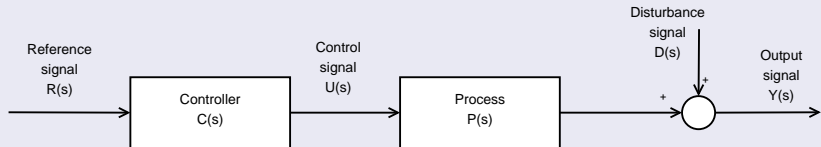


# Open-loop System

## Definition

In an open loop control system the actual output signal  $Y(s)$  has no effect on the control action  $U(s)$ .



$$Y(s) = P(s)U(s) = P(s)C(s)R(s)$$

# Open-loop System

## Example

- You are pouring a glass of water, but you **cannot look at the glass**.
- The desired output is a full glass of water within a reasonable time.
- The input can have two values: on or off (assume a quite primitive tap).
- It will not be easy to do this successfully.



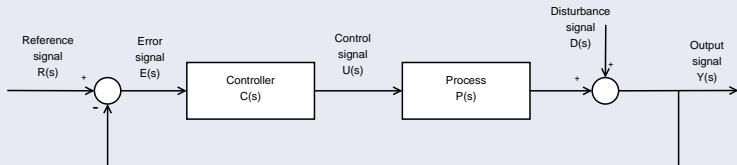
The solution is evident: look at the glass while pouring!

# Closed-loop system

## Definition

In a closed-loop system the output of the controller is influenced by the output of the system using a **negative feedback loop**.

## Classical control-loop



$$Y(s) = \frac{P(s)C(s)}{1 + P(s)C(s)} R(s) \quad \text{when } D(s) = 0$$

## Digital Control Loop

