

INTRODUCTION TO ARDUINO



What is Arduino?

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 programmed (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.



History of Arduino

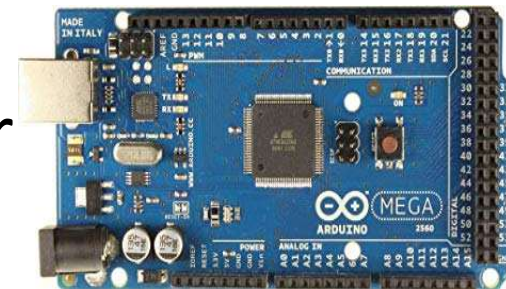
- Arduino was born in the Italian Institute of Interaction Design Ivrea, a school where students focused their experiments on the interaction with devices, many based on microcontrollers.
- Arduino comes from a need, to have a device to use in class, it is low cost, which would work under any operating system and adapted documentation that would tell people how to start from scratch.

KEY FEATURES

- Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions.
- You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).
- Unlike most previous programmable circuit boards, Arduino does not need an extra piece of hardware (called a programmer) in order to load a new code onto the board. You can simply use a USB cable.
- Additionally, the Arduino IDE uses a simplified version of C++, making it easier to learn to program.
- Finally, Arduino provides a standard form factor that breaks the functions of the micro-controller into a more accessible package.

Different types of Arduino Board

- **Arduino Diecimila** microcontroller is based on the Atmega168 chip.
- **Arduino Nano** is a microcontroller based on the Atmega328 (Arduino Nano 3.0) or Atmega168 (Arduino Nano 2.x) .
- **Arduino Mega** is a microcontroller board based Atmeg1280.



Different types of Arduino Board

- **LilyPad Arduino** microcontroller is based on the Atmega168V (version ATmega168 low consumption), or the Atmega328V.
- **Fio Arduino** microcontroller is based on the Atmega328P .
- **Arduino Mini** microcontroller is based on the ATmega168.



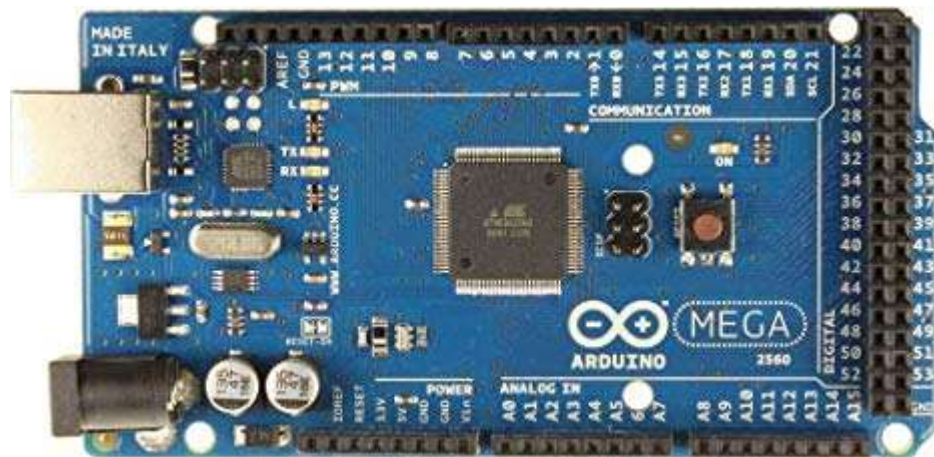
Different types of Arduino Board

- **Arduino UNO** is a microcontroller based on the Atmega328, Arduino UNO is advance version of Arduino Duemilanove.



ARDUINO MEGA 2560

The **Arduino Mega 2560** is a microcontroller board based on the ATmega2560. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.



Features of Arduino Mega

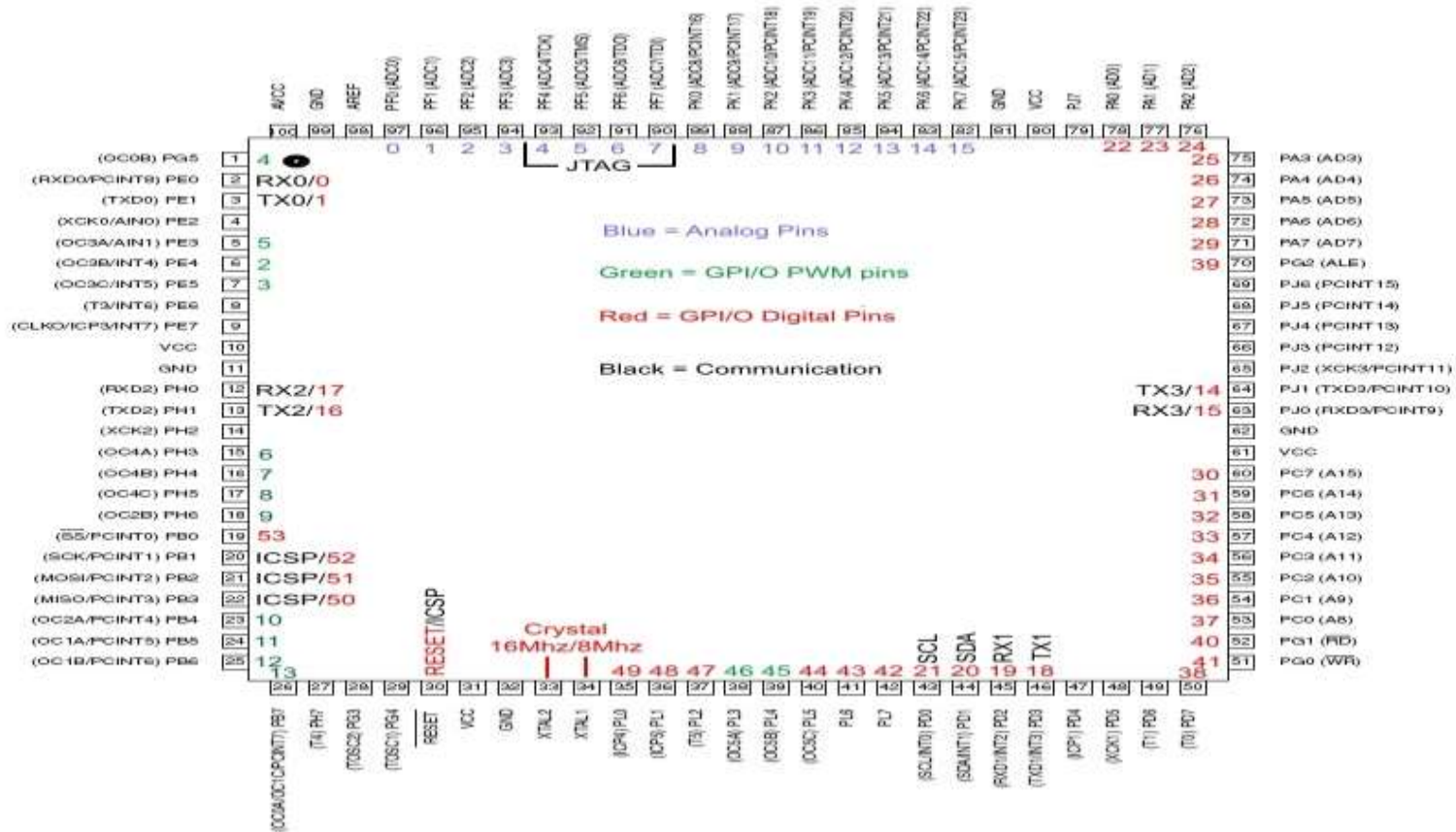
Microcontroller	ATmega2560
Input Voltage (recommended)	7-12V
Operating Voltage	5V
Input Voltage (limit)	6-20V
Digital I/O Pins	54 (of which 15 provide PWM output)
Analog Input Pins	16
DC Current per I/O Pin	20 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	256 KB of which 8KB used by boot loader
SRAM	2 KB
EEPROM	4 KB
Clock Speed	16 MHz
LED_BUILTIN	13

Atmega2560

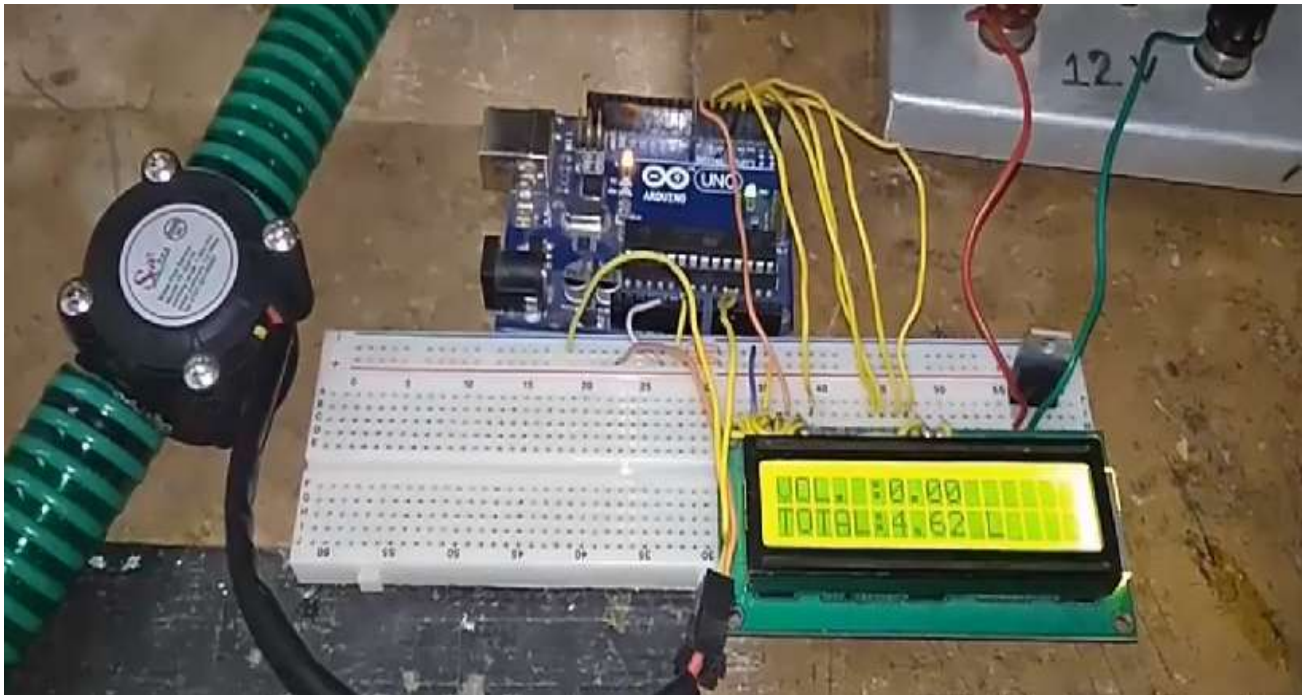
Atmega2560, commonly found in the Arduino Mega 2560 as its main microcontroller. It's an AVR RISC-based microcontroller that executes powerful instructions in a single clock cycle. This allows it to strike a fine balance between power consumption and processing speed.



Atmega2560 Pin-out



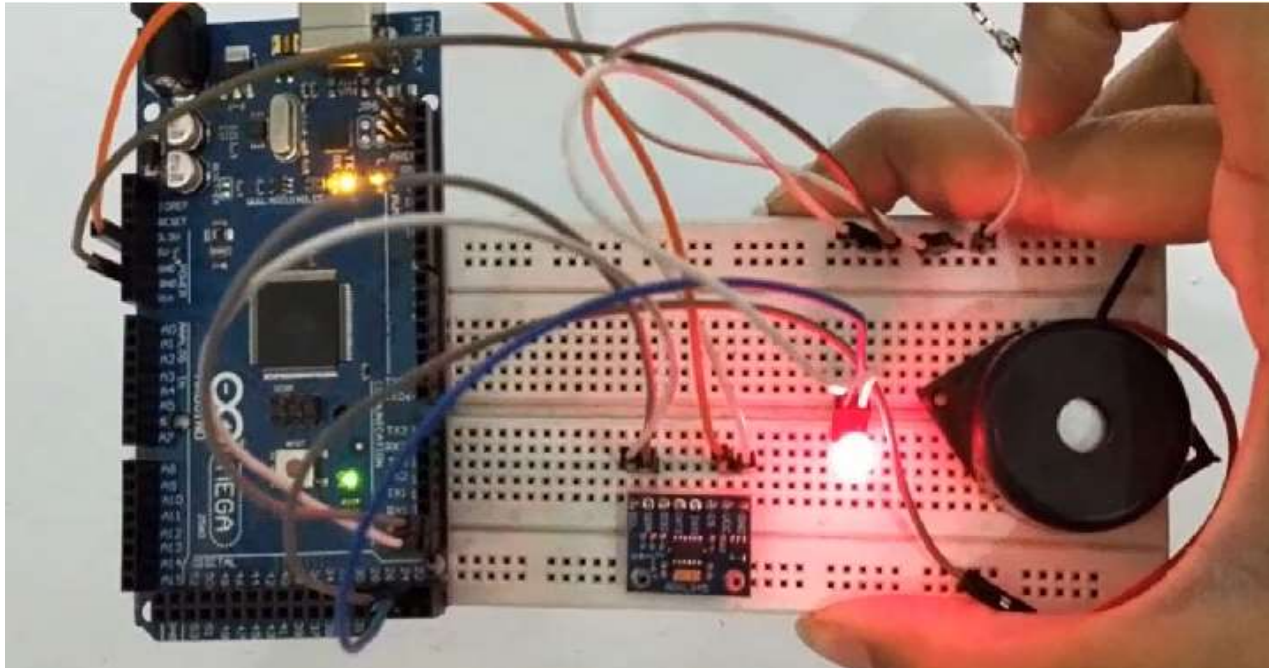
Projects developed from Arduino Mega



Water flow rate and volume measurement

Project video link : <https://youtu.be/kbKnLTPTNbg>

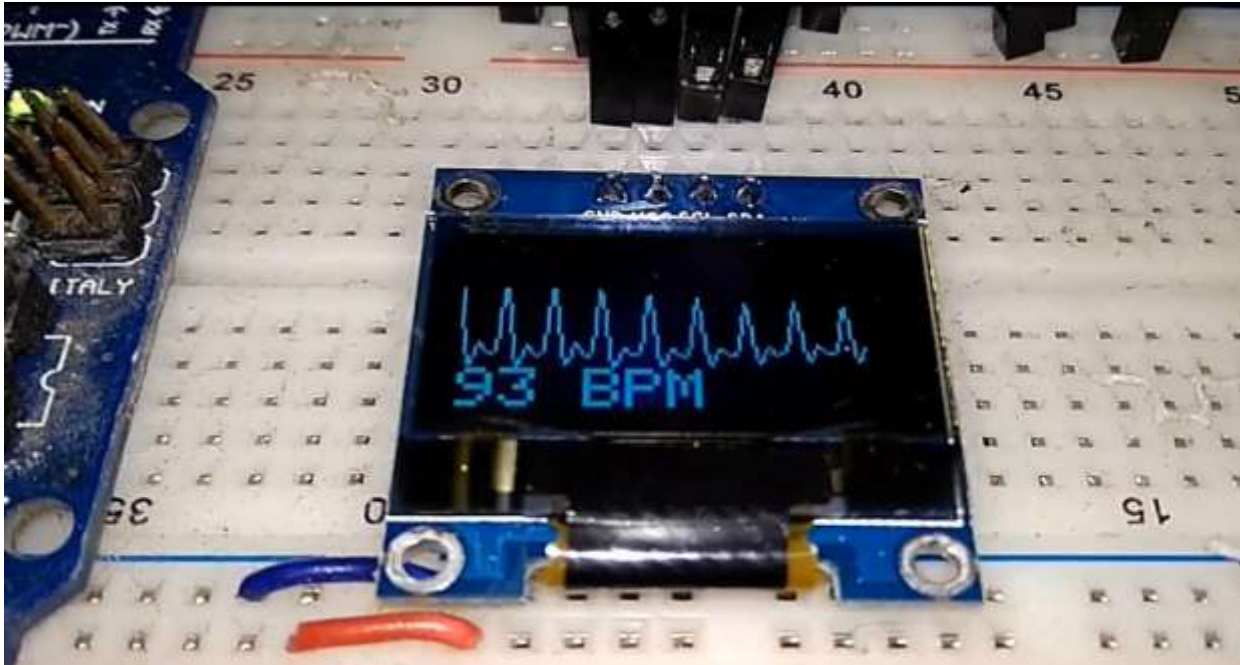
Projects developed from Arduino Mega



Earthquake Detector

Project video link : <https://youtu.be/xVdbXf8STaY>

Projects developed from Arduino Mega



ECG Display using Pulse rate sensor

Project video link : <https://youtu.be/mEJqAk4G5Xc>