Digital Utility Example Project
1.10

Features

- A Basic Counter is used to count the falling edge events from a digital pin.
- A Digital Comparator component is used to reset the Basic Counter.
- A Digital Constant component provides one value for the Digital Comparator.
- An Edge Detector component allows falling edges to produce a single pulse for the “en” input of the Basic Counter.

General Description

This example project demonstrates the usage of the Basic Counter component, the Digital Comparator component, the Digital Constant component, the Edge Detector component and the Debouncer component. A simple design utilizing these components is presented. The design takes a button press from a mechanical switch and utilizes these components to make a Mod 7 counter. The counter value is displayed on an LCD.

Development kit configuration

1. This project is written for a 2X16 LCD display as the one available in the Cypress kit CY8CKIT-001.
2. Build the project and program the hex file on to CY8C3866AXI-040 using MiniProg3.
3. Connect pins as described below and power cycle the device.
4. Press the SW1 button, and observe the count on the LCD.

Project configuration

The project consists of a Basic Counter, a Digital Comparator, a Digital Constant, an Edge Detector, a Pin, a Status Register, a Debouncer and a Char LCD component. The top design schematic is shown in Figure 1.

Digital Utility Components example project

This example project demonstrates the usage of five of the Digital Utility components:
Basic Counter, Digital Comparator, Digital Constant, and Edge Detector and Debouncer.

The project counts the rising edges on pin P1_6, resetting the counter whenever it gets to 7.

The Basic Counter has a level-sensitive enable. In order to count edges, P1_6 is connected to a "Falling Edge" Edge Detector. This produces a one cycle pulse on the en input of the Basic Counter, incrementing the count value by one on every falling edge on P1_6.

The cnt bus terminal of the Basic Counter is connected to a status register, as well as to a Digital Comparator. This causes the count value to be reset to 0 one cycle after the value reaches 7.

Development kit configuration

1. This project is pre-configured to run on the CY8CKIT-001 PSoC Development Kit (DVK) hardware platform but can be easily re-configured to suit other target hardware.

2. Set LCD power jumper J12 to ON position.

3. Connect P1[6] to SW1 on the Dev kit.

4. Build the project and program the hex file on to PSoC device using MiniProg3.

5. Press the SW1 button and observe the counter value printed to the LCD. The value displayed will count from 0 to 6 at each press. It will then reset at the 7th button press.

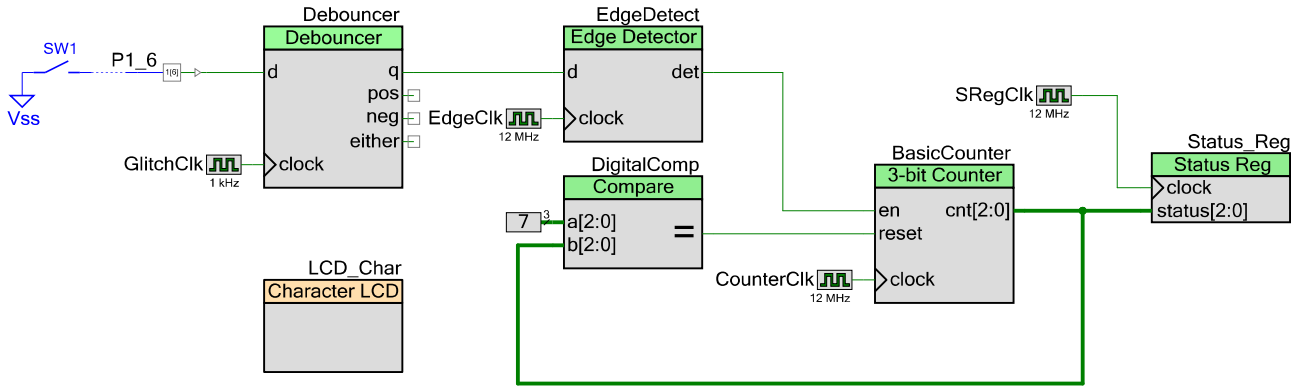

Figure 1. Top design schematic.

The Character LCD, Status Register, and Digital Input Pin components are configured to their default configurations. The signal from the button press captured via P1_6, goes through a Debouncer circuit before being passed to the Edge Detect circuit. This is to avoid the glitching that occur in mechanical switches. P1_6 is connected to pin P1[6] on the Dev. Kit and the character LCD is connected to P2[6:0].

The Edge Detector is configured with EdgeType = “Falling Edge.” The Basic Counter is configured with Width = 3. The Digital Comparator is configured with Width = 3, and CmpType “=”. The Digital Constant is configured with Width = 3, Value = 7, and DisplayAsHex = false.

Project description

This project implements a Mod 7 counter using only UDBs. Specifically it uses only 3 PLDs and a status register. The button press from P1_6 goes through the debouncer circuit and the falling edge is captured via the Edge Detect circuit. Whenever it detects a falling edge, the 3-bit

BasicCounter will increment. The comparator will check if the counter value is equal to 7 and will generate a high signal when it has met the equality condition. This will reset the counter.

The counter value is read by the CPU in the main function through a status register. This value is then displayed on the LCD.

Expected Results

The count value will increase by one every time SW1 button is pressed. When the count value reaches 7, it will immediately reset back to 0.