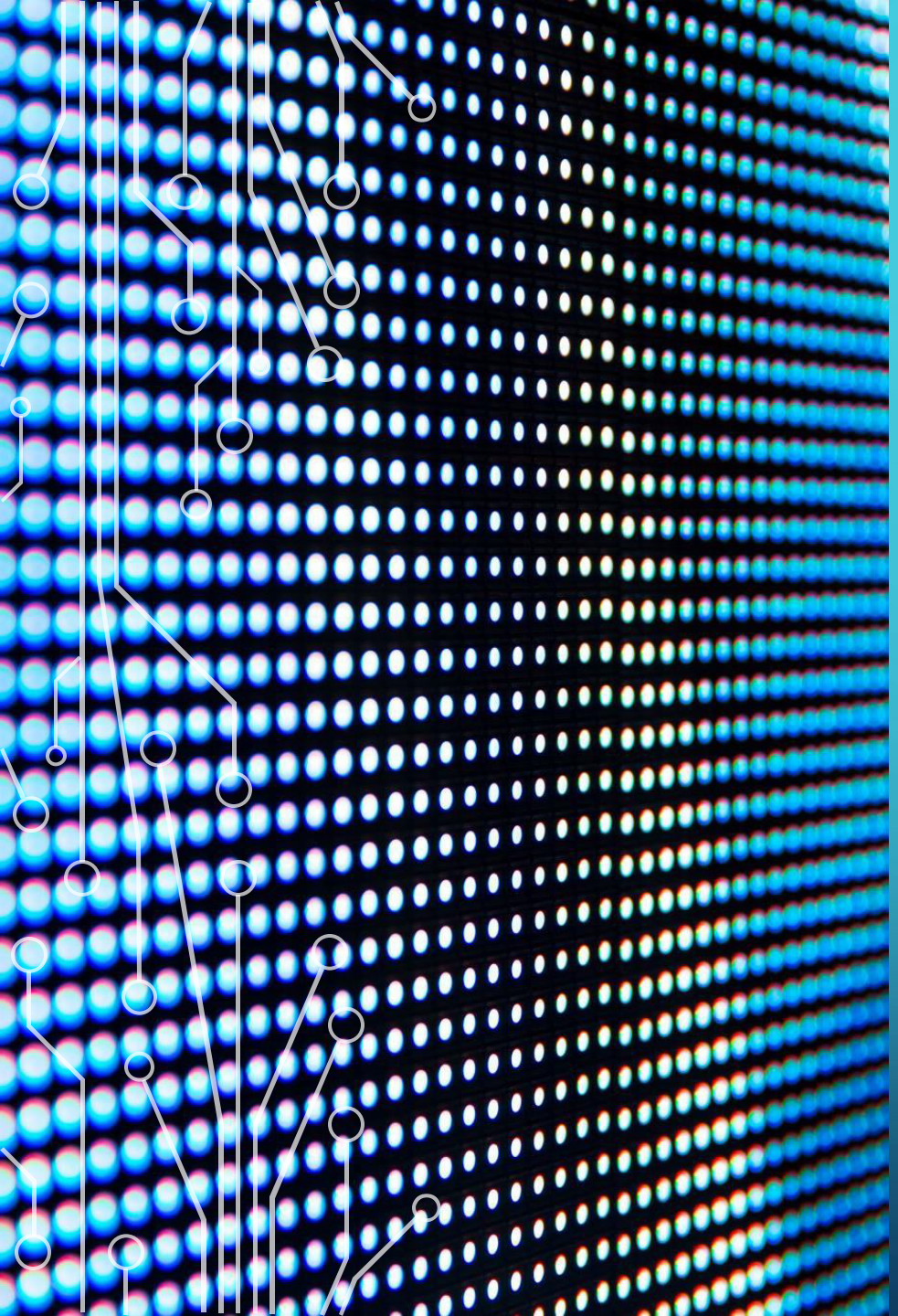
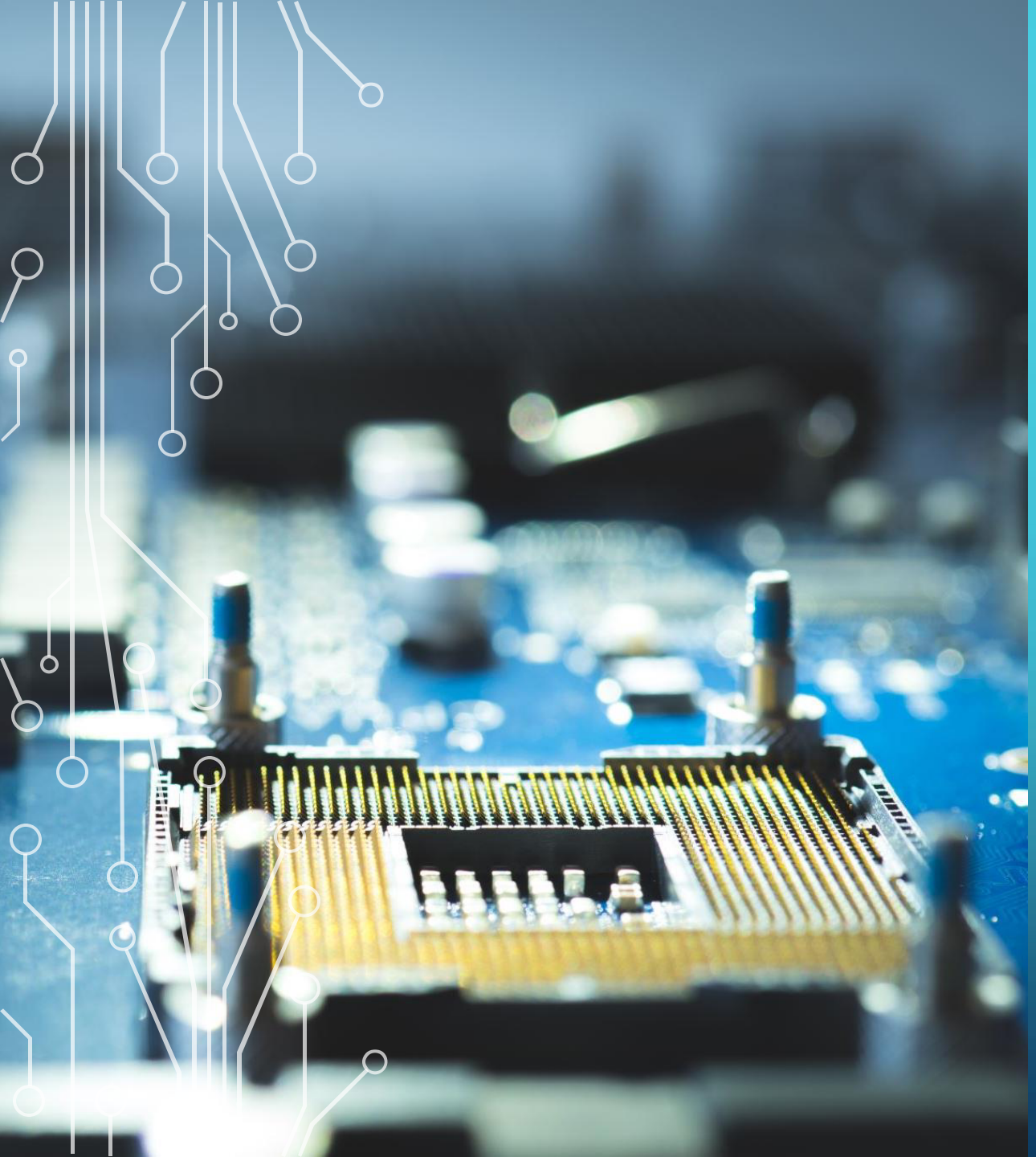
MICROCONTROLLERS

SIMPLE TASKS

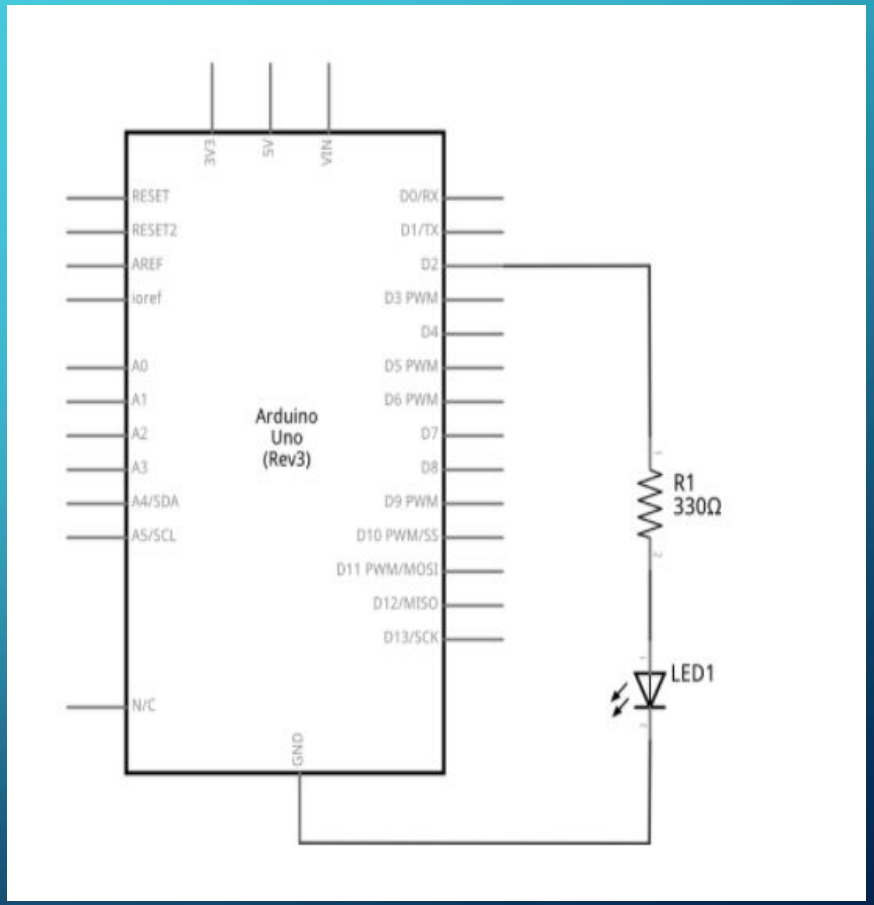


CHRISTMAS LIGHTS

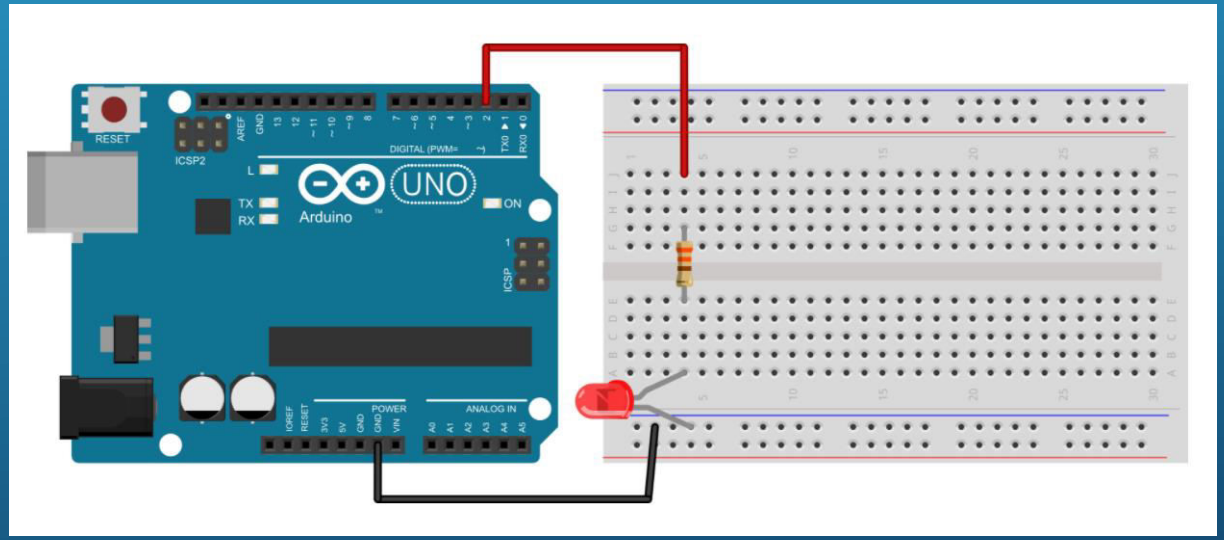
- Connect one LED to the microcontroller. Write a program that will turn the diode on and off at half-second intervals to achieve a blinking effect.



SCHEME – ONE LIGHT

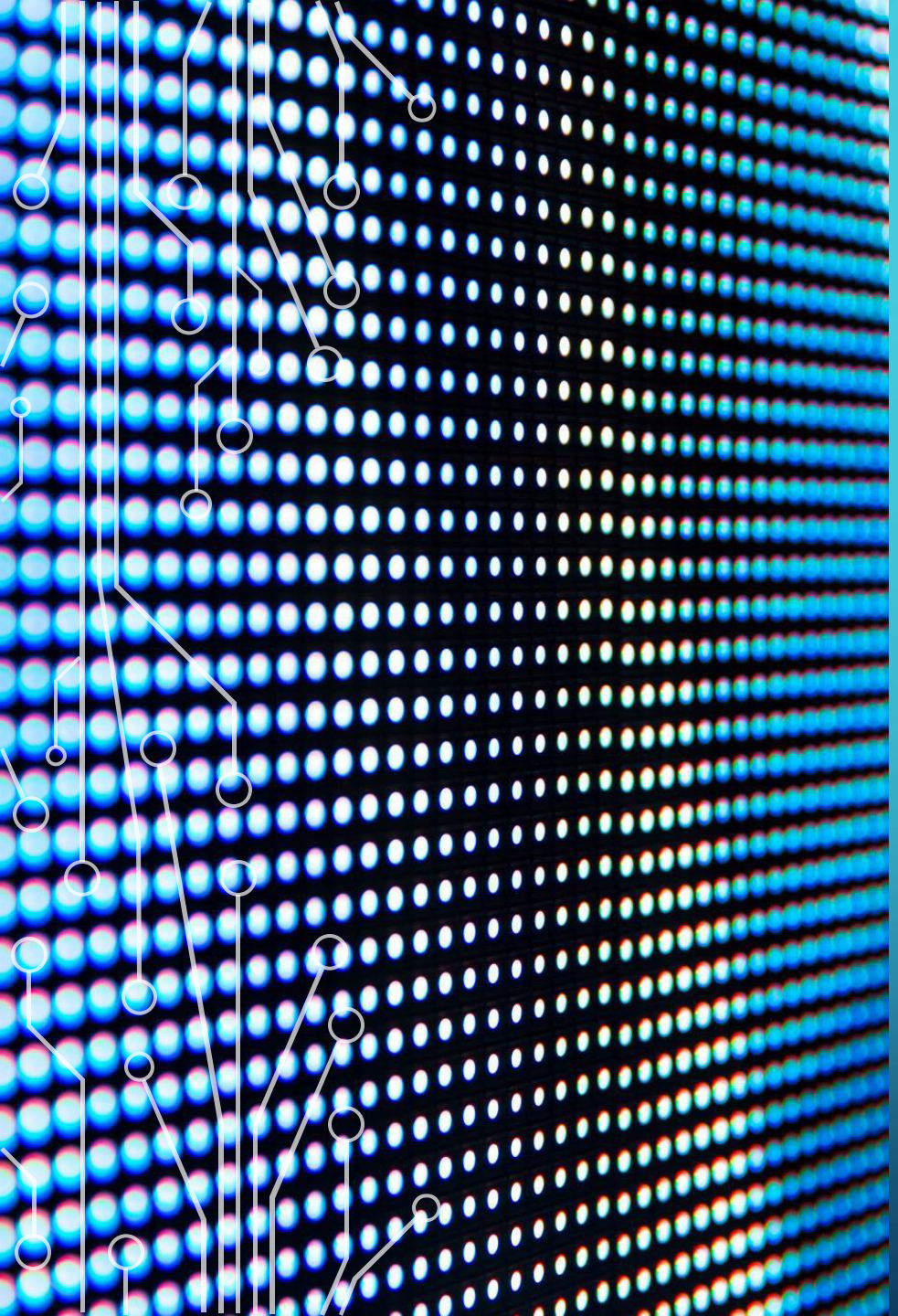


EXPERIMENTAL TILE



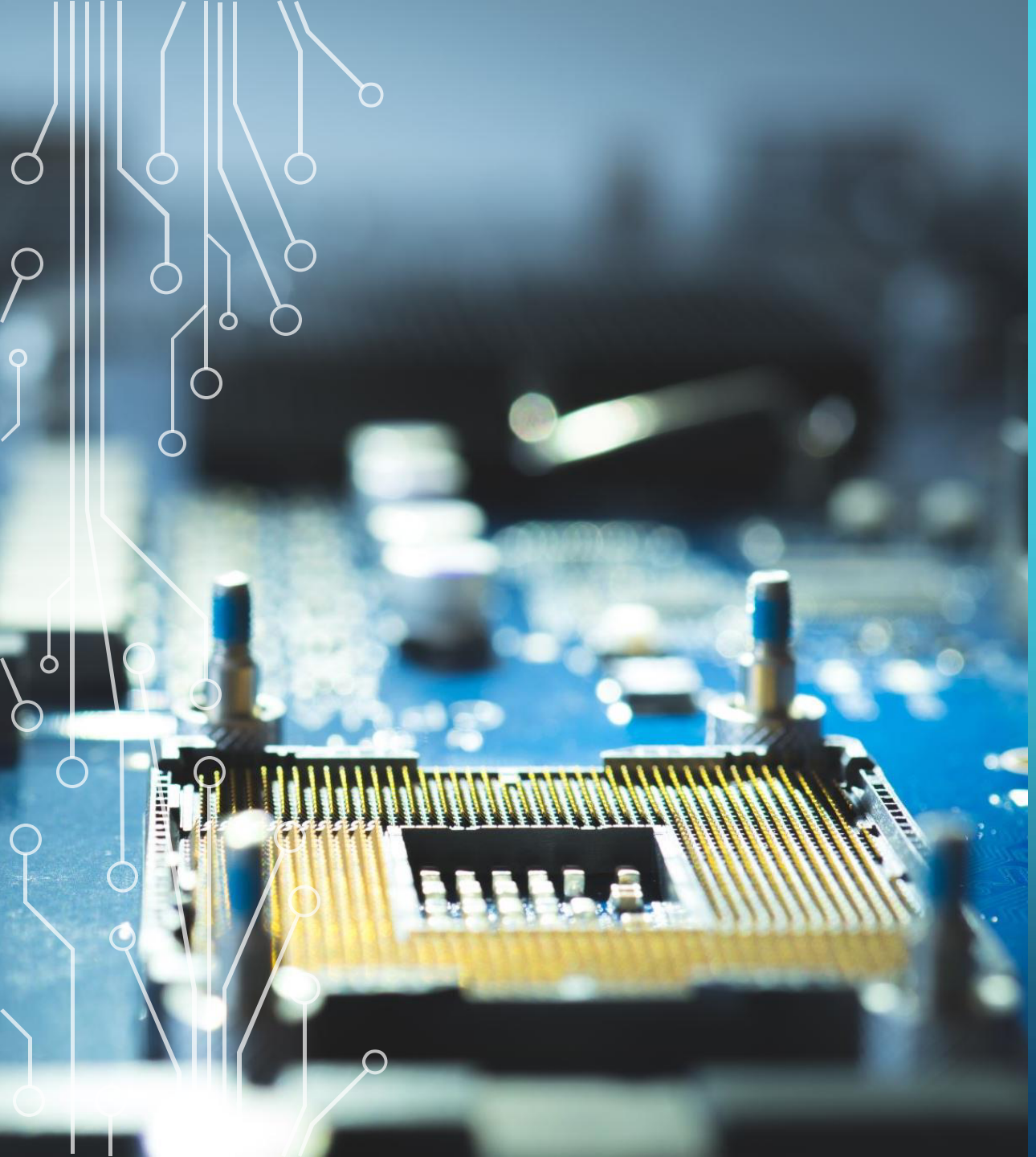
SOLUTION

```
int led = 2;                    //define led = 2

void setup() {

pinMode(led, OUTPUT);        //set statement led as
output
 digitalWrite(led, LOW);      //turn off the LED -
initial state
}

void loop() {

digitalWrite(led, HIGH);     //turn on the LED
 delay(500);                  //wait 500 ms - half
a second
digitalWrite(led, LOW);      //turn off the LED

delay(500);                  //wait 500 ms - half a
second
}
```

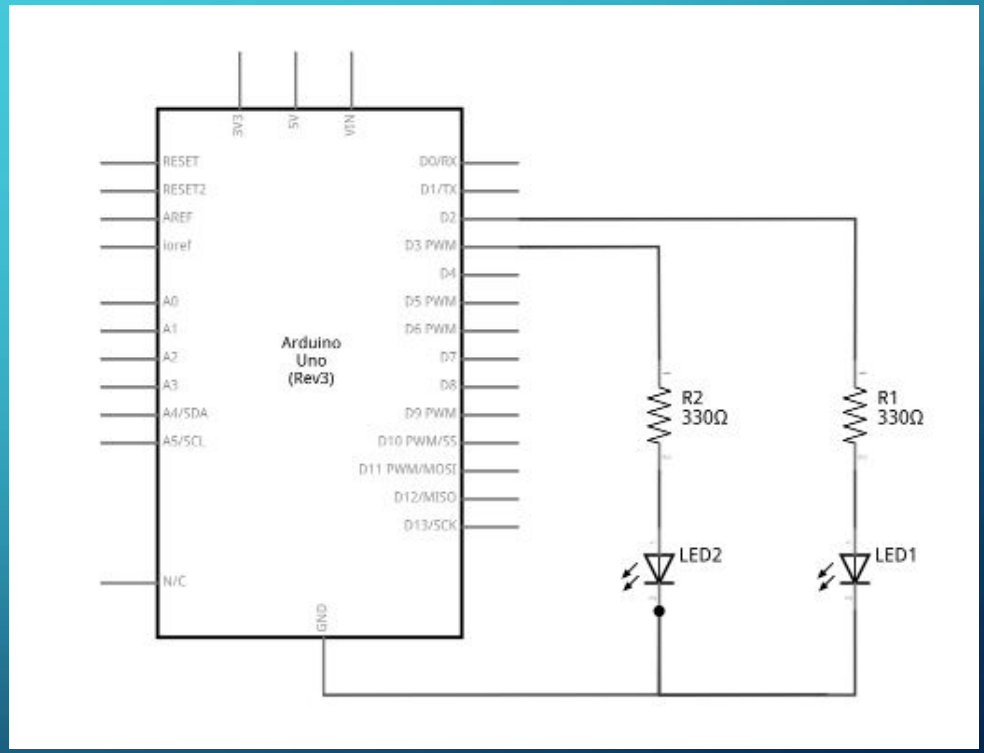


CHRISTMAS LIGHTS

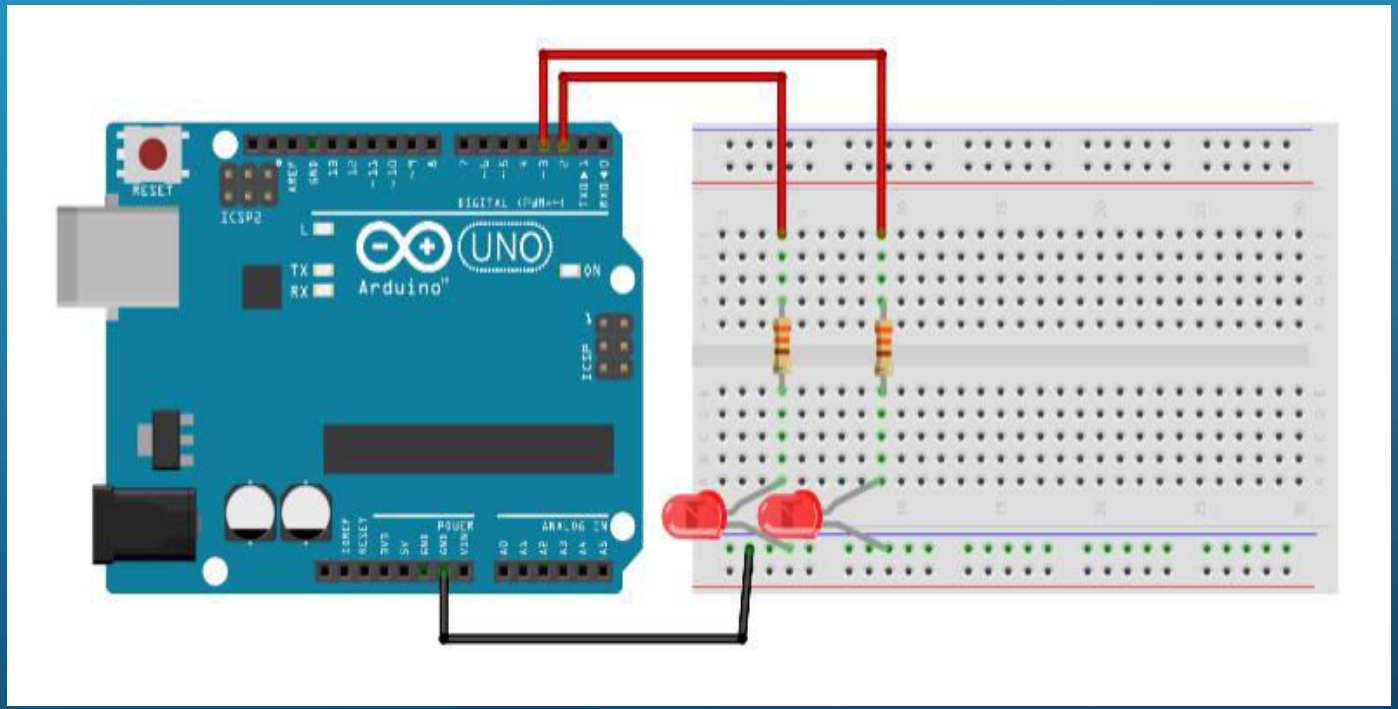
- Connect two LEDs to the microcontroller. Write a program that will turn the LEDs on and off at half-second intervals to achieve the effect that both LEDs flash together.



SCHEME – TWO LIGHTS

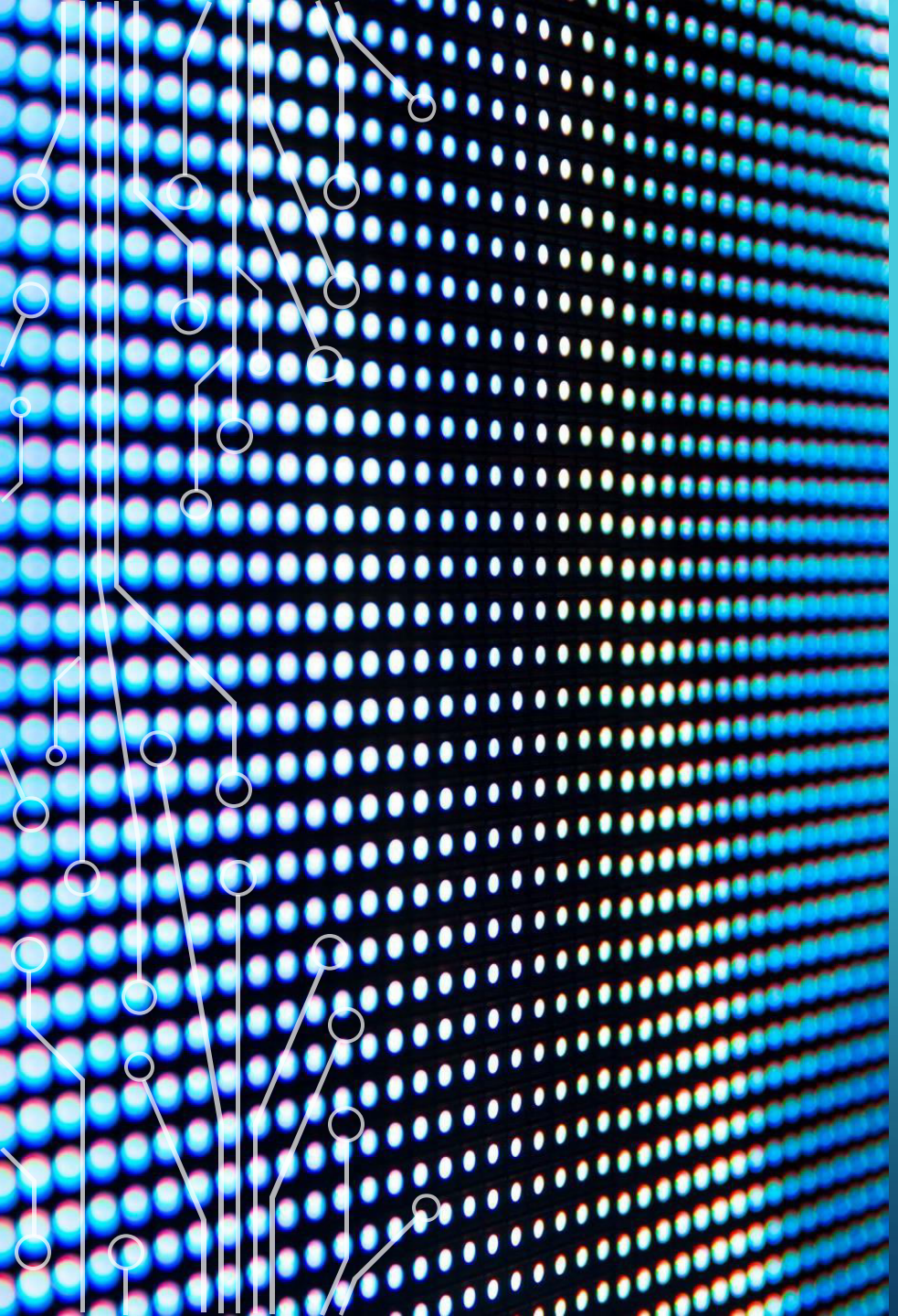


EXPERIMENTAL TILE



SOLUTION

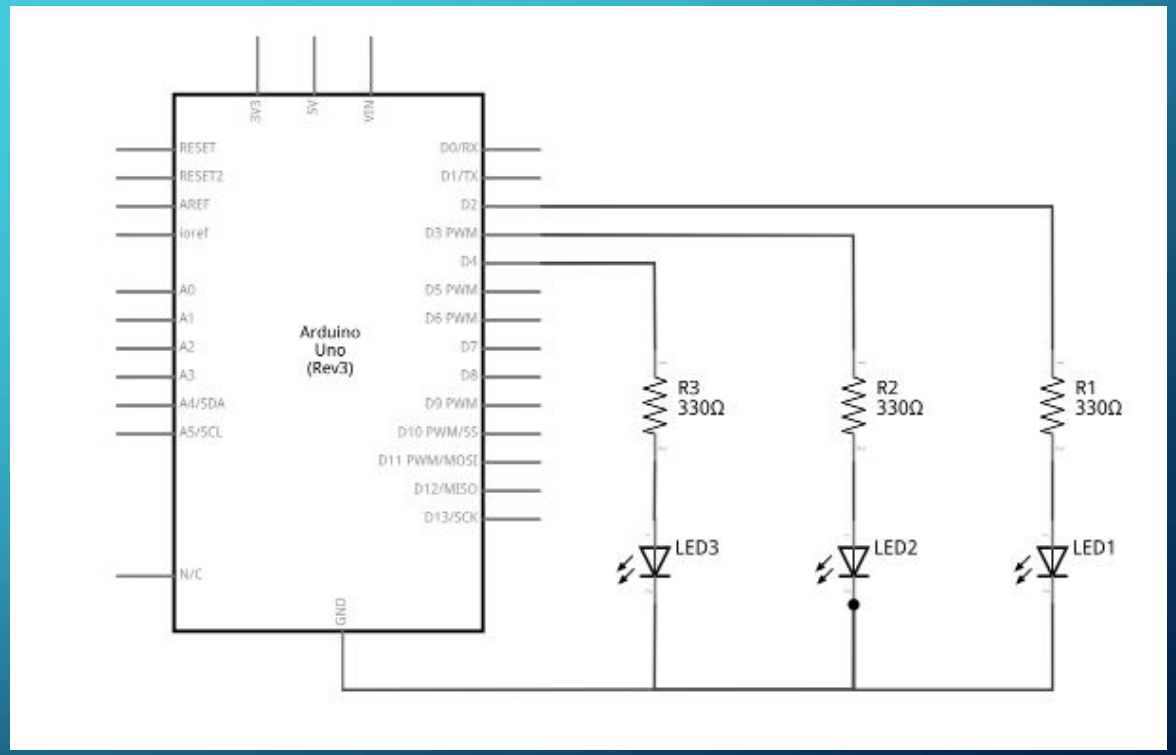
```
int led1 = 2;                    //define led1 = 2
int led2 = 3;                    //define led2 = 3

void setup() {
pinMode(led1, OUTPUT);        //set statement led1 as
output
pinMode(led2, OUTPUT);        //set statement led2 as
output
 digitalWrite(led1, LOW);      //turn off the LED 1 -
initial state
 digitalWrite(led2, LOW);      //turn off the LED 2 -
initial state
}

void loop() {
  digitalWrite(led1, HIGH);    // turn on the LED 1
  digitalWrite(led2, HIGH);    // turn on the LED 2

delay(500);                   // wait 500 ms - half a
second
  digitalWrite(led1, LOW);     // turn off the LED 1
  digitalWrite(led2, LOW);     // turn off the LED 2
  delay(500);                  // wait 500 ms - half a
second
}
```



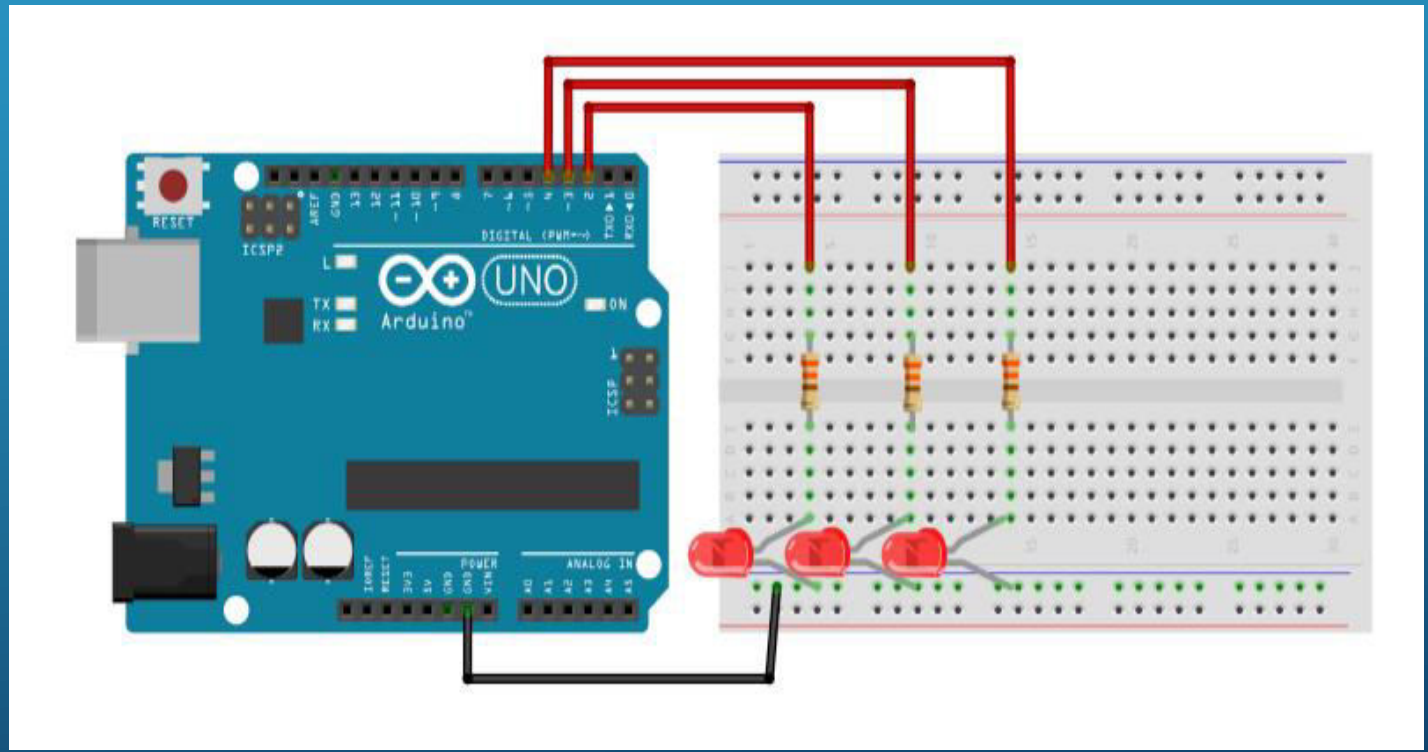
CHRISTMAS LIGHTS

- Connect three LEDs to the microcontroller. Write a program that will turn on the LEDs from left to right in turn. Only one LED is on at any one time. After switching off the last LED, the first one lights up again and the cycle starts from the beginning. Each LED is on for three hundred milliseconds.

SCHEME – THREE LIGHTS



EXPERIMENTAL TILE



SOLUTION

```
int led1 = 2;                    // define led1 = 2
int led2 = 3;                    // define led2 = 3
int led3 = 4;                    // define led3 = 4


 void setup() {
    pinMode(led1, OUTPUT);       //set statement led1
as output
    pinMode(led2, OUTPUT);       //set statement led2
as output
    pinMode(led3, OUTPUT);       //set statement led3
as output
    digitalWrite(led1, LOW);     //turn off the LED 1 -
initial state
    digitalWrite(led2, LOW);     //turn off the LED 2 -
initial state
    digitalWrite(led3, LOW);     //turn off the LED 3 -
initial state
}
```

```
void loop() {
    digitalWrite(led1, HIGH);    //turn on the LED 1
    delay(300);                  // wait 300 ms
    digitalWrite(led1, LOW);     // turn off the LED 1

    digitalWrite(led2, HIGH);    // turn on the LED 2
    delay(300);                  // wait 300 ms
    digitalWrite(led2, LOW);     // turn off the LED 2

     digitalWrite(led3, HIGH);    //turn on the LED 3
     delay(300);                  // wait 300 ms
     digitalWrite(led3, LOW);     // turn off the LED 3

}
```

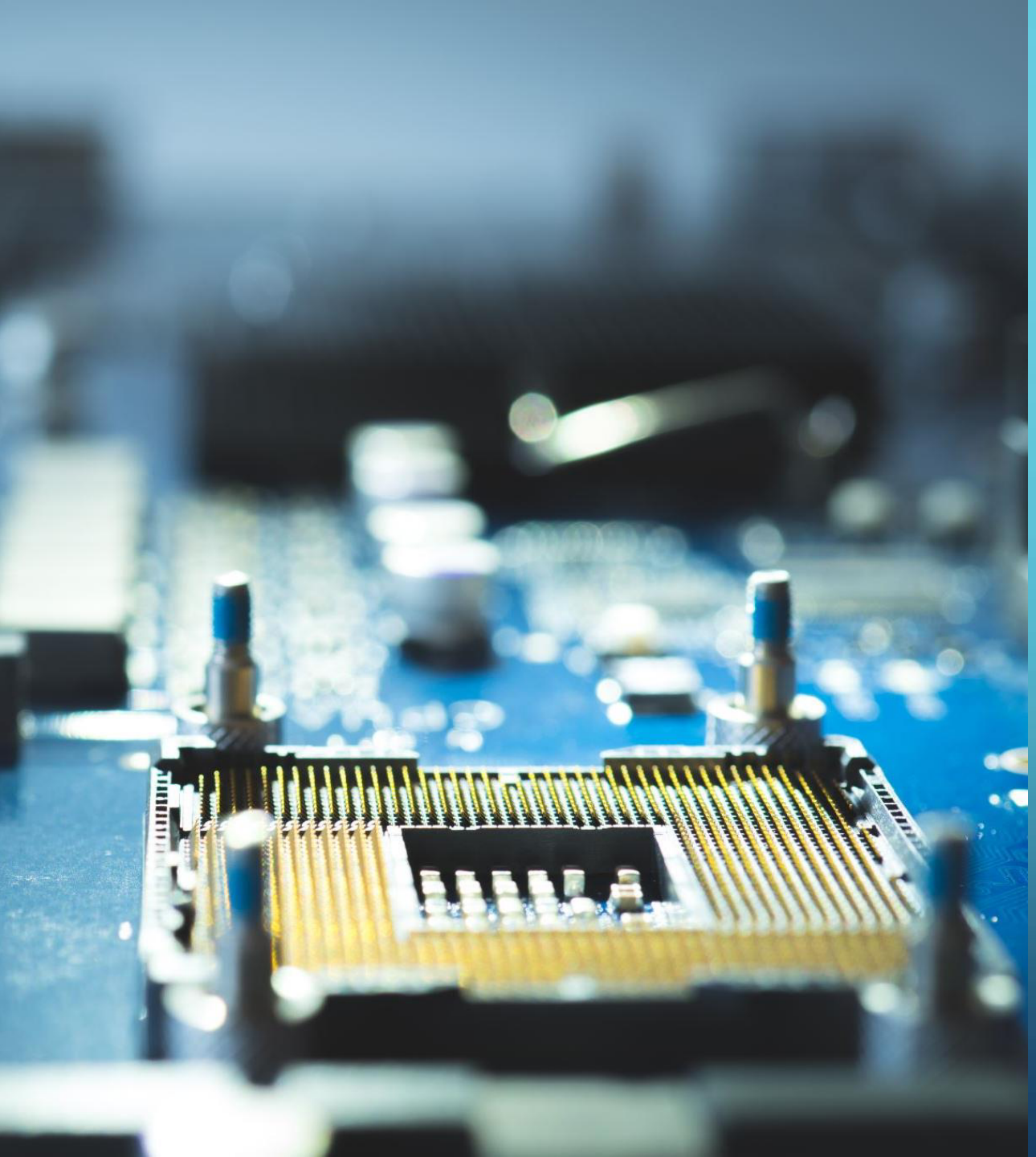
TRAFFIC LIGHTS

TWO TASKS

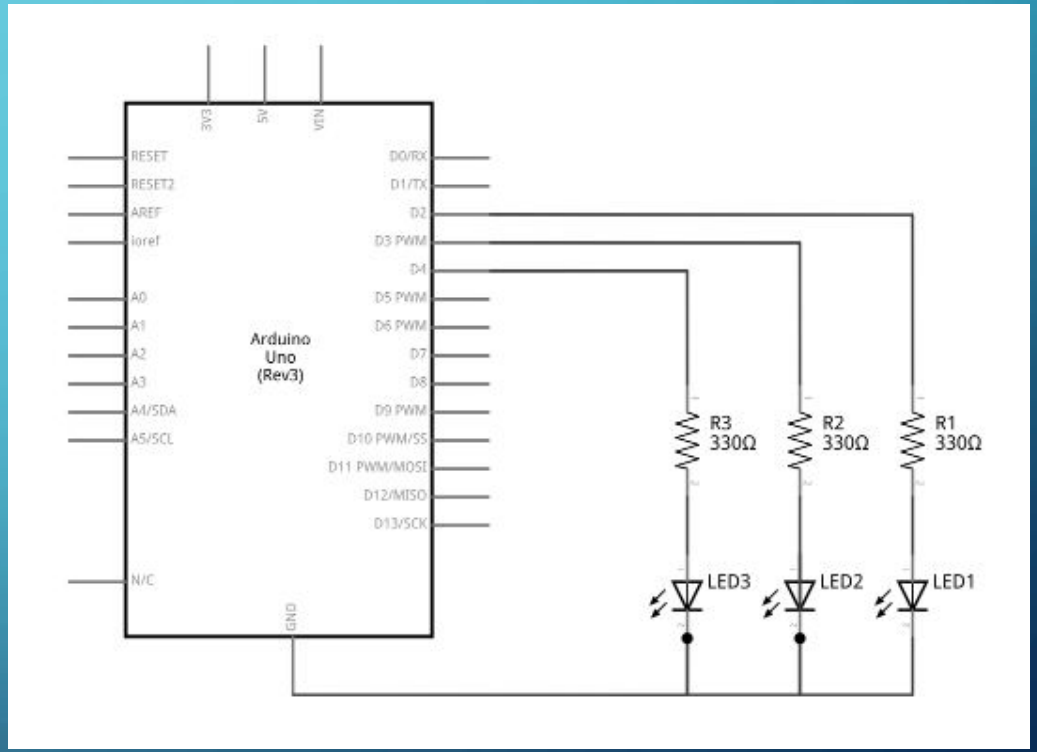
TRAFFIC LIGHTS

FIRST TASK

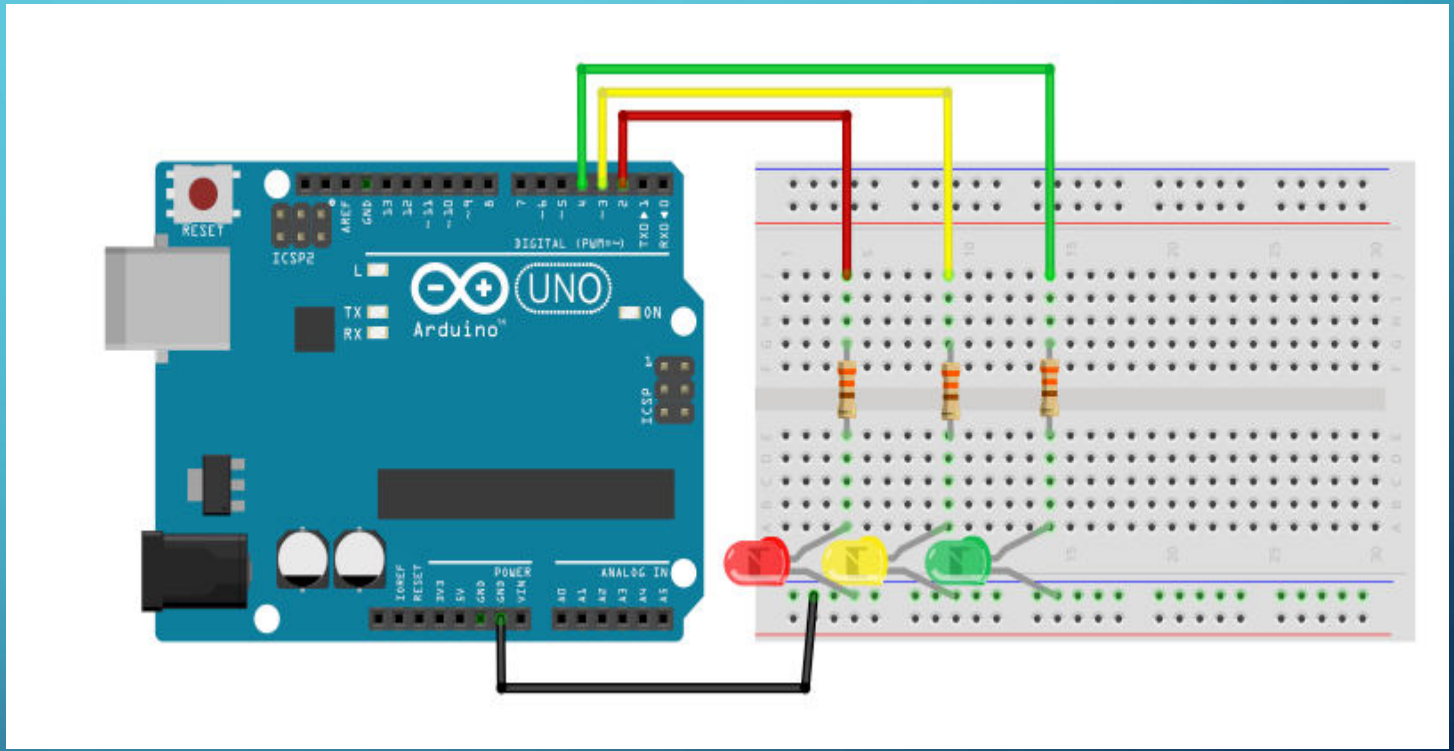
Connect three leds to the microcontroller - red, yellow and green. Write a program that will turn the diodes on and off as follows - at the beginning the red light is on and it lasts for three seconds. Then the red and yellow lights shine together for one second. After that, only the green light illuminates for three seconds. In the end, only the yellow light illuminates for one second. At the end of the cycle, it starts from the beginning.



SCHEME


3V3
5V
VIN
RESET
RESET2
AREF
ioref
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
Arduino
Uno
(Rev3)
R3
330Ω
R2
330Ω
R1
330Ω
LED3
LED2
LED1

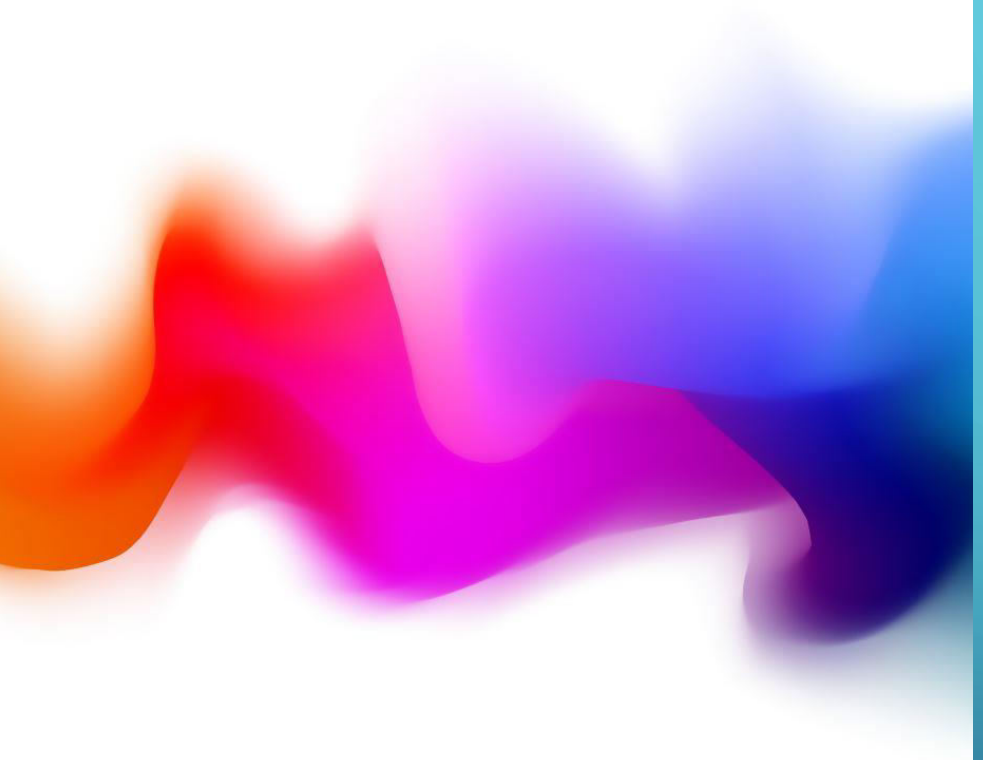
EXPERIMENTAL TILE



SOLUTION

```
int ledRed = 2;                  //define ledRed = 2
int ledYellow = 3;                //define ledYellow = 3
int ledGreen = 4;                 // define ledGreen = 4

void setup() {

pinMode(ledRed, OUTPUT);     //set statement ledRed as
output
pinMode(ledYellow, OUTPUT);   //set statement ledYellow as
output
pinMode(ledZelena, OUTPUT);     //set statement ledGreen
as output

 digitalWrite(ledRed, LOW);      //turn off the ledRed -
initial state
 digitalWrite(ledYellow, LOW);   // turn off the ledYellow
- initial state
  digitalWrite(ledGreen, LOW);   ////turn off the ledGreen
- initial state

}
```

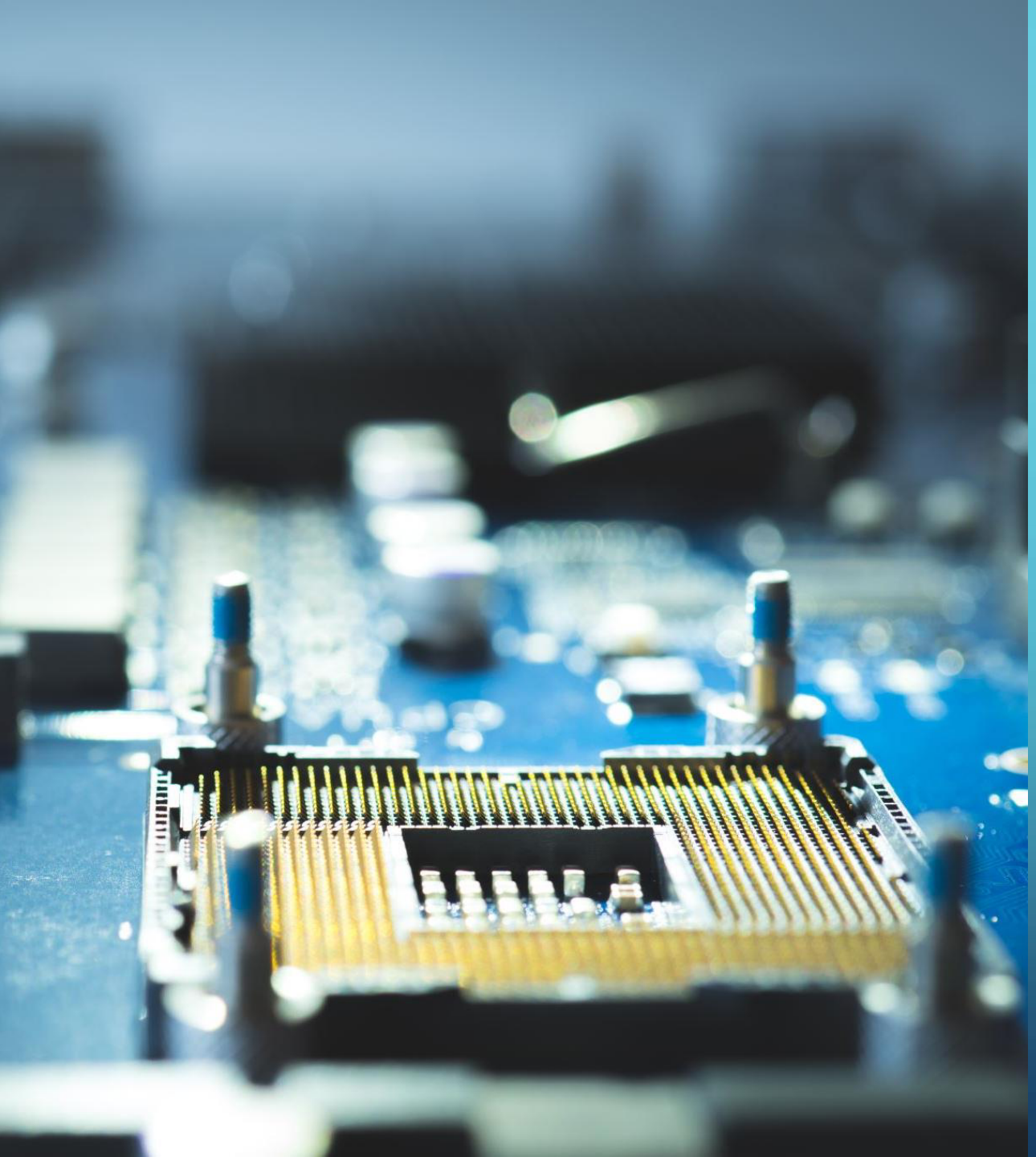
```
void loop() {

     digitalWrite(ledRed, HIGH);  // turn on the ledRed
delay(3000);                      //wait 3 s – bright
ledRed
     digitalWrite(ledYellow, HIGH);    // // turn on
the ledYellow
delay(1000);                  //wait 1 s - bright R+Y
     digitalWrite(ledRed, LOW);   // turn off the
ledRed
     digitalWrite(ledYellow, LOW);     // turn off the
ledYellow
     digitalWrite(ledZelena, HIGH);  // turn on the
ledGreen  delay(3000);                    //wait 3 s -
bright G
    digitalWrite(ledZelena, LOW);   // turn off the
ledGreen
    digitalWrite(ledYellow, HIGH);    //turn on the
ledYellow
delay(1000);                      //wait 1 s - bright Y
digitalWrite(ledYellow, LOW);     //turn off the
ledYellow

}
```



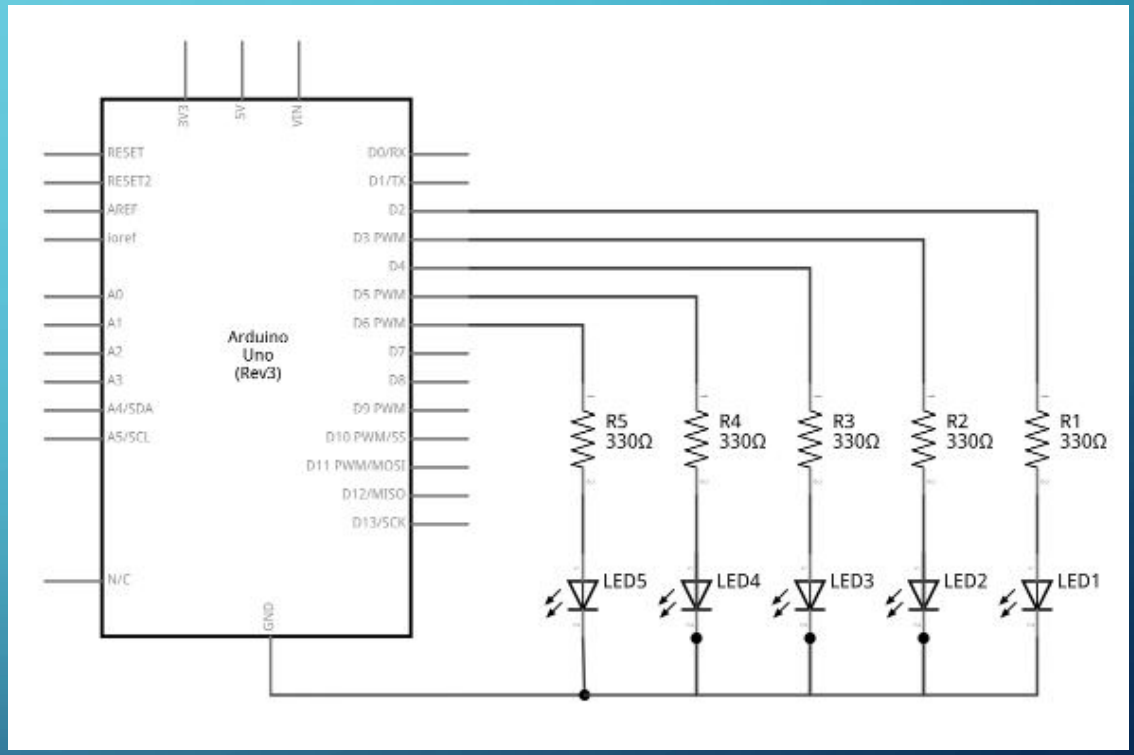
TRAFFIC LIGHTS

SECOND TASK

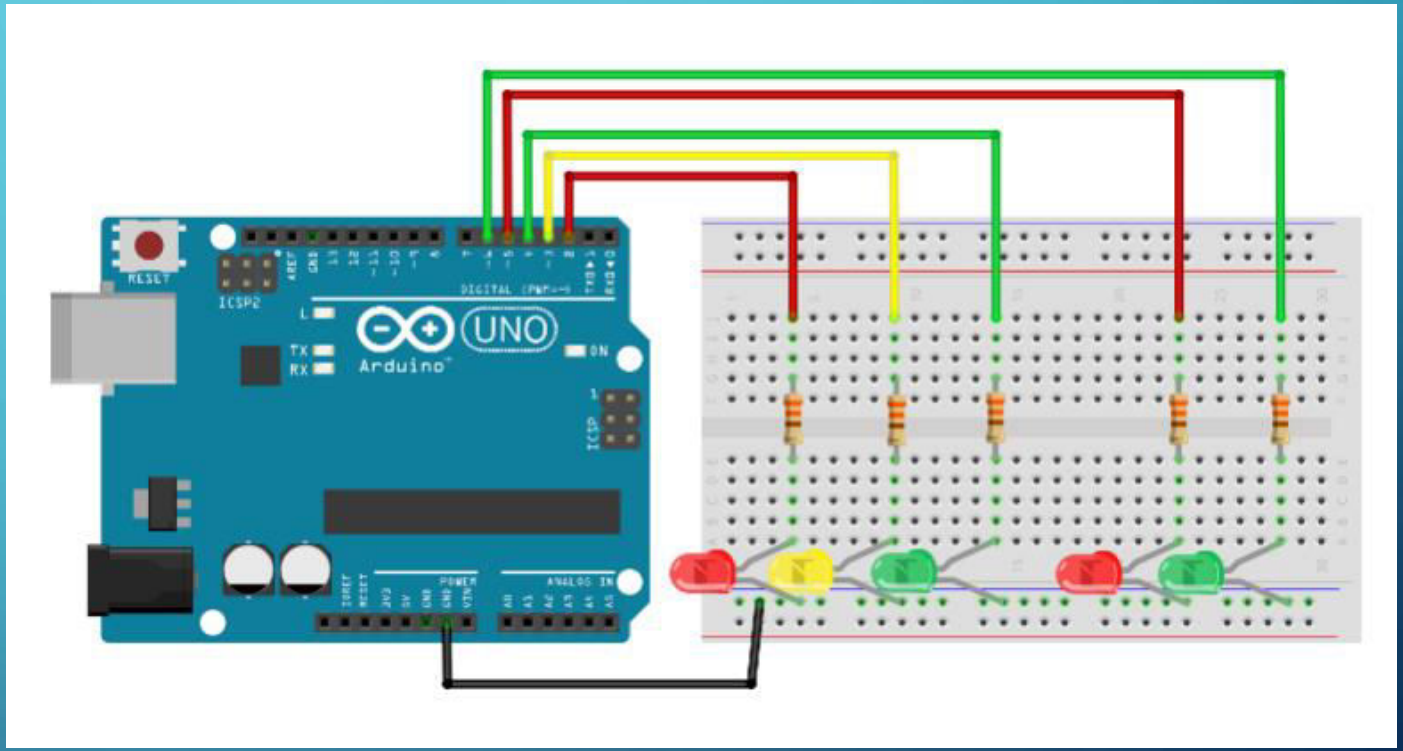
Connect two additional LEDs to the microcontroller - one red and one green which represent a pedestrian traffic light. The traffic light for cars works in the same way as in the previous task. The green light at the pedestrian traffic light only comes on when only the red light is on at the car traffic light. In all other cases, the red light at the pedestrian traffic light.



SCHEME


3V3
5V
VIN
RESET
RESET2
AREF
Ioref
A0
A1
A2
A3
A4/SDA
A5/SCL
N/C
D0/RX
D1/TX
D2
D3 PWM
D4
D5 PWM
D6 PWM
D7
D8
D9 PWM
D10 PWM/SS
D11 PWM/MOSI
D12/MISO
D13/SCK
GND
Arduino
Uno
(Rev3)
R5
330Ω
R4
330Ω
R3
330Ω
R2
330Ω
R1
330Ω
LED5
LED4
LED3
LED2
LED1

EXPERIMENTAL TILE



SOLUTION 1/2

```
int ledRed = 2;                  //define ledRed = 2
int ledYellow = 3;               //define ledYellow = 3
int ledGreen = 4;                // define ledGreen = 4
int ledCrvenaP = 5;              //define ledRedP = 5
int ledZelenaP = 6;             //define ledGreenP = 6

void setup() {


    pinMode(ledRed, OUTPUT);  //set statement ledRed
as output
    pinMode(ledYellow, OUTPUT);  //set statement
ledYellow as output
    pinMode(ledGreen, OUTPUT); //set statement
ledGreen as output
    pinMode(ledRedP, OUTPUT);   //set statement
ledRedP as output
    pinMode(ledGreenP, OUTPUT);  //set statement
ledGreenP as output
```

```
    digitalWrite(ledRed, LOW);   //turn off the ledRed -
initial state
    digitalWrite(ledYellow, LOW);  // turn off the
ledYellow - initial state
    digitalWrite(ledZelena, LOW);  // turn off the
ledGreen - initial state
    digitalWrite(ledRedP, LOW);   // turn off the ledRedP -
initial state
    digitalWrite(ledGreenP, LOW);  //turn off the ledGreenP
- initial state
}
```

SOLUTION 2/2

```
void loop() {

digitalWrite(ledRed, HIGH);           //turn on the ledRed

digitalWrite(ledGreenP, HIGH);       // turn on the ledGreenP

delay(3000);                        //wait 3 s - bright R+GP

digitalWrite(ledGreenP, LOW);        // turn off the
ledGreenP
digitalWrite(ledRedP, HIGH);        // turn on the ledRedP

digitalWrite(ledYellow, HIGH);      // turn on the ledYellow

delay(1000);                        //wait 1 s - bright R+Y+RP

digitalWrite(ledRed, LOW);          // turn off the ledRed
digitalWrite(ledYellow, LOW);       // turn off the ledYellow

digitalWrite(ledGreen, HIGH);       // turn on the ledGreen

delay(3000);                        //wait 3 s - bright G+RP

digitalWrite(ledGreen, LOW);        // turn off the ledGreen

digitalWrite(ledYellow, HIGH);      // turn on the ledYellow

delay(1000);                        //wait 1 s - bright Y+RP

digitalWrite(ledYellow, LOW);    // turn off the
ledYellow

digitalWrite(ledRedP, LOW);         // turn off the
ledRedP
}
```