
University of Dar es Salaam

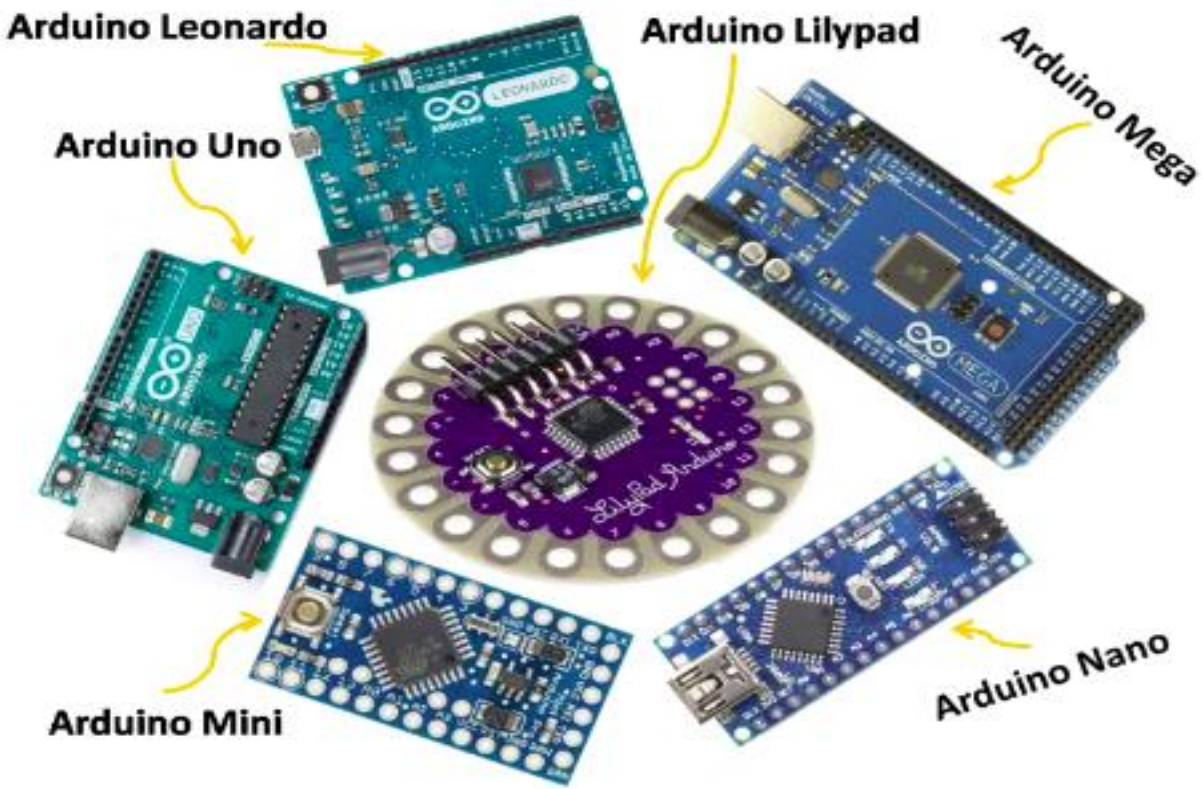
# Physical Structure, Components and real-world applications of Arduino

# Introduction to Arduino

- Arduino is an open-source hardware and software company, project and user community that designs and manufacture single-board microcontrollers and microcontroller kits for building digital devices.
- It is an open-source electronics prototyping platform based on easy-to-use hardware and software.
- Arduino is written in C++ with some additional of specific methods and functions.
- Arduino is simple a programmable microcontroller. It does not have RTOS when compared to other computer systems.
- There are variety of Arduino boards such as Arduino UNO, Arduino Nano, Arduino Mega, e.t.c

# Arduino UNO board

# Different types of Arduino Boards



# Differences of the Arduino Boards

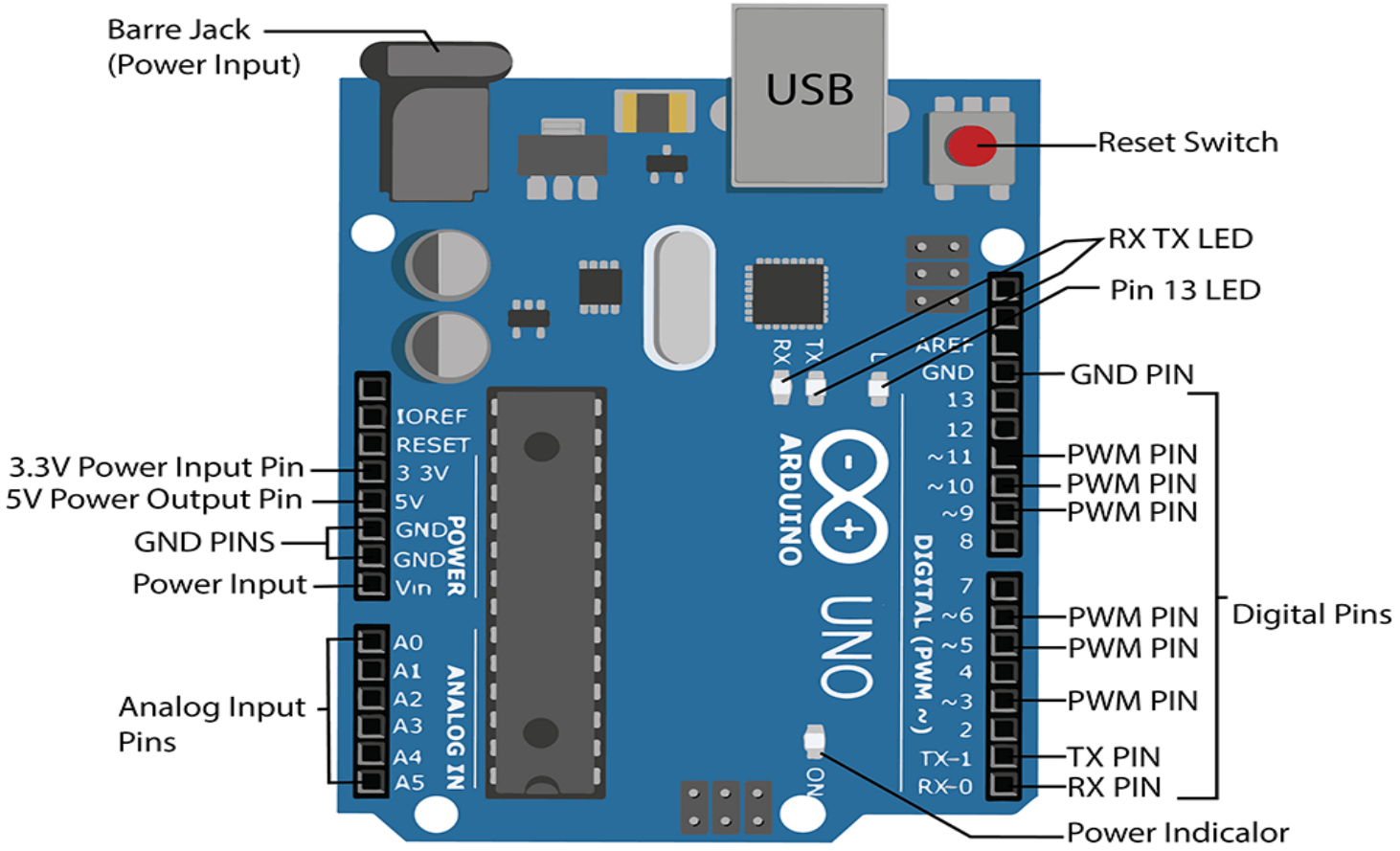
| Arduino Board | Core Unit | Memory, SRAM, EEPROM | Digital I/O | Analog I/O |
|---|---|---|---|---|
| Arduino UNO | 16MHz, ATmega328 | 2KB SRAM, 1KB EEPROM, 32KB Flash | 14 | 6 inputs, 0 output |
| Arduino DUE | 84MHz, AT91SAM3X8E | 96KB SRAM, 512KB Flash | 54 | 12 inputs, 2 outputs |
| Arduino Mega | 16MHz,ATMEGA2560 | 8KB SRAM, 4KB EEPROM, 256KB Flash | 54 | 16 inputs, 0 output |
| Arduino Leaonardo | 16MHz, ATMEGA32U4 | 2.5KB SRAM, 1KB EEPROM,32KB Flash | 20 | 12 inputs, 0 output |

# Arduino Components

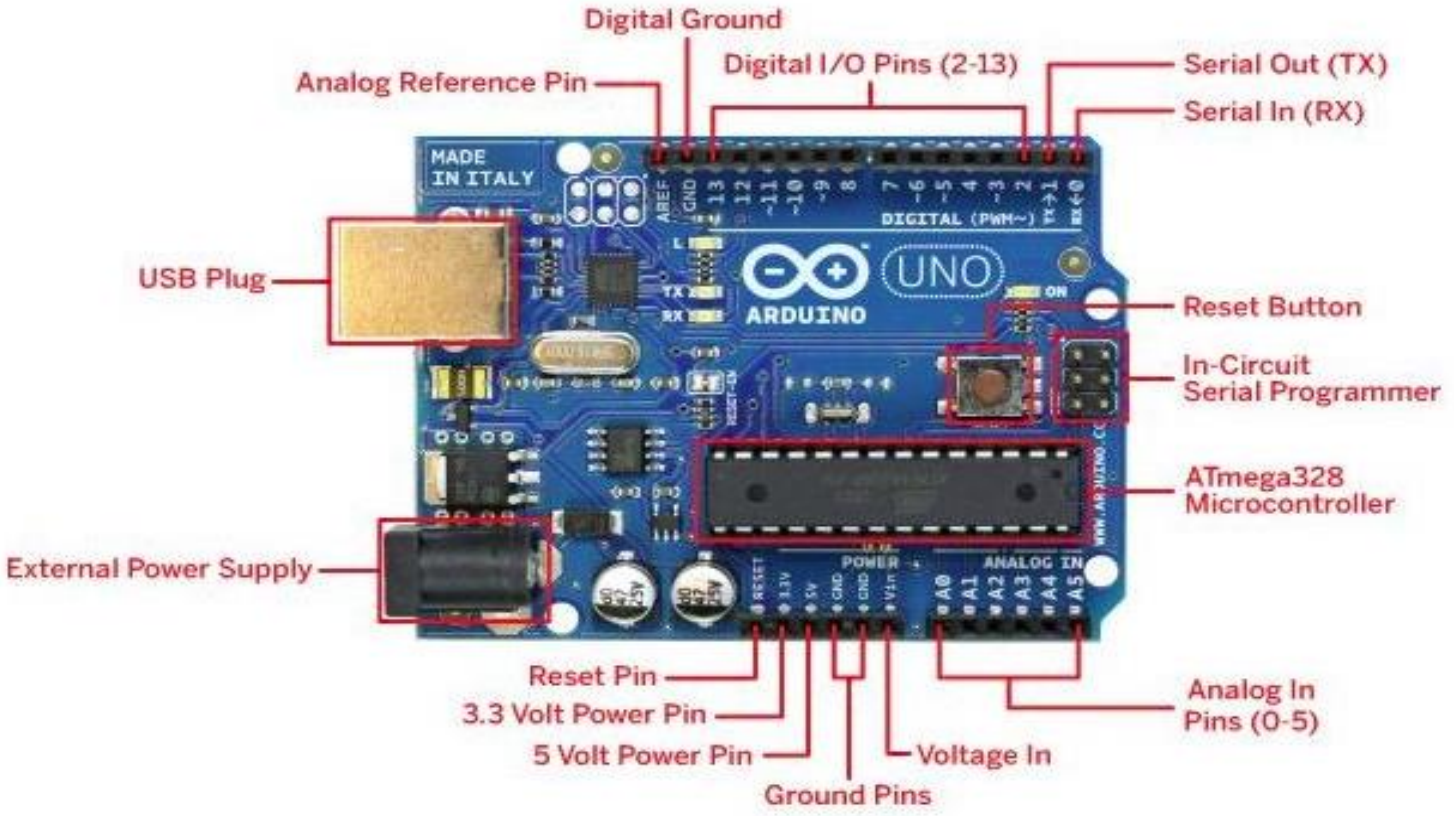
- The major components of Arduino UNO board are as follows:

i. USB Connector
ii. Power port
iii. Microcontroller
iv. Analog input and Digital pins
v. Reset switch
vi. Crystal oscillator
vii. USB interface chip
viii. TX RX LEDs

# Arduino UNO pins description



# Arduino UNO parts description ….



# Real-world Applications of Arduino

- With the Arduino board we can control the Home, Office and Industrial activities with the control systems such as motion sensors, outlet control, temperature sensors, blower control, garage door control, air flow control and many others.
- Arduino can be used in many industrial control and automation systems.
- Using different top technologies like AI, ML, IoT and many others, we can interface an Arduino board to produce more and more intelligent devices and systems.
- Arduino is an open-source, it is just an electronics prototyping board.

# Must-have Tools ....

- Simulation software (e.g Proteus, Fritzing)
- Circuit designing tools (e.g Fritzing, Proteus, LibrePCB)
- Arduino IDE (very important)
- Arduino Kit

# Simulation of Arduino Projects

- A number of tools are used to simulate Arduino circuits
- Proteus Profession configured with Arduino Libraries
- Licensed Fritzing
- Online tools such as Tinkercad from https://www.tinkercad.com
- Blinking an LED.


Thank you!