College of Science and Computer Engineering

Department of Computer Science & Artificial Intelligence

CCAI 321

Advanced Topics in Artificial Intelligence

Lab# 5

Seven-Segment Display

2022-2023

Term#2

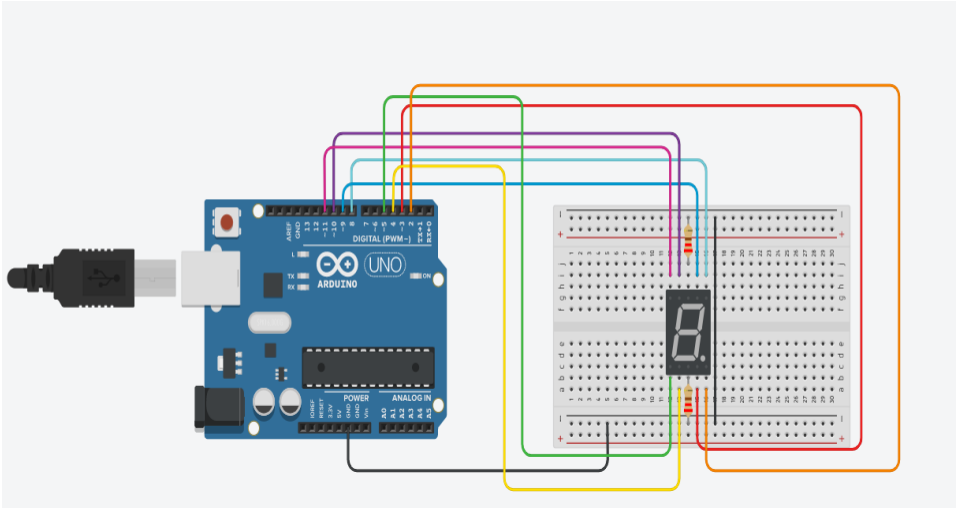
Lab Objectives:
The aim of this LAB experiment is to teach students how to interface a 7-segment display to the Arduino board and use it to display the output.

Hardware Required:
1. Arduino Uno Board
2. Breadboard
3. Common Cathode 7-Segment Display
4. Resistors

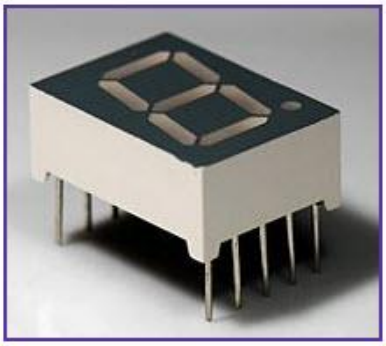
Circuit:
The circuit to be implemented in this experiment is a simple interface of a 7-segment display to pins of the Arduino board. The implementation of the 7-segment display interface using Virtual Breadboard software is show in Figure bellow.

To build this circuit follow the steps discussed in Experiments 1 and 2 to place and connect the following components:

1. breadboard
2. Arduino Uno Board
3. Resistor
4. Segment7 (common cathode)



Program:
In this part, you will write a program to display the output on a 7-segment display interfaced to the Arduino board. The counting goes from 0 to 9 with a period of 1 second (i.e., every count takes 1 second).



Truth Table:

Decimal digit	Binary	Segments						
		A	B	C	D	E	F	G
0	0000	1	1	1	1	1	1	0
1	0001	0	1	1	0	0	0	0
2	0010	1	1	0	1	1	0	1
3	0011	1	1	1	1	0	0	1
4	0100	0	1	1	0	0	1	1
5	0101	1	0	1	1	0	1	1
6	0110	1	0	1	1	1	1	1
7	0111	1	1	1	0	0	0	0
8	1000	1	1	1	1	1	1	1
9	1001	1	1	1	1	0	1	1

Code:

```
const byte numeral[10] = {
  B11111100, // 0
  B01100000, // 1
  B11011010, // 2
  B11110010, // 3
  B01100110, // 4
  B10110110, // 5
  B10111110, // 6
  B11100000, // 7
  B11111110, // 8
  B11110110, // 9
};

// pins for decimal point and each segment
// DP,G,F,E,D,C,B,A

const int segmentPins[8] = { 2, 11, 10, 5, 4, 3, 8, 9 }; //dp,g,f,e,d,c,b,a

void setup() {
  for (int i = 0; i < 8; i++) {
        pinMode(segmentPins[i], OUTPUT);   // set segment and DP pins to output
   }

  }

void loop() {
  for (int i = 0; i <= 9; i++) {
    showdigit(i);
    delay(1000);
  }
// the last value if i is 10 and this will turn the display off
  delay(1000);  // pause second with the display off

// Displays a number from 0 through 9 on a 7-segment display
// any value not within the range of 0-9 turns the display off

}
void showdigit(int number) {
  boolean isBitSet;
  for (int segment = 1; segment < 8; segment++) {
    isBitSet = bitRead(numeral[number], segment);

// isBitSet will be true if given bit is 1

    digitalWrite(segmentPins[segment], isBitSet);
    digitalWrite(segmentPins[0], HIGH);
  }
}
```