Set of peripherals for Digilent Inc. boards

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Overview

This document only describes the modules operation for the components included in this project. You can get more information in the README.md files available in some directories.

The components are common designs to use with the peripherals included in low range Digilent boards like Basys and Nesys. The modules interface is ready to be easily connected as peripheral to microcontrollers. For this purpose has been added to the project some examples of use with the Picoblaze microcontroller.

The components definitions in package *digilent_peripherals_pk* are the following:

- Inputs buttons synchronizer
- Switches controller, two versions, 8 bits and 16 bits
- Display controller, two versions, 16 bits and 32 bits.
- Leds out controller

Functional description

All peripherals are very similar and easy to use. Each peripheral contains an internal register to store the input or output data and a signal enable ready to be used as the peripheral selection signal. The figures and the tables details the signal and its behavior.

The Nexsys5 board has two 4-digit 7-segment displays, for this board a new version of display controller is available in file `port_display32_dig.vhd`.

For more info about how to use it, you can see the examples included with this mini-project.

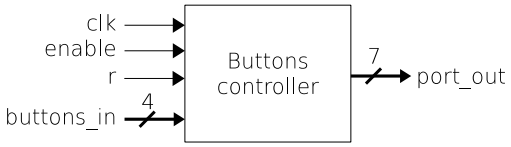

Figure 1: Buttons controller

enable	r	Operation
0	-	-
1	1	internal_reg[7:0] ← ”0000” & digit_in[3:0]

Table 1: Buttons controller signals behavior

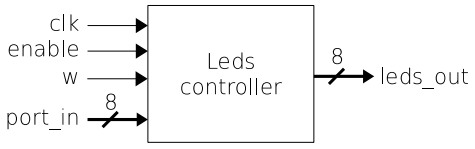

Figure 2: Leds controller

enable	r	Operation
0	-	-
1	1	internal_reg ← port_in

Table 2: Leds controller signals behavior

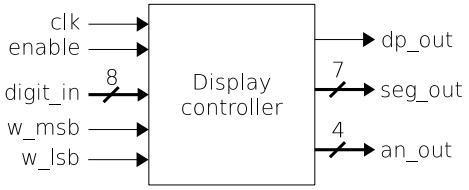

Figure 3: Display controller

enable	w_msb	w_lsb	Operation
0	-	-	-
1	0	1	lsb_reg ← digit_in
1	1	0	msb_reg ← digit_in

Table 3: Display controller signals behavior

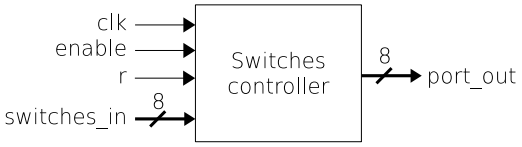

Figure 4: Switches controller

enable	r	Operation
0	-	-
1	1	internal_reg ← switches_in

Table 4: Switches controller signals behavior

The 32 bits display controller has 8+1 bit input, the display point is loaded using a extra wire. The controller acts like a 4x9 bits memory and the signal `byte_sel` is used to select the word where the data is written.

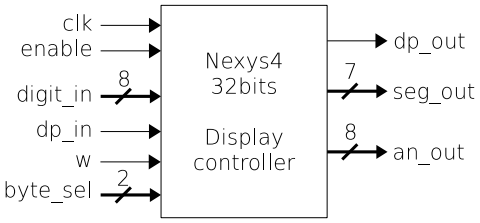

Figure 5: 32 bits display controller

enable	w	Operation
0	-	-
1	1	digit(byte_sel) ← digit_in dp(byte_sel) ← dp_in

Table 5: 32 bits display controller signals behavior

About Picoblaze peripheral examples

See README.md file included in *examples* directory