

## EXERCISE NO. 2

### Blinking LED

**Objectives:** Connecting and operating LED connected to the digital outputs of an Arduino.

**Equipment needed:**

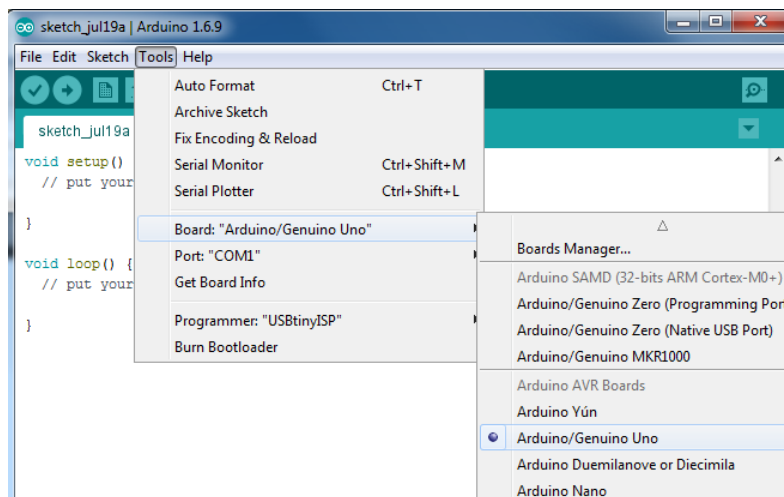
1. A computer (Windows, Mac, or Linux).
2. An Arduino-compatible microcontroller.
3. A USB A-to-B cable.
4. Budget Pack for Arduino (<https://www.adafruit.com/product/193>)

In the last lab experiment we have installed the software and also finished connected the Arduino to the right communication port on your computer. In this lab we will learn how to connect a device (LED in our case) and control it.

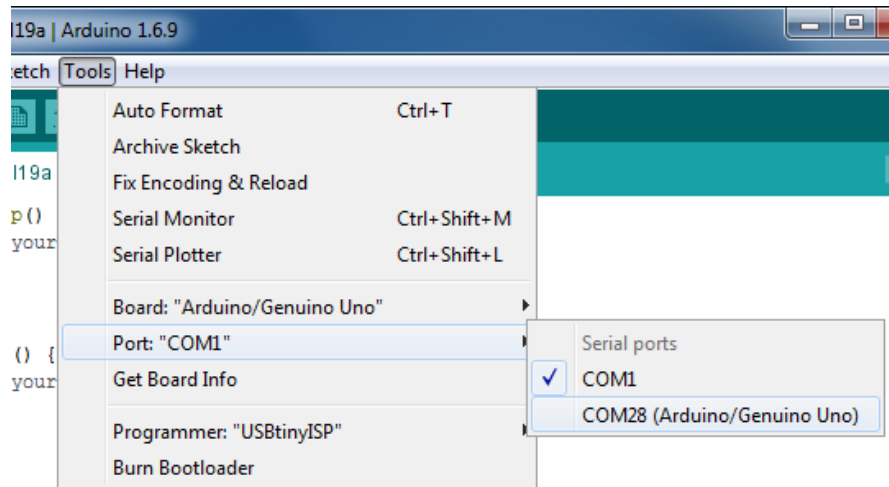
**Procedure:**

**Part 1: Connecting Arduino to the computer**

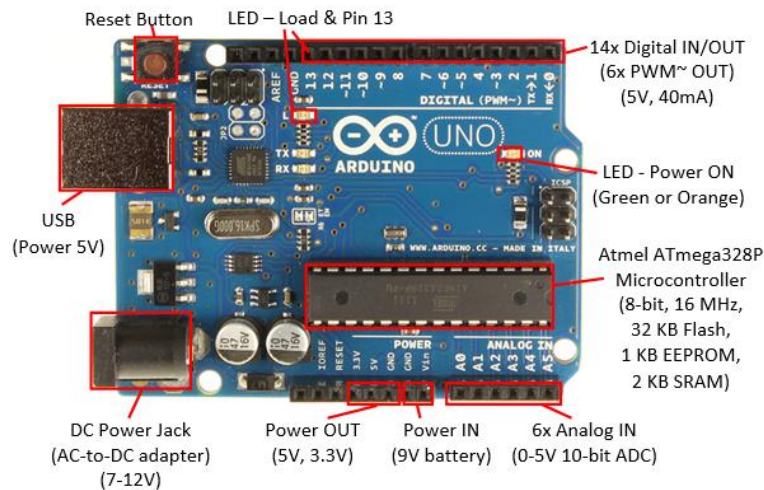
1. Open the Arduino IDE by clicking on the Arduino Icon.
2. Connect your Arduino to the computer using the USB cable.
3. Make sure you select the right board (see below screen-shot)



4. Then select the correct serial port. (see below screen-shot)

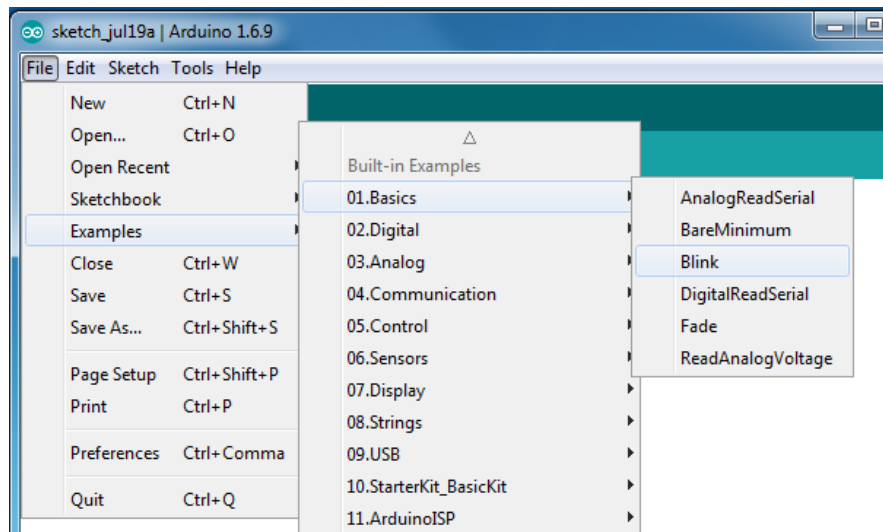


## Part 2: Compiling and Uploading file to the Arduino

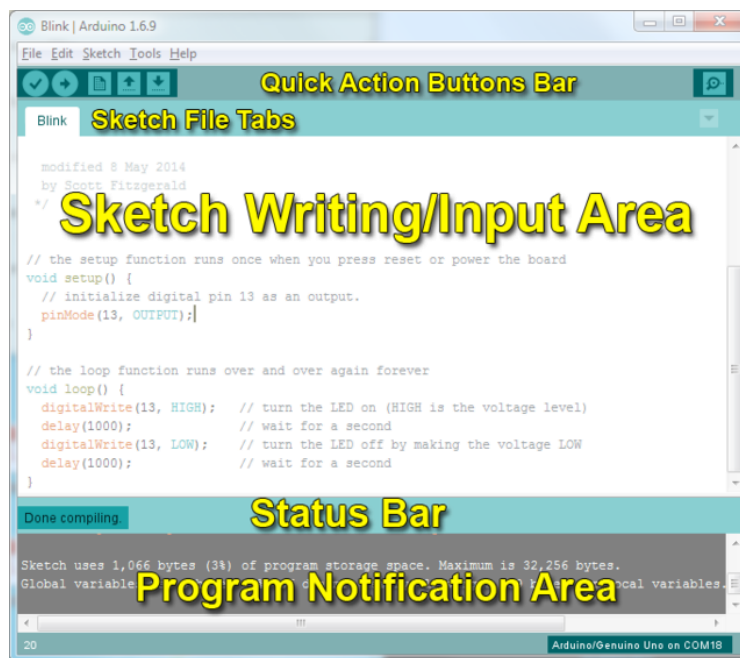


### Pinout of Arduino UNO

1. Once you see your Arduino board is connected to your computer. Go to the **File** menu -> **Examples** -> **01.Basics** -> **Blink**.



2. This should open up a new window that has a tab labeled **Blink**. See below screen-shot for description.

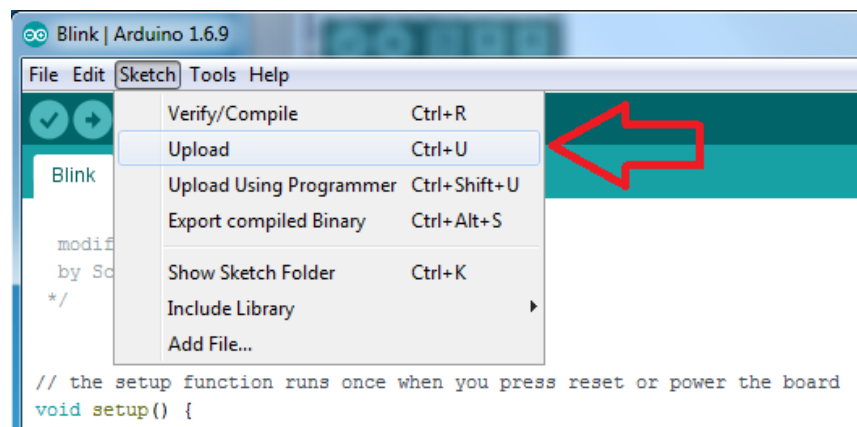


3. Then click on the Sketch menu and check for any typos / errors using verify button and Compile to the machine language if the verification is successful.

4. If the above process is successful, you should see the message in the status bar showing that the compilation is successful.
5. Now upload your program to the Arduino by clicking upload button in the Sketch menu.
6. You might face some issues from step 3-5 if you have not selected a correct board/serial port. So please make sure you went through the part 1 carefully.

### Part 3: Blinking LED

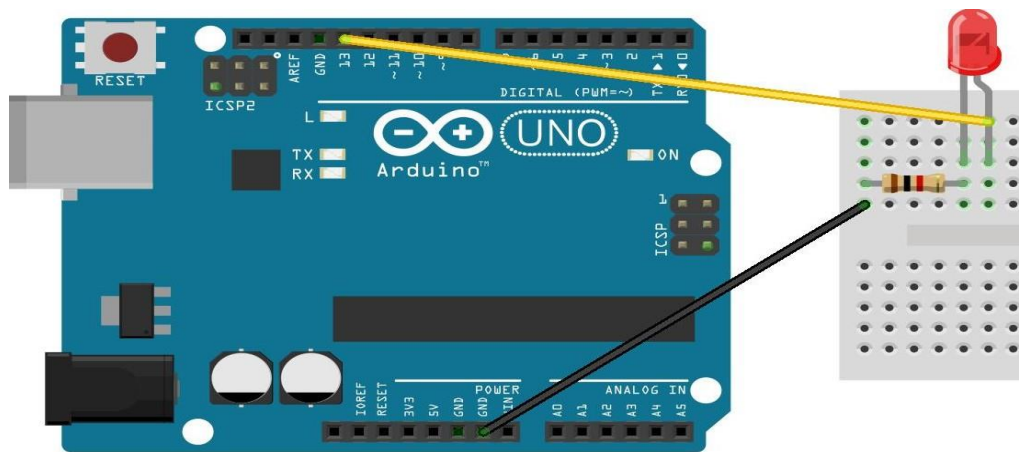
1. In the above **Blink** code you see bunch of lines performing certain operations. In our case, turning on and off an LED connected to the Digital pin 13.
2. Most Arduinos have an on-board LED that is attached to digital pin 13. So, you must see the LED on your board starting to blink. (In some cases, the boards are pre-installed with the program. So the LED starts to blink once you have powered the Arduino )



In the code you can see that the OUTPUT is being taken from the digital pin 13. We can change the output of the board by just changing the output pin numbers, i.e., see what happens if you replace 13 with 12. (You have to upload every time to see the changes)

```
// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin 13 as an output.
  pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000);           // wait for a second
  digitalWrite(13, LOW);  // turn the LED off by making the voltage LOW
  delay(1000);           // wait for a second
}
```



3. Before uploading your new code to the Arduino we have to make sure that LED is connected to the Digital pin 12, if there is nothing connected we don't have a way to see our result. Please follow the below schematic for connecting the LED to the digital pins on the Arduino board. A series resistor is mandatory for the circuit, it prevents the LED from burning out.
4. Now, you have a blinking LED controlled using an Arduino. Now, we can change the LED turn on and off times by editing the time in the software.

```
delay(1000);
```

*// here we are asking Arduino to wait for 1000ms before executing the next instruction.*

Now, try to change the delay times, for both on and off times, and upload the code again. What did you notice?

5. Repeat steps 4 and 5 for all the digital pins from 0-11

Ref: [adafruit.com](https://adafruit.com)

## Report:

Write a report that summarizes this experiment. Your report brief must include:

- a) Cover sheet.
- b) Objective - a short paragraph stating what the experiment is about.
- c) Procedure - a description of the process of conducting the experiment. It should not be a step-by-step account, but rather an overview of what was done.
- d) Discussion - a complete discussion of the results of the experiment and the principals involved. Include the outputs and also the screen captures as needed to support the statements made in this section. Relegate extensive lists of raw data and detailed computations to an appendix as appropriate.
- e) Conclusion - a summary of what you have learned from the experiment.
- f) Appendix - original raw data (initialed by the lab instructor) and details not placed in the discussion section