PmodCON3™ Reference Project

Overview

This document describes the VHDL implementation of the Digilent PmodCON3 Reference Project. The project instantiates a Digilent PmodCON3 Reference Component which controls the pins to drive four servo motors. The orientation of each servo motor can be set from a couple of buttons, one for moving it to the left and the other one for moving it to the right. Only one servo can be positioned at one time. The channel for the current servo is selected from another button. The seven-segment display shows the channel number and the pulse width value of the signal used to drive the corresponding servo.

Functional Description

The project instantiates a Digilent PmodCON3 Reference Component (Con3RefComp). For details about this component, see the CON3 Reference Component and the source file comments.

A modified seven-segment display controller is used: the most significant digit is used to display the current channel, and the two least significant digits are used to display the hex value of the pulse width. The second most significant digit is used to display a dash between the channel number and the pulse width value for the displayed channel.

The 50MHz clock is pre-divided to 23.84Hz, which is the clock signal for increasing and decreasing the pulse width. Two signals coming from two buttons (btnCntUp, btnCntDown) are used for respective count directions. btnCntUp has priority over btnCntDown. The maximum value for the pulse width is 3ms, so the counter will not increase its value over x" 96"or 150 decimal value, as the counter has a resolution of 20μs.

The servo motors are positioned one at a time. A button push increases the current channel number, displayed on the seven-segment display. On the rightmost digits, the actual pulse width value for the selected channel is shown.

Project Setup

Build a new VHDL project and add the provided source files. Set the project properties according to the target Digilent FPGA system board. Choose a connector on the system board for the PmodCon3. Build a .ucf file to assign signals to pins as follows and compile the project:

ck	system clock (50MHz)
btnCntUp	a button to rise Duty Factor
btnCntDown	a button to lower Duty Factor
btnChannel	a button to select the channel
pinCtrlA	Channel A control pin
pinCtrlB	Channel B control pin
pinCtrlC	Channel C control pin
pinCtrlD	Channel D control pin
seg	segment outputs
an	anode select signals

Connect the PmodCON3 to the servo motors and to the system board. Connect the programming cable. Supply the PmodCON3 and the system board. Configure the FPGA. Press buttons to change the selected channel and the position of the current servo motor.