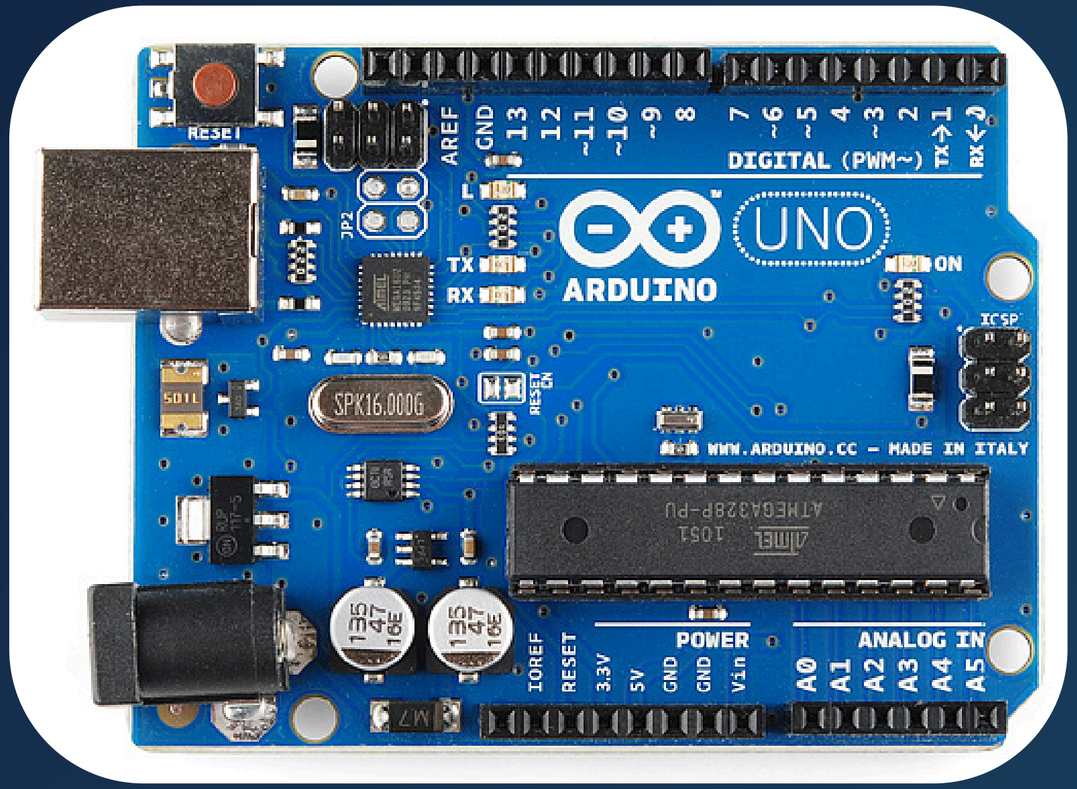
Arduino



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ABOUT

Arduino as an open-source electronics platform that consists of both hardware (the board) and software (the IDE)

Purpose:

To create interactive projects.

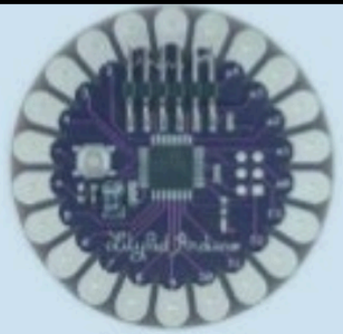
APPLICATIONS OF ARDUINO

- Robots
- Weather stations
- Smart home devices

ARDUINO BOARDS

UNO

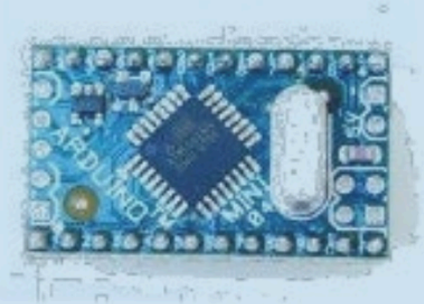
Mega



LilyPad

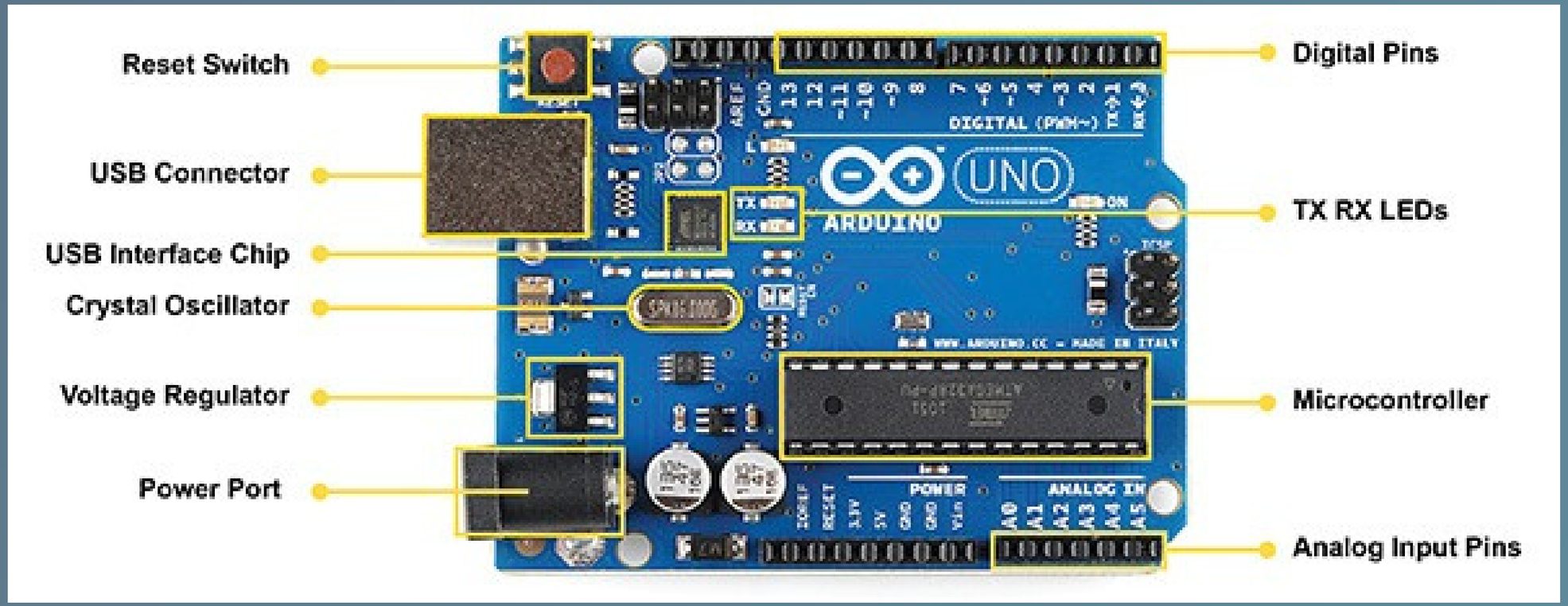
Arduino BT

Arduino Nano



Arduino Mini

Types of Arduino Boards


Reset Switch
USB Connector
USB Interface Chip
Crystal Oscillator
Voltage Regulator
Power Port
Digital Pins
TX RX LEDs
Microcontroller
Analog Input Pins
DIGITAL (PWM~)
UNO
ARDUINO
POWER
ANALOG IN

Here’s a recap of the uses of the main parts on an Arduino board:

1. **Microcontroller**
   - Function: The brain of the Arduino that executes code and controls the board's functions.

2. **Digital Pins**
   - Function: Used to read or send digital signals (0 or 1).
   - Uses:
     - Turning LEDs on/off.
     - Reading the state of buttons and switches.
     - Controlling motors.

Here’s a recap of the uses of the main parts on an Arduino board:

3. Analog Pins

- Function: Used to read varying voltage levels, which represent continuous signals.
- Uses:
  - Reading sensor values (e.g., temperature, light, potentiometers).
  - Input from analog sensors.

4. Power Supply

- Function: Provides power to the board and connected components.
- Includes:
  - USB connection (for powering via computer).
  - Barrel jack (for external power supply).
  - Voltage regulator (to maintain consistent voltage).

Here’s a recap of the uses of the main parts on an Arduino board:

5. Ground Pins (GND)

- Function: Connects to the ground of the circuit.
- Uses: Completes the circuit by providing a return path for electric current.

6. LED Indicator

- Function: Shows the status of the board.
- Uses:
  - Typically, there’s a built-in LED (often labeled "L") that can be programmed to blink, indicating that the board is functioning.
-

7. Reset Button

- Function: Resets the microcontroller.
- Uses:
  - Restarting the program without needing to unplug the board.

Here’s a recap of the uses of the main parts on an Arduino board:

8. **USB Port**
   - Function: Used for programming the board and powering it from a computer.
   - Uses:
     - Uploading code from the Arduino IDE.
     - Providing power during development.

9. **Voltage Regulator**
   - Function: Ensures that the board receives a consistent voltage level.
   - Uses:
     - Converts the input voltage (from the USB or external power supply) to the required levels for the microcontroller.
   -

10. **Crystal Oscillator**
    - Function: Provides a clock signal for the microcontroller.
    - Uses:
      - Keeps the timing for operations, ensuring that processes happen at the right intervals.

SUMMARY

Each component on the Arduino board works together to allow users to create a wide variety of electronic projects, from simple LED blinking to complex robotics. Understanding these parts is essential for effective programming and building with Arduino!

1. The setup() Function

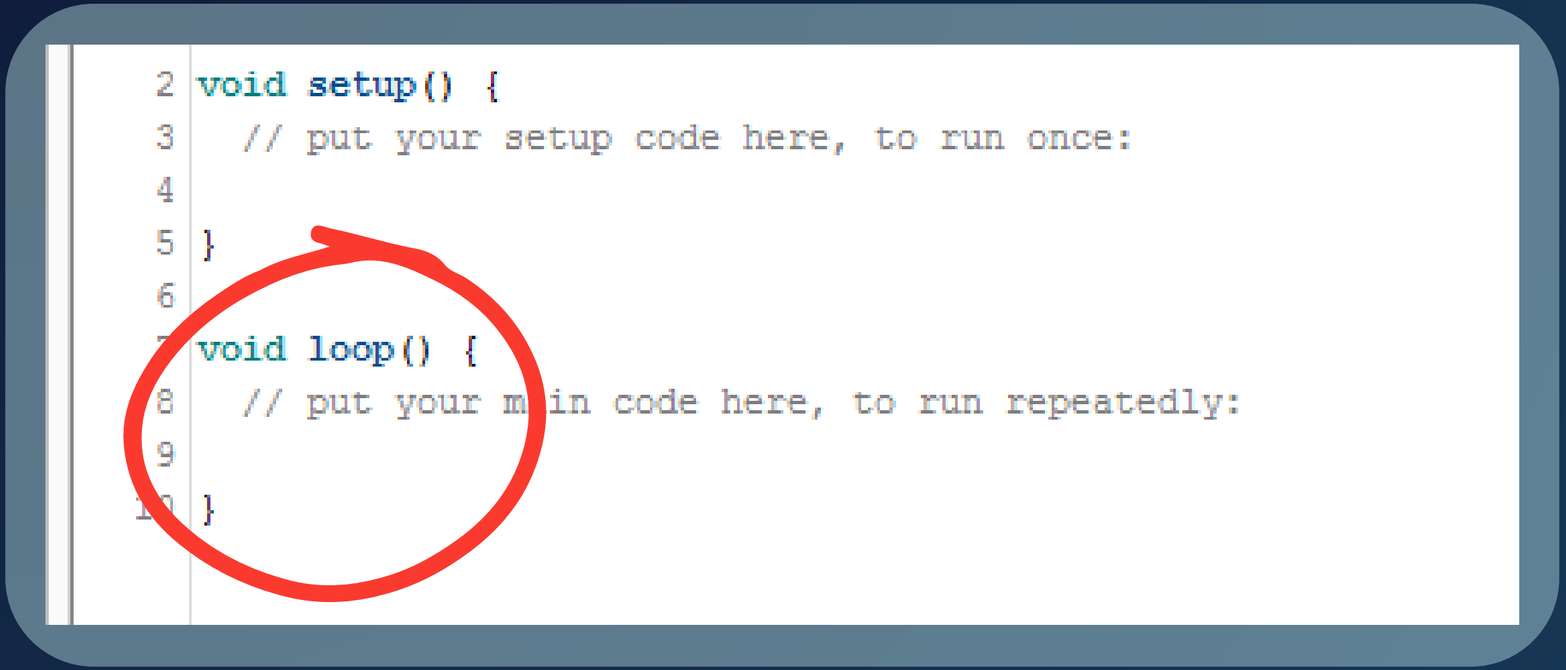
```
2  void setup() {
3    // put your setup code here, to run once:
4
5  }
6
7  void loop() {
8    // put your main code here, to run repeatedly:
9
10 }
```

- The setup() function runs once when the Arduino is turned on or reset.
- It is used to set up everything you need, like setting pins as inputs or outputs and starting communication (e.g., with the serial monitor).

Why is it important?

- This function prepares everything for the program to work properly.

1. The loop() Function



- The loop() function runs over and over as long as the Arduino is powered.
- It is where most of the actions happen — this function keeps running your code, like reading sensors or turning on/off devices.

Why is it important?

- This function allows your Arduino to repeat tasks continuously without stopping.

Example:

```
void setup() {
  pinMode(13, OUTPUT);  // Set pin 13 as an output pin
}

void loop() {
  digitalWrite(13, HIGH);  // Turn the LED on
  delay(1000);             // Wait for 1 second
  digitalWrite(13, LOW);   // Turn the LED off
  delay(1000);             // Wait for 1 second
}
```

What is pinMode?

- pinMode() is a function used to set a pin on the Arduino board as either an input or an output.
- Input means the Arduino will read data from that pin (e.g., from a sensor or a button).
- Output means the Arduino will send data to that pin (e.g., to turn on an LED or control a motor).

Synatex:

pinMode(pin, mode);

- pin: The pin number (e.g., 13, A0, etc.).
- mode: The mode you want to set for the pin:
- INPUT: For reading data.
- OUTPUT: For sending data.

What is Digital vs Analog Pins

Digital Pins: These pins can be set as either input or output and handle on/off signals (HIGH or LOW).

- Example: Pins 0 to 13 on most Arduino boards.

Analog Pins: These pins can read a range of values, from 0 to 1023, typically from sensors that give varying voltage (e.g., a temperature sensor).

- Example: Pins A0 to A5 on most Arduino boards.

digitalWrite()

- **Purpose: This function is used to send a HIGH or LOW signal to a digital pin (turn it on or off).**

```
digitalWrite(13, HIGH); // Turn on the LED connected to pin 13
digitalWrite(13, LOW); // Turn off the LED
```

digitalRead()

Purpose: This function reads the state of a digital pin (either HIGH or LOW).

```
int state = digitalRead(pin);
```