal for controlling enemy behaviors such as:

- Idle
- Patrol
- Chase

Why Use FSM in Games?

FSM is:

Easy to understand

Easy to debug

Perfect for deterministic enemy AI

Stable and predictable

Modern games still use FSM for many enemy types, especially simple enemies or NPC behaviors.

Enemy AI (patrolling, chasing, attacking)

NPC interaction behaviors

Boss phase transitions

UI state management

Player action state machine (Idle → Run → Jump)

FSM Structure Overview

An FSM consists of:

1. States

Examples:

- Idle
- Patrol
- Chase

2. Transitions

Rules that cause the AI to switch to a new state:

- "At the beginning AI will Idle for a while later will Patrol"
- "If player distance > 10 → Patrol"
- "If player distance < 10 → Chase"

3. State Behaviors

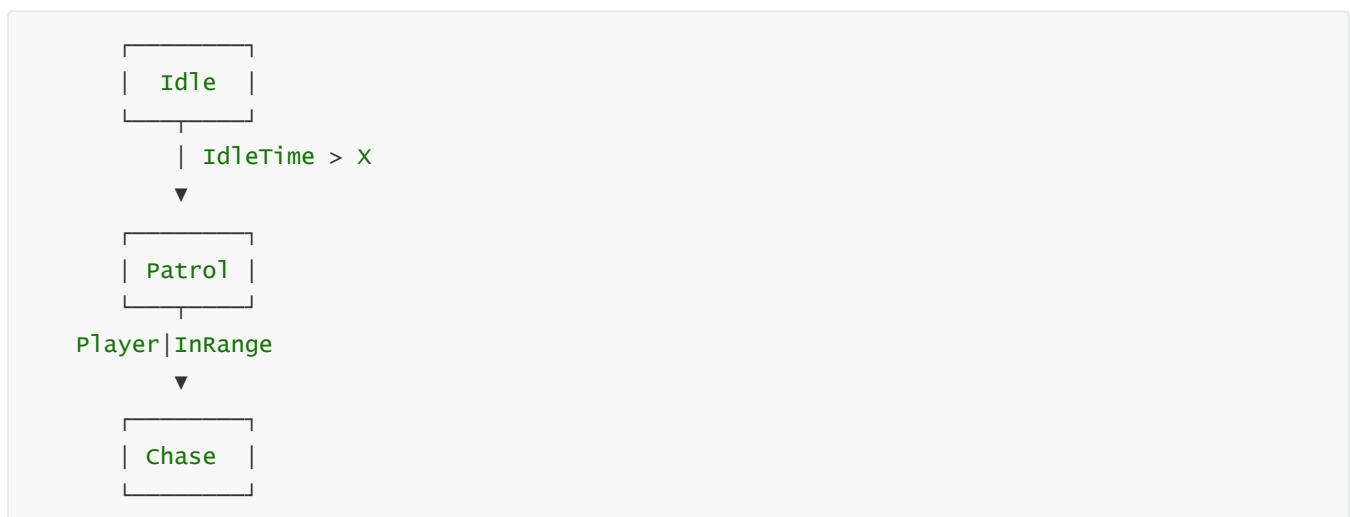
Each state contains logic such as movement or animations.

Example Enemy FSM (Used in Unity Demo)

States:

1. **Idle** – Standing still
2. **Patrol** – Walking between waypoints
3. **Chase** – Moving toward the player

FSM State Transition Diagram



Idle → Patrol → Idle (loop)

Idle → Chase (player enters range)

Patrol → Chase (player enters range)

Chase → Patrol (player escapes beyond range)

Recommended AI Parameters

Parameter	Value	Purpose
Detection Range	10	Player enters → Chase
Lost Target Range	15	Player escapes → Return to Patrol
Idle Duration	2–3 seconds	Switch back to Patrol
Patrol Speed	1.5	Slower movement
Chase Speed	3	Faster pursuit