ISTANBUL TECHNICAL UNIVERSITY

COMPUTER ENGINEERING DEPARTMENT

BLG 351E

MICROCOMPUTER LABORATORY
EXPERIMENT REPORT

EXPERIMENT NO	:	1
EXPERIMENT DATE	:	09.11.2020
LAB SESSION	:	MONDAY - 13.30
GROUP NO	:	G10

GROUP MEMBERS:

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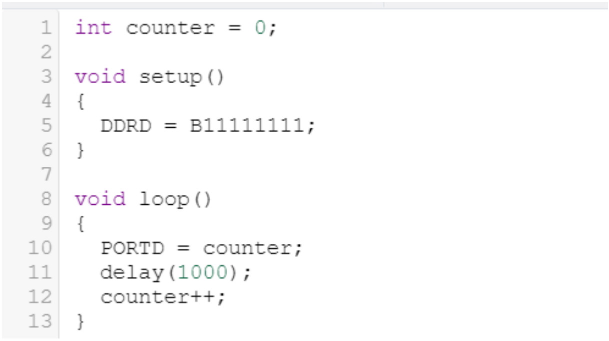
Contents

1 INTRODUCTION

In this experiment, we learned how to use Arduino programming language to create various patterns with the Arduino Uno board and 8 LED pins.

2 MATERIALS AND METHODS

2.1 Part 1: 8-bit Counter

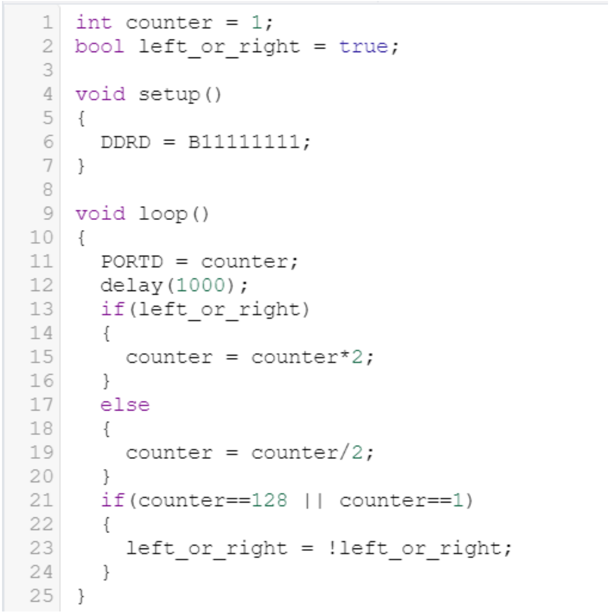


```
int counter = 0;

void setup()
{
  DDRD = B11111111;
}

void loop()
{
  PORTD = counter;
  delay(1000);
  counter++;
}
```

Figure 1: Code to create 8-bit counter

In this part we used the code above to create an 8-bit counter. After reaching 255 (11111111 in binary) it rounded back to 0.

2.2 Part 2: Generating Given Pattern

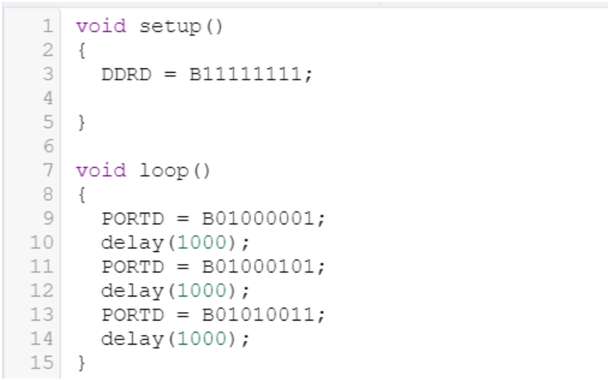


```
int counter = 1;
bool left_or_right = true;

void setup()
{
  DDRD = B11111111;
}

void loop()
{
  PORTD = counter;
  delay(1000);
  if(left_or_right)
  {
    counter = counter*2;
  }
  else
  {
    counter = counter/2;
  }
  if(counter==128 || counter==1)
  {
    left_or_right = !left_or_right;
  }
}
```

Figure 2: Code to create the requested pattern

In this part we created the requested pattern by starting from 1 and multiplying by 2 to shift the 1 to the left by 1 bit. After reaching 128 (B10000000) we divided by 2 to shift the 1 to the right by 1 bit.

2.3 Part 3: First Letters of Our Names



```
void setup()
{
  DDRD = B11111111;

}

void loop()
{
  PORTD = B01000001;
  delay(1000);
  PORTD = B01000101;
  delay(1000);
  PORTD = B01010011;
  delay(1000);
}
```

Figure 3: Code to display the first letter of our names in ASCII

In this part we used a text to binary converter to obtain the ASCII code of the first letter of our names 'A','E', and 'S'. We wrote the code above to display these characters repeatedly.

3 RESULTS

3.1 Part 1 Results

time	LED pattern
0	00000000
1	00000001
2	00000010
3	00000011
...	...
...	...
255	11111111
256	00000000
257	00000001
...	...

Table 1: Time table for LED patterns produced by 8-bit counter

3.2 Part 2 Results

time	LED pattern
0	00000001
1	00000010
2	00000100
3	00001000
4	00010000
5	00100000
6	01000000
7	10000000
8	01000000
9	00100000
10	00010000
11	00001000
12	00000100
13	00000010
14	00000001
15	00000010
...	...

Table 2: Time table for LED patterns produced by Part 2

3.3 Part 3 Results

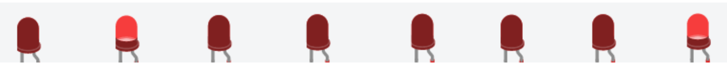


Figure 4: ASCII code for letter 'A'

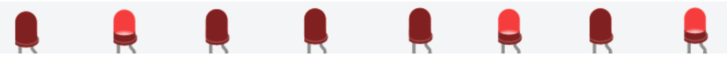


Figure 5: ASCII code for letter 'E'

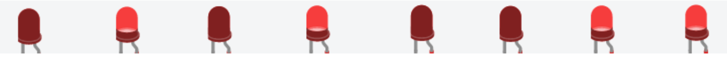


Figure 6: ASCII code for letter ’S’

4 DISCUSSION

For the first part, we used a variable and incremented the variable by 1 for every cycle. This part was relatively difficult because we used an Arduino board for the first time and had difficulties before we figured out how it worked.

For the second part, we used division and multiplication operations to shift the 1 to the left or right. We checked at 1 and 128 to change the direction of the shift. This part was easy but we had some problems first time because we couldn’t figure out when to change the direction of the shift.

For the third part, we used an ASCII to binary converter to find the binary versions of the first letters of our names. This part was the most straightforward part of the experiment.

5 CONCLUSION

In this experiment we learned the basics of the Arduino programming language. We created an 8-bit counter, generated the requested sequence and displayed the first letters of our names in ASCII.