UMBC

# CMPE 310

Final Lab

Tasks for Assignment 6 (Jumper Description in the last two slides)

Assignment 6 due on December 6, 2019

# Tasks Assigned

**Task 1 – Up/Down counter using 7-seg LEDs and DIP switch.**

- Implement code to initialize one of the 7-segment LEDs with a number (0-9).
- Use one (you are free to chose one) of the DIP switches to control the up/down counting operation of the 7-seg LED.
- You can choose which state of the DIP switch controls the up/down count on the 7-seg LED.
- The up/down count routine should update the 7-seg LED at a rate close to one second.

  You may implement an interrupt routine with timer control for the update to trigger.

  OR

  You can introduce delay loops (Loops with NOPs) to control the rate of update.
- An efficient approach would be to utilize a look-up table in a constant segment (section) for each of 7-seg LED number mappings.
- When counting up, after the number on the 7-seg LED updates to 9, control logic should update to 0 next and continue counting up.
- When counting down, after the number on the 7-seg LED updates to 0, control logic should update to 9 next and continue counting down.

# Tasks Assigned

**Task 2 – Stopwatch**

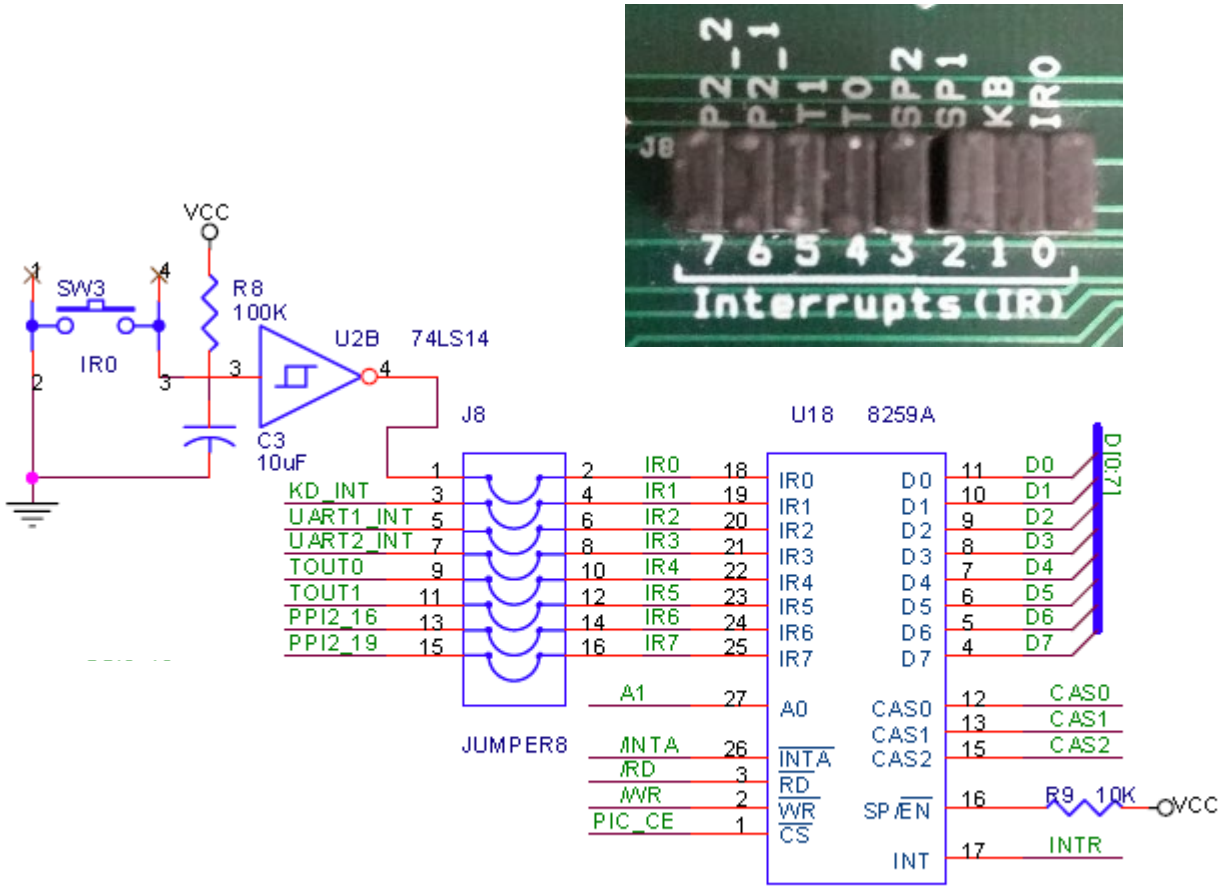
- Implement code to initialize the LCD with the following information.

  Timer : 00:00:00
  Current : 00:00:00
  Previous: 00:00:00
  Lap : 00:00:00
- Code should utilize pushbuttons numbered 1, 2, 3, and 4 for controlling the operation of the stopwatch.
- The timing format is HH:MM:SS, where

  HH represents 2 digits for hours from 00 – 23.
  MM represents 2 digits for minutes from 00 – 59.
  SS represents 2 digits for seconds from 00 – 59.
- Implement interrupt driven code to handle keypad inputs at any point in time.
- Keypad #1 - Start the timer. Timer line (line 1 on LCD) will be updated with an interval of 1 second. Utilize timer output for the same.
- Keypad #2 - Stop the timer. Timer line (line 1 on LCD) will freeze and no updates are made.
- Keypad #3 - Clear and reset. Reset LCD to default (shown above).
- Keypad #4 - Record lap time.

  Current and Lap will display the same information.
  Lap time will be updated to the difference between its current state and time on the timer line
  e.g. if Lap time was 00:06:50 and the time on the Timer line was 00:15:35,
  then the difference 00:08:45 (Time that transpired) is recoded as the new Lap time.
  Previous line (line 3) will record the previous Lap time.

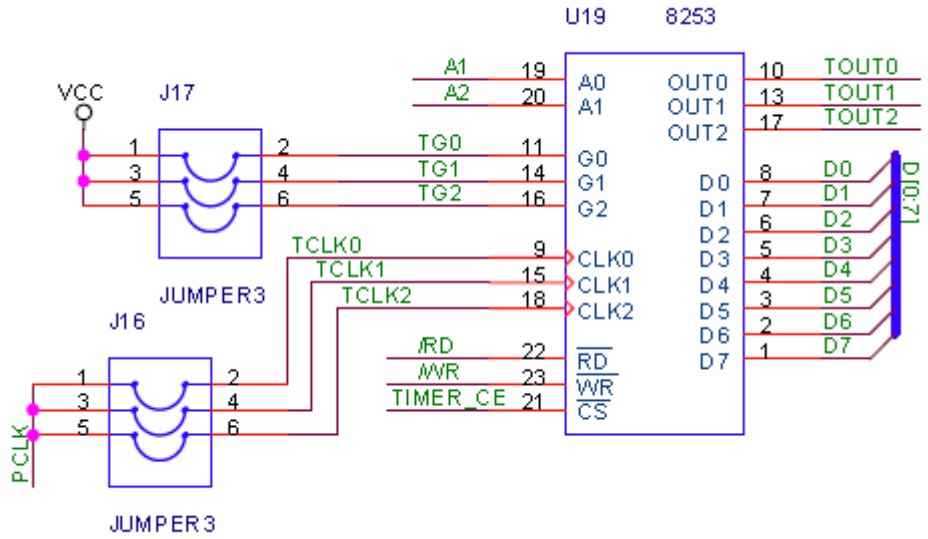
# Jumper settings (Interrupt Pin Mappings)

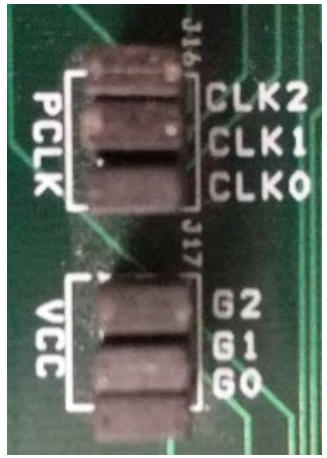



Here is the summary of IR mappings for each device.

IR0 - IR0 Push button
IR1 - 8279 (Keypad)
IR2 - Serial Port 1 (UART 1 – 8086 comm)
IR3 - Serial Port 2 (additional debugging)
IR4 - T0 (8254 Timer 0/ Counter 0) out
IR5 - T1 (8254 Timer 1/ Counter 1) out
IR6 - PPI1 (82C55) INTR
IR7 - PPI2 (82C55) INTR

# Jumper settings (Timer Gate control)




Jumpers for Gate pins short out to VCC.