

In this lab, you are required to complete two different experiments:

EXPERIMENT 1:

You are required to create a circuit with an Arduino board, a seven-segment display and a push-button using Arduino Software (IDE).

When you correctly assembled the circuit, you will need to write a source code to display hexadecimal numbers on seven-segment display. These numbers will start from “0” and increase by “1”, or another integer value we select, when push-button is pressed. Assuming another integer is selected for increment, your program should calculate the next possible integer to show using modulus operation (%), if the next integer value is greater than “f” (15 in decimal).

To make the increase value dynamic, you are required to define a **global variable** named “COUNTER_VALUE” at the top of your source code, that will hold the integer value of increment that will be used when push-button is pressed.

Example scenarios with different increment values are given below:

For COUNTER_VALUE = 1

seven-segment display:

0→1→2→3→4→5→6→7→8→9→a→b→c→d→e→f→0→...

For COUNTER_VALUE = 2

seven-segment display:

0→2→4→6→8→a→c→e→0→2→4→6→8→a→c→e→0→...

For COUNTER_VALUE = 7

seven-segment display:

0→7→e(14)→
5(21%16)→c(12)→
3(19%16)→a(10)→
1(17%16)→8→f(15)→
6(22%16)→d(13)→...

EXPERIMENT 2:

In this experiment, you will use the same circuit as before. Instead of counting numbers, you need to generate random numbers between “0” and “f” and display them on seven-segment display after push-button is pressed. They can be repeating and can include both “0” and “f”.

An example scenario is given below:

seven-segment display:

0→7→3→a→f→c→2→7→f→a→0→1→3→e→2→5→c→...

UPLOAD REQUIREMENTS:

You are free to use functions as you wish. Please take care to use only English language in your code including variables, functions and comments. In addition, make sure your code is understandable, readable and well structured.

You are also required to make a video that will explain and show the circuit and its operation. The video you are going to make should be at most 5 minutes. Videos uploaded longer than this time limit will have their grade reduced. In addition, please make sure the video quality is good and your circuit and computer screen (when it is required) is clearly visible. You can use Turkish or English in this video, you are free to use either of them.

You are required to upload two different files. One is the source code you have written in Arduino IDE and the video you have made to show and run your circuit. The extension of your source code file should be “ino” because that is the extension Arduino IDE uses for C source code files. The extension of your video file could be any video extension that is used (e.g. mp4, mkv, etc.), however, make sure you can play this file on your computer and it can be viewed correctly.

The files you are required to upload are given below with explanations:

(STUDENT_NUMBER)_(STUDENT_NAME)_LAB2_EXP1_Code.ino
(Source code you have written for the experiment 1)

Example = 2043901815_Augusta_Ada_LAB2_EXP1_Code.ino

(STUDENT_NUMBER)_(STUDENT_NAME)_LAB2_EXP2_Code.ino
(Source code you have written for the experiment 2)

Example = 2043901815_Augusta_Ada_LAB2_EXP2_Code.ino

(STUDENT_NUMBER)_(STUDENT_NAME)_LAB2_Video.mp4
(Video recording of you explaining your project and showing its execution)

Example = 2043901815_Augusta_Ada_LAB2_Video.mp4