



IIT ROORKEE



NPTEL ONLINE
CERTIFICATION COURSE

AUTOMATIC CONTROL SYSTEM

DEFINITION AND TYPES

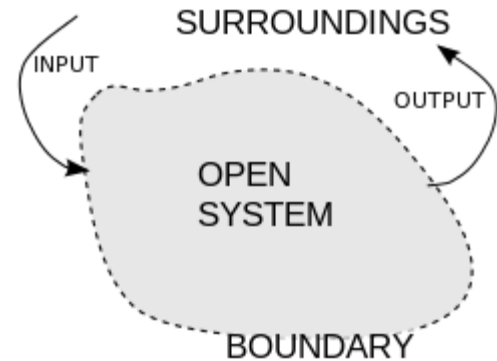
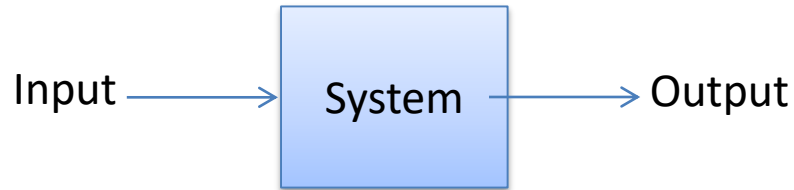
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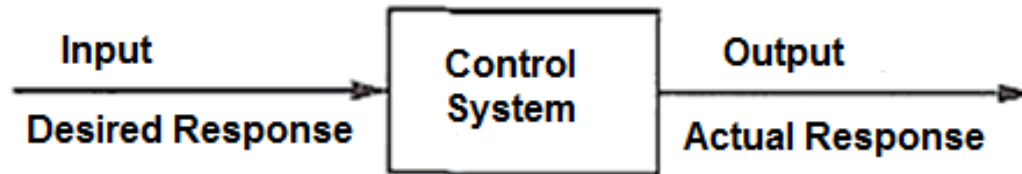
SYSTEM

- A system is a collection of components which are co-ordinated together to perform a function
- Systems interact with the environment across a separating boundary
- The interaction is defined in terms of variables: system inputs, system outputs, environmental disturbances



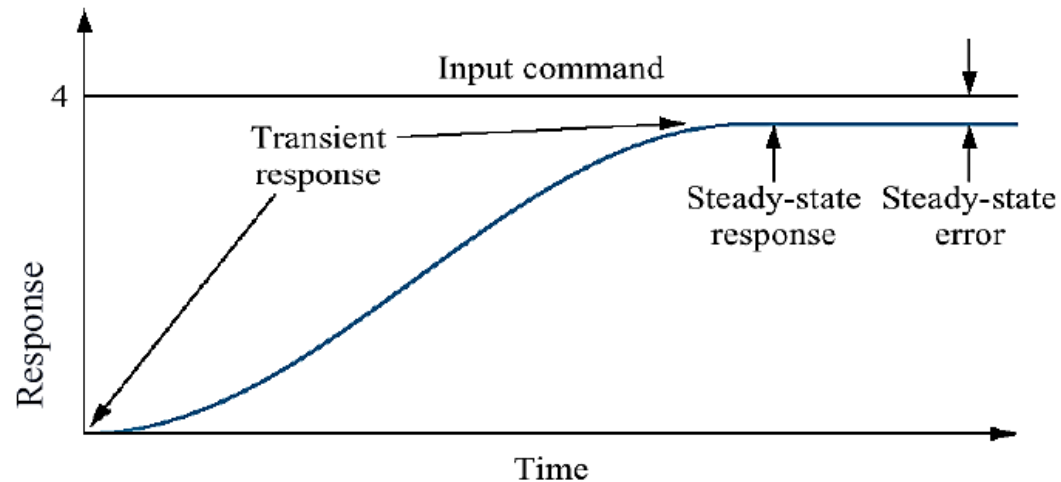
CONTROL SYSTEM

- A control system consists of subsystems and processes assembled for the purpose of obtaining a DESIRED output with DESIRED performance, given a specific input.



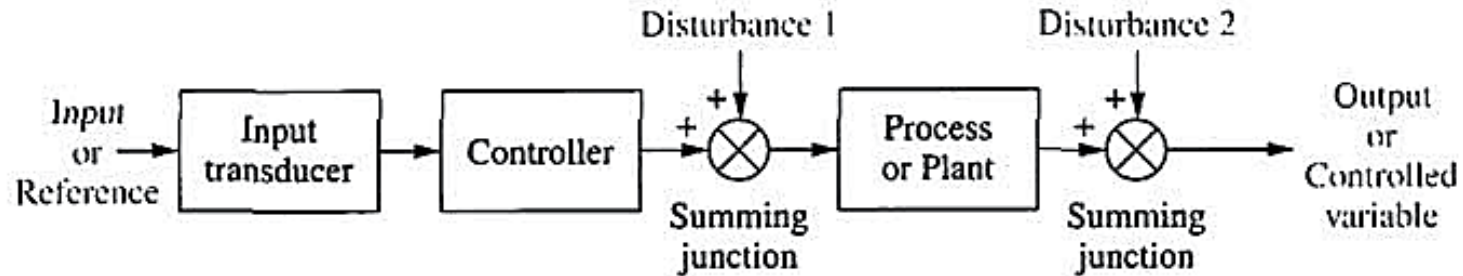
ELEVATOR

- Response of an elevator when you press the 4th floor button



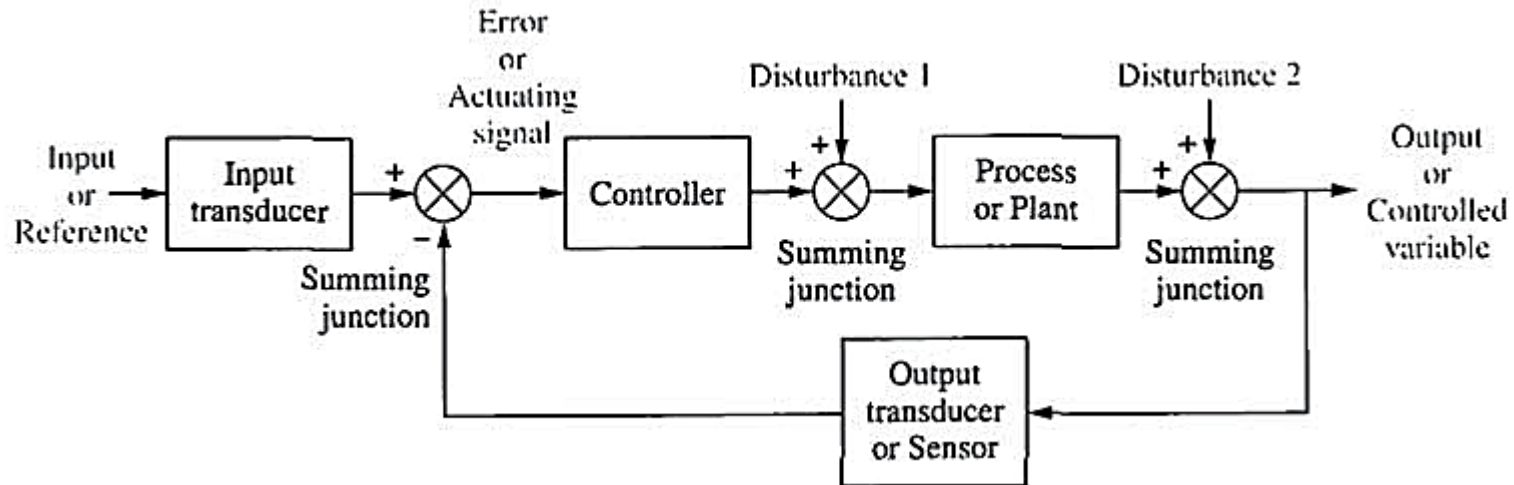
OPEN-LOOP SYSTEM

- They do not monitor (measure) or correct for disturbances and are simply commanded by the input.
- It cannot compensate for Disturbance 1 and 2
- Examples: toaster, washing machine, fan, etc.



CLOSED-LOOP SYSTEM

- They monitor the output and compare it to the input
- If an error is detected, the system corrects the output and hence corrects the effects of disturbances
- Examples: air conditioner, microwave oven, etc.



OPEN-LOOP vs CLOSED-LOOP SYSTEM

OPEN-LOOP

- They do not monitor (measure) or correct for disturbances and are simply commanded by the input.
- Simple
- Less expensive
- Sensitive to disturbances
- Inability to correct for the disturbances

CLOSED LOOP

- They monitor the output and compare it to the input
- If an error is detected, the system corrects the output and hence corrects the effects of disturbances
- Greater accuracy
- Less sensitive to the noise, disturbances and changes in the environment
- More complex and expensive

REFERENCE BOOKS/MATERIALS

- Norman S. Nise, Control Systems Engineering, Wiley, 2013
- Katsuhiko Ogata, Modern Control Engineering, Prentice Hall, 2010.

