

Key points of signal processing of Keypad

In lab 6, we will design a keypad reader using FPGA board. A keypad with eight pin points will be connected to the FPGA board. However, we found that the input signal of keypad after pushing the buttons was not stable. Therefore, the input signal need processing.

The following document records the method I use to process input signal.

Please note that any of the following method maybe omitted while the design is still feasible.

1. Ensure input signal is a stable "1" when no button is pressed
 - * suspended state: default input is a unstable "1"
 - * connect pull-up resistor so that default input becomes a stable "1" in suspended state
 - * resistor: 10k Ω
 - * adjust Pull Type to PULLUP when assign ports
2. Synchronize input signal
 - * I use input synchronization clock : 10000 Hz
3. Eliminate influence of remaining output signal
 - * set the output signal to 4'b0000, before entering a new state (the output signal will change)
4. Wait some time after output signal sends out, and then check input signal
 - * insert a blank state before entering the new state
5. Avoid input signal fading
 - * make sure the frequency of clock controlling state change is not too slow
 - * I use 1000 Hz
6. Ensure long-pressing button produces stable output number on SSD
 - * Repeat output signal (e.g. 4'b1110) until all the input signal becomes 4'b1111, which means the button is released