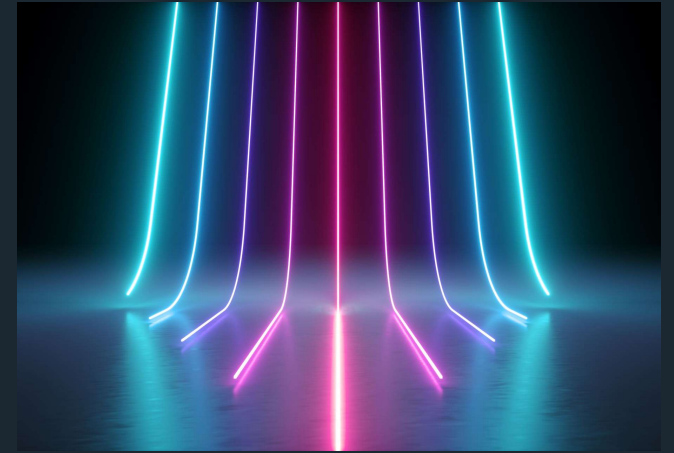

ARDUINO

Beginning with Arduino UNO



WHY ARDUINO SYSTEM?

- Easy use
- Low cost



ARDUINO MODELS

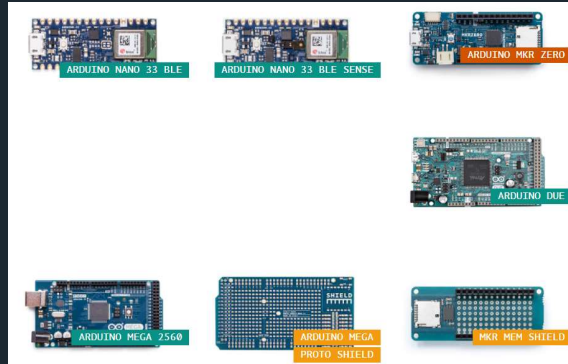
There are several Arduino models, some optimized for space saving, other with many inputs and outputs...

→ <https://www.arduino.cc/en/Main/Products>

Arduino UNO

Enhanced Features

Experience the excitement of more complex projects choosing one of the boards with advanced functionalities, or faster performances.



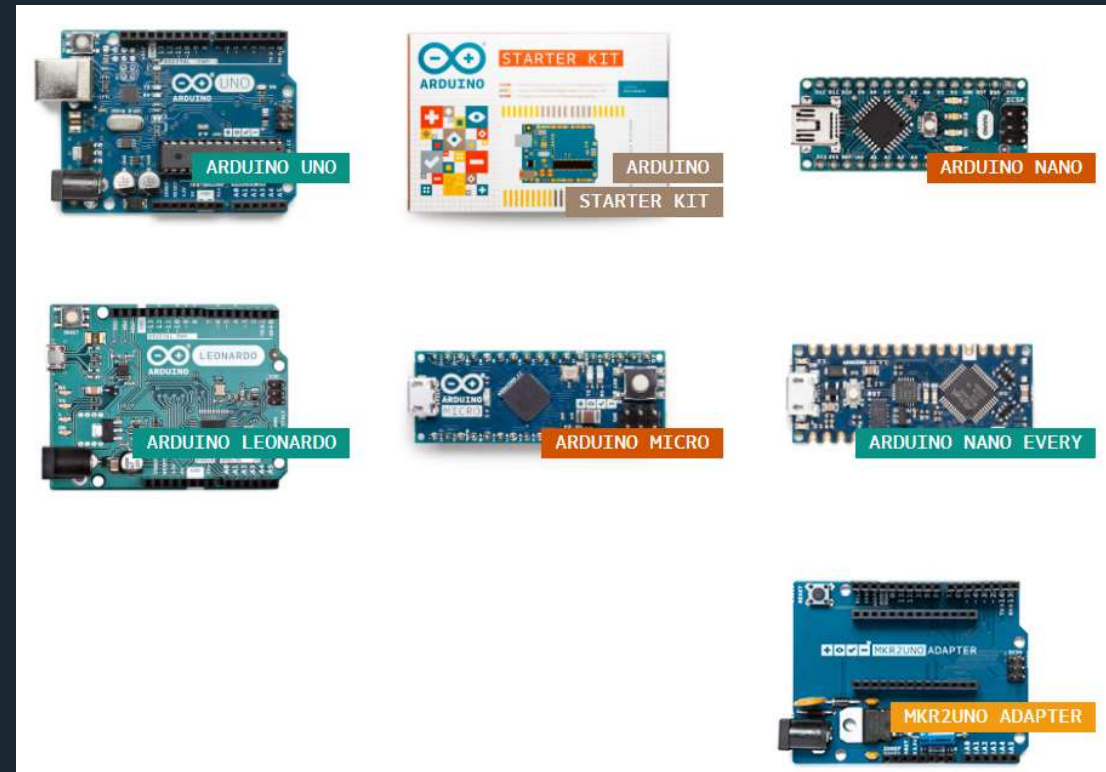
Internet of Things

Make connected devices easily with one of these IoT products and open your creativity with the opportunities of the world wide web.



Entry Level

Get started with Arduino using Entry Level products: easy to use and ready to power your first creative projects. These boards and modules are the best to start learning and tinkering with electronics and coding. The StarterKit includes a book with 15 tutorials that will walk you through the basics up to complex projects.



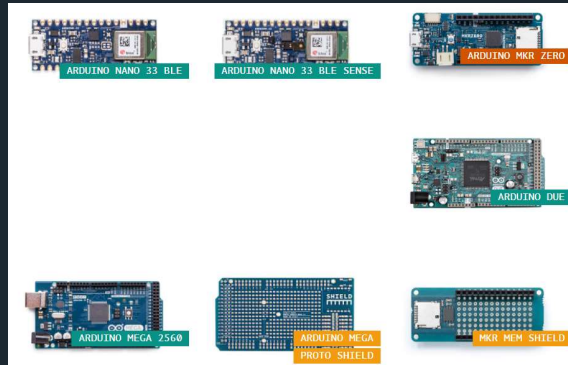
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→ <https://www.arduino.cc/en/Main/Products>³

Arduino UNO

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→ <https://www.arduino.cc/en/Main/Products>

4

We are going to use the model named :

ARDUINO UNO,

*It is the most globally used,
and
with greater availability*



Arduino UNO ADVANTAGES

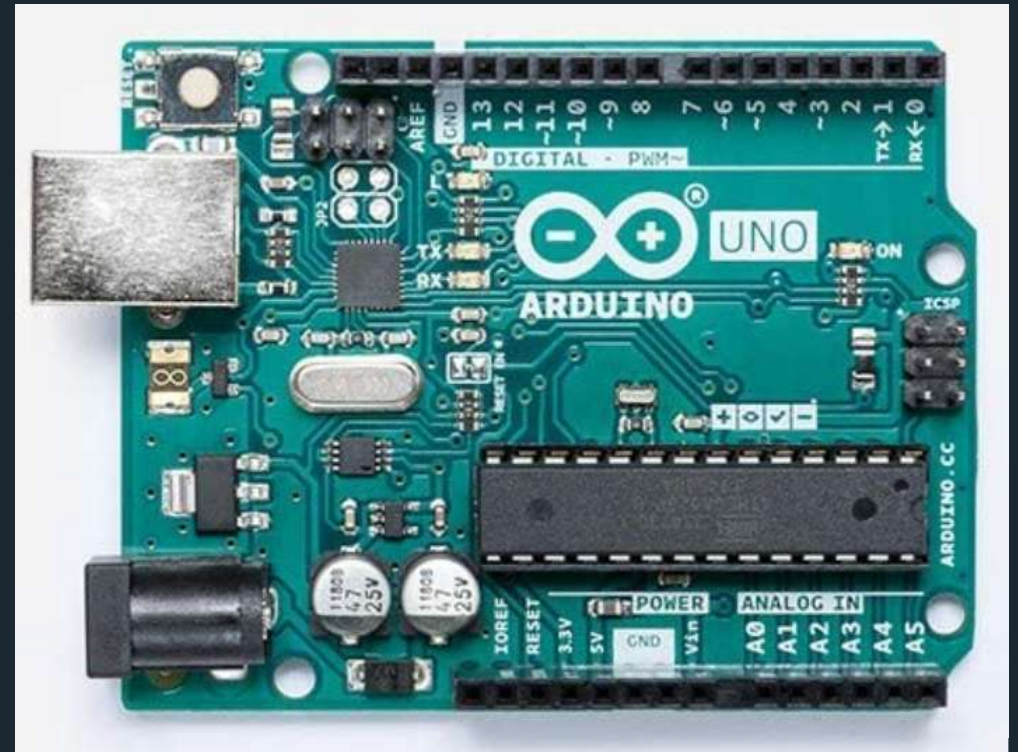
- Good balance inputs – outputs*
- Affordable price*
- Easily programmable*



Arduino UNO

Easily programmable:

- You *don't need* to have programming knowledge
- Used to *introduce students* to the world of programming and robotics



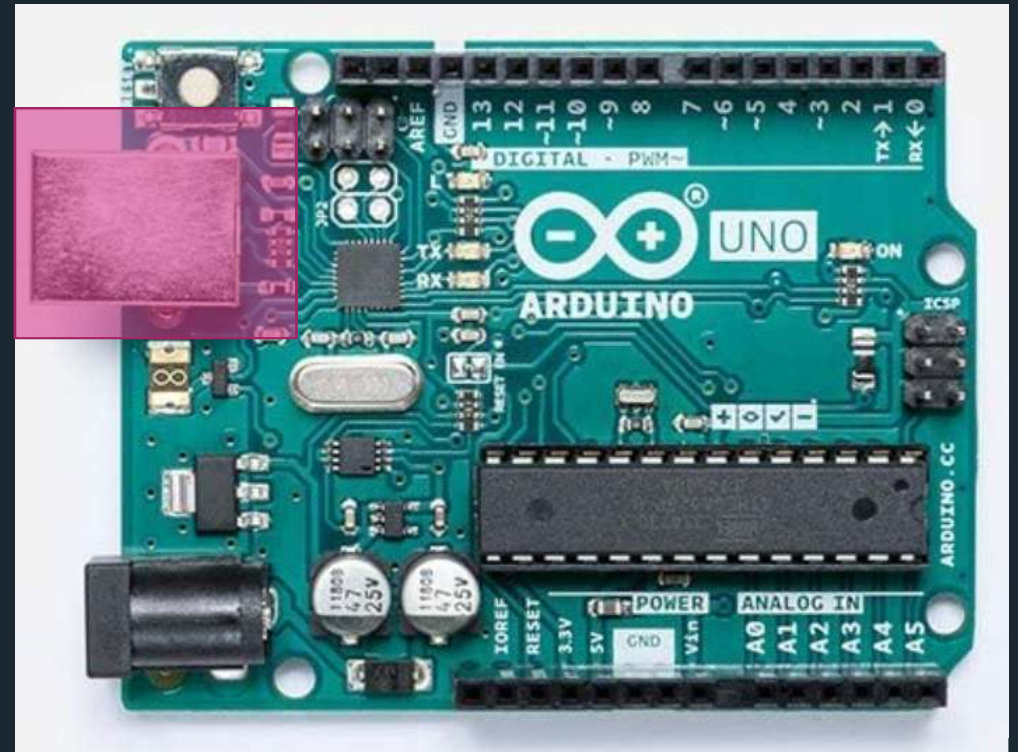
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The major components of Arduino UNO board:

USB Connector

This is a printer **USB port** used to **load a program** from the Arduino ONE onto the Arduino board. The board can also be **powered** through this port using the USB cable from your computer. All you need to do is connect the USB cable to the USB connection.

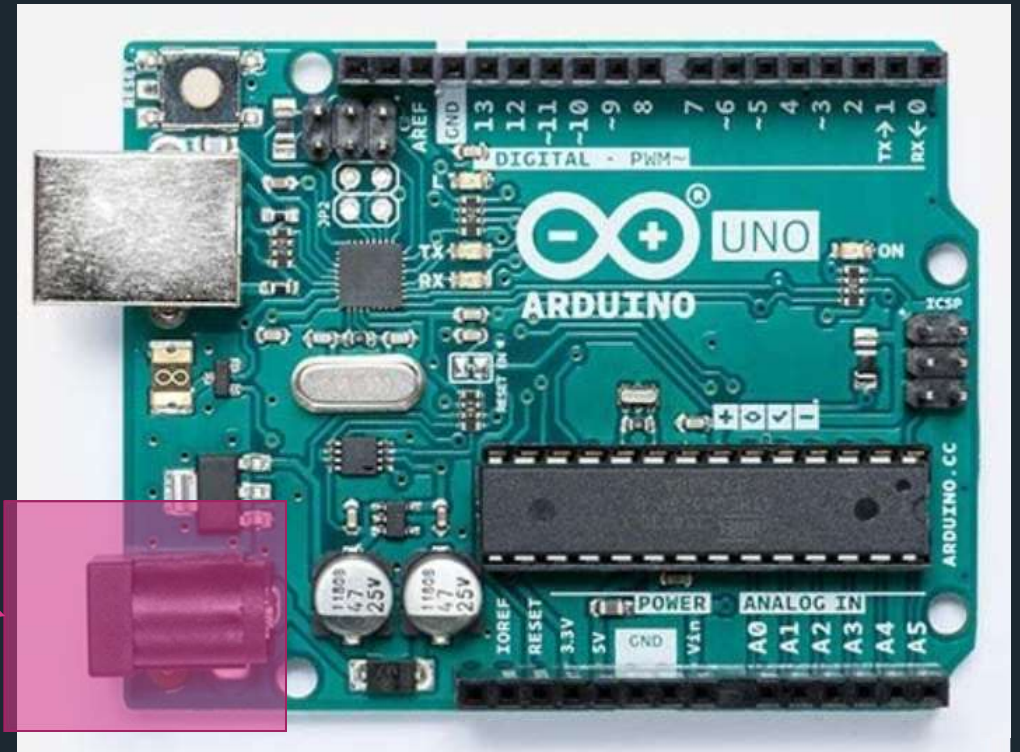
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The major components of Arduino UNO board:

Power (Barrel Jack)

Arduino boards can be *powered directly* from the AC mains power supply by connecting it to the Barrel Jack



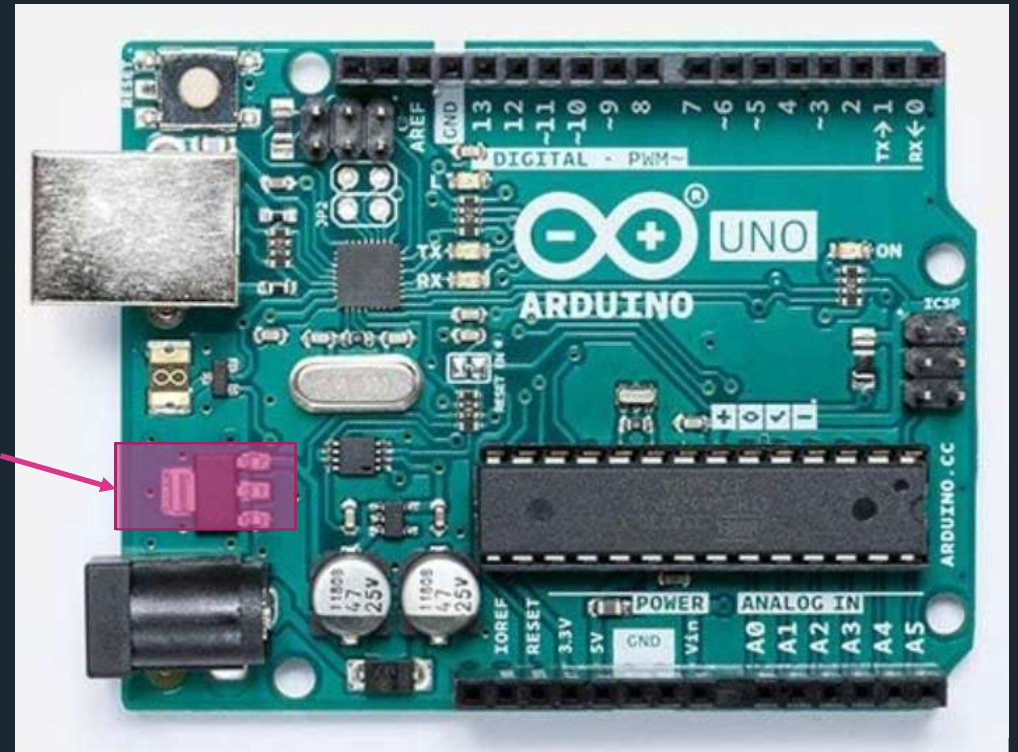
The major components of Arduino UNO board:

The Arduino UNO board operates at a voltage of 5 volts, but it can withstand a maximum voltage of 20 volts. If the board is supplied with a higher voltage, there is a voltage regulator (it sits between the power port and USB connector) that protects the board from burning out.

The major components of Arduino UNO board:

Voltage Regulator

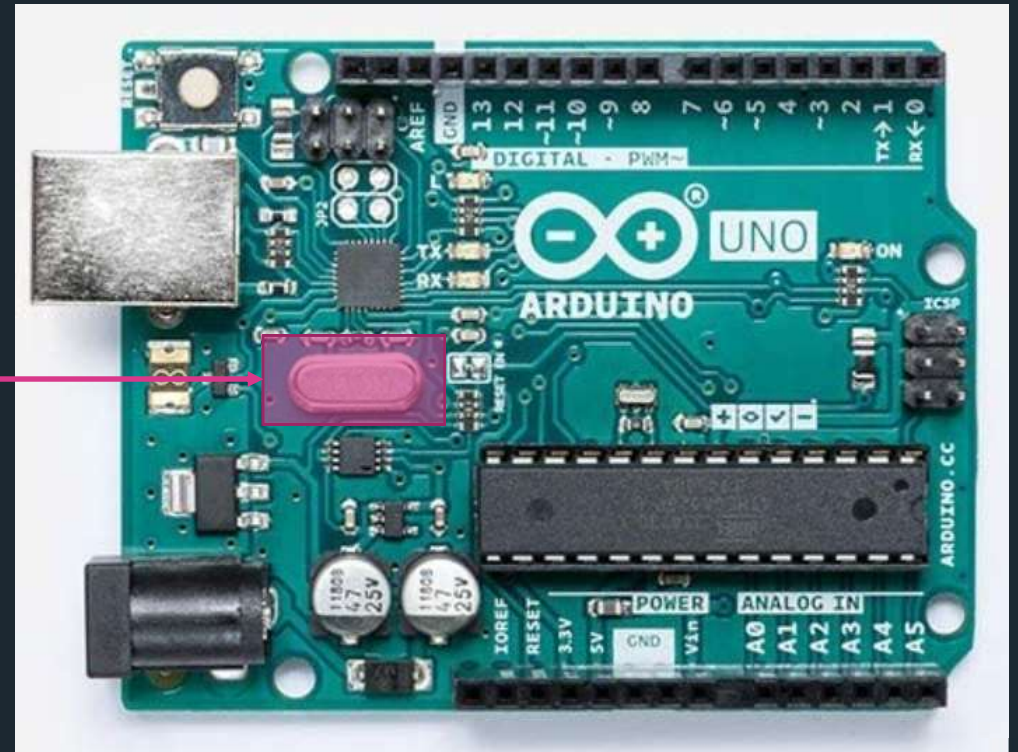
The function of the voltage regulator is to *control the voltage* given to the Arduino board and *stabilize the DC* voltages used by the processor and other elements.



The major components of Arduino UNO board:

Crystal Oscillator

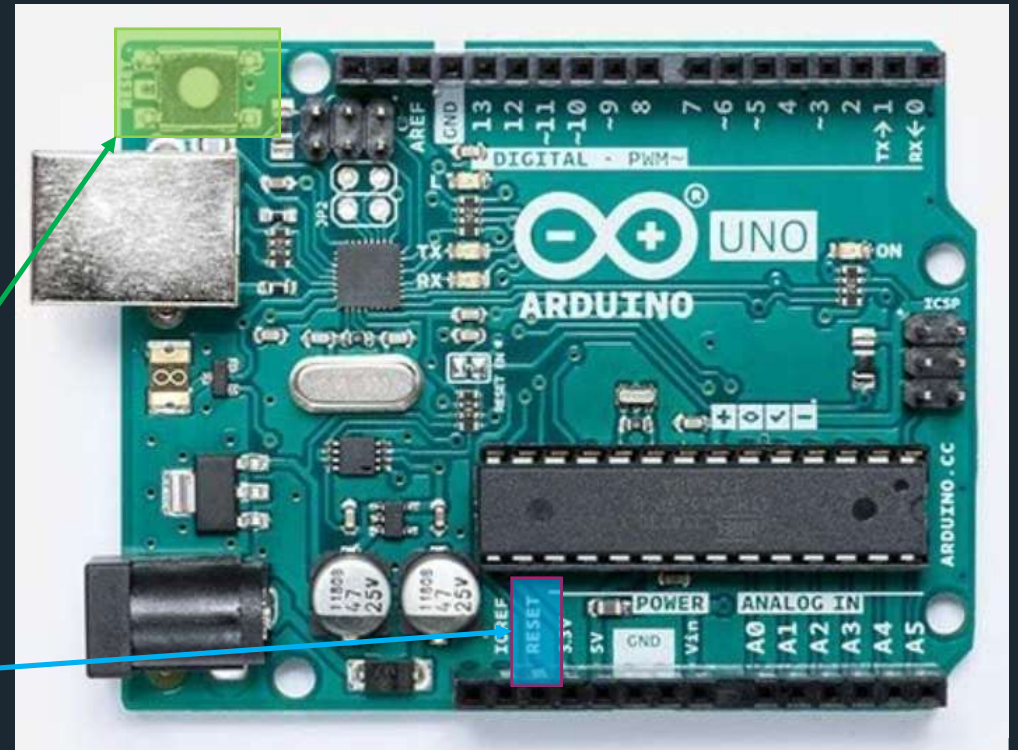
The crystal oscillator helps Arduino in dealing with time issues. How does Arduino *calculate time*? The answer is, by using the crystal oscillator. The number printed on top of the Arduino crystal is 16.000H9H. It tells us that the frequency is 16,000,000 Hertz or 16 MHz



The major components of Arduino UNO board:

Arduino Reset

You can reset your Arduino board, i.e., start your program from the beginning. You can reset the UNO board in two ways. First, by using the *reset button* on the board. Second, you can connect an external reset button to the *Arduino pin labelled RESET*



The major components of Arduino UNO board:

Pins (3.3, 5, GND, Vin)

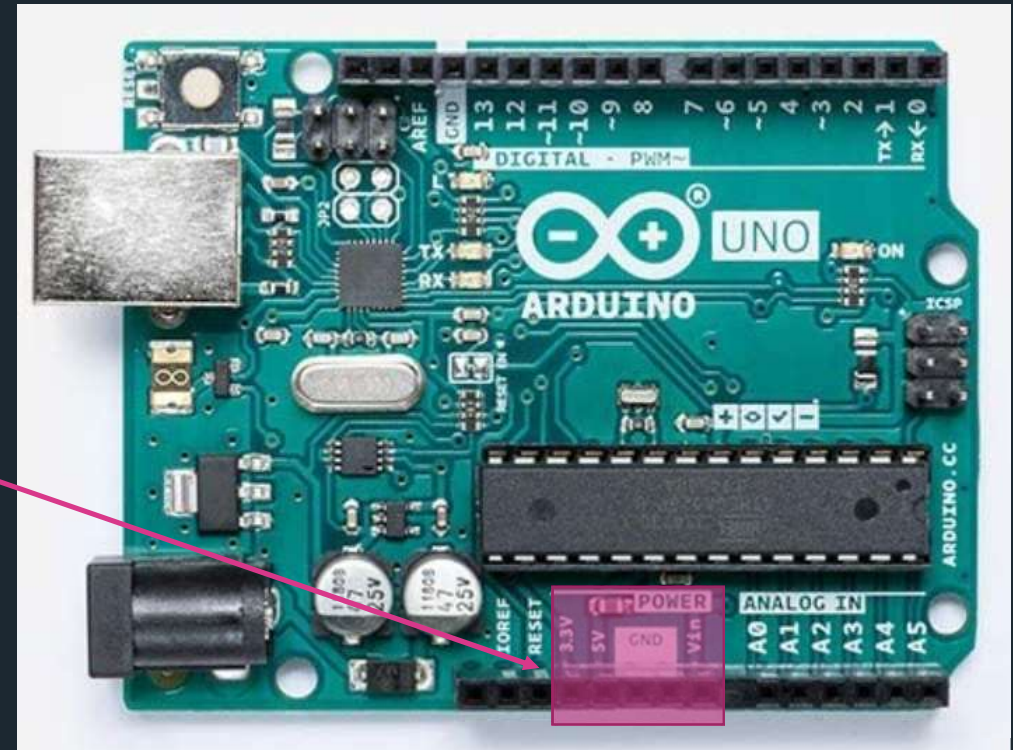
-3.3V – Supply 3.3 output volt

-5V – Supply 5 output volt

Most of the components used with Arduino board works fine with 3.3 volt and 5 volt.

-GND (Ground) – There are several GND pins on the Arduino, any of which can be used to ground your circuit.

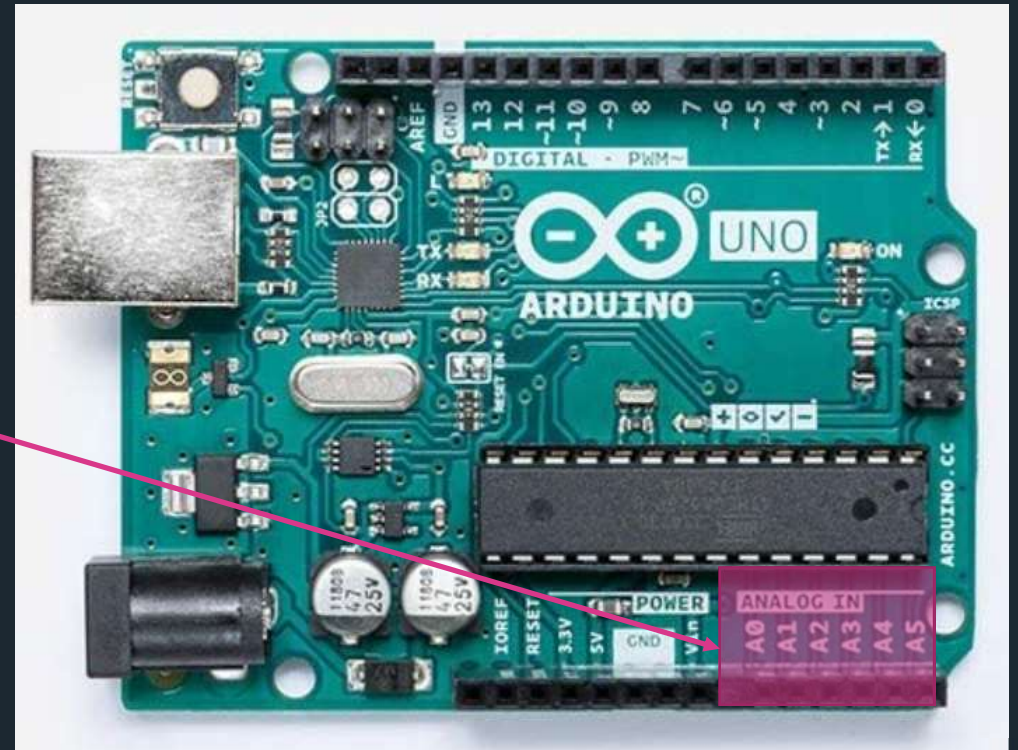
-Vin – This pin also can be used to power the Arduino board from an external power source, like AC mains power supply.



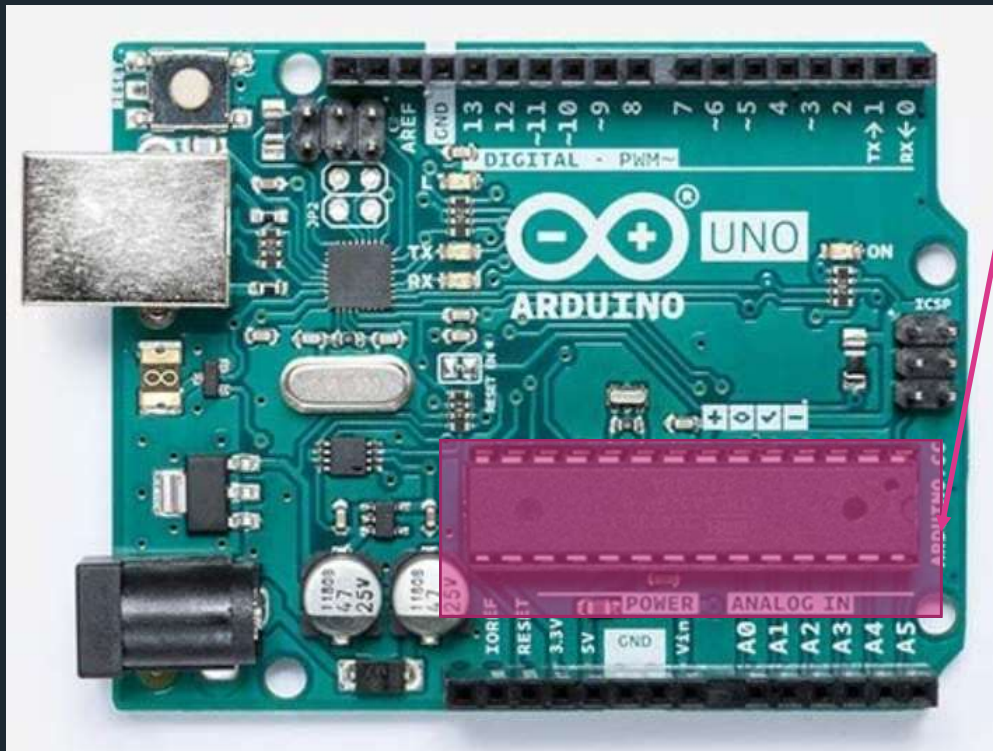
The major components of Arduino UNO board:

Analog pins

The Arduino UNO board has six analog input pins A0 through A5. These pins can read the signal from an *analog sensor* like the *humidity sensor* or *temperature sensor* and convert it into a digital value that can be read by the microprocessor



The major components of Arduino UNO board:



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Main microcontroller

Each Arduino board has its own *microcontroller*. You can assume it as the *brain of your board*. The main IC (integrated circuit) on the Arduino is slightly different from board to board. The microcontrollers are usually of the ATMEL Company. You must know what IC your board has before loading up a new program from the Arduino IDE. This information is available on the top of the IC. For more details about the IC construction and functions, you can refer to the data sheet.

The major components of Arduino UNO board:



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ICSP pin

Mostly, ICSP is an AVR, a tiny programming header for the Arduino consisting of MOSI, MISO, SCK, RESET, VCC, and GND. It is often referred to as an SPI (Serial Peripheral Interface), which could be considered as an "expansion" of the output. Actually, you are slaving the output device to the master of the SPI bus.

The major components of Arduino UNO board:

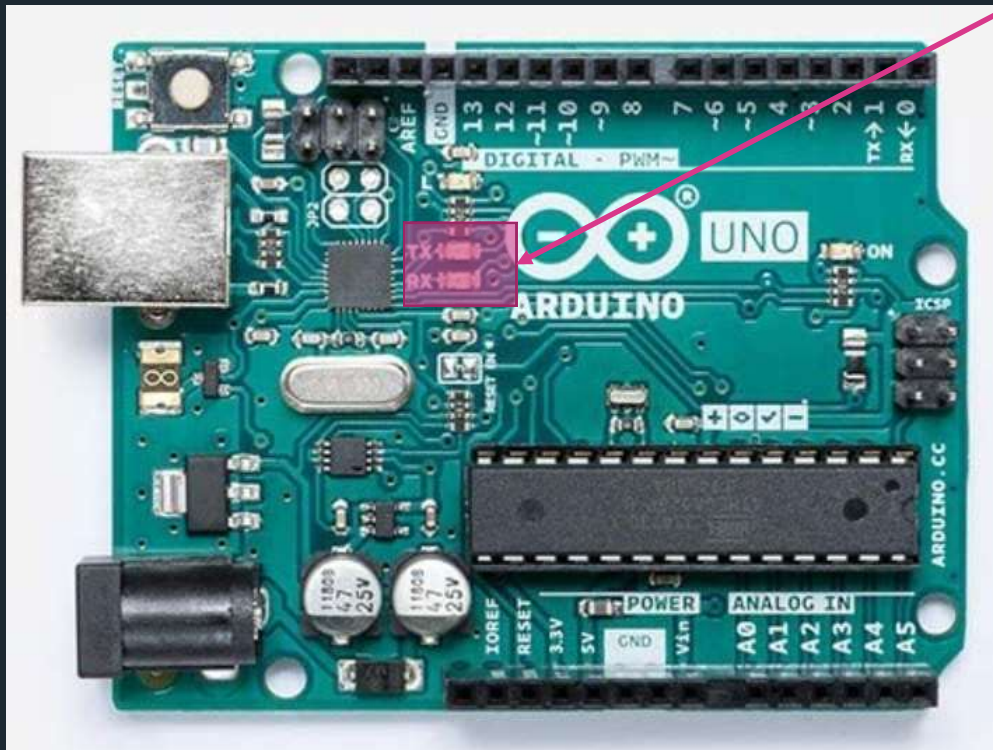


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Power LED indicator

*This LED should light up when you plug your Arduino into a power source to indicate that your **board is powered up correctly**. If this light does not turn on, then there is something wrong with the connection.*

The major components of Arduino UNO board:



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TX and RX LEDs

On your board, you will find two labels: *TX* (transmit) and *RX* (receive). They appear in two places on the Arduino UNO board. First, at the digital pins 0 and 1, to indicate the pins responsible for serial communication. Second, the TX and RX led. The *TX* led flashes with different speed while *sending the serial data*. The speed of flashing depends on the baud rate used by the board. *RX* flashes during the *receiving process*.

The major components of Arduino UNO board:



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Digital I/O

Digital: Across from the analog pins are the digital pins (0 through 13 on the UNO). These pins can be used for both *digital input* (like telling if a button is pushed) and *digital output* (like powering an LED).

The major components of Arduino UNO board:



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Digital I/O

UPWM: You may have noticed the tilde (~) next to some of the digital pins (3, 5, 6, 9, 10, and 11 on the UNO).

These pins act as normal *digital pins*, but can *also* be used for something called *Pulse-Width Modulation* (PWM), *for now*, think of these pins as being able to *simulate analog output* (like fading an LED in and out).

The major components of Arduino UNO board:

AREF

AREF stands for Analog Reference. It is sometimes, used to set an external reference voltage (between 0 and 5 Volts) as the upper limit for the analog input pins.

