Digital Clock

08.12.2021

Adeen Atif (22999) | Nada Waqar (22849)
Section: 5050
Bachelors of Science in Computer Science
Institute of Business Administration

Introduction

Digital clocks will display the time in a specific number, meaning that you can tell right by looking at the clock that it is a certain time. Everywhere you look, you'll find digital clocks around you. From your computer's desktop to the screen outside of the local bank, you will be able to see the time clearly and easily using this particular method. The fact that digital clocks are also much easier to see makes them a better choice than their more traditional cousin.

Project Goals / Objectives

1. To build a functional digital clock on our breadboard.
2. The 7 segment display is successfully able to display time in hours, minutes, and seconds format, as a conventional digital clock would.
3. The digital clock has an accurate time base, as a conventional digital clock would.
4. Our digital clock is successfully powered up with a 9V power supply.

Components Used

- 555 Timer
- IC 4026
- IC 7411 (Three input AND Gate)
- 7-Segment common cathode display
- 1.5uF Capacitor.
- 470 ohms and 470-kilo ohm resistors.
- 9V Battery
- Resistors
- BreadBoard

Functionality of the components used:

555 Timer:

The 555 is basically a monostable Multivibrator. The important characteristic of a Monostable Multivibrator is as long as pin 2 receives a positive trigger the output at pin 3 will be of low state. And when the negative trigger was fed into pin 2, the output at pin 3 will go high for a specific period of time. This time was decided by the Resistor and Capacitor connected with it.

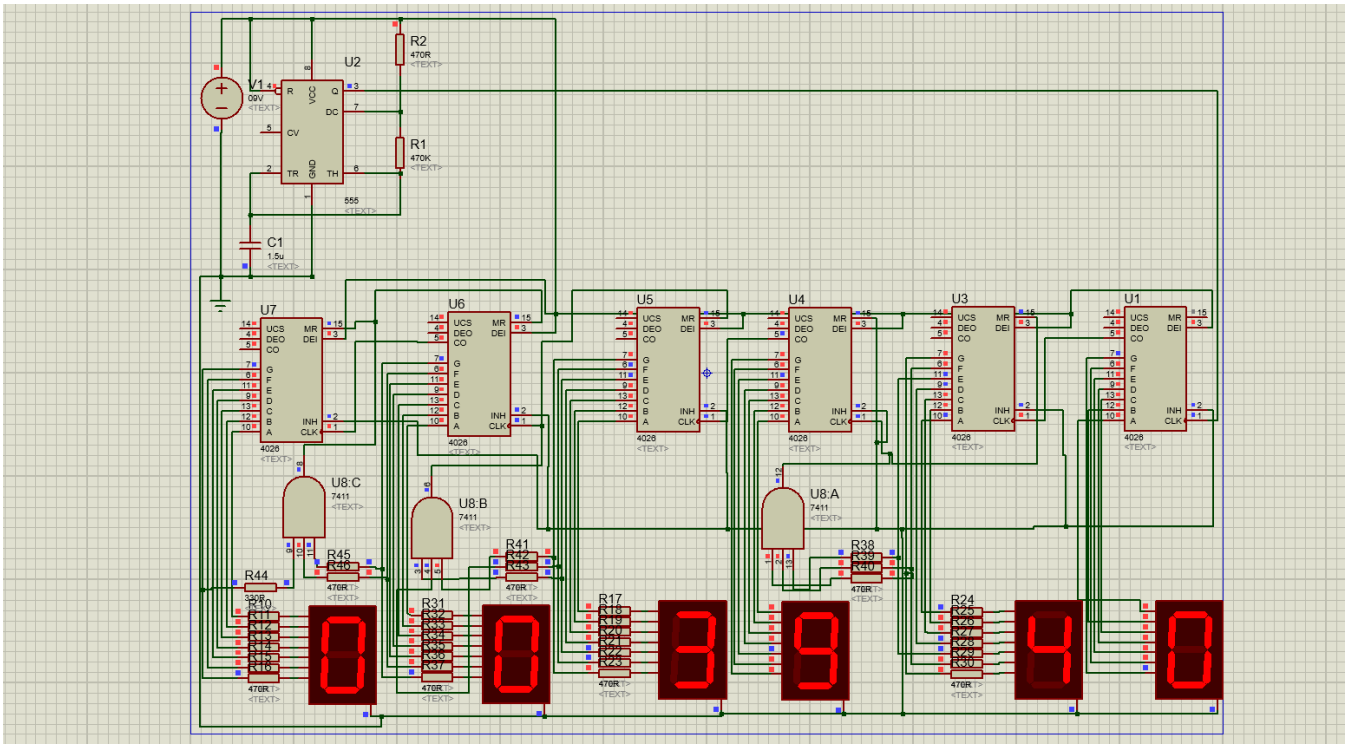
IC 4026:

The 4026 IC is a 16-pin CMOS seven-segment counter from the 4000 series. It counts clock pulses and returns the output in a form that can be displayed on a seven-segment display. This avoids using a binary-coded decimal to seven-segment decoder, but it can only be used to display the (decimal) digits 0-9.

IC 7411:

The IC 7411 is basically AND Gate having three inputs and one output. This IC contains three AND Gates.

CIRCUIT ON PROTEUS :



Working of the diagram:

The working of the circuit starts with the 555 timer where it was wired as a monostable Multivibrator. The 555 timer generates clock pulse after a second and output of 555 is connected to pin 1 of IC 4026 which is a seven-segment display decade counter which is used to drive a 7 segment display with input clock pulse. Here the clock pulse was obtained from the monostable multivibrator and fed into pin 1 of first ic 4026. Pin 2 was usually grounded since giving a high signal to this pin will inhibit the input clock signal to pin 1 and pin 3(Enable Clock) is always taken High.

Initially when the circuit is switched ON the 7 segments will indicate "00:00:00" count and as soon as the negative trigger was given to 555 high pulse will be obtained from pin 3. The high pulse was fed to the first IC and therefore it increments its count with each clock, displaying 1 to 9 in its seven-segment. As soon as 10 counts were incremented by IC a high to low signal was obtained from its pin 5 which indicates the completion of ten increments.

Pin 5 was connected to the clock pin of the next 4026 IC. Therefore whenever 10 counts were completed by the 7-segment, the high to low signal at pin 5 will feed a single clock pulse input to the second IC, and therefore the corresponding 7-segment will be incremented one value. For a digital clock, we must reset the second IC when it reaches number 6 because we want seconds to count up to "59" therefore we used IC 7411 (Three input AND Gate). In the same manner, the fourth IC will count from 0 to 6 and then the value in the fifth IC will be incremented by one. This is all about the seconds and minutes of the clock. Now for hours, we must reset the fifth and sixth IC when the number reached “23” so we put one more three-input AND gate

Conclusion

We created a digital clock indicating hours, minutes, and seconds in the form of digits, through the usage of common ICs, breadboards, a common cathode 7 segment display, and other components for our DLD project.