

Experiment No. 01 – Interfacing Simple Output Devices**Part 1 – LED Blink with Delay****Equipment List:**

1. 1x Arduino Nano
2. 1x USB 2.0 to USB type A connecting cable
3. 1x Breadboard
4. 1x 330 Ω Resistor
5. 1x LED (any color)

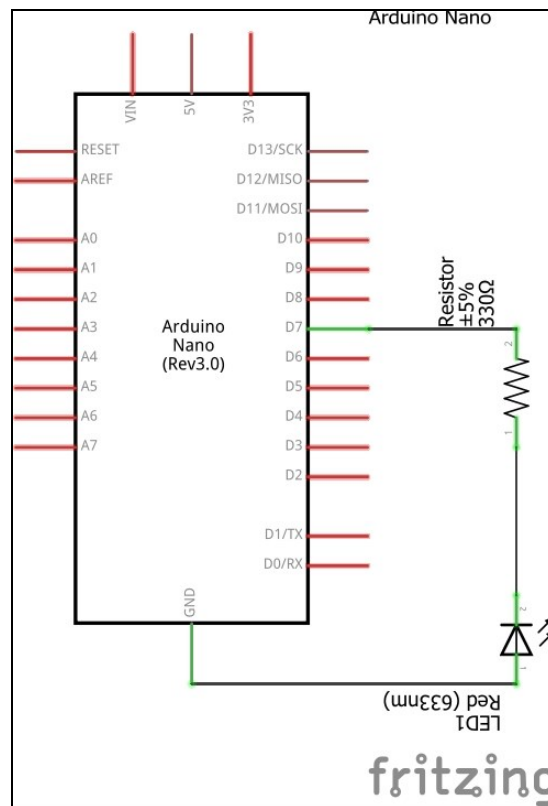
Schematic Diagram:

Figure 1 - Exp. 01 - Part 1 - LED Blinking with delay

Experiment Setup:

- Connect the LED with any digital pin of the Arduino (in the diagram the pin number is 7).
- Open Arduino IDE.
- Compile and upload given code to the development board.
- Analyze the output.

Code:

```
void setup() {  
  int led_pin = 7;  
  pinMode(led_pin, OUTPUT);    // Initialize the LED_BUILTIN pin as an output  
}  
  
// the loop function runs over and over again forever  
void loop() {  
  digitalWrite(led_pin, LOW);  // Turn the LED on (Note that LOW is the  
                               // voltage level  
  delay(1000);                 // Wait for a second  
  digitalWrite(led_pin, HIGH); // Turn the LED off by making the voltage HIGH  
  delay(1000);                 // Wait for one second (to demonstrate the  
                               // active low LED)  
}
```

Expected Output:

- The connected LED should blink with an interval of 1 second.

Part 2 – LED Fade with Delay**Equipment List:**

1. 1x Arduino Nano
2. 1x USB 2.0 to USB type A connecting cable
3. 1x Breadboard
4. 1x 330Ω Resistor
5. 1x LED (any color)

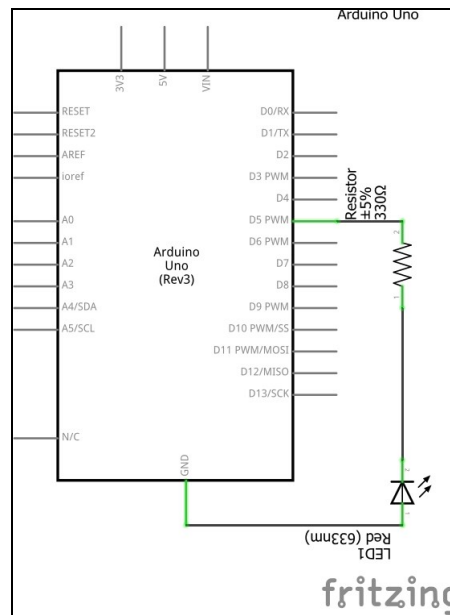
Schematic Diagram:

Figure 2 - Exp. 01 - Part 2 - LED fading with delay

Experiment Setup:

- Connect the LED with any PWM pin of the Arduino (in this case the pin number is 5).
- Open Arduino IDE.
- Compile and upload given code to the development board.
- Analyze the output.

Code:

```
int led = 5;           // the PWM pin the LED is attached to
int brightness = 0;    // how bright the LED is
int fadeAmount = 5;    // how many points to fade the LED by

// the setup routine runs once when you press reset:
void setup() {
  // declare pin 5 to be an output:
  pinMode(led, OUTPUT);
}

// the loop routine runs over and over again forever:
void loop() {
  // set the brightness of pin 9:
  analogWrite(led, brightness);

  // change the brightness for next time through the loop:
  brightness = brightness + fadeAmount;

  // reverse the direction of the fading at the ends of the fade:
  if (brightness <= 0 || brightness >= 255) {
    fadeAmount = -fadeAmount;
  }
  // wait for 30 milliseconds to see the dimming effect
  delay(30);
}
```

Expected Output:

- The LED should start from lowest brightness and end in highest brightness.
- After reaching highest brightness it will end in lowest brightness.
- The transition delay is 30 ms.
- The smaller the delay, the faster the transition.

Tasks:

1. Connect three LED's with your Arduino and do the following:
 - a. All LED's will blink at the same time.
 - b. LED's will alternately blink.
 - c. At a time two LED's will blink and the third one will be switched off.
2. Connect two LED's with your Arduino and do the following:
 - a. Both LED's will fade at the same time.
 - b. Each LED will fade in reverse direction, i.e. if one LED is going to brighter state then the other will go to darker state.