NCTU-CS Digital System Lab

FPGA LAB 02

Design: Button, Knob, and Keyboard

Data Preparation

Extract LAB data from the Course Website.
The extracted LAB directory contains:
FPGA_Lab02/: top.v, top.ucf, keyboard.v

Design Description

You have to design LED with following three modes.
(A) Button Mode: (SW==0)

(B) Knob Mode: (SW==1)

(C) Keyboard Mode: (SW==2)

Button Mode (SW==0)

Control	LEDs	Operation
RESET	Initial	All LEDs are reset to **OFF**.
BTN_1	Right	Only Right half of the LEDs are ON (i.e. LED0~LED3)
BTN_2	Left	Only Left half of the LEDs are ON (i.e. LED4~LED7)
BTN_3	Shining	LEDs are shining from previous Mode to its relative 1's complement one.

NOTICE: If your finger leaves buttons, the LEDs should always keep in the current State. For example, Press BTN_3 to enter Shining state. If your finger leaves buttons, the LEDs should always keep in the Shining state.

Knob Mode (SW==1)

Control	LEDs	Operation
Clockwise	8'b10000000 8'b11000000 8'b11100000 ... 8'b11111111 8'b10000000 ...	Light the LEDs from left to right.
Counterclockwise	8'b00000001 8'b00000001 8'b00000011 ... 8'b11111111 8'b00000001 ...	Light the LEDs from right to left
ROT_CENTER	8'b11111111	All LEDs are ON.

NOTICE: When you changed from clockwise to counterclockwise, the LED will start form 8'b0000_0001.

Keyboard Mode (SW==2)

Key	LEDs
Number 1~9	Light the LEDs corresponding to the number in binary format.
Number 0	All LEDs are ON.
Others	All LEDs are OFF.

e.g.: If you press the key 9, the LED_3 and LED_0 will light.