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ENTRY AND EXIT COUNTER THROUGH A SINGLE DOOR WITHOUT USING MICRO-CONTROLLER –Software Simulation

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ABSTRACT: This is a circuit which senses the number of persons entering and leaving a room through a single door and hence we can count the number of persons inside the room. Apparently it seems to be very simple but it has a very important application. The main idea of the device will be to deliver the corresponding outputs on reading the inputs from the various sensors fitted just outside the door on a seven segment display using a mechanism stated below. This circuit can be used in shopping malls or in large buildings to calculate the number of persons inside the building so that the rescue team can rescue all the victims if any disaster comes.

INDEX TERMS: Monostable multivibrator[2], multiplexer[1], binary counter[3].

M.en – monostable entry
M.ex – monostable exit
T.on – Time period on
T.off – Time period off

INTRODUCTION: Every person has a strong desire to survive in this world as long as possible to enjoy the taste and joy of life. No one wants to die helplessly. But anybody cannot predict about the disaster whether they are manmade or natural. But they can surely be saved from these disasters. For example, when a severe fire breaks out in a shopping mall or in a large building where there is a large number of people inside the building, it is very difficult for the rescue team to know how many people are inside the building. The
Team saves those who are in the vicinity but the rest; die helplessly because the rescue team cannot find them. But if we use this circuit in the main gate of the building, then we can easily get an idea about the number of victims trapped inside the building and try to save them.

PROPOSED WORK: First we are using two sensors, a* and b*. 'a*' is fitted just outside the door, b* is fitted inside the door. So during entry the condition will be

a*	b*
0	0
1	0
1	1
0	1
0	0

This is the condition for full entry. If this condition is fully satisfied then entry counter will count one pulse. Similarly for exit condition

a*	b*
0	0
0	1
1	1
1	0
0	0

For this condition exit counter will count one pulse.

This circuit also takes into account certain error conditions, such as if any person stands near the door but does not enter, or if a person tries to enter but on last minute changes his mind etc. , in such cases sensor a* is 1 but sensor b* remains 0, so no counting is done.

CIRCUIT OPERATION

ENTRY CONDITION:

a*	b*
0	0
1	0
1	1
0	1
0	0

At '0 0' condition

Both monostables are reset. The circuit is ready for counting an entry or exit.

At '1 0' condition

Monostable[2] 'M.en' is triggered with negative trigger. M.en's T.on pulse starts. That goes to select line of entry MUX. So entry MUX's select line has 1, thus it will select data input D1 (1B in diagram), this D1 is attached to b*--but b* is 0 now.

monostable 'M.ex' is getting high voltage at negative trigger trigger, so it is not triggered. Hence, exit MUX (u3) is getting 0 in select line, thus selecting D0(1A) in

diagram. D0 is connected to 0V. So, exit counter will not count.

At '1 1' condition

#M.en 's o/p is still 1. Still D1 is selected. D1 is connected with b*. So as b* is 1 now, entry counter will count 1.

monostable 'M.ex' is getting high voltage at negative trigger trigger, so it is not triggered. Hence, exit MUX[1] (u3) is getting 0 in select line, thus selecting D0(1A) in diagram. D0 is connected to 0V. So, exit counter will not count.

At '0 1' condition

#entry counter is unaffected after previous result.

monostable 'M.ex' is triggered with negative trigger. M.ex's T.on pulse starts. That goes to select line of exit MUX. So exit MUX's select line has 1, thus it will select data input D1 (1B in diagram), this D1 is attached to a*--but a* is 0 now. So exit counter won't count.

At '0 0' condition

#monostables are reset. Their output pulses are forced to T.off condition. So that, as soon as one entry or exit is complete the circuit is ready for another entry or exit.

HALF ENTRY CONDITION—Suppose a man goes to enter through a door but before completing his entry changes his mind. In that case too this circuit will **not malfunction**.
In that case we will have such a condition

a*	b*
0	0
1	0
0	0

For such a case entry counter will not count anything.

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EXIT CONDITION:

a*	b*
0	0
0	1
1	1
1	0
0	0

At '0 0' condition

#both monostables are reset. The circuit is ready for counting an entry or exit.

At '1 0' condition

#monostable 'M.ex' is triggered with negative trigger. M.ex's T.on pulse starts. That goes to select line of exit MUX. So exit MUX's select line has 1, thus it will select data input D1 (1B in diagram), this D1 is attached to a*--but a* is 0 now.

monostable 'M.en' is getting high voltage at negative trigger trigger, so it is not triggered. Hence, entry MUX (u3) is getting 0 in select line, thus selecting D0(1A) in diagram. D0 is connected to 0V. So, entry counter will not count.

At '1 1' condition

#M.ex's o/p is still 1. Still D1 is selected. D1 is connected with a*. So as a* is 1 now, exit counter will count 1.

monostable 'M.en' is getting high voltage at negative trigger trigger, so it is not triggered. Hence, entry MUX (u3) is getting 0 in select line, thus selecting D0(1A) in diagram. D0 is connected to 0V. So, entry counter will not count.

At '0 1' condition

#exit counter is unaffected after previous result.

monostable 'M.en' is triggered with negative trigger. M.en's T.on pulse starts. That goes to select line of entry MUX. So entry MUX's select line has 1, thus it will select data input D1 (1B in diagram), this D1 is attached to a*--but a* is 0 now. Thus entry counter **won't count**.

At '0 0' condition

#monostables are reset. Their output pulses are forced to T.off condition. So that, as soon as one entry or exit is complete the circuit is ready for another entry or exit.

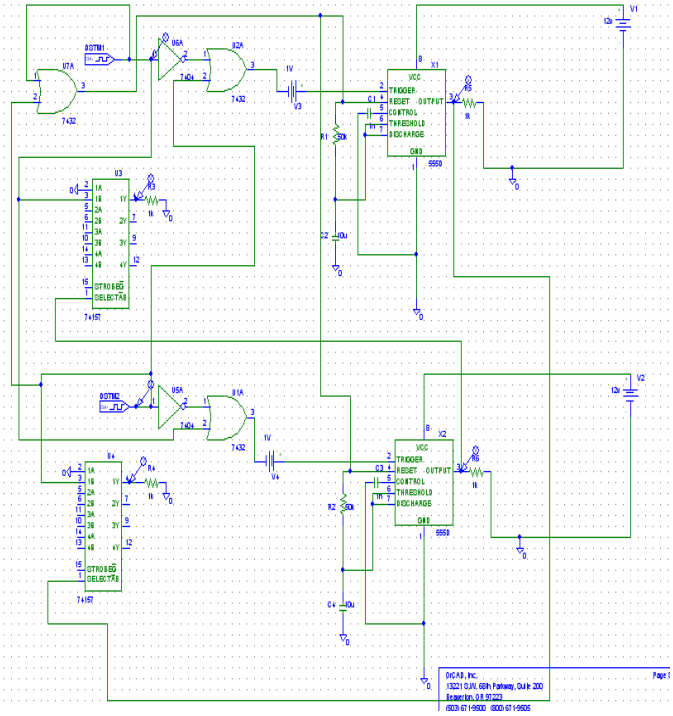
HALF EXIT CONDITION—Suppose a man goes to exit through a door but before completing his exit changes his mind. In that case too this circuit will **not malfunction**.
In that case we will have such a condition

a*	b*
0	0
0	1
0	0

For such a case exit counter will not count anything

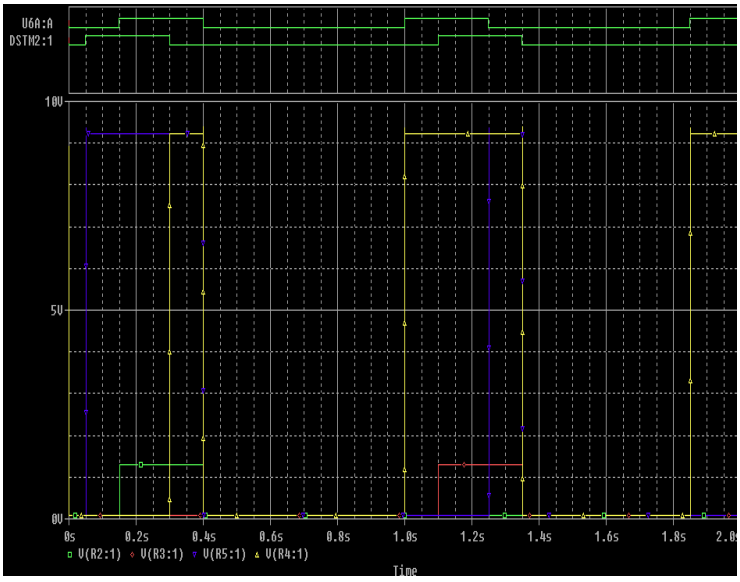
SIMULATION:

CIRCUIT DIAGRAM:



Fig(i)[4]

SIMULATION OUTPUT: Here dstm1 is a*, dstm2 is b*. u3-exit MUX's o/p is going to exit counter, u4-entry MUX's[1] o/p is going to entry counter. Upper monostable is entry monostable(M.en) ,lower monostable[2] is exit monostable (M.ex).

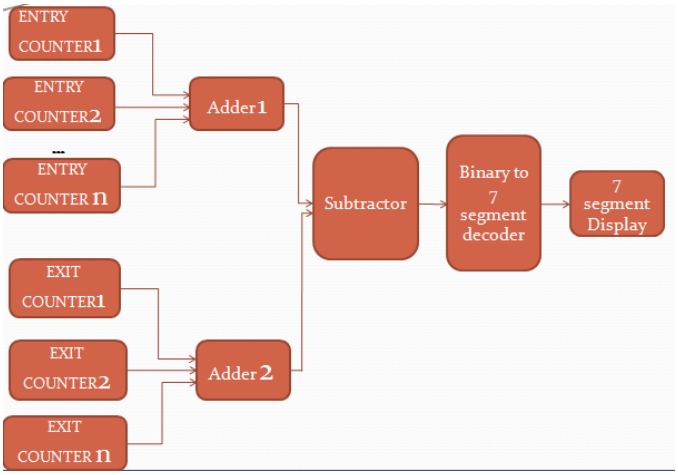


Fig(ii) [4]
U6A: A-----b*
Dstm2:1------a*
Blue line: Entry counter feed
Yellow line: Exit counter feed

MECHANISM: The outputs of all entry counters are connected to an adder circuit [5] and similarly the outputs of all exit counters [3] are connected to another adder circuit.

The difference between the outputs of the two adder circuits are connected to a master counter which gives us the ultimate result which is then shown in a seven segment display[6].

BLOCK DIAGRAM:



CONCLUSION AND FURURE WORKS:

The main concept behind this circuit is to ascertain the order of triggering when multiple transducers are present and triggered almost simultaneously. Hence find the direction of the movement concerned. This concept has been used here to differentiate between entry and exit through same door. Similarly, they can be used in future to -

*Differentiate between any such dual movements. Such as in case of animal monitoring in forests, we can determine the direction it went.

*Or to find the rate of any movement. Such as in case of water level rise we can determine the rate of its rise.

*Rate = entry MUX output – entry monostable output.

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