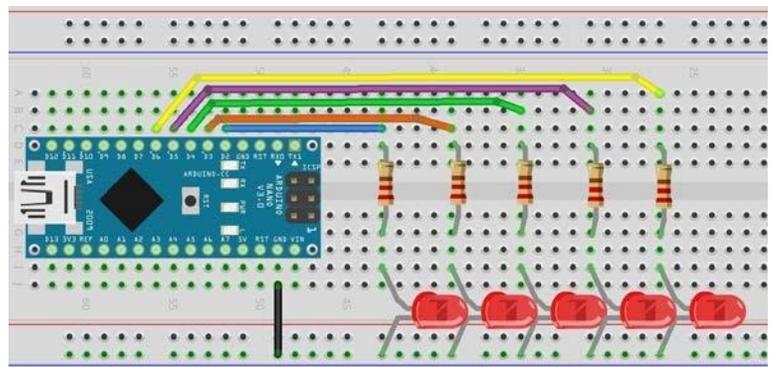
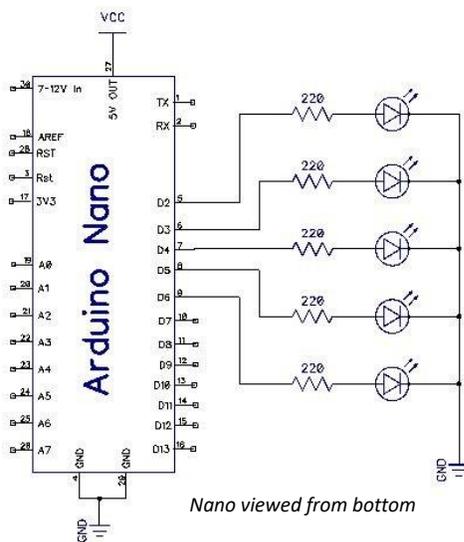


# Introduction to Arduino

## 5 LEDs – Call Function

Note: Marks will be deducted for messy breadboarding (wires need to be flat on board as shown)

1. Now that you've been successful with the Blink lab, it's time to expand your knowledge.
2. Breadboard the following. Connect the 5 - 220Ω resistors to D2-D6, followed by 5 of the same LEDs.



3. The code you used in Lab 1 needs to be expanded to have all 5 LEDs work. Start adding to the code by initializing D2-D6 in the Setup using - `pinMode(xx, OUTPUT)`; Next, in the main part of the program, add 4 more `digitalWrite(xx, HIGH)`; and 4 more `digitalWrite(xx, LOW)`; lines to your code so that ALL 5 LEDs blink on and then off. Finally, change the delay to be only 250ms. The picture to the right shows the completed code.

```
Arduino IDE - _5_led | Arduino 1.0.1
File Edit Sketch Tools Help

_5_led

void setup() {
  // initialize the digital pins as outputs.
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
}

void loop() // the loop routine runs over and over again forever:
{
  digitalWrite(2, HIGH); // set the LED on
  digitalWrite(3, HIGH); // set the LED on
  digitalWrite(4, HIGH); // set the LED on
  digitalWrite(5, HIGH); // set the LED on
  digitalWrite(6, HIGH); // set the LED on

  delay(250); //delays for 1/4 of a second

  digitalWrite(2, LOW); // set the LED off
  digitalWrite(3, LOW); // set the LED off
  digitalWrite(4, LOW); // set the LED off
  digitalWrite(5, LOW); // set the LED off
  digitalWrite(6, LOW); // set the LED off
}

Done Saving.
```

4. Now, using the structure of the ON/OFF code on the previous page, copy and paste it SEVERAL TIME and then make the 5 LEDs advance one at a time from left to right and then back continuously. A hint is to use the code in the box to the right. Just advance the “HIGH” from D2 to D3, to D4, etc for each grouping of 5 `digitalWrite`'s

```
digitalWrite (2, HIGH);
digitalWrite (3, LOW);
digitalWrite (4, LOW);
digitalWrite (5, LOW);
digitalWrite (6, LOW);

delay (250);

digitalWrite (2, LOW);
digitalWrite (3, HIGH);
digitalWrite (4, LOW);
digitalWrite (5, LOW);
digitalWrite (6, LOW);
```

## Show the teacher the working back and forth sequence. Save your program!!!

5. Finally, you are going to create a 5 LED light show that will be able to do the following;
- Turn on All 5 LEDs at once
  - Turn off All 5 LEDs at once
  - Sequence from left to right, then back right to left
  - Sequence outside to inside
  - Sequence inside to outside

6. Start a new file and copy the code from the right into it. In the example code to the right there is a **VARIABLE** at the very top “`int setdelay = 250;`”. A variable can be used, as in this case, to store a number that can be inserted wherever the word “`setdelay`” is written in your code. In this example, “`delay (setdelay);`” really means “`delay (250);`”. This allows you to make 1 change at the top of your code to slow down or speed up you lightshow instead of scrolling through your program and changing it several lines. You might want to use several variables?

7. The “`void setup()`” sets the initializing of the digital pins you will use as outputs. Next is the `void loop ()`. A good programmer will organize different aspects of code into “Functions” (mini programs that ‘do’ something) and “Call” these when needed. You will notice in the `void loop()` that there are 2 functions that are being called; `all_on()` and `all_off()`. Below the `void loop()` you will see the function `void all_on()` which turns all the LEDs on and the function `void all_off()` which turns the LEDs off.

```
int setdelay = 250;

void setup() {
  // initialize the digital pin as an output.
  pinMode(2, OUTPUT);
  pinMode(3, OUTPUT);
  pinMode(4, OUTPUT);
  pinMode(5, OUTPUT);
  pinMode(6, OUTPUT);
}

void loop() // call/run functions
{
  all_on();
  delay (setdelay);
  all_off();
  delay (setdelay);
}

//.....
void all_on () // a 'function' to turn all on
{
  digitalWrite(6, HIGH); // set the LED on
  digitalWrite(5, HIGH); // set the LED on
  digitalWrite(4, HIGH); // set the LED on
  digitalWrite(3, HIGH); // set the LED on
  digitalWrite(2, HIGH); // set the LED on
}

//.....
void all_off () // a 'function' to turn all off
{
  digitalWrite(6, LOW); // set the LED off
  digitalWrite(5, LOW); // set the LED off
  digitalWrite(4, LOW); // set the LED off
  digitalWrite(3, LOW); // set the LED off
  digitalWrite(2, LOW); // set the LED off
}
```

8. Upload the code and they should flash all on and then all off.
9. Your task is to add 3 more **'FUNCTIONS'** and code these to perform the named operations
  - a. void left\_right()
  - b. void out\_in()
  - c. void in\_out()

Then, **"call"** each of the 5 different functions in the void loop() to make the lightshow using the 5 LEDs.

10. Complete the 5 LED lightshow using 5 additional functions of your own design. Call your functions. Your final program should consist of at least 10 functions that will then repeat over and over again, or in other words, 'loop'.

**Show the teacher the working lab and code. It should turn off/on, sequence back and forth, and sequence in/out**

***Marks will be deducted if the wires on the breadboard are not flat like shown above!!!!***