Digital Control Systems

Design, identification and implementation

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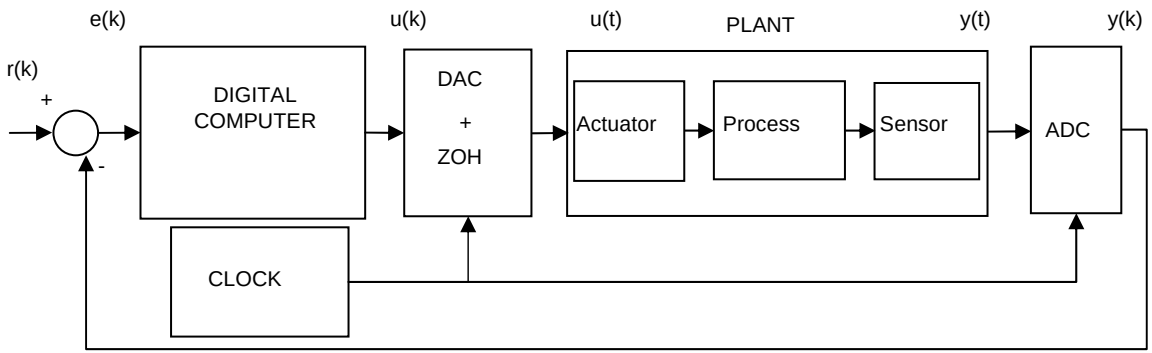
The object of study

Digital Control System

The *control law* is implemented on a digital computer



ADC: analog to digital converter
DAC: digital to analog converter
ZOH: zero order hold

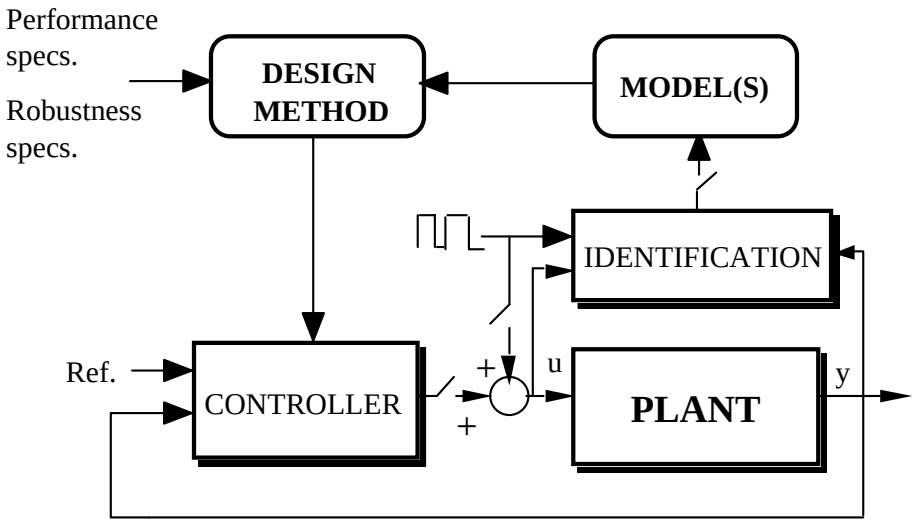
Some preliminary remarks

- Almost all control systems built now use *microprocessors*
- To take advantage of the capabilities of microprocessors, specific *model based* design techniques should be used
- The digital control design techniques have known an important development and have been tested extensively in industry
- The development of control design software has modified the design procedure
- Computer-aided control design software requires the understanding of a number of concepts in order to be used efficiently

Objectives of the book

- To give the necessary knowledge for the understanding and the design of computer controlled systems for varied types of applications
- Presentation oriented towards the need of the designer and user of control systems
- Illustrate by examples and practical realizations the design and implementation methodology

The main stream



To design and tune a good controller one needs: :

- To specify the desired control loop performance and robustness
- To know the dynamic model of the plant to be controlled
- To possess a suitable controller design method
- To implement the resulting controller taking into account practical constraints
- To validate the controller performance on site and, if necessary, to re-tune it

How to achieve a « good control»

- A relevant *dynamic model* of the plant is necessary

- *System identification* allows to extract a dynamic model of the plant form input/output measurements

- *System identification* is a key factor for obtaining a high performance control and for shortening the on site tuning

- Based on the identified model, an appropriate *controller* is designed for achieving the desired performance

-The knowledge of data acquisition techniques and implementation of digital algorithms is also necessary

- This design methodology is often called MBC (model based control)

Content

Logical dependence of the various chapters