

## MEE 3017 System Modelling and Analysis

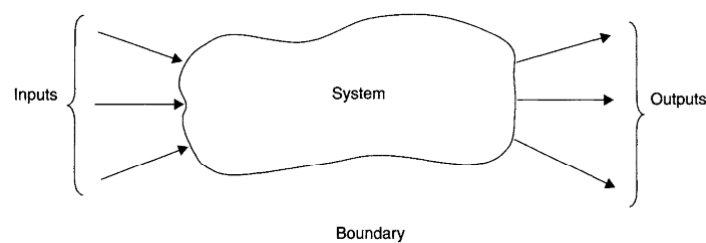
## L01 Introduction to System Dynamics Concepts

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## Engineering System Definition

**SYSTEM:**

1. A system can be defined as a collection of matter, parts, components or procedures which are included within some specified boundary.
2. A **system** is a set of interacting or interdependent components forming an integrated whole.
3. **Systems** require inputs and outputs to be specified.

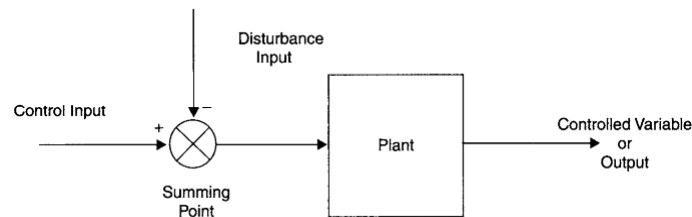


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## Engineering System Definition

**SYSTEM:**

4. It is conventional to refer to the system being controlled as '**plant**', and this, as with other elements, is represented by a '**block diagram**'.
5. Some inputs, over which the engineer will have direct control, can be used to control the plant outputs. These are known as '**control inputs**'.
6. There are other inputs over which the engineer has no control, and these will tend to deflect the plant outputs from their desired values. These are called '**disturbance inputs**'.

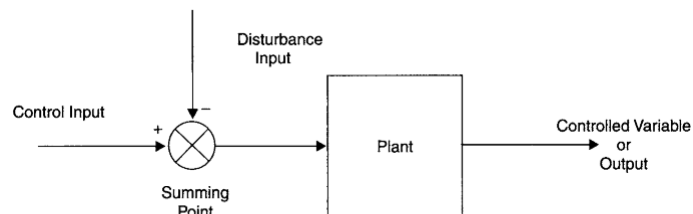


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## Engineering System Definition

**Open Loop Systems:**

- Systems in which the output has no effect on control action are called '**open-loop systems**'.
- The main problem with the control of an open loop system is that the controlled variable is very sensitive to disturbance effects.



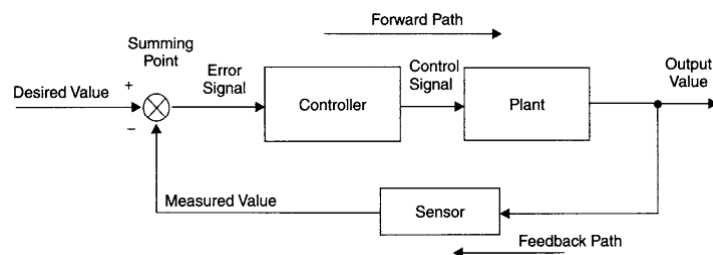
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## Engineering System Definition

**Closed Loop Systems:**

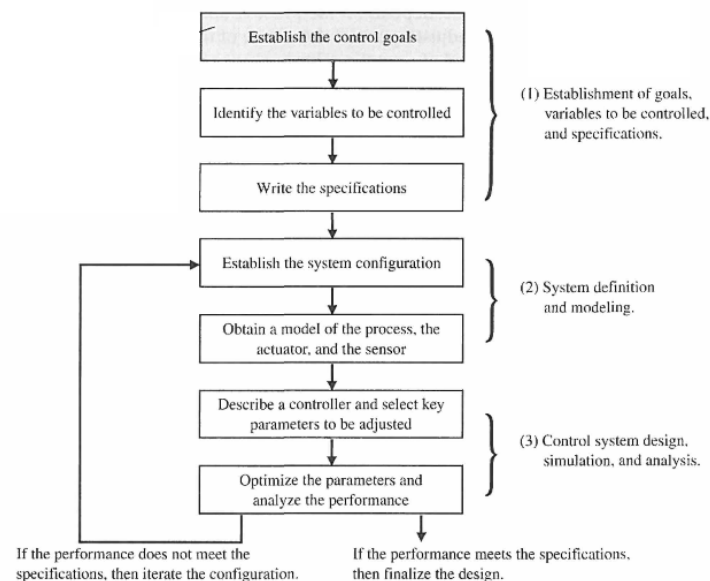
- In contrast to an open-loop control system, a closed-loop control system utilizes an additional measure of the actual output to compare the actual output with the desired plant response.
- The measure of the output is called the '*feedback*' signal.
- A feedback control system is a control system that tends to maintain a prescribed relationship of one system variable to another by comparing functions of these variables and using the difference as a means of control..



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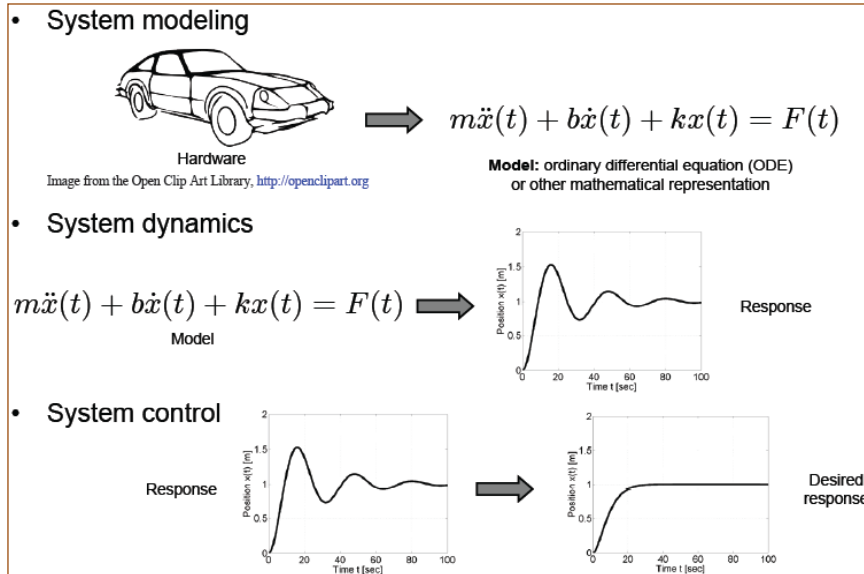
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## Engineering System Definition



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