Lab Experiment 3

Lab Report

For

Electronics Devices & Circuits Lab

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Contents

Chapter 1

8 Hours Clock Using D-Fip Flops

1.1 Introduction:

This clock consists of three main counters: one for seconds, one for minutes, and one for hours. Each counter is implemented using D flip-flops, which store and toggle binary states based on clock signals. The seconds counter counts from 0 to 59, resets, and increments the minutes counter. The minutes counter operates similarly, resetting after 59 and incrementing the hours counter. The hours counter counts from 0 to 7, completing an 8-hour cycle before resetting. The entire system functions as a cohesive timekeeping device, with Asynchronized counters for accurate time tracking.

1.2 Aim:

The aim of this experiment is Build 8 hours clock.

1.3 Components Used:

- 7 Segment Display
- SN74LS74N D-Fip Flop
- SN74LS47N Decoder
- 7420 Nand Gates
- Jumper Wires
- Arduino
- Connecting Wires
- Breadboard

1.4 Circuit Diagram:

- 7 segement display Pinout

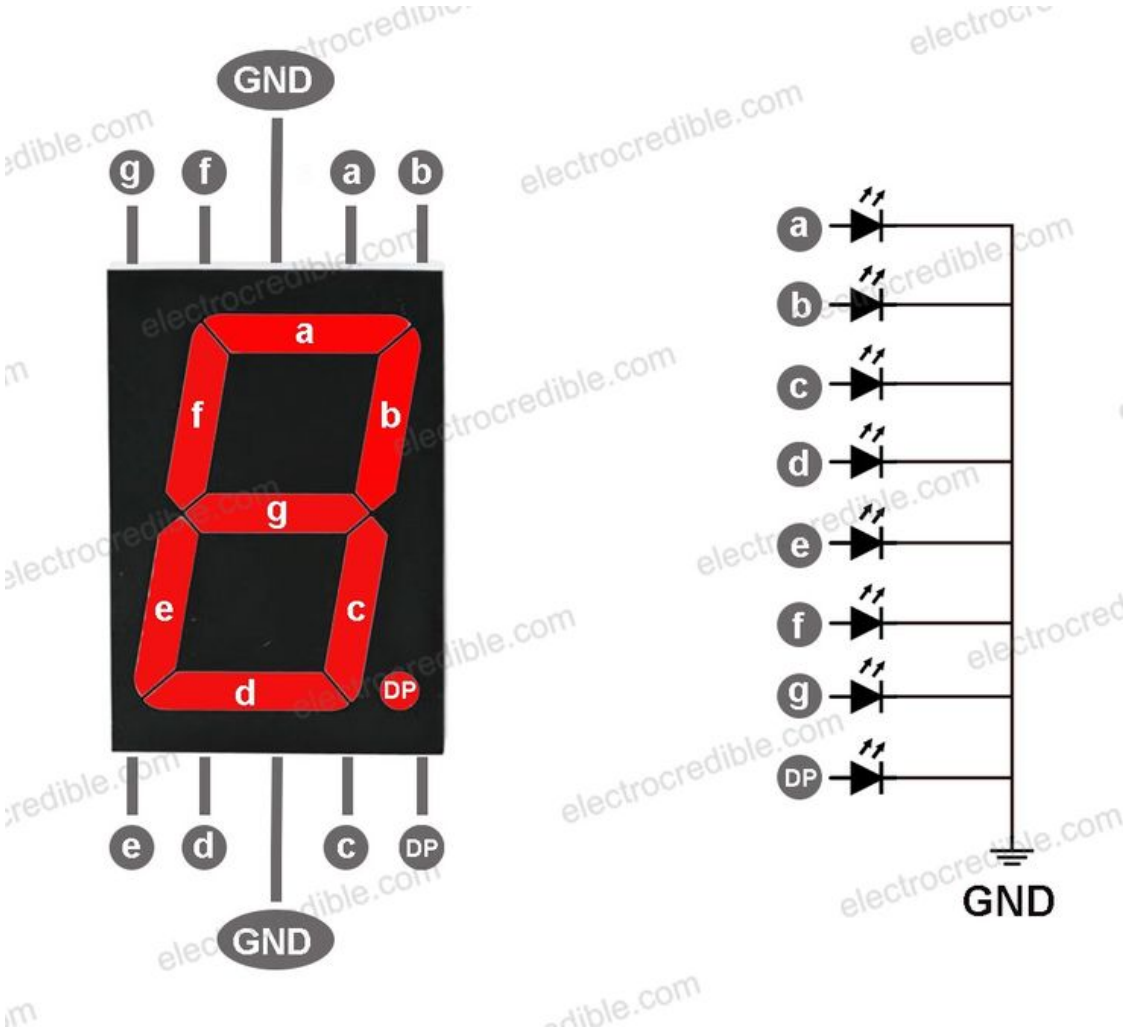

Figure 1.1: Circuit Diagram

- Pinout diagram of 74LS74 Pinout:

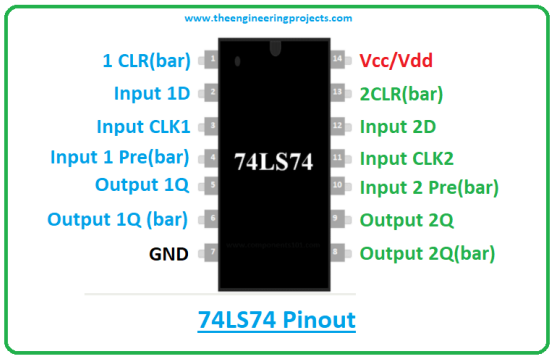

Figure 1.2: D Fip-Flop Pinout Diagram

- Pinout diagram of SN74LS47N Pinout:

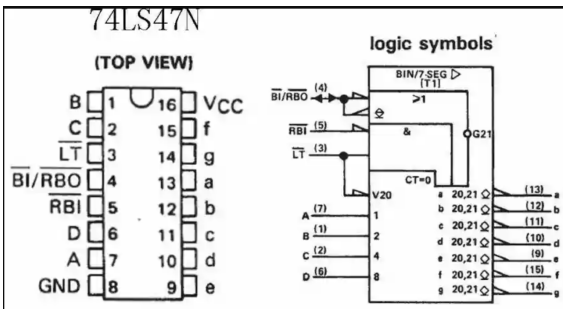

Figure 1.3: Decoder Pinout Diagram

- Arduino Uno

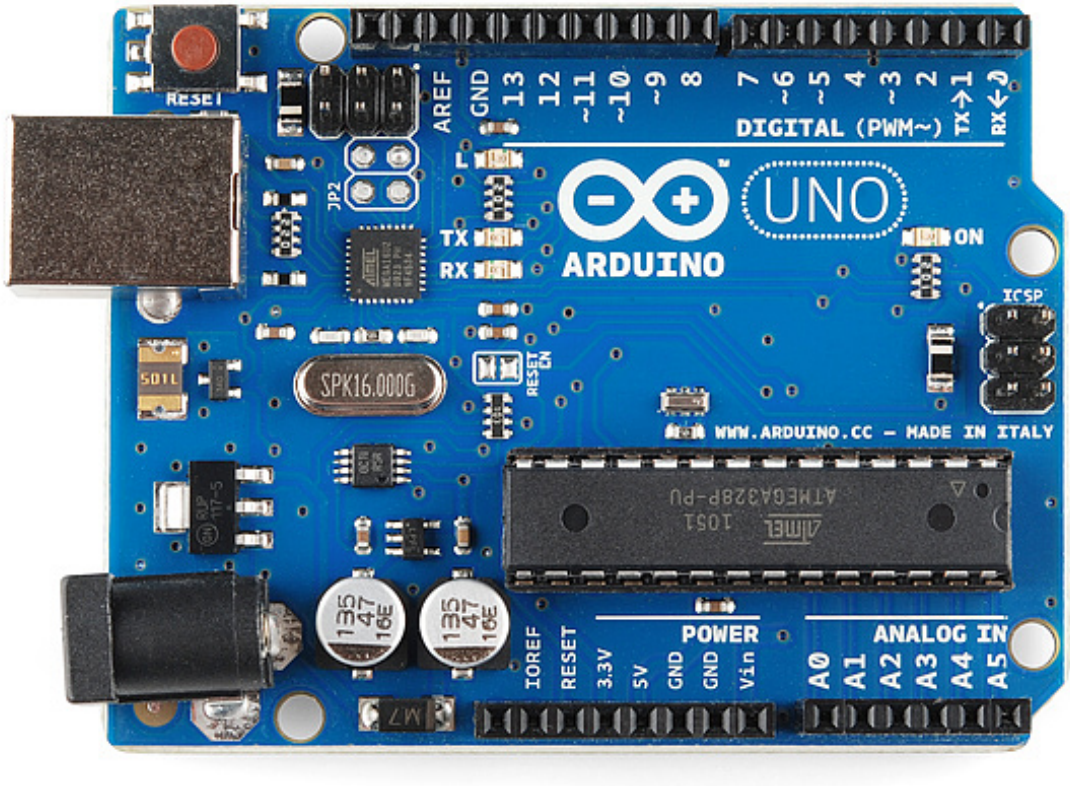

Figure 1.4: Circuit Diagram

1.5 Design:

1.5.1 mod 10 Counter:

- Circuit diagram
- Connect 4-D flip-flops as shown in above figure to form a 4-bit counter.
- Design the reset logic to reset the counter when it reaches 9.

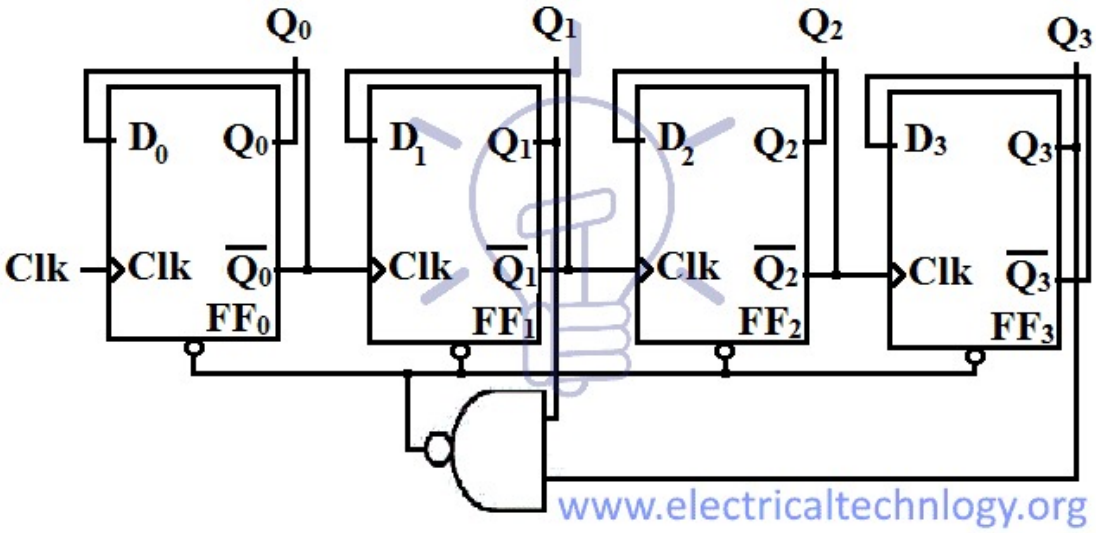

Figure 1.5: Circuit Diagram

1.5.2 8 Hours Counter

- Similarly implement another counters for seconds,minutes and hours.
- Design the reset logic to reset the counter.
- Use seconds counter to clock minutes.
- Use minutes counter to clock hours.

1.6 Procedure:

- Arrange the components on the breadboard according to the circuit diagram and make all connections accordingly.
- Check the all components before arranging into the circuit.
- Give the code to the Arduino board using laptop.
- After code uploaded successfully, the Arduino starts to work automatically.
- Start to display on 7 segment display.

1.7 Observations:

- The clock is working good.
- The clock is accurate.

1.8 Result:

The 8-hour clock circuit was successfully designed. The counter operated as expected, counting seconds, minutes, and hours up to the specified limits and resetting appropriately.
The main challenge was ensuring that the asynchronous nature of the counter did not introduce timing issues.

1.9 Conclusion:

The experiment was successful and none of equipment was damaged during the experiment. The 8-hour clock functioned correctly, validating the design approach. This lab provided valuable insights into the workings of digital counters and the importance of careful design to ensure correct timing and operation.