

Exercise 2_More LEDs

s214417 Lukas Schou

s214413 Christian Cederhorn

Traffic light

```
// time integer for 1s
int unit = 1000;

void setup() {
  Serial.begin(9600);
  //Pin outputs are chosen
  pinMode(8, OUTPUT);
  pinMode(9, OUTPUT);
  pinMode(10, OUTPUT);
}

void loop() {
  digitalWrite(8, HIGH);           //Turns on red light (RL)
  Serial.println("STOP");          //Writes STOP
  delay(2*unit);                   //Keeps RL on for 2s
  digitalWrite(8, LOW);            //RL turns off
  digitalWrite(9, HIGH);           //Turns on yellow light (YL)
  delay(unit);                     //Keeps YL on for 1s
  digitalWrite(9, LOW);            //YL turns off
  digitalWrite(10, HIGH);          //Turns on green light (GL)
  Serial.println("GO");            //Writes GO
  delay(2*unit);                   //Keeps GL on for 2s
  digitalWrite(10, LOW);           //GL turns off
  digitalWrite(9, HIGH);           //Turns on yellow light (YL)
  delay(unit);                     //Keeps YL on for 1s
  digitalWrite(9, LOW);            //YL turns off
}
```

From serial monitor

```
GO
STOP
GO
STOP
```

The program runs a traffic light sequence, where the light shifts between 2s RED to 1s YELLOW and then 2s GREEN.

Binary Counter

```

1  int unit = 1000; // counter time
2
3  void setup() {
4      Serial.begin(9600);
5      pinMode(8, OUTPUT);
6      pinMode(9, OUTPUT);
7      pinMode(10, OUTPUT);
8  }
9
10 void loop() {
11     // Runs a counter from 0-7
12     for(int i = 0; i < 8; i++){
13         // Turns off every LED before tuning the right ones on again
14         digitalWrite(8, LOW);
15         digitalWrite(9, LOW);
16         digitalWrite(10, LOW);
17         Serial.println(i);
18         display(i);
19         delay(unit);
20     }
21 }
22
23 // Uses the modulo operator to display the binary number on the LEDs
24 void display(int i){
25     if (i % 4 < i && i > 3){
26         digitalWrite(10, HIGH);
27         i = i % 4;
28     }
29     if (i % 2 < i && i > 1){
30         digitalWrite(9, HIGH);
31         i = i % 2;
32     }
33     if (i % 1 < i && i > 0){
34         digitalWrite(8, HIGH);
35     }
36 }

```

From serial monitor

```

0
1
2
3
4
5
6
7

```

Questions

- 2a: You should be used to the normal arithmetic operators $+$ $-$ $*$ $/$, but do you know this operator: $\%$? What is $42 \% 5$?

The operator gives the remainder after division.

$$42 \% 5 = 2$$

- 2b: What can you use the $\%$ -operator for in this exercise?

In this exercise the $\%$ -operator can be used to control which light turns on when. The third light representing 2^2 only turns on when $7 \% 4 > 3$, the second light 2^1 , when $7 \% 2 > 1$ and the first light 2^0 , when $7 \% 1 > 0$.