CPE 301 – Embedded Systems Design Lab **Lab # 03**

Shift Registers

Fall 2020

Objectives:

1. To understand how a shift register works and the various control signals necessary to operate the IC.
2. To learn how to read a data sheet and build a circuit from the information found.

Required Equipment:

1. Laboratory Oscilloscope
2. Laboratory Power Supply
3. Laboratory Function Generator
4. LED
5. DIP Push-button
6. 330Ω SIP Resistor (for LEDs)

Procedure:

BEFORE THE LAB: Find the datasheets for the 74HC595 and 74HC75 and read their functional descriptions on the first few pages. Then review how a shift register functions.

Complete the lab, answer the questions and include them in your lab report. Be sure to label your answers with respect to their relevant lab part and question number. Any handwritten drawings should be scanned and included alongside the Tinkercad link and text of your lab report.

Construct a circuit which demonstrates the functionality of the 74HC595 Shift Register as depicted in the figure below. Use the push button or a switch with a pullup resistor to generate the shift in signal. Use a function generator set to a slow frequency, (0.5 to 5hz) as the clock in signal.
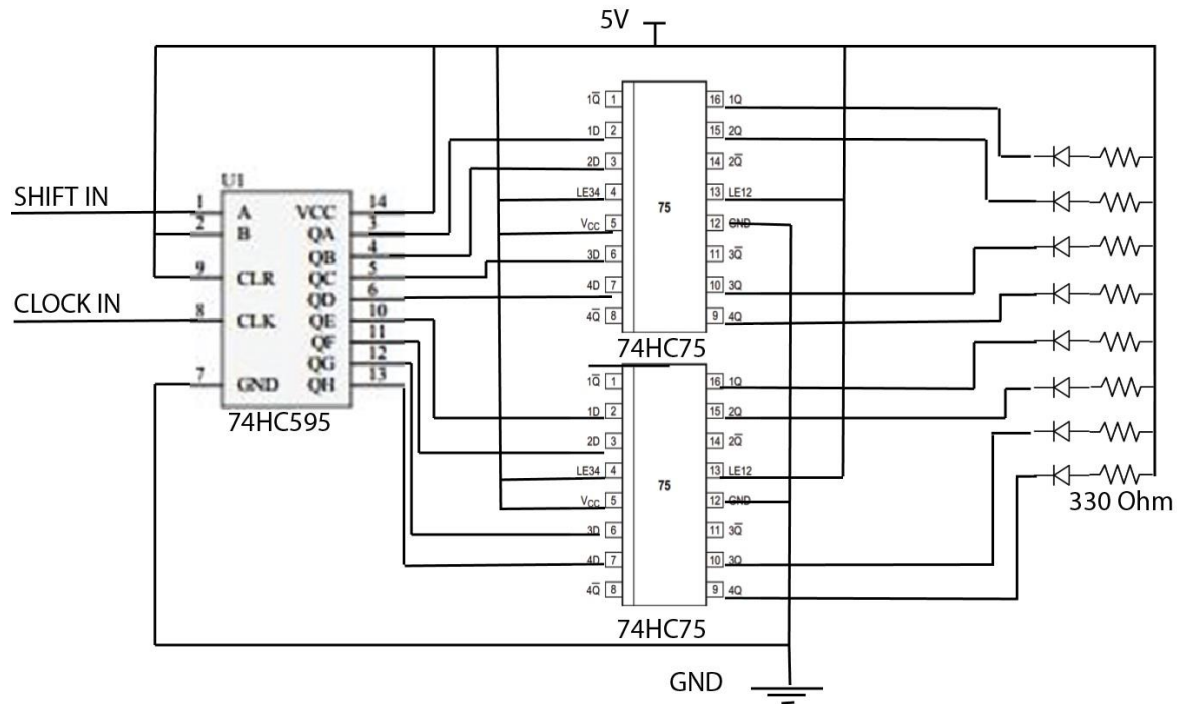
Figure 1. Overall Circuit Layout

1. Briefly explain how the circuit works / what function does it perform?
2. Explain what is the relationship between the clock frequency and output of the LED?
3. What is the relationship between shift in and output?
4. What are the control signals for 74HC595?
5. What are the control signals for 74HC75

Note:
The shift register is available in Tinkercad with the name "74HC595".   The chip will look like the photo below:

To create 8-bit D type flip flop, you can concatenate two 4-bit D latch 74HC75 chips