Agustin Espinoza

SIE 370 – Embedded Computer Systems

Dr. Keaton

4/3/2023

Homework 4

Problem 1 Shifting Serial Data From the Arduino

Questions:

a. Draw the Pin-Out Diagram for the 74HC595 8-Bit Shift Register from the datasheet. You will find the diagram in Figure 9-2 from the textbook.

b. Look at the shiftOut function. What are the parameters it takes and what do they do?

shiftOut(DATA, CLOCK, MSBFIRST, B10101010)

Parameters: DATA, CLOCK, MSBFIRST, B10101010

- DATA: the pin on which to output each bit.
- CLOCK: the pin to toggle once the dataPin has been set to the correct value.
- MSBFIRST: indicates that the most significant bit will be sent first (the leftmost bit when looking at the binary number to send).
- B10101010: binary number sent.

c. If there was no code in the loop() function for Alternating LED Pattern, how did the program work? (Please explain what happens, how the program executed, and why no code was needed.)

The shift register latches the values sent in the setup() function and they stay at those values until their state is changed.

d. What happened when you changed the Latch pattern and ran the program?

After changing the Latch pattern and running the program, the LEDs corresponding to the binary value B11110000 were lit.

e. Which LEDs were dark and which ones were lit?

The four rightmost LEDs were lit.

Problem 2 Controlling Light Animations with a Shift Register

Questions:

a. What part of the code cycled through the LEDs?

The for loop.

b. How did it work? (Please explain the logic, the counts, and the sequence)

Using a for loop, the program cycles through an array of each of the specified binary values and shifts them out to the shift register one at the time. The sequence of the LEDs is defined by the seq[14] array. The program them iterates through the integer array 15 times creating a light rider animation.