EDC Experiment 3

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1 Build 8 Hours Clock

1.1 Aim

The aim of this experiment is to Build a 8 hours clock.

1.2 Theory

A digital clock using D flip-flops, a decoder, and an Arduino operates by dividing a high-frequency clock signal from the Arduino to generate time intervals (seconds, minutes, hours). D flip-flops store the binary count of time, changing state with each clock pulse. A decoder converts the binary output from the flip-flops into a 7-segment display format, showing the time. The Arduino generates the base clock signal and controls the logic, ensuring proper synchronization and time increments.

1.3 Components Required

- 2 7420 ICs containing NAND Gates
- Arduino
- Wires
- Breadboard
- 5 7 Segment Displays
- 10 7474 IC (containing D Flip Flops)
- 5 SN74LS47N Decoder

1.4 Procedure

Arrange the components on the breadboard according to circuit diagram. Make the proper connections between different ICs. We can use LEDs to see the proper functioning of the circuit. This will help in the debugging of the circuit. Write the code on arduino to generate the clock. Connect the arduino to the circuit and compile the code to run the clock. Make the mod counters by making proper resets in the D Flip Flops to get Mod 8, Mod 6, Mod 10 counters.

1.5 Circuit

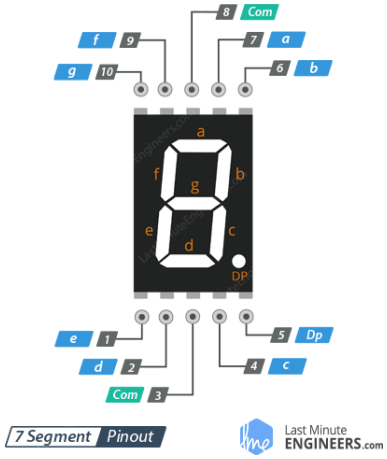

Figure 1: 7 Segment Display Pinout

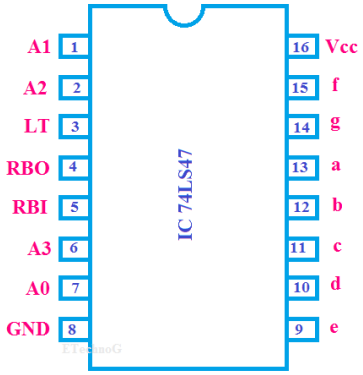

Figure 2: Decoder SN74LS47N pinout

Figure 3: 7474 IC pinout

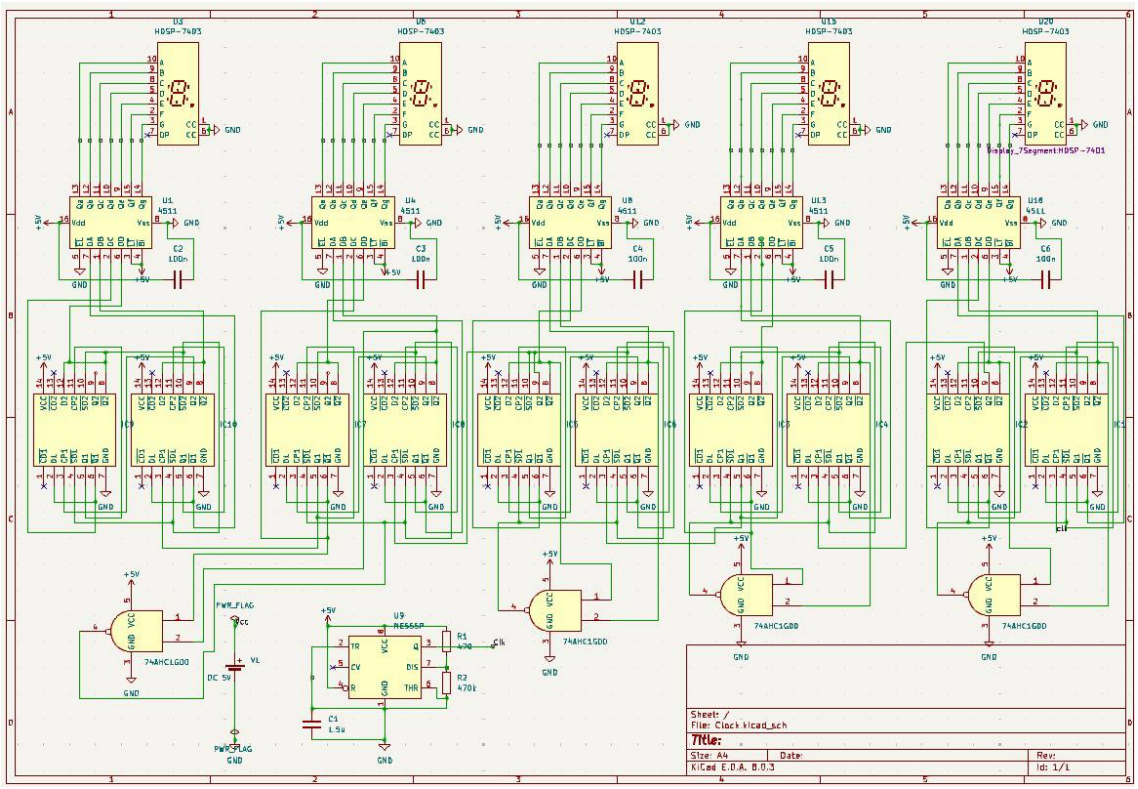

Figure 4: Circuit Schematic

1.6 Observations

The Clock works fine and we can change the clock frequency in arduino code to check the functioning of all 7 Segment Displays.

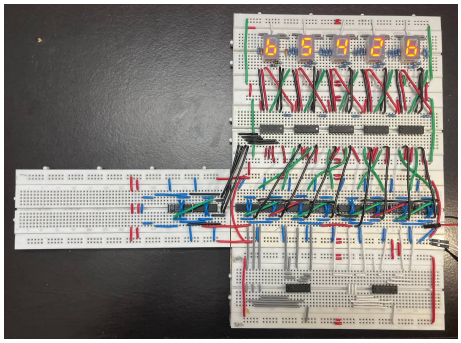

Figure 5: Circuit on Breadboard

1.7 Result

This experiment shows how we can create a functional digital clock using simple components like D flip-flops, a decoder, and an Arduino. The flip-flops manage the counting, while the decoder translates it into a readable time format on a 7-segment display. The Arduino keeps everything in sync by generating the clock pulses. Overall, it provides a hands-on way to see how digital circuits work together to keep time.