

DIGITAL LOGIC DESIGN

MAKING OF DIGITAL WATCH



Submitted To:

Miss Anam Iftikhar.

Submitted By:

Anns Shahzad (2019-CS-601).

Ammar Yasir (2019-CS-604).

M. Hassan Ijaz (2019-CS-617).

Abdul Subhan (2019-CS-646).

Department of Computer Science
University of Engineering and Technology
(New Campus), Lahore.

Making of Digital Watch

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MAKING OF DIGITAL WATCH

Abstract:

In the past, people used sand to count time. Some used the shadows of objects made due to the light of sun in order to check the time. That was very long time ago. Then, analog clock took birth and the ability to keep a track of time increased. With the increasing technological inventions, **DIGITAL WATCH** was invented. The first **digital electronic watch**, a Pulsar **LED** prototype in 1970, was developed jointly by **Hamilton Watch Company** and **Electro-Data**, founded by **George H. Thiess**.

Introduction:

The digital watch will be made by using the **Proteous 8 Professional**. The different logic gates containing different number of inputs will be used. Also, different IC's will be used. LEDs will be used in making of digital watch along with digital 7-seg BCD. Logic state buttons and grounding terminals will be used in making of this project. The final form of our project will give us a digital clock that will work just like any other digital clocks.

time is updated on a per second basis or on a per minute basis. This program is nothing more than a wrapper around the d-clock widget not associated with any particular widget set. All the components are placed on the **proteus professional 8** and connected with each other in such a way to take the results as a digital watch. We used these components and built up a Digital Watch which shows the time accurately i.e., Hours, Minutes and seconds. The digital watch is a very beneficial in our daily life that tells the exact time than analog watches.

List of the Components:

The components used in building the Digital Watch on Proteus Professional are as follow:

- AND Gate
- NOT Gate
- IC 74192
- 7-Segment BCD
- SW-SPDT (Single Pole Double Throw)
- LEDs
- DCLOCK
- Ground Terminal
- Power

Explanation of the Circuit Diagram:

We took six 7-segment BCDs and 4 AND Gates and a NOT Gate and IC 74192 and LEDs and DCLOCK SW-SPDT and 4 Ground Terminals and place them on the sheet. Firstly, we connected the six 7-Segment BCDs with the 6 ICs 74192 by using wires on the positions 7,6,2,3 i-e two 7-segment BCDs are connected with two ICs 74192 and both ICs are also connected with each other. 4 LEDs are connected with each other and a DCLOCK is connected with them. The inputs of the 2 AND Gates on the right side are connected with the wires that connects the 7-Segment BCDs and ICs 74192 on the right side and the 2 AND gates on the Left side from which the both inputs of the 1 AND Gate are connected with the wires that connects of the left side 7-seg BCD and ICs 74192 and the output is connected as the 1 input of the 2 AND gate and the other input is also connected with the wire to which 1 AND Gate inputs are connected and the outputs of other AND gates are connected with the Inputs of the ICs 74192 as you can see in the circuit diagram below.

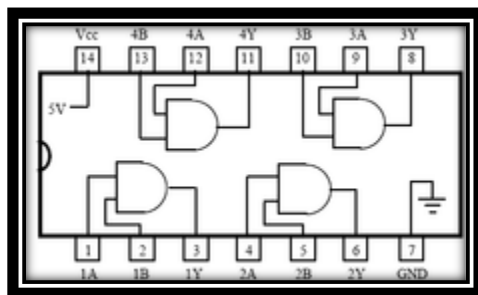
Power is connected to the ICs to provide the power to the ICs separately. While working on large circuit using direct connection between different components of circuit result in many wire cluttering. The power symbol is very useful to give direct voltages to the circuit. All the circuit is grounded using the ground terminals. DCLOCK are used to display the time in digital format which is connected in the circuit. The NOT Gate is connected with the left 2 ICs and the SW-SPDT switch is connected with the ICs to take one inputs and give 2 outputs and DCLOCKS are connected with one output of SW-SPDT and the other output is connected with the next IC 74192.

Components description:

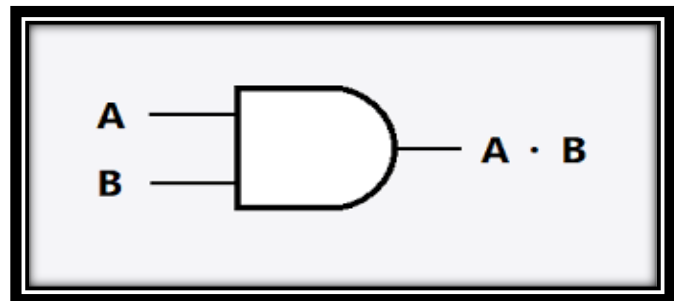
AND Gate:

The IC number of AND Gate is 74LS08. This IC consist of four AND gates which work together. The AND gate perform logical AND operation. Logic gates come in form of ICs. The all four AND gates are independent. Each gate has three pins two inputs and one output. An AND Gate Is a Digital logic Gate with two or more inputs and one output that performs logical conjunction. The output of AND is **true** only when all inputs are **true**. If one or more of an AND Gate's input are **false**, then the output of the AND gate is **false**.

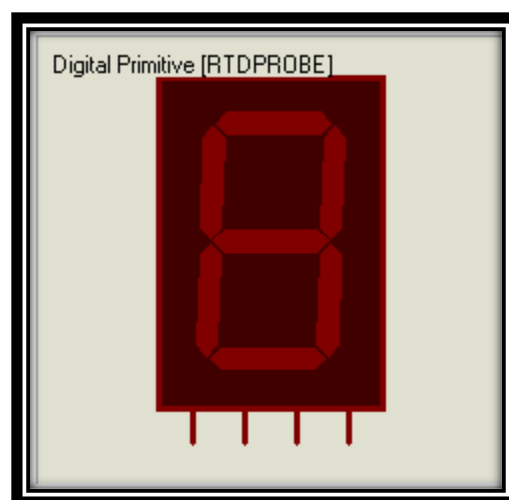
7-Segment BCD:



A

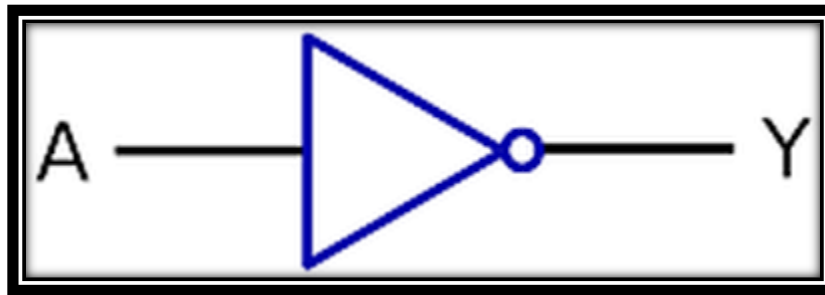


seven-segment display is an electronic display device for displaying decimal numerals. Seven-segment displays are widely used in digital clocks, electronic meters and other electronic devices that display numerical information. A 7 Segment LED display generally has 8 input connections, one for each LED segment and one that acts as a common terminal. A BCD to Seven Segment decoder is a combinational logic circuit that accepts a decimal digit in BCD (input) and generates appropriate outputs for the segments to display the input decimal digit.

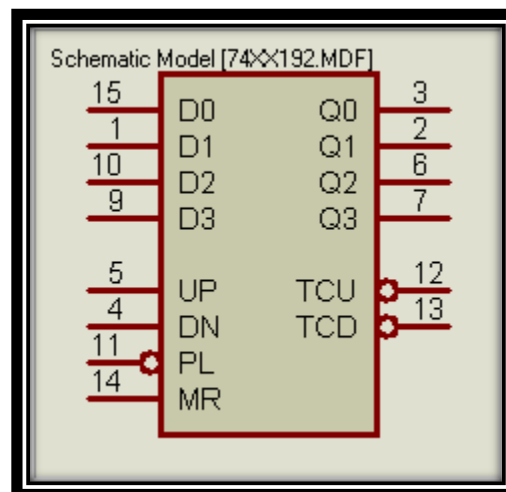


NOT Gate:

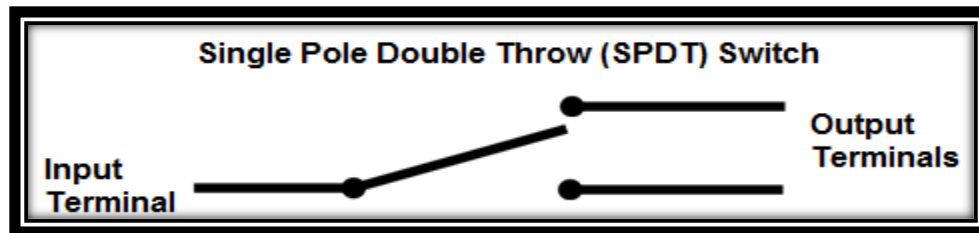
The IC number of NOT Gate is 74LS04. A NOT gate, often called an inverter. This is a digital logic gate to start with because it has only a single input with simple behaviour. A NOT gate performs logical negation on its input. In other words, if the input is true, then the output will be false. Similarly, a false input result in a true output. The symbol of NOT operation is bar ____.

**IC 74192:**

The 74192 is a presentable synchronous BCD 4-Bit up/down decade counter. Presenting the counter to the number on the present data inputs is accomplished by a LOW asynchronous parallel load input. The counter is incremented on the low to high transaction of the up input (and a high level CLOCK- DOWN) and decremented on the low to high transaction of the DOWN input. A counter would be considered standard logic when a discrete IC is used.

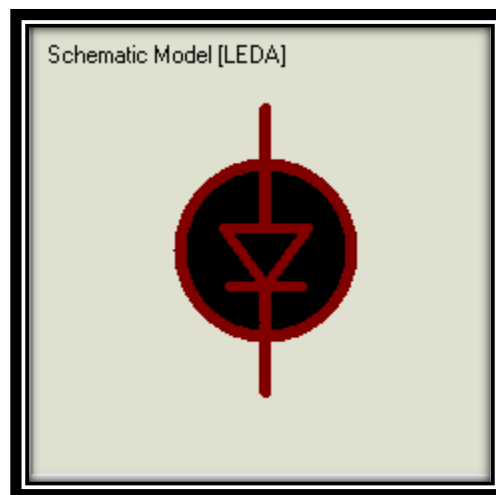
**SW-SPDT:**

SPDT is a three terminal switch, only one is used as input other two are as output. Therefore, we get two outputs, one from COM and A and second is from COM and B, but only one at a time. Mainly it is used in three-way circuit to turn **ON/OFF** an electrical appliance from two location. A Single Pole Double Throw switch can serve a variety of functions in a circuit. It can serve as an on-off switch, depending on how the circuit is wired. Or it can serve to connect circuits to any 2 various paths that a circuit may need to function in.



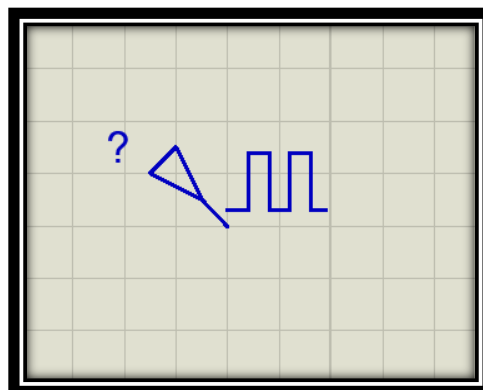
LED:

The “**Light Emitting Diode**” or LED as it is more commonly called, is basically just a specialized type of diode as they have very similar electrical characteristics to a PN junction diode. This means that an LED will pass current in its forward direction but block the flow of current in the reverse direction.



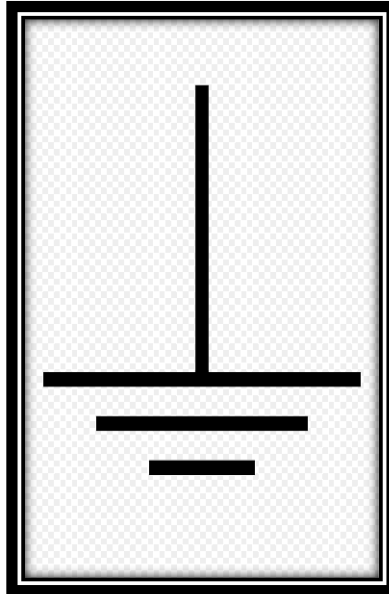
DCLOCK:

The **DCLOCK** program displays the time in digital format only. The time is updated on a per second basis or on a per minute basis. This program is nothing more than a wrapper around the d-clock widget not associated with any particular widget set.



GROUND:

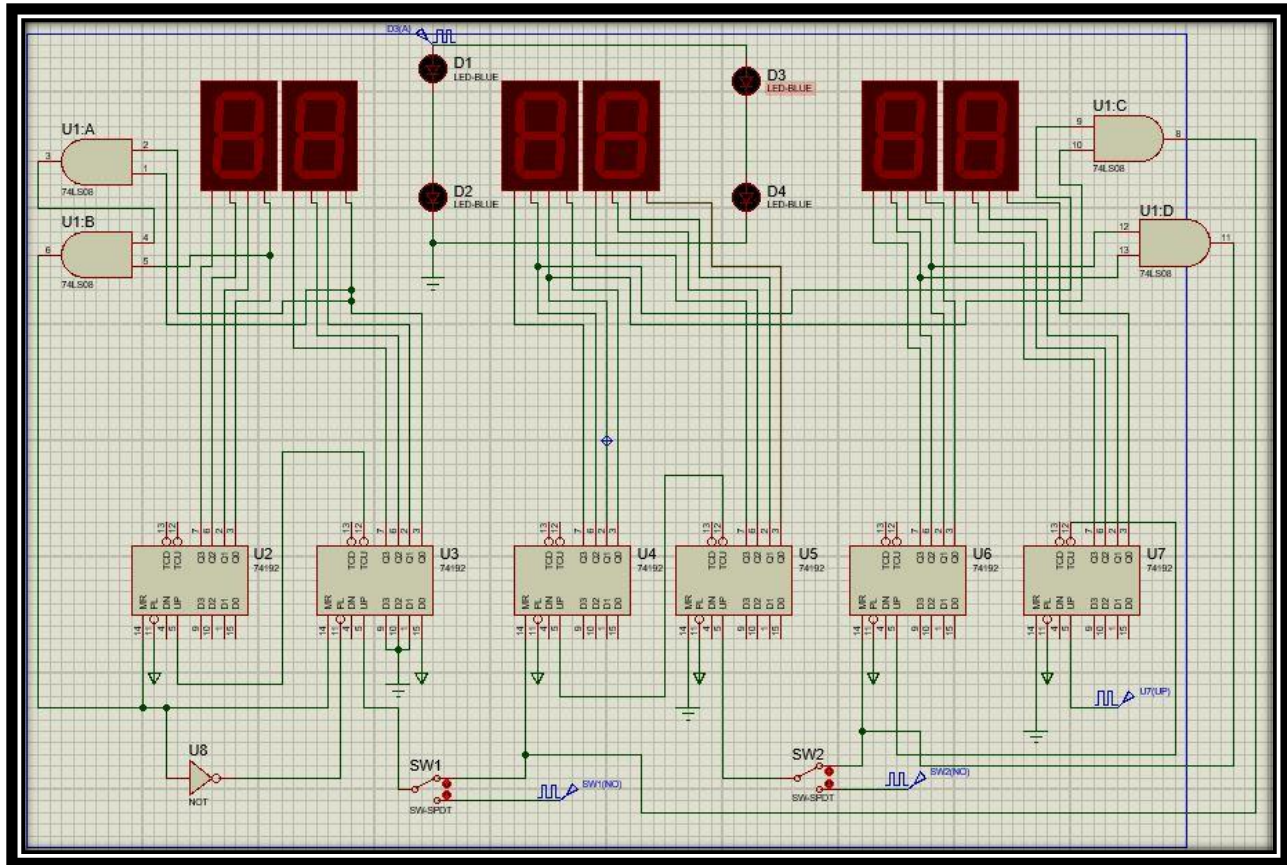
Most schematic Diagram use **ground** symbols instead of a line to show the path by which current returns to the battery. You can also use the voltage source symbol to refer to negative voltage. In that case, the **ground** actually carries positive voltage back to the source.

**Advantages:**

Following are the some advantages to us, students, who are making this project and implementing it:

- ***Exact Time:*** The biggest advantage of digital watch is too able to know the exact time.
- ***Accuracy:*** It can give time accurately and very easily at once glance.
- ***Practical Advantage:***
 - By making this we will get the first-hand experience and get to know the working of circuits.
 - Having more clear concepts on the circuits and ICS.
 - Identification of electronic components will be rather easy.
 - These concepts and working on ICS Gates and Circuits will help us in further Circuits designing

Project Implementation on Proteus:



Applications:

Digital watches are used in many places in our daily life such as;

- Stadiums (during matches)
- In Houses.
- In Mosques
- By sportsmen/women
- Used for monitoring heart rate.
- For tracking time.