

October 25, 2017

Modeling of the Embedded Control System

Introduction

The final project in this class will be for the team of students to implement an embedded control system on a Xilinx SOC platform. This semester the students are given the choice to implement a control system that it is of interest to them. The next step is to model the controller and the plant together. The model will be used in MATLAB simulations to be able to tune controller parameters together with the plant without actually building the embedded control system.

Requirements for the project

The system to be controlled will consist of at most one state variable, i.e. the controller to be implemented in the embedded system will be able to control (and measure) one variable, as shown in Figure 1.

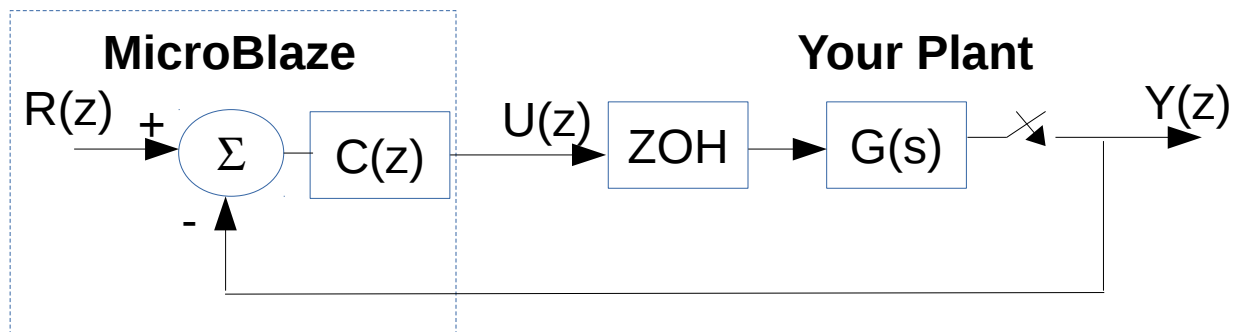


Figure 1. Embedded Control System

Deliverables

Write a report (use as many pages as needed) describing as detailed as possible the embedded control system you and your team is planning to implement. Items to consider would be:

- The modeling of the components in your system.
- Type of controller you will need, i.e. PI, PD, PID
- The methodology you will use to check stability and find the (optimal or suboptimal) controller parameters, i.e. Root Locus, Nyquist, Bode, Empirical tuning, etc.
- Strategy on the implementation of the controller, i.e. design of analog controller and mapping to the discrete domain, direct z-domain design, frequency design, direct control design, finite settling time design, etc.