

# ELEC 334 - Midterm #1

## Randomized Counter



### Objective

Your objective for this project is to implement **a randomized counter** in Assembly. A 4-digit SSD should be connected that will display your ID (last 4 digits) when your code is not counting (idle state). When an external button is pressed, it will generate a 4-digit random number, and start counting down to 0. The generated random number should be between 1000 - 9999. When the counter reaches 0, the number 0000 should be displayed for a second, then the code should go back to idle state waiting for the next button press. Pressing the button while counting down should pause counting, and pressing again should resume counting.

### Approach

Since there are a number of parts to the project, divide into small tasks and implement each task on its own, then gradually incorporate them into your project. Your tasks should be as small as possible. Example is given below.

Task1 - Turn on / off on-board LED

Task2 - Connect an external LED and turn it on / off

Task3 - Using the on-board button, turn on / off LED

Task4 - Connect an external button and when pressed turn on LED

Task5 - Connect one SSD to the board and turn on one part of a segment

Task6 ....

### Requirements for the project

Make sure to read and understand the requirements for each section since your grade will depend on it.

### Technical requirements

- Written in Assembly.
- An external button should be attached that will generate a random number when pressed
  - Generated random number should be between 1000 - 9999.

- An external LED that will be turned off when the counting is in progress, and will be turned on as soon as the number reaches to 0000
- A 4-digit seven segment display that will show the 4-digit number
  - the first digit should display the seconds, the last three digits should display the milliseconds, so it will count down from 9 at most.
- When the system is idle, your school ID will be shown (last 4-digits)
  - Number 0000 should be displayed at least 1 second before going to ID mode
- Pressing the button should pause the counting and pressing again should resume counting.

## Quality requirements

- No debouncing on the button
- No considerable delay with button presses
- No flickering on the displays
- Should be as accurate as possible with the seconds
- Code should be properly commented with your name / school ID added in the beginning

## Submission requirements

- **A 1-minute video of your project demonstration**
  - Record the video explaining your code briefly, and show the demonstration.
  - Preferably hold the camera still.
  - Upload the video to wherever you want (youtube / onedrive / stream) and give a link.
- **A well-written report** including block diagram, flow chart, parts list (w/ prices), project setup w/ picture, detailed task list, methodology for any numerical work, references, properly formatted code list, any missing parts and explanation about why they are missing, any challenges you faced and how you solved them, conclusion about what you learned from the project
  - Report should be in PDF format
  - Cover page should be included
  - Connections should be obvious in the block diagram
- Your submission should be **a zip file** with the following name  
yourname.lastname.project1.zip

The zip file should have the following folder structure

```
yourname.lastname.project1/  
  report/  
    yourname.lastname.project1.report.pdf  
  code/  
    project1.asm  
  video/  
    video_link.txt
```