High and low level programming of a control system

Description

The purpose of this project is to program a new control system for electric drives and power electronics applications.

Requirements

A new control system is being developed at the institute. The building blocks of the system are the TMDEVM6678, an Evaluation Module from Texas Instruments, an in house designed and built FPGA board, ADC board, DAC board, and a fiber optic board for sending PWM signals. The FPGA board reads data from the ADC and sends it to the main board. The processor on the main board runs the control algorithm and calculates the required output voltage and sends it to the FPGA. The FPGA then sends the required signals to the fiber optic board. Fast communications with short latency between the FPGA and main board is highly desired.

The main tasks of the student will be:
- Read the available documentation and familiarize self with an old version of the system
- Read the available documentation on the newly designed system
- Program the FPGA to do the main tasks (ADC, DAC, PWM…)
- Program the communication between the FPGA and the processor on the main board
- Program and test a simple control algorithm
- Documentation of the system configurations and testing codes.

Prerequisites:
- Courses on control systems, electrical drives and power electronics
- Programming in C and VHDL
- Hardware experience is a plus

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