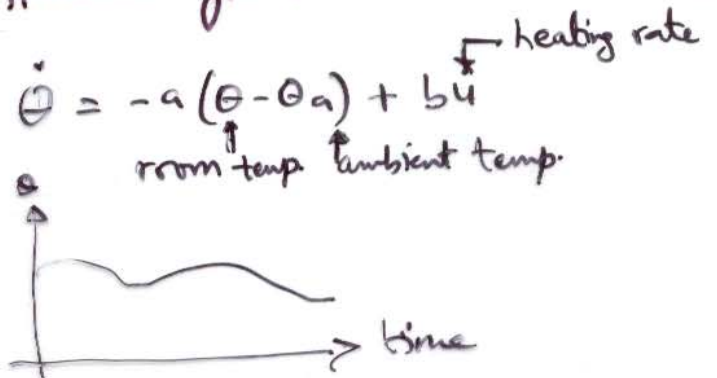


## Introduction

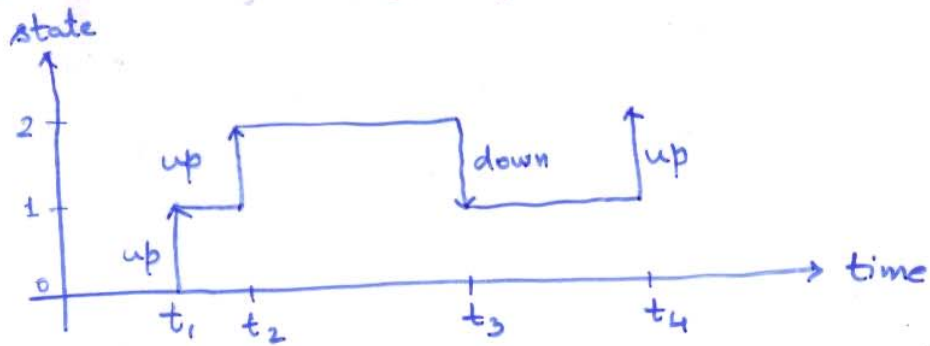
- Discrete Event System (DES) evolves on occurrence of events (which occur asynchronously)
- Events : arrival of customer in a queue  
completion of a task or failure of machine in mfg.  
transmission of a message in communication network  
termination of a computer program
- Examples of DES include : computer & communication network  
robotics & mfg. system  
computer program  
automated traffic system
- Differences from most physical (continuous/discrete time) systems.
  - (1) Event-driven as opposed to time-driven
  - (2) states/events discrete ; may take symbolic value  
m/e states: idle, working, broken, etc.  
m/e events: start, stop, fail, repair, etc.
  - (3) Relationship between state and events highly irregular  
may not be described by differential eqn. (as in cont. time system)  
or by difference eqn. (as in discrete time system)

Example (cont. time system) :  $\dot{\theta} = -a(\theta - \theta_a) + b u$



## DES: Example

- Elevator that moves between floors 0, 1, and 2; executes "up" and "down" motions.
- Example state-time trajectory:



- States of elevator: 0, 1, 2; events: "up" and "down" events occur asynchronously at times  $t_1, t_2, t_3, t_4, \dots$
- State-time trajectory piece-wise constant; state changes are event-driven;