

Hierarchical and Distributed Control

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March 22, 2002

Abstract

First, you are asked to do some background reading on hierarchical and distributed control. Second, you are asked to design a functional architecture for a building temperature control system where you explain the control loops and interconnections you plan to implement for this system in the laboratory.

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1 Background: Hierarchical and Distributed Control

1. Read pp. 30–50 in Chapter 1 from: K. Passino, “Biomimicry for Optimization, Control, and Automation,” unpublished manuscript, 2001.
2. Do Exercise 1.8 from that book (given at the end of that chapter).
3. *Optional:* See the web site:

<http://eewww.eng.ohio-state.edu/~passino>

and go to the link on “Books” and see the book: P. Antsaklis and K. Passino, eds., “An Introduction to Intelligent and Autonomous Control,” Kluwer Academic Pub., Boston, 1993. You can download any chapter that you would like to read. There are several early ones there that are particularly relevant to hierarchical and distributed control.

2 Design Problem: Functional Architecture for a Temperature Control Problem

1. In the lab study the layout of the model building temperature control problem so that you have some insight into the physical layout of the plant (e.g., windows, doors, disturbances), its actuators, and sensors. Read the description of the building temperature control problem for the model building.
2. Design a functional hierarchy for the temperature control problem for the model building. Include in this a block diagram of all control loops that you plan on implementing and an explanation of how you will implement your hierarchical and distributed controller. Clearly, since you will be implementing the entire controller within one computer and in dSPACE you will have to simulate effects of the lack of information sharing between subsystems and hence the necessary communication channels.