



**Student Name**

**UID:**

**Branch: CSE**

**Section/Group:**

**Subject Name: DIGITAL ELECTRONICS**

## AIM



Design a logical gate based system that activates a security alarm when both the lights available in a house are turned off.

**Hint: Use NOR gate.**

Design a logical gate based system that activates a security alarm when both the doors of a showroom are locked

**Hint: Use NAND gate.**

## Task to be done

-  *Design a logical gate based system that activates a security alarm when both the lights available in a house are turned off.*
-  *Design a logical gate based system that activates a security alarm when both the doors of a showroom are locked*

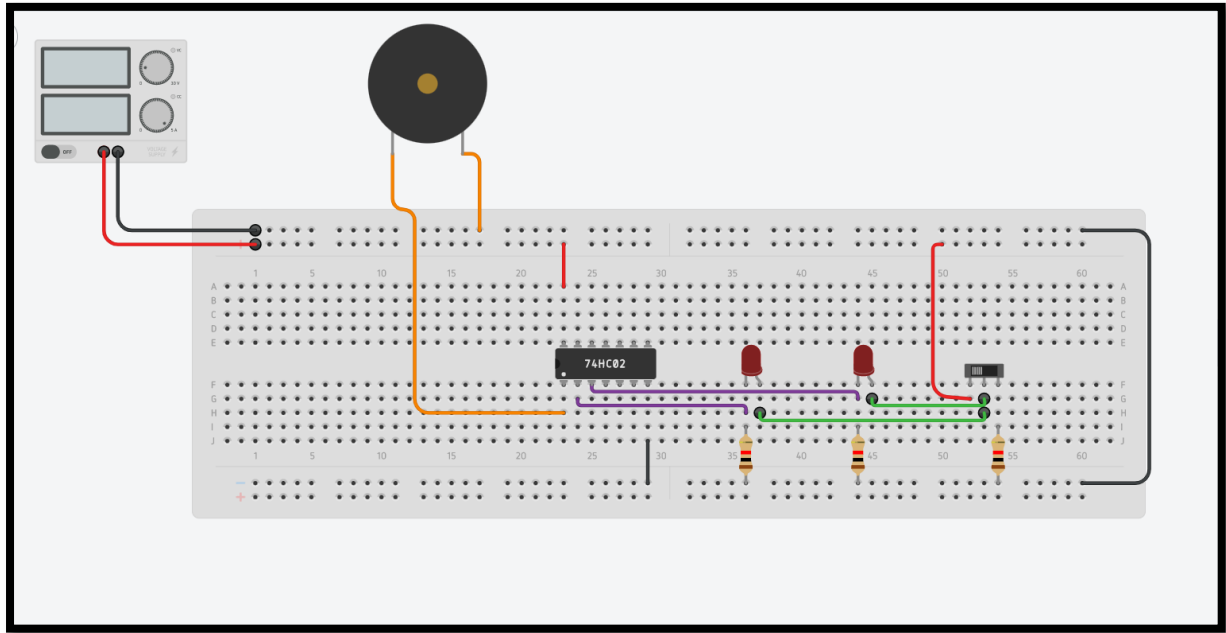
Design a logical gate based system that activates a security alarm when both the lights available in a house are turned off.

## ❖ Requirements

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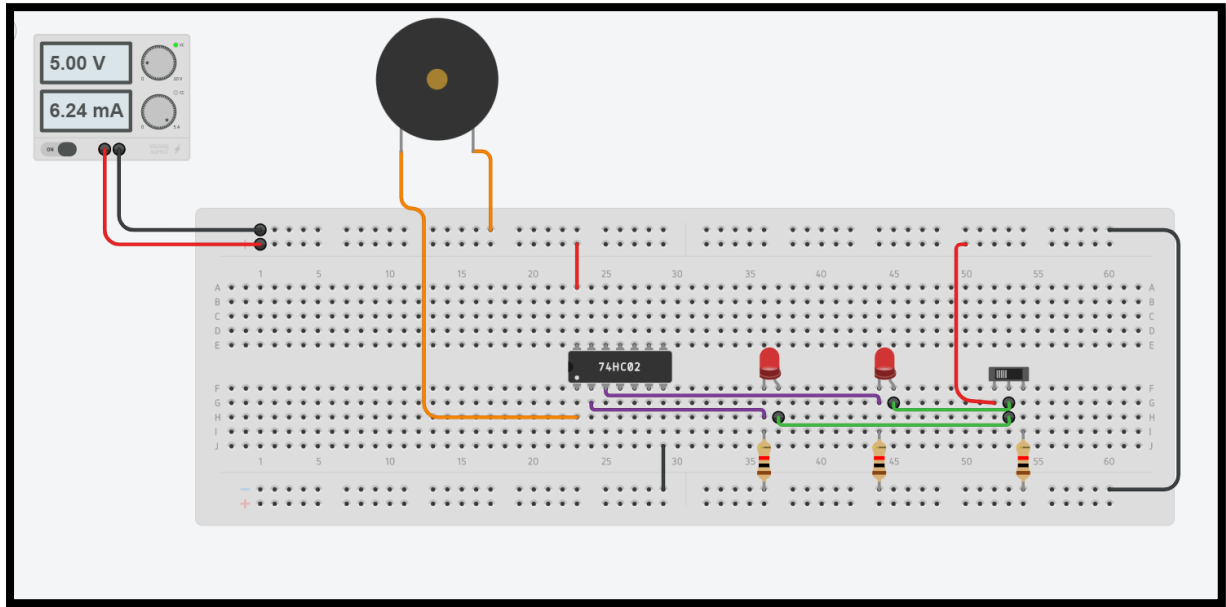
QUAD NOR GATE , LED , RESISTOR , SLIDESWITCH , POWER SUPPLY , PIEZO , BREADBOARD

## ❖ Circuit diagram/ Block diagram

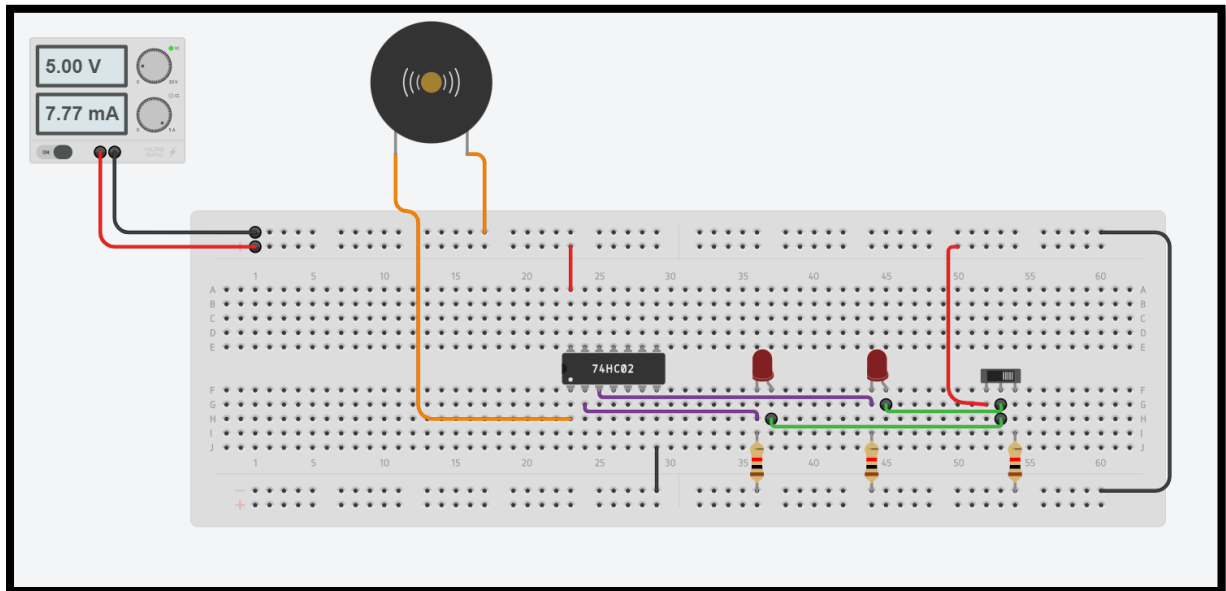


## ❖ Simulation Results:

WHEN THE SLIDEWITCH IS OFF



WHEN THE SLIDESWITCH IS ON



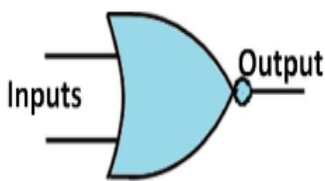
❖ Concept used

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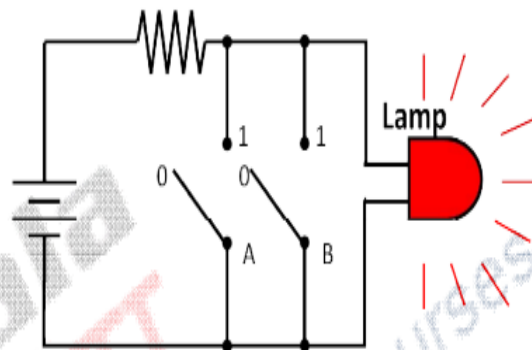
The alarm will sound when any one or all of the door-mounted normally closed (NC) push button switches are released (closed) by a door opening.

The bubble at the output of the gate suggests that the alarm is activated when the output of the gate is LOW (*active-low output*). An OR gate is equivalent to a bubbled NAND gate. The *buffer* is required to provide extra current to drive the alarm circuit.

NOR gate is combination of OR and NOT gates. The NOR gate provides OR function with inverted output shows the logic symbol and truth table of two input NOR gate along with simple implementation using switches. The output of a NOR gate is a logic '1' when all its inputs are logic '0'. For all other input combinations, the output is a logic '0'. NOR gate operation is logically expressed as  $Y = \overline{A + B}$



(a)



(b)

Input A (Switch)	Input B (Switch)	Output Y (Lamp)
0 (Open)	0 (Open)	1 (ON)
0 (Open)	1 (Closed)	0 (OFF)
1 (Closed)	0 (Open)	0 (OFF)
1 (Closed)	1 (Closed)	0 (OFF)

The NOR gate produces a logic 0, if either one or both the inputs are at logic 1 else the output is at logic 0.

NOR gate can be implemented using switches. Let us now consider an electronic circuit consisting of Battery, Resistor, Switches and Lamp to explain



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the NOR function. If any one or both the switches are Closed (logic '1') then lamp will be OFF (logic '0'). If both the switches are open (logic '0') then the lamp is ON (logic '1'). The NOR produces a 0, if either one or both the inputs are at logic 1 else the output is at logic 0. The truth table may be extended to any number of inputs.

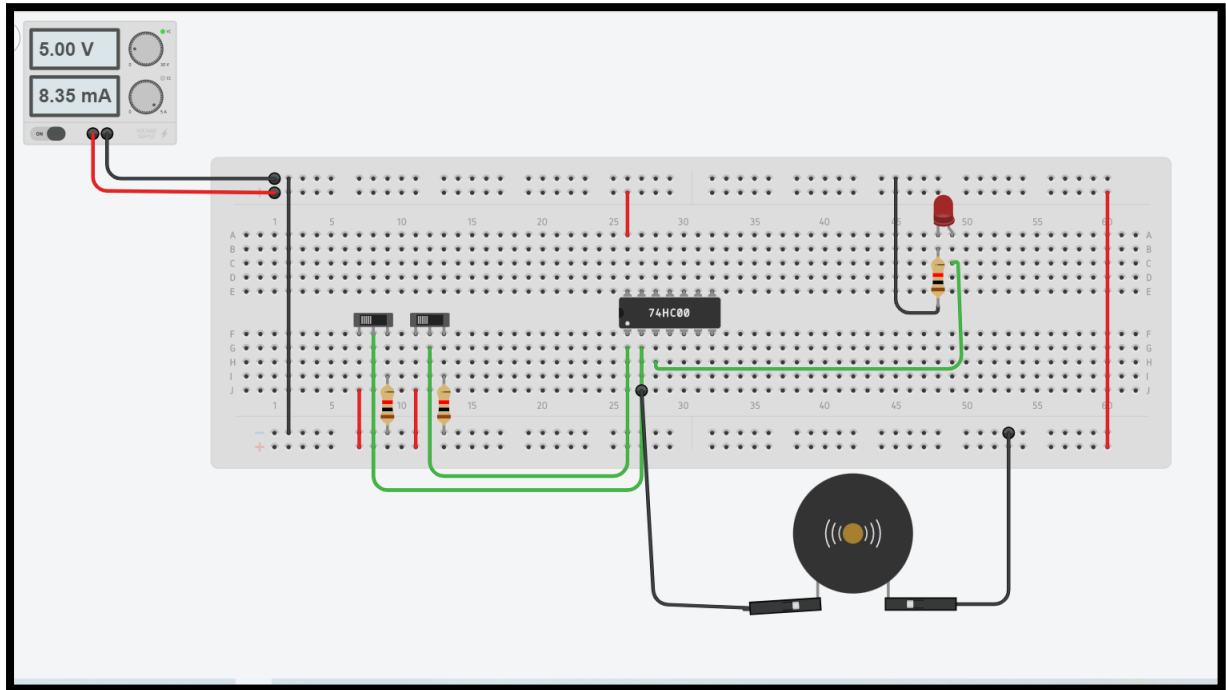
Design a logical gate based system that activates a security alarm when both the doors of a showroom are locked

## ❖ Requirements

*BREADBOARD , SLIDESWITCH , QUAD NAND GATE , LED , RESISTOR ,  
POWER SUPPLY , PIEZO*

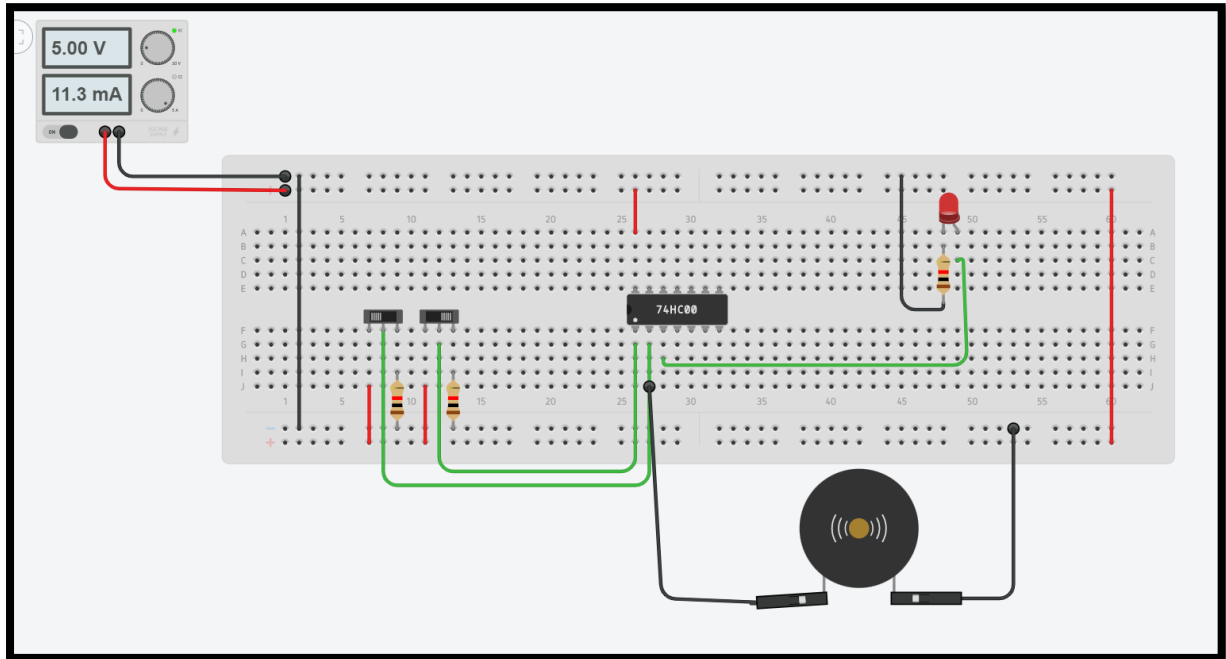
## ❖ Circuit diagram/ Block diagram

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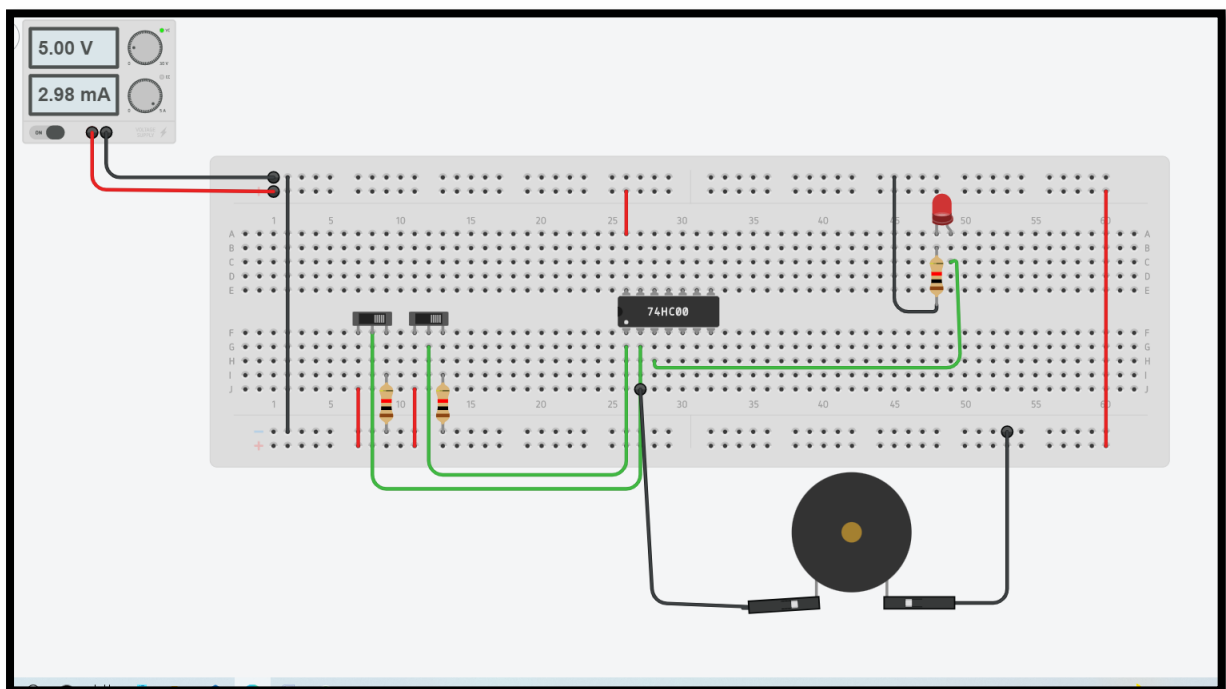


## ❖ Simulation Results:

**WHEN ONE SLIDESWITCH IS ON AND OTHER ONE IS OFF**



**WHEN BOTH OF THE SLIDESWITCH IS ON**



❖ **Concept used**

The basic building block of this circuit is CD4011 along with some other components viz. resistors, capacitor along with transistor and relay which is

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used to save your important things from robbery with the help of this easy circuit. It produces a warning beep, when someone tries to unlock the lock as an effect of its wire loop will split and alarm is produced.

To get familiar with the working, you should get aware with the NAND gate truth table which is shown below –

Input		Output
A	B	$Y = \overline{A.B}$
0	0	1
0	1	1
1	0	1
1	1	0

When any of the input states or both the input states go to the low state in the NAND gate, then the output will be high and if both the inputs are at high state, then the output will be low in that case.

## Learning/ observation

**Logic gates are the basic elements in digital world. In the previous article we have learnt about basic logic gates. These basic gates can be constructed from the universal gates. There are two universal gates in the digital logic. They are NAND gate and NOR gate.**

**If these gates are fabricated properly other basic gates can be constructed easily. For this reason they are called universal gates. As they are easy to fabricate and economical ,these gates are popularly used.**

## Troubleshooting

NA