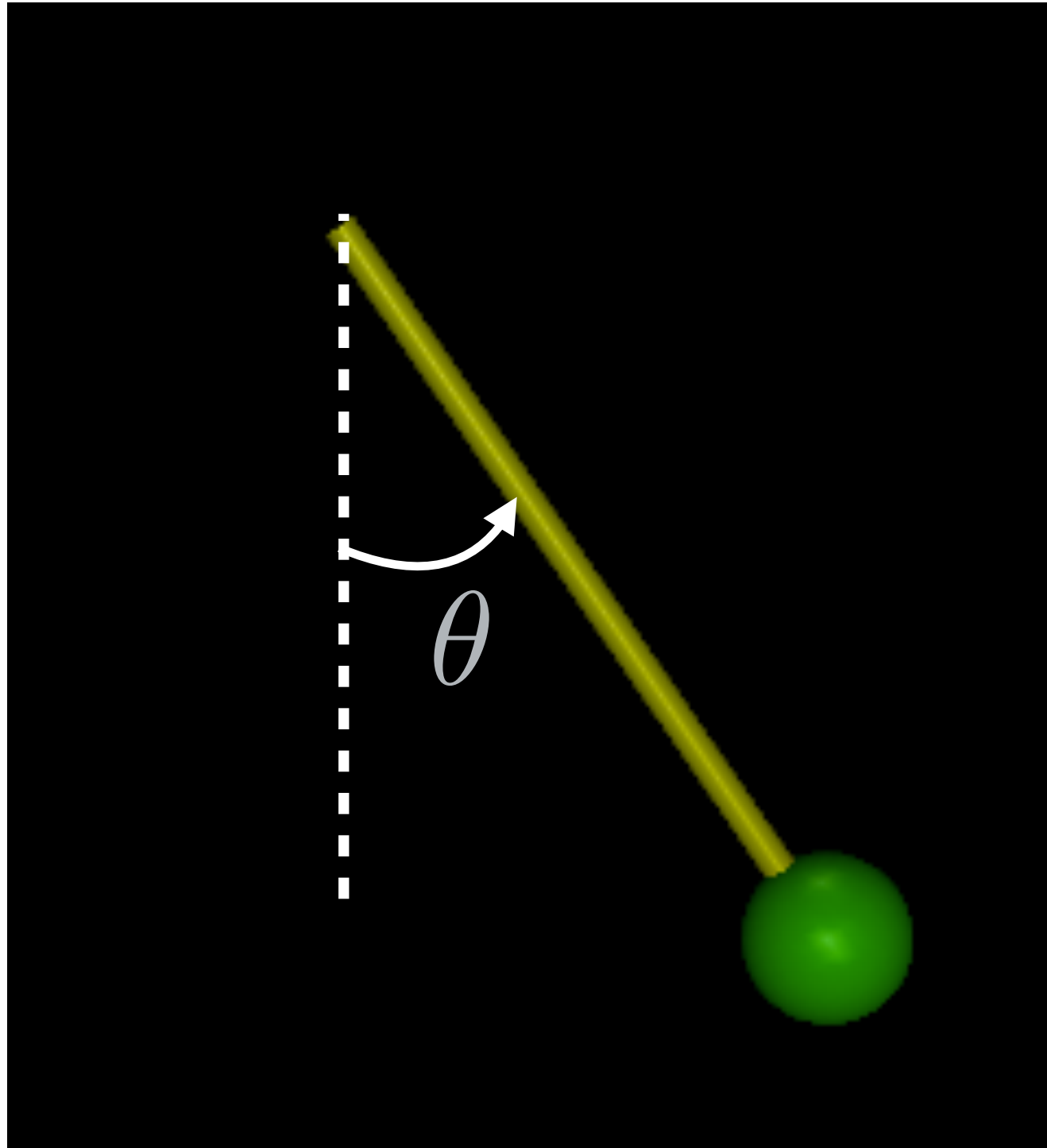


# Swing up and hold in vertical position

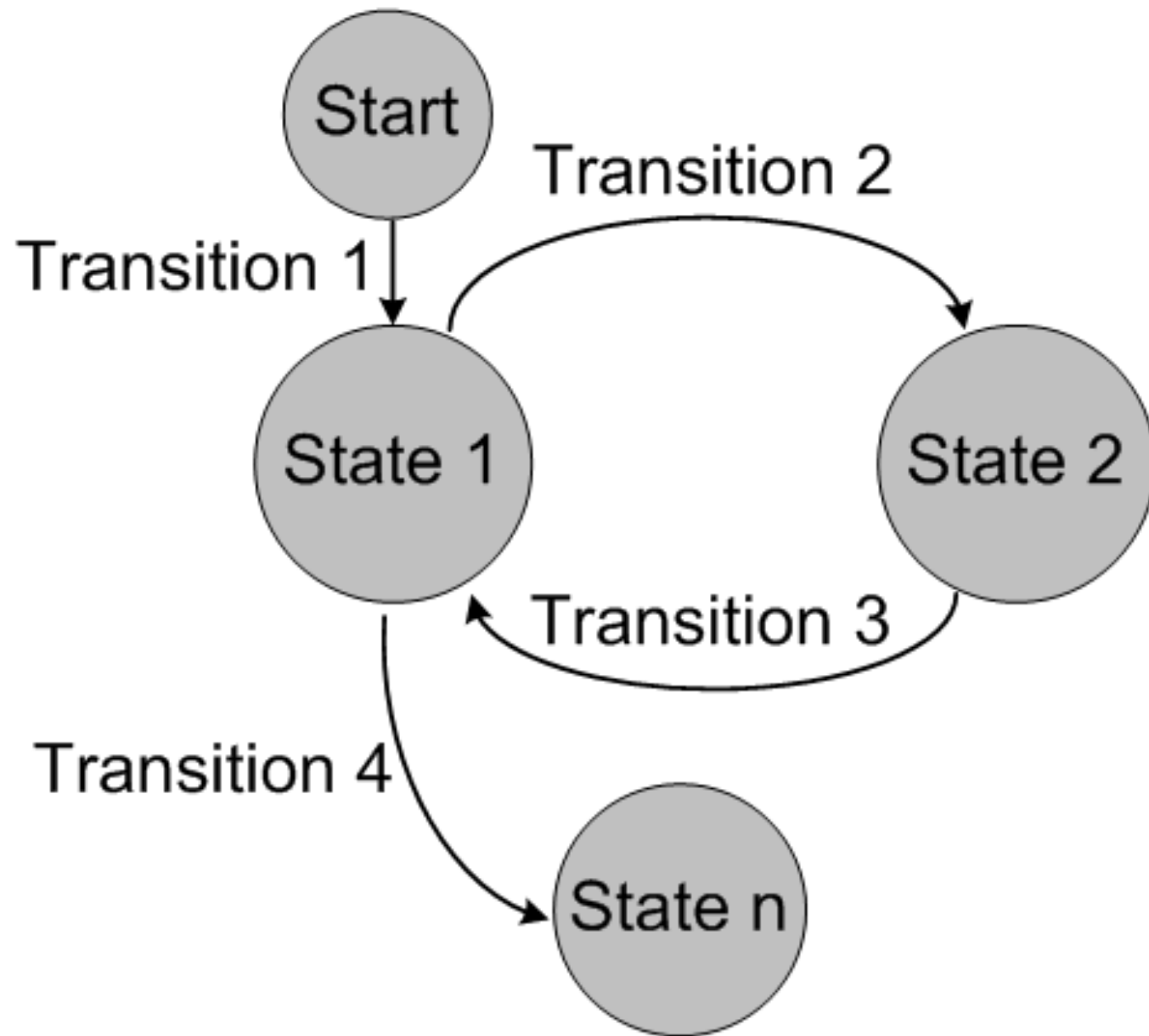


Needs two controllers

1) Swing up

2) Hold in vertical position

# Finite State Machine (FSM)



**State:** Do an action  
e.g., move, grasp

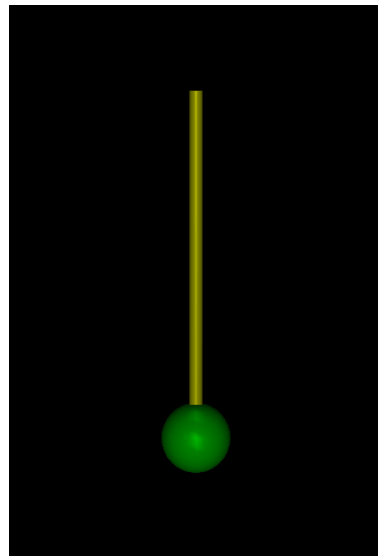
**Transition:** Switching condition.  
e.g.,  $t > 4$  sec,  
reached a position

[https://en.wikipedia.org/wiki/Finite-state\\_machine](https://en.wikipedia.org/wiki/Finite-state_machine)

# Swing up and hold in vertical position

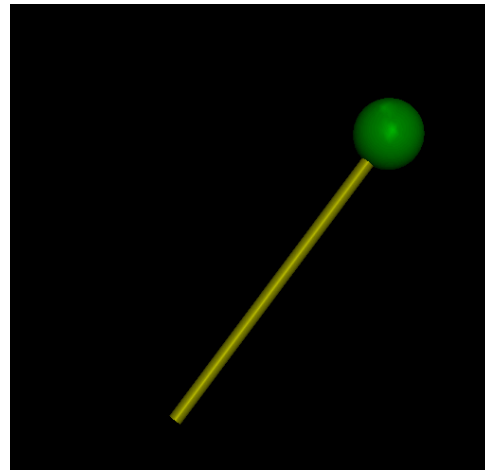
**Start**

theta=0

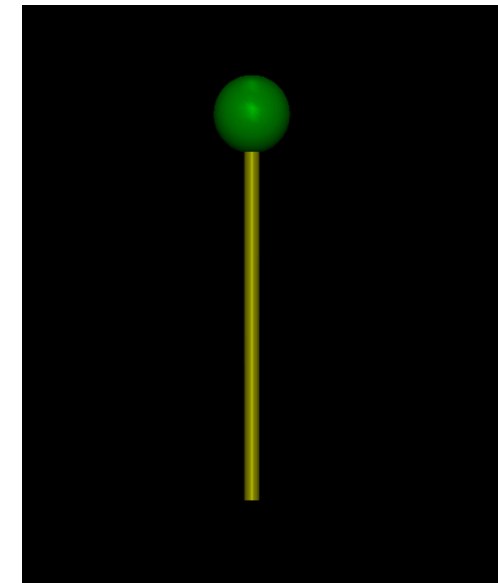


FSM\_SWINGUP

Velocity control



theta=pi



FSM\_HOLD

Position control

Transition



theta > 2.5