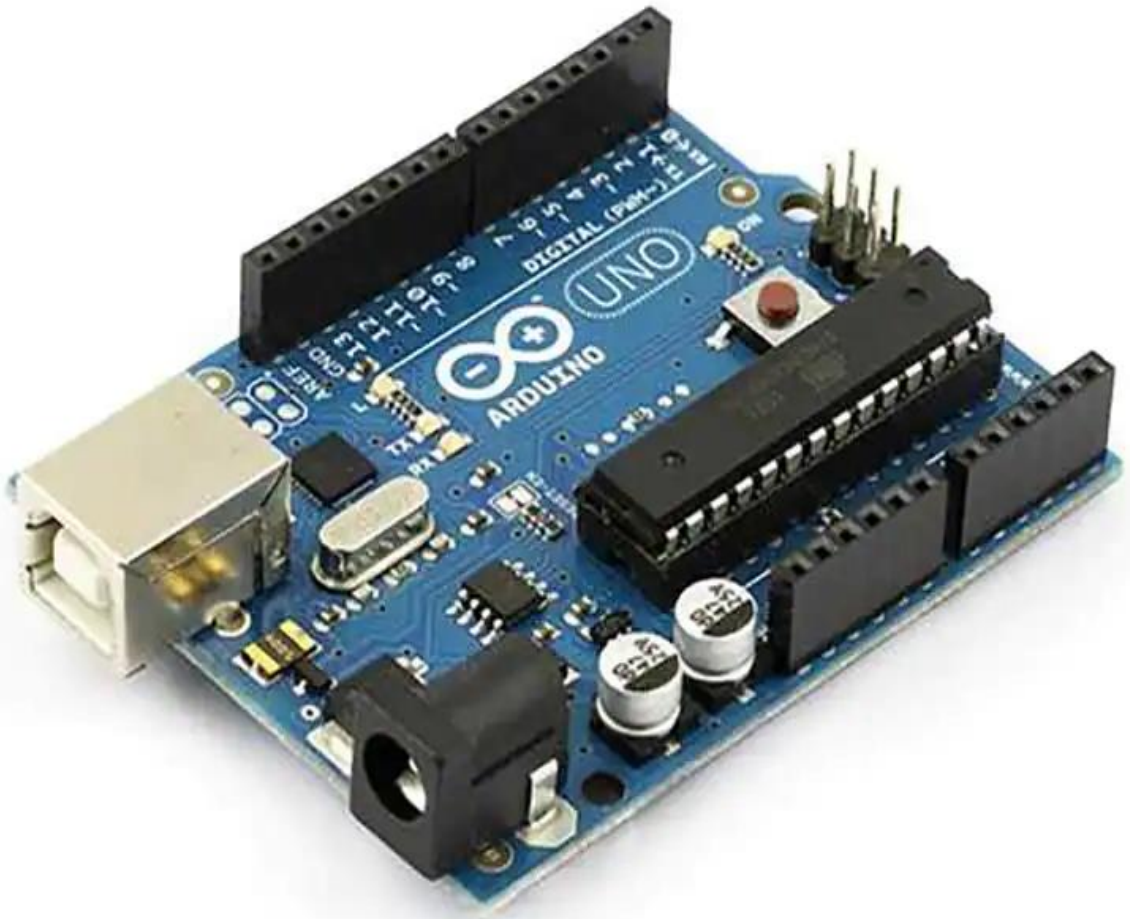
The architecture of Arduino



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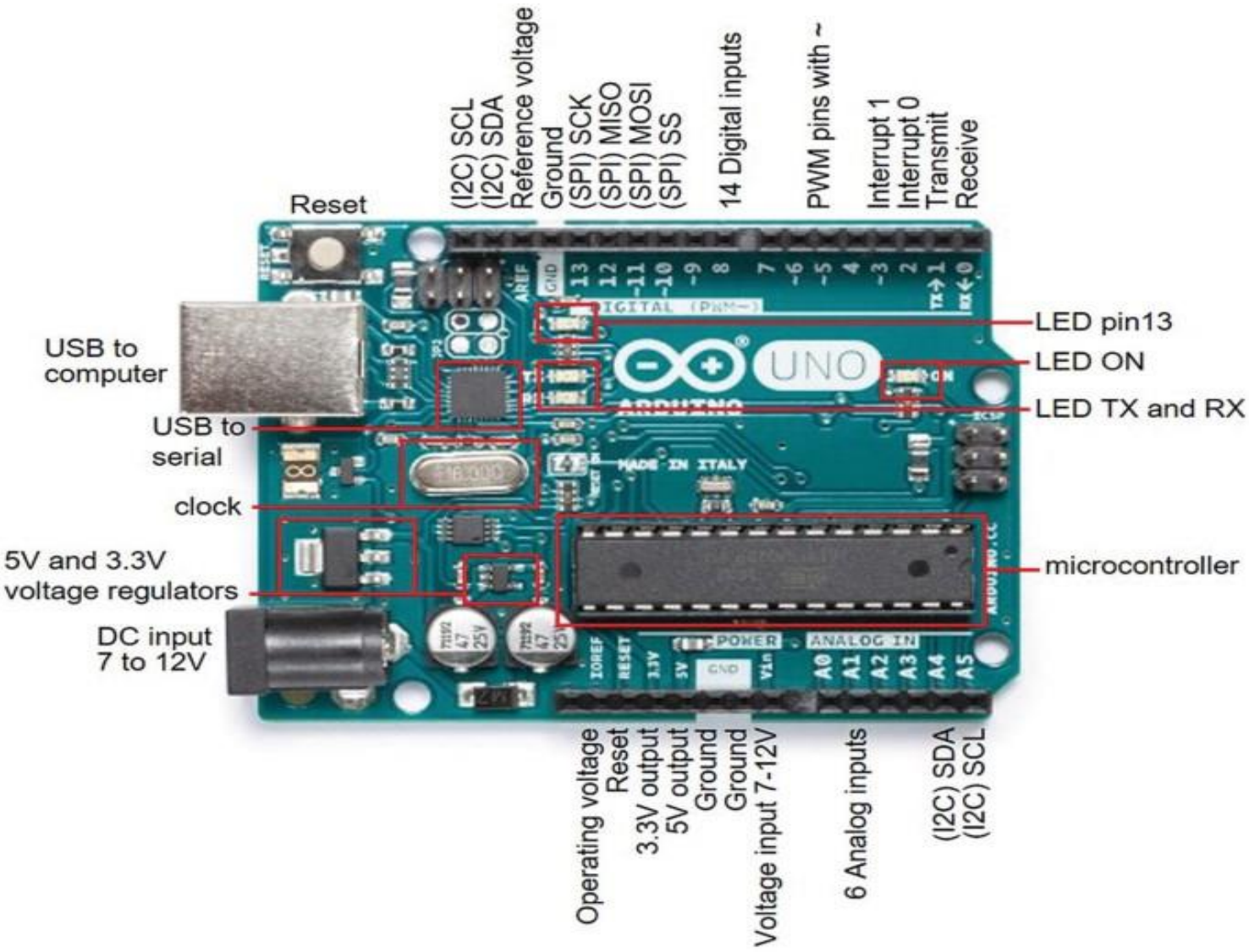


1-Microcontroller:((the brain of our board))

It is an integrated circuit (IC) or "chip" which we can reprogram by using Arduino IDE. Arduino board was designed to make programming and connecting devices to the microcontroller much easier.

2-RESET BUTTON:

Re-starts the Arduino and start our program from the beginning.

3- USB CONNECTOR:

We upload our Program from computer to Arduino using USB communication.We can use it to Send\ Receive data and also use it to power the Arduino.

4-USB Interface Chip:

It is Just a serial converter chip which is a solution to allow our software like the Arduino IDE to talk to a device via a software comm port interface. It controls all of the USB communications between the Arduino and computer.

5-CRYSTAL OSCILLATOR:

It helps microcontroller to calculate time and synchronize the internal operations. Time factors play a crucial role in receiving and sending signals to Arduino and its peripherals. Based on crystal oscillator frequency microcontrollers can make decisions fast. Generally, most Arduino boards have a 16MHz crystal oscillator onboard.

6-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,it steps down the 7 to 12 volt input power to 5 volts, which is the operating voltage of Arduino.

7-Power Port:

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

8- POWER SUPPLY DECOUPLING CAPACITORS:

The power supply decoupling capacitors filter the incoming power supply to reduce voltage spikes that could damage the board.

9- PIN 13 LED:

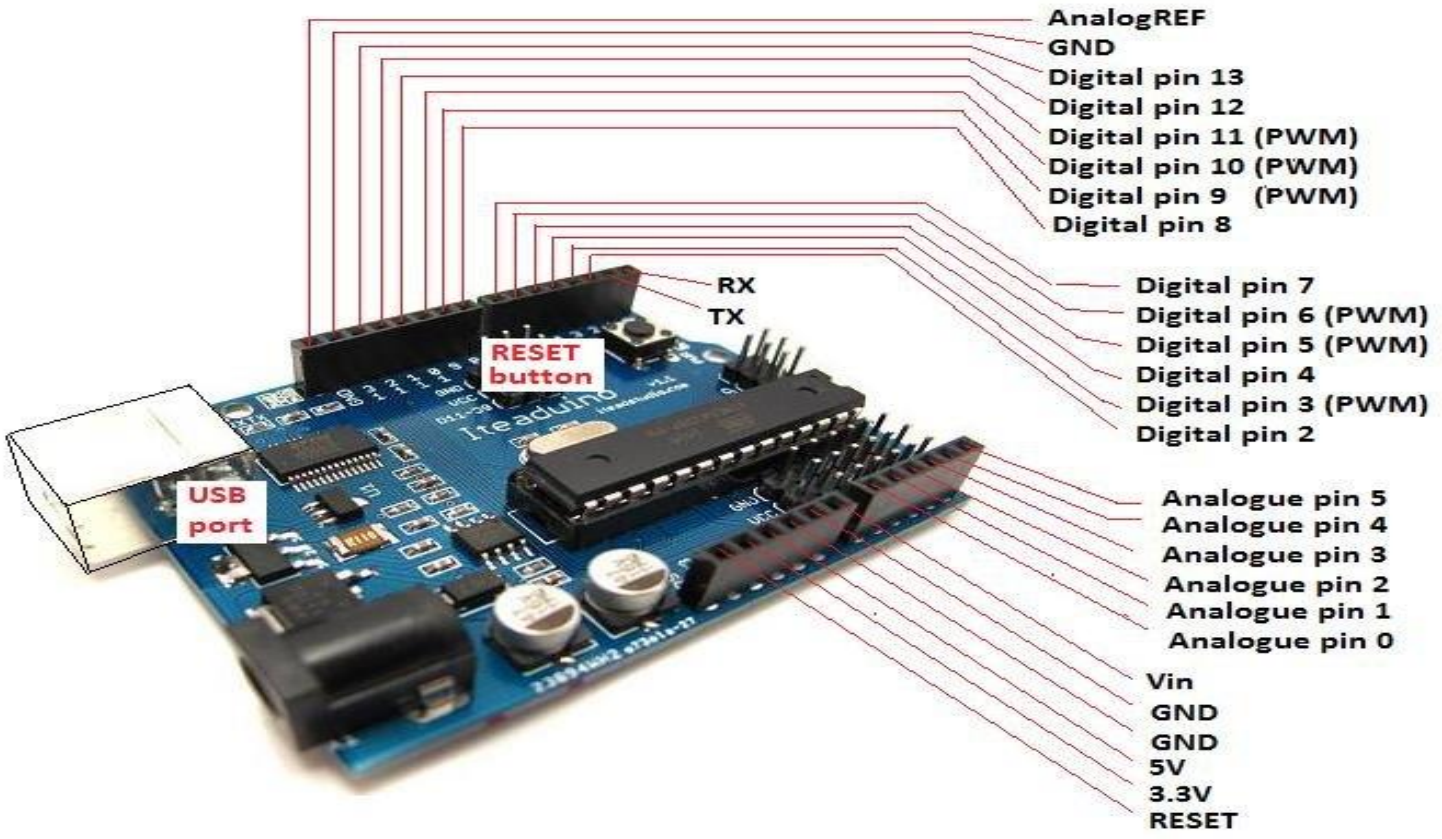
This is a surface mounted LED which is connected to digital pin 13. Whenever pin 13 is in a high voltage state the LED will light up

10- TX and RX LEDs:

TX and RX LEDs light up whenever data is transferred between the Arduino and your computer.
TX (transmit) and RX (receive). They appear in two places on the Arduino UNO board, the digital pins 0 and 1, to indicate the pins responsible for serial communication, and the TX and RX led (13). 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.

11- Power LED indicator:

This LED should light up when we plug our Arduino into a power source to indicate that our board is powered up correctly.



12- Digital I/O Pins :

Digital pins can supply a high (5V) or low (0V) signal to external components and devices like LEDs, they can work as input digital pins to read logic values (0 or 1) .They are labelled 0 to13 Pins(3,5,6,9,10,11) are PULSE WIDTH MODULATION PINS**(PWM).**

13- Analog pins:

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.

14- POWER AND GROUND PINS:

The power and ground pins can supply 5 volts or 3.3 volts to external devices and circuits.

What is the PWM???

Pulse Width Modulation, or PWM, is a technique for getting analog results with digital means. Digital control is used to create a square wave, a signal switched between on and off. This on-off pattern can simulate voltages in between the full Vcc of the board 5 V or 3.3 V) and off (0 Volts) by changing the portion of the time the signal spends on versus the time that the signal spends off. The duration of "on time" is called the pulse width….

In the graphic below, the green lines represent a regular time period. This duration or period is the inverse of the PWM frequency. In other words, with Arduino's PWM frequency at about 500Hz, the green lines would measure 2 milliseconds each. A call to analogWrite() is on a scale of 0 - 255, such that

analogWrite(255)

requests a 100% duty cycle (always on)

analogWrite(127)

is a 50% duty cycle (on half the time)