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Digital-electronics-2 / **Labs** / **05-segment** / Assignment.md

🔷 UTAN25 Update Assignment.md   ⟲

👥 1 contributor

☰ 72 lines (47 sloc) │ 2.89 KB   · · ·

Lab 5: Unai Telletxea

Link to your `Digital-electronics-2` GitHub repository:

https://github.com/UTAN25/Digital-electronics-2

7-segment library

1. In your words, describe the difference between Common Cathode and Common
   Anode 7-segment display.

   - CC SSD: All catodes have to be conected to the same GND, so to switch any
     part ON we must apply voltage to the pin. Active High.
   - CA SSD: All anodes have to be conected to the same power source, so to
     switch any part ON we must NOT apply voltage to the pin. Active Low.

2. Code listing with syntax highlighting of two interrupt service routines
   (`TIMER0_OVF_vect` , `TIMER0_OVF_vect`) from counter application with at least two
   digits, ie. values from 00 to 59:

```
/*******************************************************************
 * Function: Timer/Counter1 overflow interrupt
 * Purpose:  Increment counter value from 00 to 59.
 *******************************************************************/
ISR(TIMER1_OVF_vect)
{
```

```c
        if (counter1==9) //Add 1  to the first digit at the start of the 10th cicle

            counter1=0;    //Last digit
            counter2++;    //First digit

        else

            counter1++;

        if (counter2==6) //Replace number 60 with 00
          counter2=0;
          counter1=0;

}




/************************************************************************
 * Function: Timer/Counter0 overflow interrupt
 * Purpose:  Display tens and units of a counter at SSD.
 ************************************************************************/
ISR(TIMER0_OVF_vect)
{
    static uint8_t pos = 0;
    if (pos)   //flip between the 2 display position every loop

        SEG_update_shift_regs(counter2,1);    //Display the first digit
        pos=0;

    else

        SEG_update_shift_regs(counter1,0);    //Display the last digit
        pos=1;

}
```
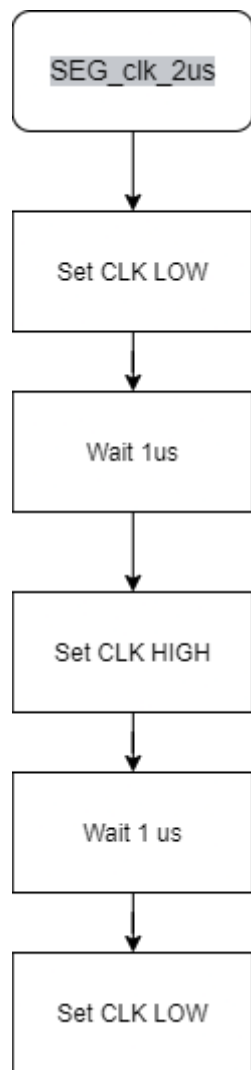
3. Flowchart figure for function `SEG_clk_2us()` which generates one clock period on `SEG_CLK` pin with a duration of 2 us. The image can be drawn on a computer or by hand. Use clear descriptions of the individual steps of the algorithms.

```
┌─────────────────┐
│  SEG_clk_2us    │
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│   Set CLK LOW   │
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│    Wait 1us     │
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│  Set CLK HIGH   │
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│    Wait 1 us    │
└────────┬────────┘
         │
         ▼
┌─────────────────┐
│   Set CLK LOW   │
└─────────────────┘
```

Kitchen alarm

Consider a kitchen alarm with a 7-segment display, one LED and three push buttons: start, +1 minute, -1 minute. Use the +1/-1 minute buttons to increment/decrement the timer value. After pressing the Start button, the countdown starts. The countdown value is shown on the display in the form of mm.ss (minutes.seconds). At the end of the countdown, the LED will start blinking.

1. Scheme of kitchen alarm; do not forget the supply voltage. The image can be drawn on a computer or by hand. Always name all components and their values.