Feedback principles

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Control y Sistemas

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Lo primero es definir el tipo de control a hacer

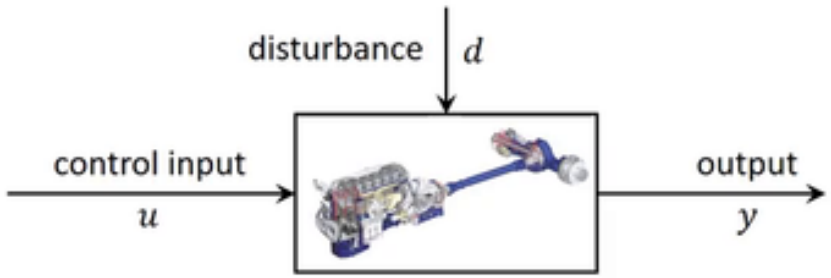
Feedback principles – model based design

Control objectives (specification)

- Qualitative – minimize energy
- Quantitative – response time

Ej de minimizar: consumo de energía, respuesta de un actuador para que no sea violenta, pico de tensión

Que cumpla ciertos tiempos mínimos o cierto sobrepico.

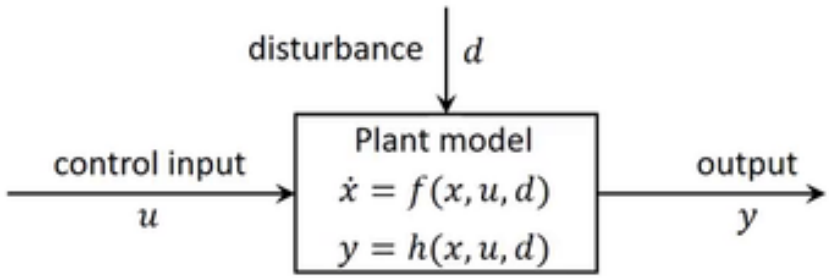


Lo siguiente es conocer la planta->Modelo matemático (en espacio de estados por ej)

Feedback principles – model based design

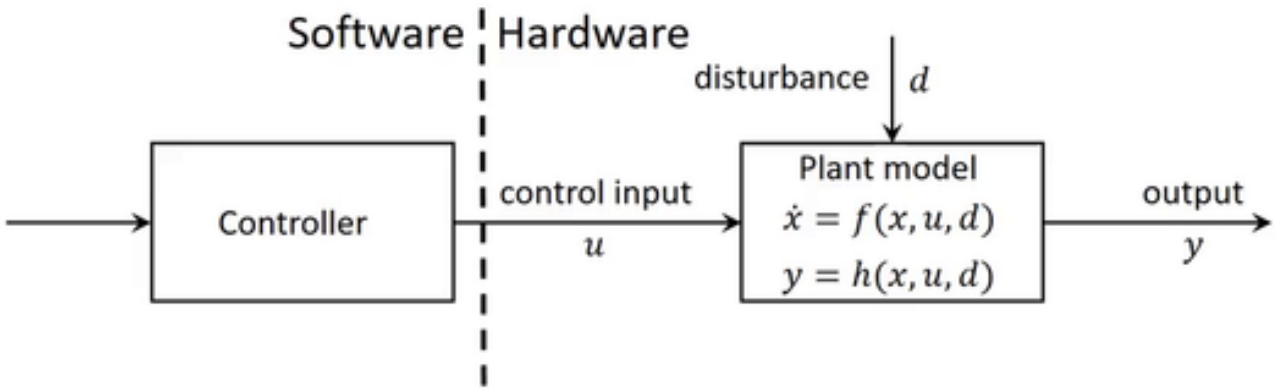
Description of the system/plant

- Level of abstraction
- Modeling – physical modeling or from measured data



Feedback principles – model based design

Design controller

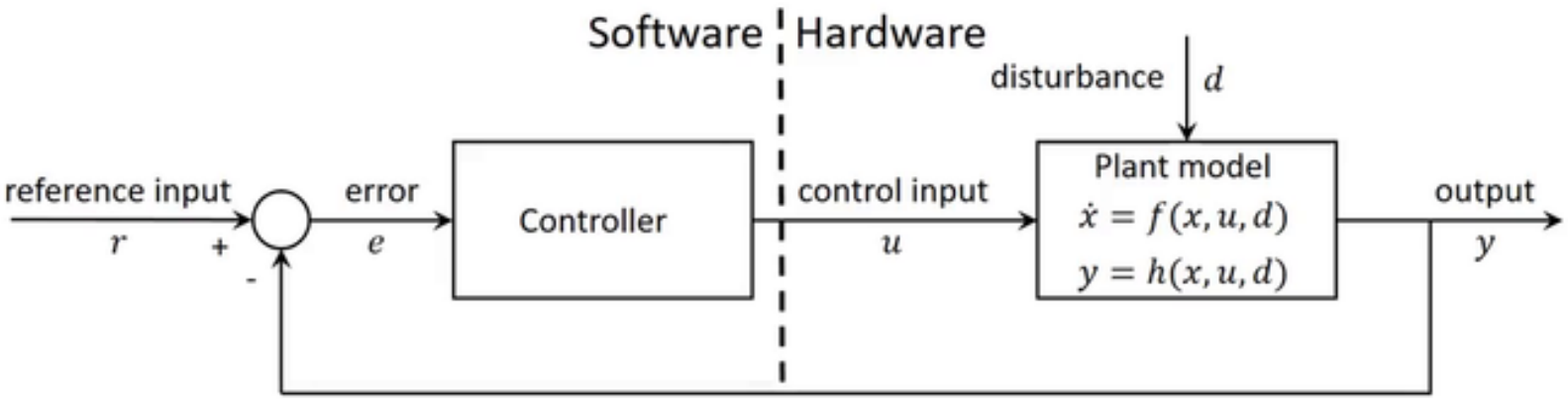


Feedback principles – model based design

Design controller

- Select technique – Open loop or closed loop

No siempre puedo medir la salida.
A veces hago circuito abierto a costa de mala rta a perturbaciones o cambios de sus parámetros

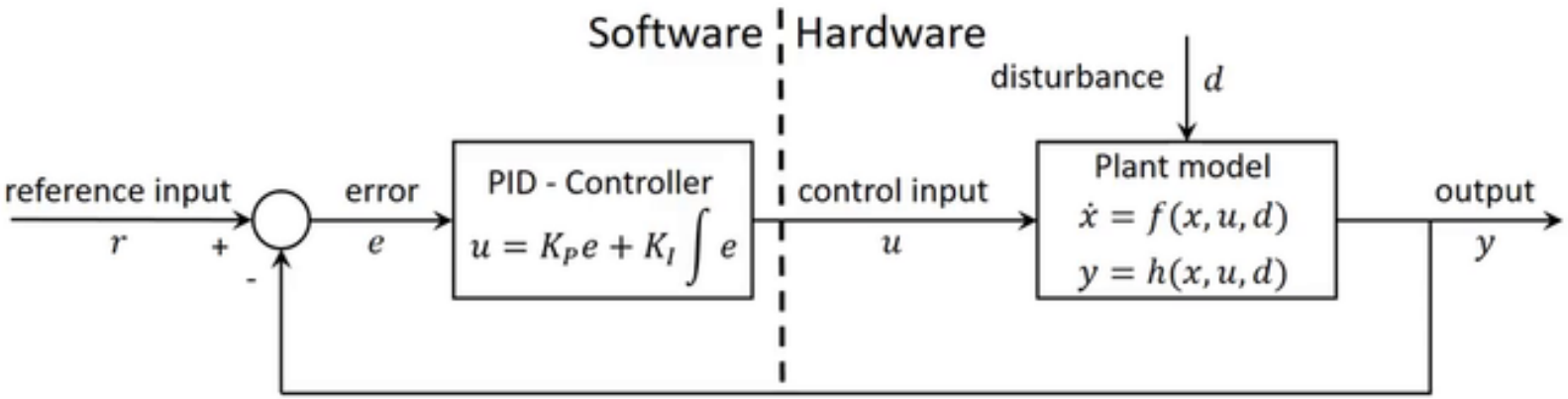


Feedback principles – model based design

Design controller

- Select technique – Open loop or closed loop
- Classical methods or state-space methods

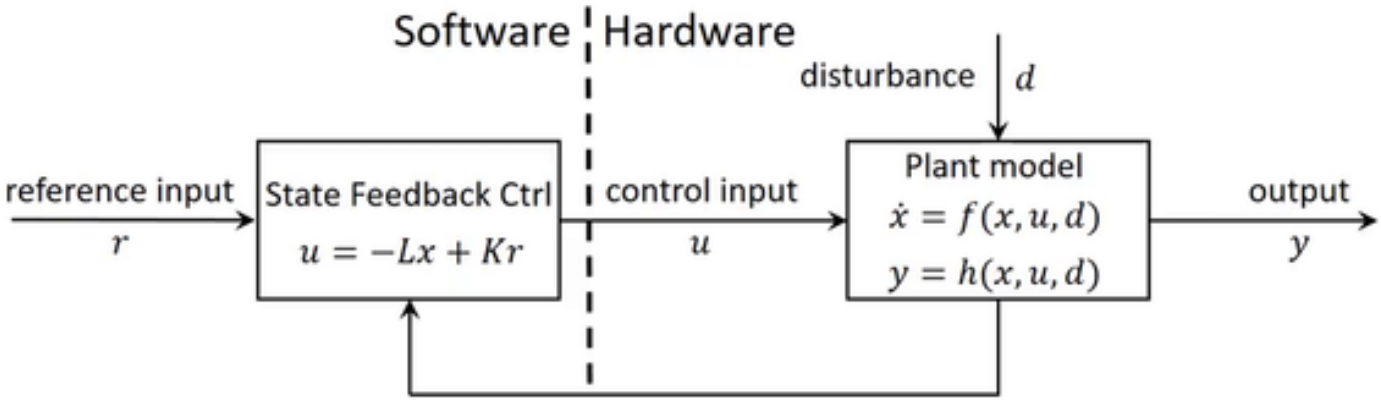
PID Mas nuevos



Feedback principles – model based design

Design controller

- Select technique – Open loop or closed loop
- Classical methods or state-space methods
- Choose parameters (trial-and-error, design method, optimization)



Control design methods

Classical control methods

- works well for simple systems,
- can be tuned based on trial-and-error or engineering intuition,
- do not require a mathematical model of the system

Podrías cambiar radicalmente parámetros de la planta y el PID va a seguir funcionando mas o menos. Siendo estable al menos

but

- are typical iterative, Probando para ajustar, y rehacer al cambiar parámetros
- are difficult to use for larger-scale systems (complex systems) with multiple inputs and outputs (MIMO),

Control design methods

State-space methods

- can easily handle larger-scale systems (complex systems) with multiple inputs and outputs (MIMO),
- tuning can be formed as an optimization problem,
- are easy to implement

Sin iteraciones,es matemático

but

- require a mathematical model of the system,

Cambios en parámetros del modelo alteran el controlador. No es tan estable como el PID en eso

Bibliography

- Karl J. Astrom and Richard M. Murray *Feedback Systems*. Version v3.0i. Princeton University Press. September 2018. Chapter 11.
- Ogata, Katsuhiko. Modern Control Engineering. Fifth Edition. Prentice Hall. 2009. Chapter 8.