MCU Sheet [2]
AVR Assembly [2]

1. Build an AVR based system that has 2 push buttons and 8 LEDs connected to an ATMEGA328 AVR microcontroller. The system has two modes:
    1. Mode1: All LEDs are blinking with a delay time of 1 sec.
    2. Mode2: LEDs are turned ON in an ascending order starting from LED connected to pin 0 till that that on pin 7 until all LEDs are ON, like a charging level, and when at the max level (all LEDs ON) it goes down again until all LEDs are OFF, and starts all over again.

    The system behavior is as following:

    - At start, the system is at mode 1.
    - If button 0 is pressed, mode 2 starts running.
    - If button 1 is pressed, mode 1 starts running.

    Use Proteus and ATMEL Studio to verify the system.

2. Build an AVR based counter having two 7-segments and 1 push button. The button is to increment numbers shown on 7-segments from 0-to-99.
   Use Proteus and ATMEL Studio to verify the system.

3. Build an AVR based simple calculator with keypad to work as numbers from 0-to-9 and mathematical operations '+', '-', '*', '/' and '=' to do addition, subtraction, multiplication, division and calculate the result respectively. When a button is pressed, it should be displayed on the connected LCD. The result is to be displayed on LCD too.
   Use Proteus and ATMEL Studio to verify the system.
4. Build an AVR based garage system with 2 gates, each has a sensor that senses if a car goes in the garage or out of the garage. The garage has a maximum capacity of 15 cars. There're 2 digit 7-segments to show the current free (available) spaces in the garage (that should start by 15), a red LED to light on when there's no more space available and a green LED to show if there are still spaces available in the garage.
   You must use external interrupts (INT0 and INT1) for the sensors.
   You can use push buttons to simulate the sensor behavior.
   Use Proteus and ATMEL Studio to verify the system.
5. Build an AVR based system that has two modes:
   Mode 1: Temperature sensing system with over-heat alert, that reads temperature data from LM35 temperature sensor through the AVR's ADC and displays the current temperature on 2 digit 7-segments. If the read temperature is above 60 degrees, a buzzer should keep buzzing to indicate over-heat until temp. is back below 60.
   Mode 2: Voltmeter that reads voltage applied on external potentiometer and displays it on 2 digit 7-segment as a floating number with 1 digit after the decimal point.
   A push button should be used by using external interrupt INT0 to toggle between the 2 modes.
   Use Proteus and ATMEL Studio.