

Multiway Switching Controller Design using FPGA

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Abstract

Multiway switching has become quite frequently used in building wiring nowadays. It can be defined as an interconnection of two or more electrical switches in order to control an electrical load from more than one location. Although the electrical load is often a lamp, electrical outlets, fans, pumps, heaters or other appliances can also be controlled by multiway switching. However, in this paper we will deal only with lighting systems.

Special switches are required to implement the system (three-way and four-way switches) that have additional contacts, and extra wires must be run between them. In this way the light can be controlled from different spots, e.g. the top and bottom of stairs or the end of a long hallway.

Externally there is a resemblance between these switches and the standard single-pole ones. Extra connections make possible the control of a circuit from multiple locations. By connecting one or more four-way switches in-line, with three-way switches at either end, the light can be controlled from three or more locations. Toggling any switch changes the state of the light from off to on, or from on to off.

In this paper we would like to introduce a solution, based on FPGA for the mentioned system using HDL. The aim is to attain a high level of generalization by applying indefinite number of switches.

Keywords: Multiway switching, FPGA, controller, HDL.