IOT and Applications (Internet of Things)

Lab session-1

Practical-1: Study of Arduino and Raspberry-Pi Circuit

- Arduino and Raspberry are using for hardware to run programs whichever things we have to perform.
- Now we discussed both the topic below where and when we used this circuits as applicable.

1) Arduino

- Arduino is Hardware and Software company, project and user community that designs and manufactures single board Micro-Controllers and kits for building digital devices.

- Arduino board designs use a variety of Microprocessors and controllers.
- It's hardware products are licensed under a Creative commons license, while software is licensed under the GNU Lesser General Public License (LGPL) permitting the manufacture of Arduino boards and software distribution by anyone.
- The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or breadboards and other circuits.

- The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers.
- The microcontrollers can be programmed using the C and C++ programming languages, using a standard API which is also known as the "Arduino language".
- In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) and a command line tool (Arduino- cli) developed in Go.

➢ Application of Arduino:

1 Security System

2 Traffic Light Count Down Timer
3 Parking Lot Counter
4 Weighing Machines
5 Medical Instrument
6 Emergency Light for Railways

And many more IOT device that's uses sensor to program using Arduino.

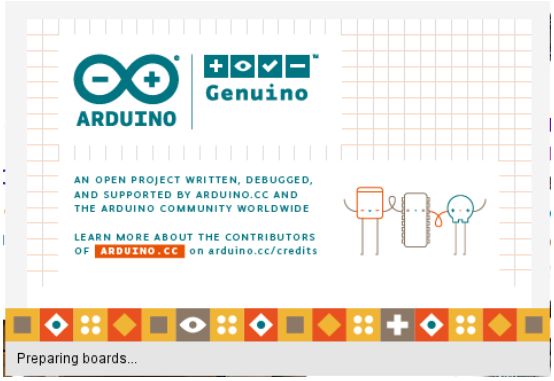
➢ Advantage

The biggest advantage of Arduino is its ready to use structure.

As Arduino comes in a complete package form which includes the 5V regulator, a burner, an oscillator, a micro-controller, serial communication interface, LED and headers for the connections.

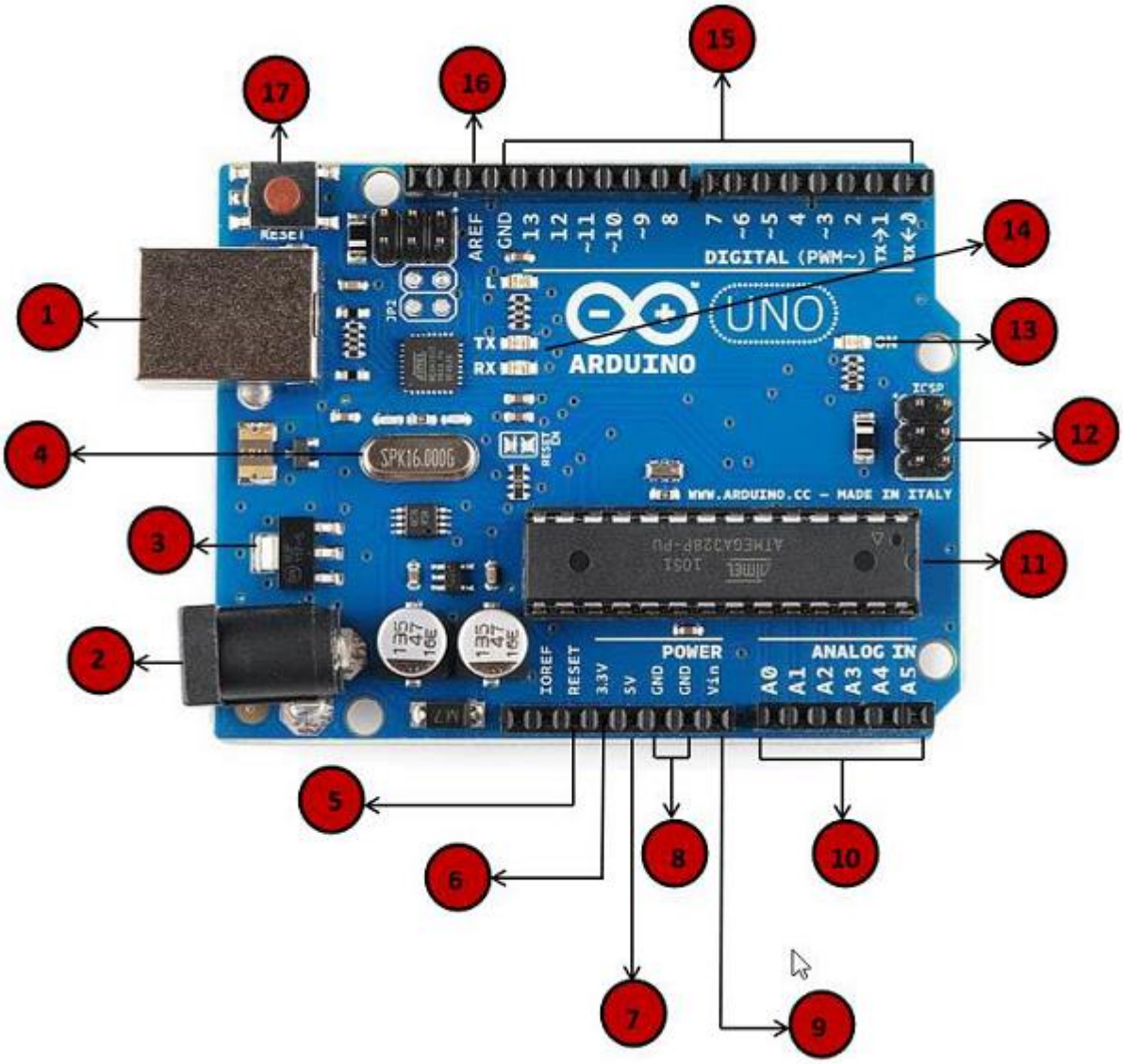
You don't have to think about programmer connections for programming or any other interface.

IDE



Internet of Things

Arduino Circuit



Label -> Instructions

1-> Power USB

2-> Power (Barrel Jack)

3-> Voltage Regulator

4-> Crystal Oscillator

5,17-> Arduino Reset

6,7,8,9 -> Pins (Supply 3.3 output volt, Supply 5 output volt, (Ground), AC mains)

10-> Analog pins

11-> Main microcontroller

12-> ICSP pin

13-> Power LED indicator

14-> TX and RX LEDs

15-> Digital I/O

16-> AREF stands for Analog Reference

2) Raspberry Pi (Mini Computer)

- Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation in association with Broadcom.
- Early on, the Raspberry Pi project leaned towards the promotion of teaching basic computer science in schools and in developing countries.
- Later, the original model became far more popular than anticipated, selling outside its target market for uses such as robotics.

- It is now widely used in many areas, such as for weather monitoring, because of its low cost, modularity, and open design.
- After the release of the second board type, the Raspberry Pi Foundation set up a new entity, named Raspberry Pi.
- The Foundation was rededicated as an educational charity for promoting the teaching of basic computer science in schools and developing countries.

Applications of Raspberry Pi

- The raspberry pi boards are used in many applications like Media streamer, Arcade machine, Tablet computer, Home automation, Carputer, Internet radio, controlling robots, Cosmic Computer, hunting for meteorites, Coffee and also in raspberry pi-based projects.

Advantage of Raspberry Pi

- Low cost
- Huge processing power in a compact board
- Many interfaces (HDMI, multiple USB, Ethernet, onboard Wi-Fi and Bluetooth, many GPIOs, USB powered, etc.)
- Supports Linux, Python (making it easy to build applications)
- Readily available examples with community support
- Developing such an embedded board is going to cost a lot of money and effort.

- **Raspberry Pi Circuit**