OVERVIEW OF IOT SUPPORTED HARDWARE PLATFORMS

The Internet of Things (IoT) is a network of interconnected physical devices that collect, process, and exchange data. These devices rely on IoT-supported hardware platforms, which provide the necessary components for connectivity, computation, and control.

IoT hardware platforms include microcontrollers, microprocessors, sensors, actuators, and communication modules that allow devices to interact with their surroundings and transmit data over the internet. These platforms can be categorized based on their capabilities, power consumption, and intended applications.

Arduino is a prototype platform (open-source) based on an easy-to-use hardware and software. It consists of a circuit board, which can be programed (referred to as a microcontroller) and a ready-made software called Arduino IDE (Integrated Development

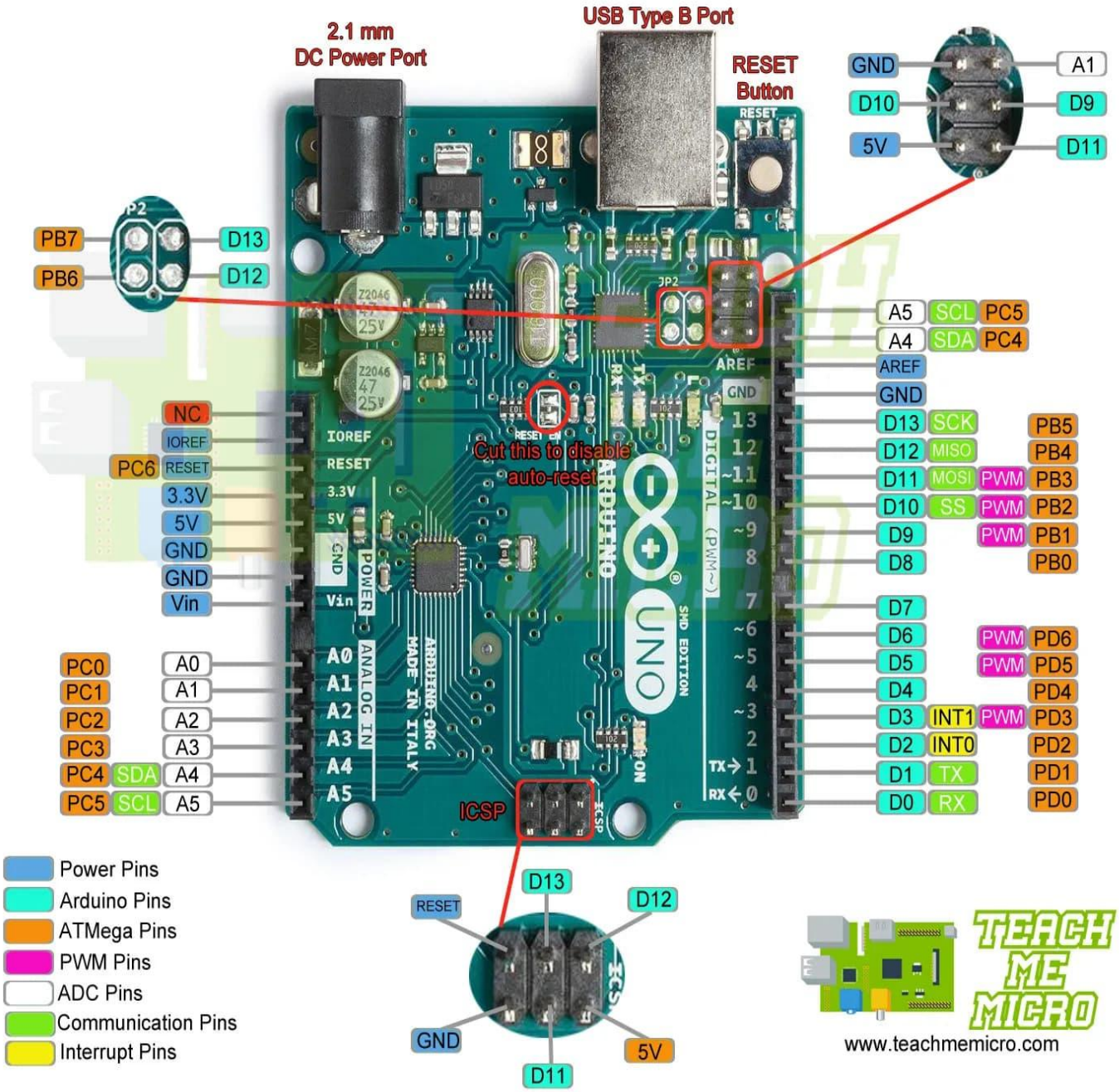
Environment), which is used to write and upload the computer code to the physical board.

Features

The features of Arduino are listed below:

- Arduino programming is a simplified version of C++, which makes the learning process easy.
- The Arduino IDE is used to control the functions of boards. It further sends the set of specifications to the microcontroller.
- Arduino does not need an extra board or piece to load new code.
- Arduino can read analog and digital input signals.
- The hardware and software platform is easy to use and implement.

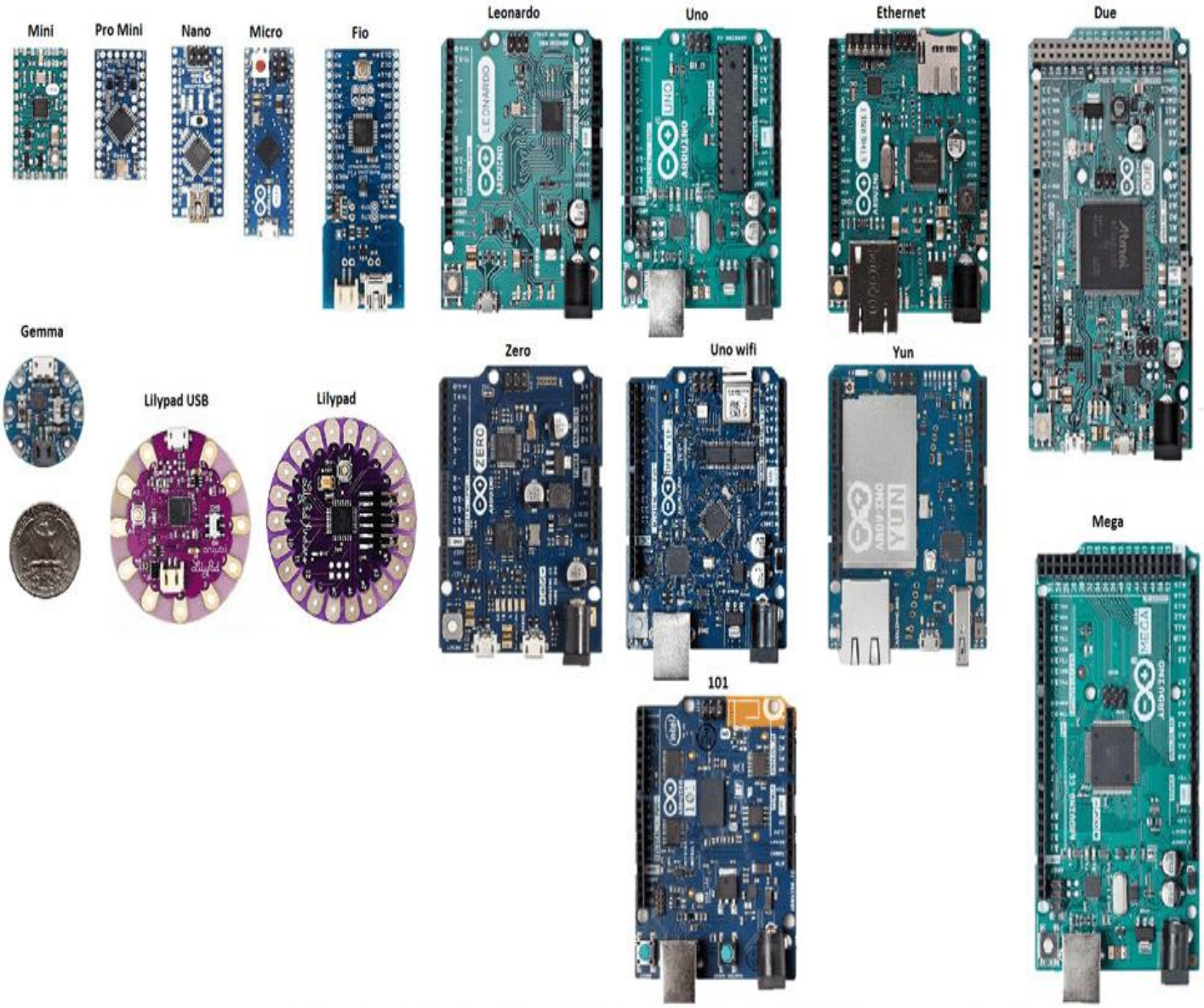
Pin Diagram of Arduino



Component	Description
Power USB	Powers the board via USB connection.
Barrel Jack	Powers the board using an external power supply (AC adapter).
Voltage Regulator	Regulates and stabilizes the DC voltage for the board.
Crystal Oscillator	Provides the clock signal (16 MHz) for timekeeping.
Reset Button	Resets the board, restarting the program.
Pins (Power)	- 3.3V, 5V: Provides power output. - GND: Ground connections. - Vin: External power input.
Analog Pins (A0 - A5)	Reads analog signals from sensors and converts them into digital values.
Main Microcontroller	The brain of the board, usually an ATmega328P IC.
ICSP Header	Used for programming the microcontroller directly.
Power LED Indicator	Lights up when the board is powered correctly.
TX & RX LEDs	Indicate data transmission (TX) and reception (RX) via serial communication.
Digital I/O Pins (0 - 13)	Used for input/output, controlling modules like LEDs, sensors, etc.
PWM Pins (~)	Digital pins with Pulse Width Modulation capability.

AREF (Analog Reference)	Sets an external reference voltage for analog inputs.

Types of Arduino Boards



Arduino Board	Microcontroller	Digital I/O Pins	Analog Pins	Special Features
Arduino UNO	ATmega328P	14	6	Most popular, easy for beginners
Arduino Nano	ATmega328P/ATmega168	14	8	Small, compact, mini USB connectivity
Arduino Mega	ATmega2560	54	16	More memory, 4 UARTs, ideal for larger projects
Arduino Micro	ATmega32U4	20	12	Small, built-in USB connectivity
Arduino Leonardo	ATmega32U4	20	12	Can act as a keyboard/mouse via USB
Arduino Due	Atmel SAM3X8E (ARM Cortex-M3)	54	12	32-bit processor, higher performance
Arduino Lilypad	ATmega168/ATmega328	9	-	Designed for wearable/e-textile projects
Arduino Bluetooth (BT)	ATmega168	16	6	Wireless programming via Bluetooth

Arduino Diecimila	ATmega168	14	6	USB-powered, earlier version of UNO
Arduino Robot	ATmega32U4	Multiple	Multiple	Includes motors, sensors, display, and buttons
Arduino Ethernet	ATmega328	14	6	Built-in Ethernet for IoT projects
Arduino Zero	ATSAMD21 (32-bit)	14	6	Debugging support, 32-bit extension of UNO
Arduino Esplora	ATmega32U4	Predefined	Predefined	Has built-in sensors and joystick
Arduino Pro Micro	ATmega32U4	12	5	Small form factor, similar to Arduino Mini

Board Types

Various kinds of Arduino boards are available depending on different microcontrollers used. However, all Arduino boards have one thing in common: they are programed through the Arduino IDE.

The differences are based on the number of inputs and outputs (the number of sensors, LEDs, and buttons you can use on a single board), speed, operating voltage, form factor etc. Some boards are designed to be embedded and have no programming interface (hardware), which you would need to buy separately. Some can run directly from a 3.7V battery, others need at least 5V.

Here is a list of different Arduino boards available.

Arduino boards based on ATMEGA328 microcontroller

Board Name	Operating Volt	Clock Speed	Digital i/o	Analog Inputs	PWM	UART	Programming Interface
Arduino Uno R3	5V	16MHz	14	6	6	1	USB via ATMega16U2
Arduino Uno R3 SMD	5V	16MHz	14	6	6	1	USB via ATMega16U2

Red Board	5V	16MHz	14	6	6	1	USB via FTDI
Arduino Pro 3.3v/8 MHz	3.3V	8MHz	14	6	6	1	FTDI-Compatible Header
Arduino Pro 5V/16 MHz	5V	16MHz	14	6	6	1	FTDI-Compatible Header
Arduino mini 05	5V	16MHz	14	8	6	1	FTDI-Compatible Header
Arduino Pro mini 3.3v/8 mhz	3.3V	8MHz	14	8	6	1	FTDI-Compatible Header
Arduino Pro mini	5V	16MHz	14	8	6	1	FTDI-Compatible Header

5v/16mhz							
Arduino Ethernet	5V	16MHz	14	6	6	1	FTDI-Compatible Header
Arduino Fio	3.3V	8MHz	14	8	6	1	FTDI-Compatible Header
LilyPad Arduino 328 main board	3.3V	8MHz	14	6	6	1	FTDI-Compatible Header
LilyPad Arduino simple board	3.3V	8MHz	9	4	5	0	FTDI-Compatible Header

Arduino boards based on ATMEGA32u4 microcontroller

Board Name	Operating Volt	Clock Speed	Digital i/o	Analog Inputs	PWM	UART	Programming Interface
Arduino Leonardo	5V	16MHz	20	12	7	1	Native USB
Pro micro 5V/16 MHz	5V	16MHz	14	6	6	1	Native USB
Pro micro 3.3V/8 MHz	5V	16MHz	14	6	6	1	Native USB
LilyPad Arduino USB	3.3V	8MHz	14	6	6	1	Native USB

Arduino boards based on ATMEGA2560 microcontroller

Board Name	Operating Volt	Clock Speed	Digital i/o	Analog Inputs	PWM	UART	Programming Interface
Arduino Mega 2560 R3	5V	16MHz	54	16	14	4	USB via ATMega16U2B
Mega Pro 3.3V	3.3V	8MHz	54	16	14	4	FTDI-Compatible Header
Mega Pro 5V	5V	16MHz	54	16	14	4	FTDI-Compatible Header
Mega Pro Mini 3.3V	3.3V	8MHz	54	16	14	4	FTDI-Compatible Header

Arduino boards based on AT91SAM3X8E microcontroller

Board Name	Operating Volt	Clock Speed	Digital i/o	Analog Inputs	PWM	UART	Programming Interface
Arduino Mega 2560 R3	3.3V	84MHz	54	12	12	4	USB native