Introduction to Control

July 20, 2015

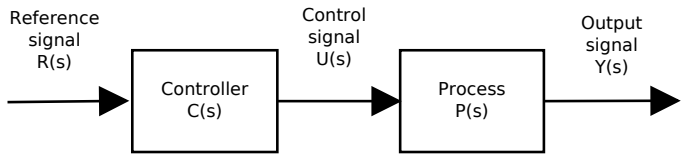
Outline

1 Basics

An introduction to control

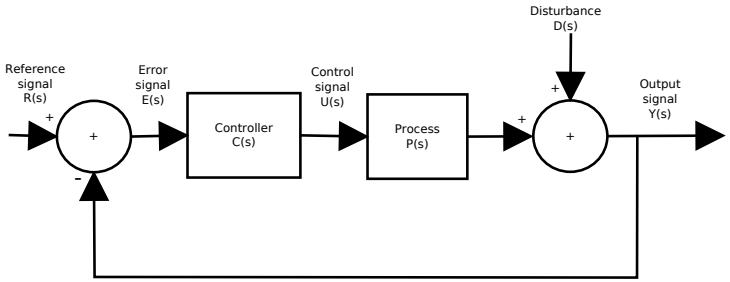
What is control?

- The goal is to find an input (control signal U(s)) such that the process produces the desired output
- Open loop control system: the actual output signal has no effect on the control action



A general set-up of a closed loop system

- We will focus on closed loop control systems



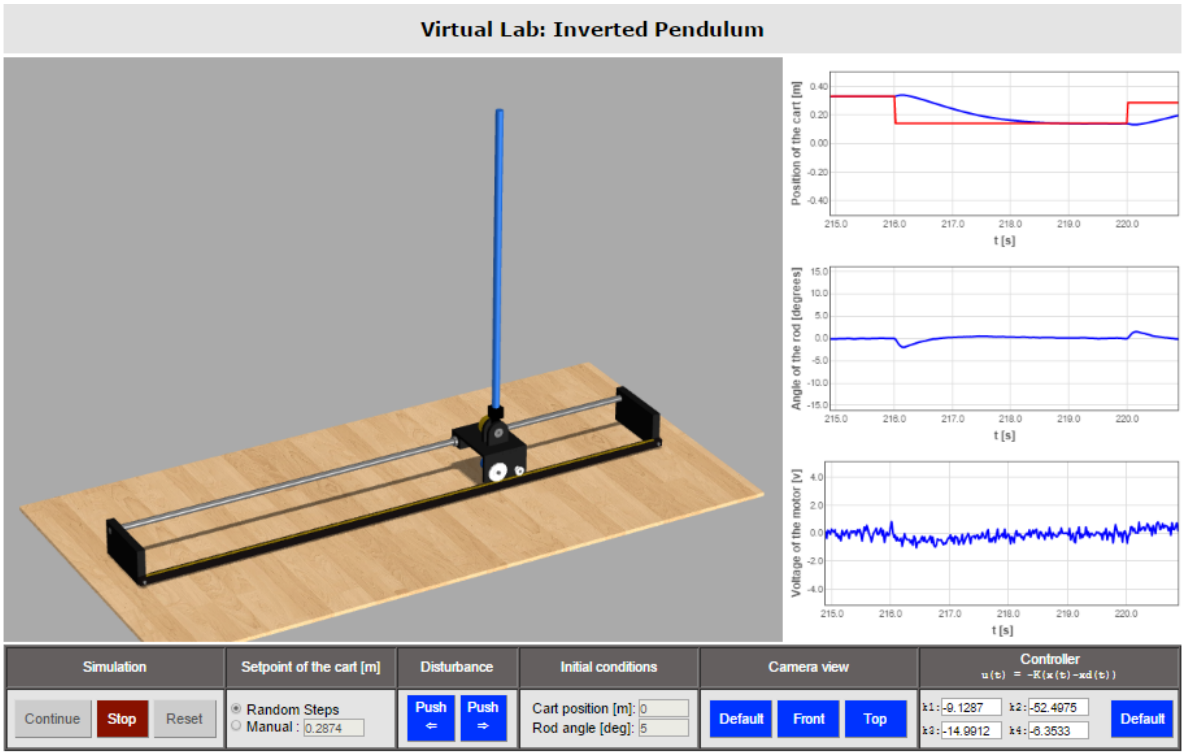


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Figure: Inverted Pendulum

Concrete Control

- On-off controller
  - Thermostate at home
- **PID controllers, Lead and lag compensators (this course)**
  - Cruise-control in your car
- More advanced controllers
  - STATE-space feedback controllers
  - Model Predictive Controller (MPC)
  - Fuzzy Control
  - Neuro-fuzzy Control
  - ...

Outline

1 Basics

What is good control?

- Before we will start to design control systems we will first focus on the question. What is good control?
- It depends on the application
  - Stability
  - Disturbance rejection
  - Reference tracking (speed)
  - Sensitivity to errors on model
  - Etc...