San Francisco Bay University

CE450 Fundamentals of Embedded Engineering
Lab 5 Driving 7-Segments LEDs

Objectives:

In this lab, the display for some numbers and alphabets will be designed by using several 7-segments LEDs on Raspberry Pi board through Python program and do hands-on exercise through lab assignments

Introduction:

Two 7-segments LEDs are available in Sunfounder accessory box. The control circuit has been shown using 74HC595(8-bit shift registers) to drive only one 7-segments LED in the following schematic. Three control signals generated from three pins in GPIO port are shifted into 74HC595
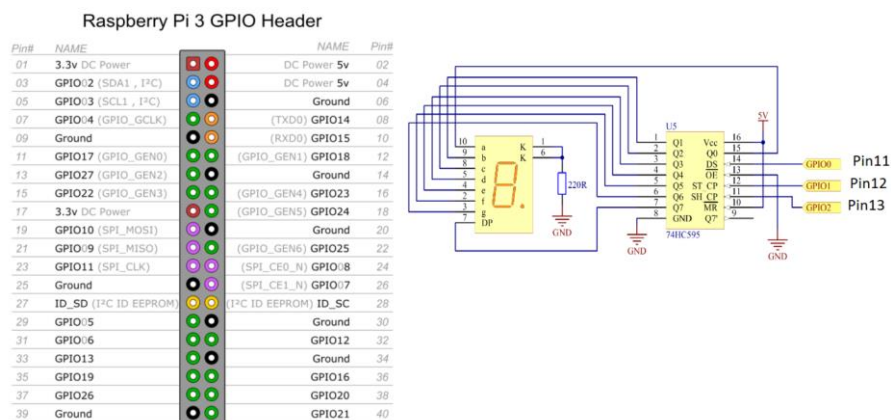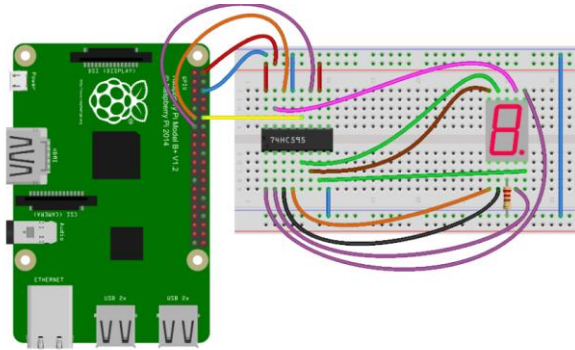
Equipment:

The equipment you require is as follows:
- Laptop & Raspberry Pi 3 model Board
- SunFounder Super Starter Kit V2.0 for Raspberry Pi

The Laboratory Procedure:

1. **Hardware connection**

The Laboratory Assignments:

1. Implement the 7-segment LEDs control based on the above example program
   Youtube video link:
   https://youtube.com/shorts/K3_XRrN2WTw?feature=share

2. Add one more 7-segment LED to the above design for the continuous display of
   the decimal number from *1* to *25* and alphabet from *A-Z* display, such as the
   following
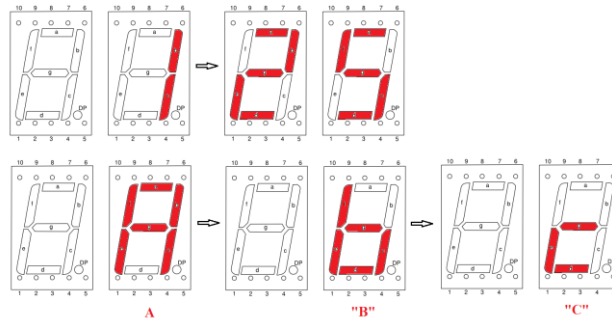
Hardware connection:
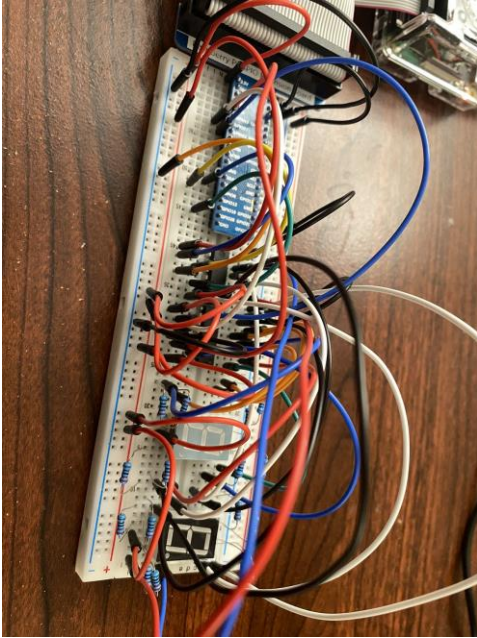
Source code:

```python
def shiftOut(dPin,cPin,order,val):
    for i in range(0,8):
        GPIO.output(cPin,GPIO.LOW);
        if(order == LSBFIRST):
            GPIO.output(dPin,(0x01&(val>>i)==0x01) and GPIO.HIGH or GPIO.LOW)
        elif(order == MSBFIRST):
            GPIO.output(dPin,(0x80&(val<<i)==0x80) and GPIO.HIGH or GPIO.LOW)
        GPIO.output(cPin,GPIO.HIGH);

def loop():
    while True:
        for i in range(1,26):
            low = i % 10
            high = i // 10
            GPIO.output(latchPin,GPIO.LOW)
            if(high > 0):
                shiftOut(dataPin,clockPin,MSBFIRST,num[high])  # Send serial data to 74HC595
            else:
                shiftOut(dataPin,clockPin,MSBFIRST,off)  # Send serial data to 74HC595
            GPIO.output(latchPin,GPIO.HIGH)

            GPIO.output(latchPin1,GPIO.LOW)
            shiftOut(dataPin1,clockPin1,MSBFIRST,num[low])  # Send serial data to 74HC595
            GPIO.output(latchPin1,GPIO.HIGH)

            time.sleep(0.5)
        for i in range(0,len(alphabet)):
            GPIO.output(latchPin,GPIO.LOW)
            shiftOut(dataPin,clockPin,MSBFIRST,off)  # Send serial data to 74HC595
            GPIO.output(latchPin,GPIO.HIGH)

            GPIO.output(latchPin1,GPIO.LOW)
            shiftOut(dataPin1,clockPin1,MSBFIRST,alphabet[i])  # Send serial data to 74HC595
            GPIO.output(latchPin1,GPIO.HIGH)
            time.sleep(0.5)
```

Youtube Link:
https://youtube.com/shorts/yf5hIQ-F-90?feature=share