CS 303 Logic and Digital System Design Assigned : 05/04/2022
Laboratory Assignment #03 Preliminary work due : 10/04/2022
Sessions : 11/03–15/04

A multiway switch circuit (French: Montage va-et-vient, Turkish: vaviyen bağlantı) is used to control light sources from multiple locations, such as at the two ends and center of a long hallway. In this laboratory assignment, we would like to demonstrate the operation of a multiway switch with three control points.

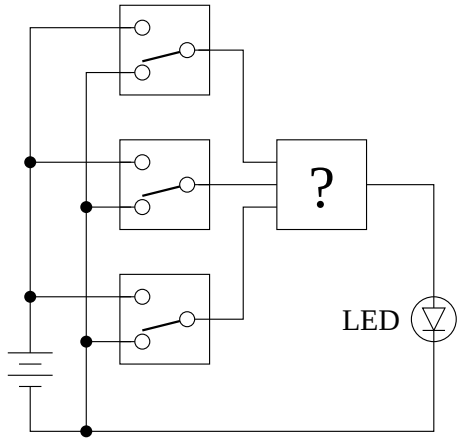

Fig. 1: A multiway switch circuit implemented using a logic component.

All three switches of the circuit shown in Fig. 1 should be capable of turning the LED on or off, independent of the others. Depending on the positions of the other two, one switch may turn the LED on when it is thrown up or down.

Part-I
Design the circuit (marked by ?) by constructing its truth table, and minimizing it (if possible) by using a Karnaugh map. Demonstrate its functionality using *Digital*. Submit your .dig file by 10/04/2022.

Part-II
Create the .v and .xdc files to demonstrate the operation of the multiway switch on the Nexys A7 board. Make sure your design is synthesizable on Vivado. Names of the relevant FPGA pins can be found at

`https://digilent.com/reference/programmable-logic/nexys-a7/reference-manual`

In-lab
During the laboratory session, you will test your circuit on the Nexys A7 board. You will be then asked to make a modification to the circuit to implement a different function. You may work in groups of two. Bring along your computer with all the software tools installed.

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