EE/AA 448: Sensors and Actuators

Laboratory Module #5

Analog Controller Implementation

Assigned: Feb. 9, 2009

Due: 12:30 PM, Monday Feb. 16, 2009 (In Class)

Objectives

The objective of this lab is to build a PID controller using analog electronic components.

You Will Need...

To complete this module, you will need

1. A TCL Board, IO Card and Computer, configured the same way as in Module 2.
2. A project board and a variety of analog components that should be available in the lab.

Build an Analog PID Controller

Using the course notes as a guide, build an analog PID controller on a breadboard. Try building this a piece at a time, checking things as you go. Start with the voltage regulator, then the virtual ground block. Next, do the voltage follower and then the error signal. Finally, add the PID controller itself.

Choose resistors and capacitors to (a) give a fast response with about 10% overshoot and (b) give a slower, critically damped response. Describe this design process in your report.

Hook up the controller to the I/O board so that you can send the desired voltage from LabView. Also, for the purpose of data collection, hook up the I/O board so that you can get the temperatures into LabView as well.

Controller Performance

Use your controllers (a) and (b) to track a square wave generated by LabView via the I/O card. Compare the performance of the analog PID controller with your previous PID controllers.