

Chapter 1: Introduction to Control Systems

Objectives

In this chapter we describe a general process for designing a control system.

A control system consisting of interconnected components is designed to achieve a desired purpose. To understand the purpose of a control system, it is useful to examine examples of control systems through the course of history. These early systems incorporated many of the same ideas of feedback that are in use today.

Modern control engineering practice includes the use of control design strategies for improving manufacturing processes, the efficiency of energy use, advanced automobile control, including rapid transit, among others.

We also discuss the notion of a design gap. The gap exists between the complex physical system under investigation and the model used in the control system synthesis.

The iterative nature of design allows us to handle the design gap effectively while accomplishing necessary tradeoffs in complexity, performance, and cost in order to meet the design specifications.

Introduction

System – An interconnection of elements and devices for a desired purpose.

Control System – An interconnection of components forming a system configuration that will provide a desired response.

Process – The device, plant, or system under control. The input and output relationship represents the cause-and-effect relationship of the process.



Process to be controlled.

Introduction

Open-Loop Control Systems

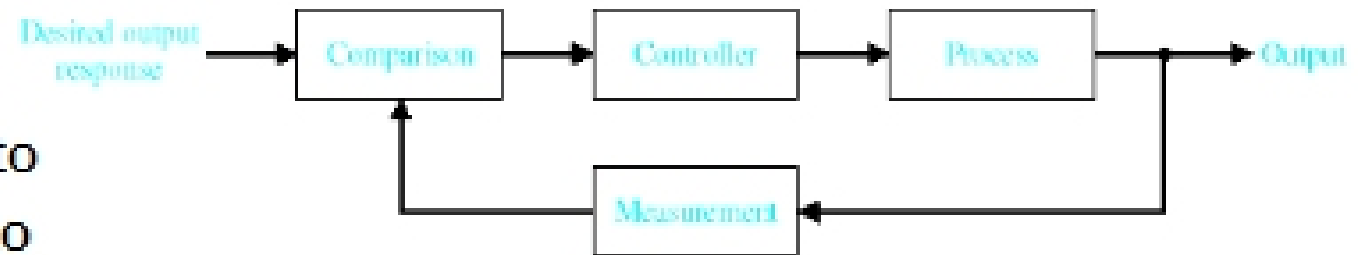
utilize a controller or control actuator to obtain the desired response.



Open-loop control system (without feedback).

Closed-Loop Control Systems

utilizes feedback to compare the actual output to the desired output response.



Closed-loop feedback control system (with feedback).

Multivariable Control System

