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Development of an Automatic Room Population Monitor

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Abstract

The paper presents the design, construction and testing of an Automatic Room Population Monitor. It is used to determine the number of people in a room or other enclosure. It has both logistic and security applications. The design is realized using digital circuitry and light emitting diode (LED) light sources. When the light beams are broken in the entry direction, the counter increments. When broken in the exit direction, the counter decrements. The number showing on the display unit at any point in time is the number of people currently remaining in the enclosure. The design uses latches to clock the Up/Down counters in the circuit and hence determine the direction of motion. It has an alarm that produces a high tone for forward crossing (entry) and a low tone for exit, as well as LED directional indicators. For some security purposes, the alarm can be switched off. A control oscillator is used to reset the circuit after a reasonable time to prevent the circuit from responding in the event of someone crossing halfway. It also has a 'zero detector' to prevent the circuit from responding when the count is already at zero and a reset button in case the counting has to be restarted.

Keywords: *Automatic, beam, counter, clock, decoder, latch, flip-flops, monitor, oscillator, room population, sensor.*

Introduction

Counters are required for various counting applications and in all sorts of circumstances. Indeed, counters are so important in so many applications that many different kinds of counter ICs have been designed for both transistor–transistor logic (TTL) and complementary metal-oxide-semiconductor (CMOS) logic families. Some count up for clocks and time intervals; others count down to show time remaining until some event. Some are specifically designed to count in decimal mode, while others count in binary, and still others have selectable counting ranges. The list of capabilities and options is quite large.

In general, a counter is a device which stores (and sometimes displays) the number of times a particular event or process has occurred, often in relationship to a clock signal. In electronics, a counter is a digital circuit that consists of 'n' flip-flops, connected in cascade, whose function is to count the number of pulses applied to its input terminals. Counter circuits are digital in nature and can be implemented quite easily using flip-flops.

Counting applications allow digital monitoring, numbering, recording and control of things, even people as in the case of this design.

This room population monitor uses a counting device for well-organized human traffics. It is designed to count the number of people passing through a specific point. The design involves the application of light. The set-up monitors both forward and backward movement. This results into bi-directional or up-down capability of the counter which is connected to a display panel to show the count. The design logically discourages error count.

This device has application at train terminals, religious buildings, banks, schools and other public places. It solves the problem of getting the number of people in a room.

The device also has both logistic and security applications. For logistics, it can be used to determine the number of people in a conference, seminar or other formal gathering so that the number of conference materials