

# Intro to Arduino and different types of Arduino boards

CSE 315

Peripherals & Interfacing

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# What is Arduino

- Arduino board is an open-source platform used to make electronics projects.
- It consists of both a microcontroller and a part of the software or Integrated Development Environment (IDE) that runs on your PC.
- It is used to write & upload computer code to the physical board.
- The platform of an Arduino has become very famous with designers or students just starting out with electronics, and for an excellent cause.

# Different types of Arduino Boards

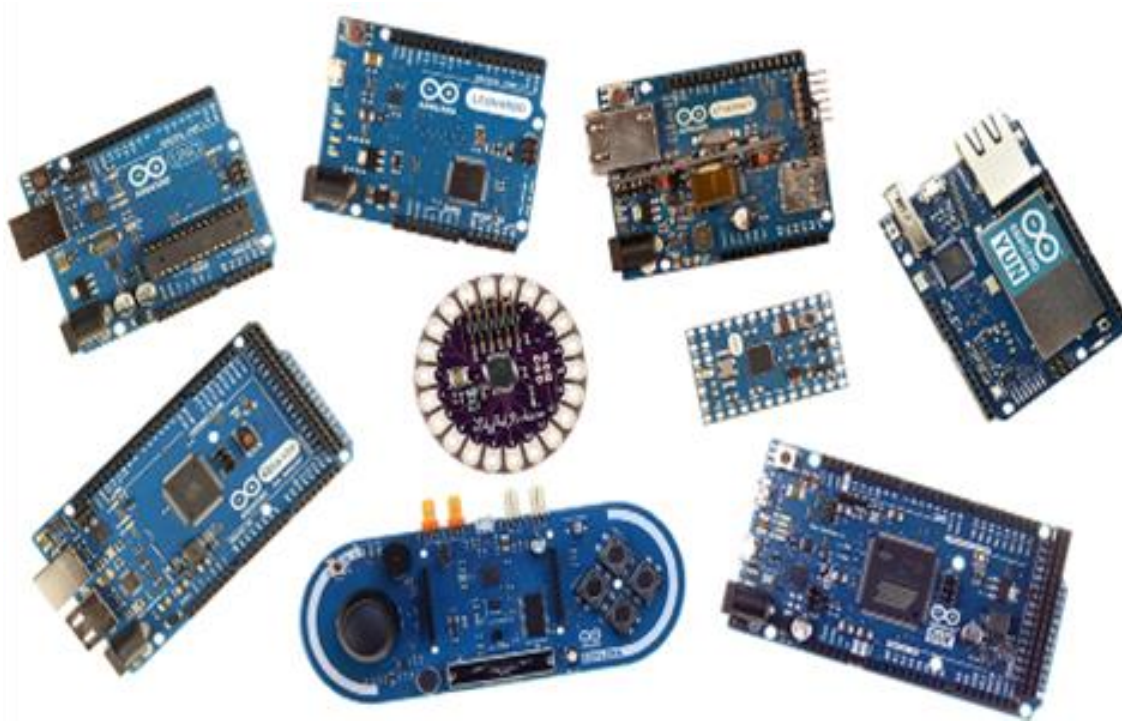


Fig 1. Different types of Arduino Boards.

# Basic Features:

- The Arduino does not require a separate part of hardware.
- In order to program a new code onto the board you can just use a USB cable.
- The Arduino IDE uses a basic version of C++, making it simpler to learn the program.
- At last, Arduino board offers a typical form factor that breaks out the functions of the microcontroller into a more available package.

# Why Arduino:

- Arduino board has been used for making different engineering projects and different applications.
- The Arduino software is very simple to use for beginners, yet flexible adequate for advanced users.
- It runs on windows, Linux and Mac.
- Teachers and students in the schools utilize it to design low cost scientific instruments to verify the principles of physics and chemistry.
- Arduino also makes simpler the working process of microcontroller.

# In a Nutshell:

- Inexpensive
- Cross-platform
- Simple, clear programming environment
- Open source and extensible software
- Open source and extensible hardware

# Feature analogy of different boards:

Arduino Boards	Processor	Memory	Digital I/O	Analogue I/O
Arduino Uno	16Mhz ATmega328	2KB SRAM, 32KB flash	14	6 input, 0 output
Arduino Due	84MHz AT91SAM3X8E	96KB SRAM, 512KB flash	54	12 input, 2 output
Arduino Mega	16MHz ATmega2560	8KB SRAM, 256KB flash	54	16 input, 0 output
Arduino Leonardo	16MHz ATmega32u4	2.5KB SRAM, 32KB flash	20	12 input, 0 output

# List of Arduino boards

- Arduino Uno (R3)
- LilyPad Arduino
- Red Board
- Arduino Mega (R3)
- Arduino Leonardo



# Arduino Uno R3

- The Uno is a huge option for your initial Arduino.
- It consists of 14-digital I/O pins, where 6-pins can be used as PWM(pulse width modulation outputs).
- 6-analog inputs, a reset button, a power jack, a USB connection and more.
- It includes everything required to hold up the microcontroller.
- Simply attach it to a PC with the help of a USB cable and give the supply to get started with a AC-to-DC adapter or battery.

# Arduino Uno(R3)



Fig 2. Arduino Uno basic hardware

# Some projects based on Arduino UNO:

- Automatic Medicine Reminder Using Arduino
- Obstacle Avoiding Robot using Arduino and Ultrasonic Sensor
- Google Assistant Based Voice Controlled Home Automation using DIY Arduino Wi-Fi Shield
- Self balancing robot
- Line follower

# Arduino Lilypad

- The Lily Pad Arduino board is a wearable e-textile technology .
- It expanded by [Leah Buechley](#) and considerately designed by “Leah and [SparkFun](#)”.
- Each board was imaginatively designed with huge connecting pads
- A smooth back to let them to be sewn into clothing using conductive thread.
- This Arduino also comprises of I/O, power, and also sensor boards which are built especially for e-textiles. These are even washable

# Arduino Lilypad

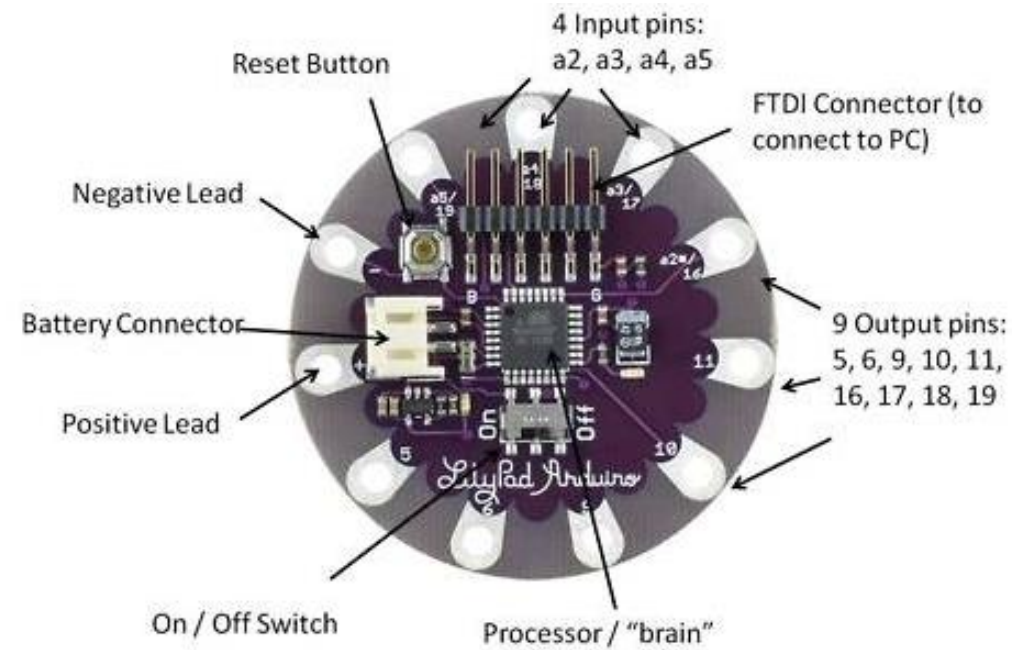


Fig 3. Arduino Lilypad basic hardware

# Some projects based on Arduino Lilypad:



# Some projects based on Arduino Lilypad:

- Unicorn Horn With NeoPixel LEDs and Arduino Lilypad
- Arduino LilyPad Controlled NeoPixel Earrings
- Hertzian Armor

# Arduino Redboard

- The RedBoard Arduino board can be programmed using a Mini-B USB cable using the Arduino IDE.
- It will work on Windows 8 without having to modify your security settings.
- It is more constant due to the USB or FTDI (Future Technology Device International) chip we used and also it is entirely flat on the back.
- Creating it is very simple to utilize in the project design.
- Just plug the board, select the menu option to choose an Arduino Redboard and you are ready to upload the program.
- You can control the RedBoard over USB cable using the barrel jack.



# Arduino Redboard

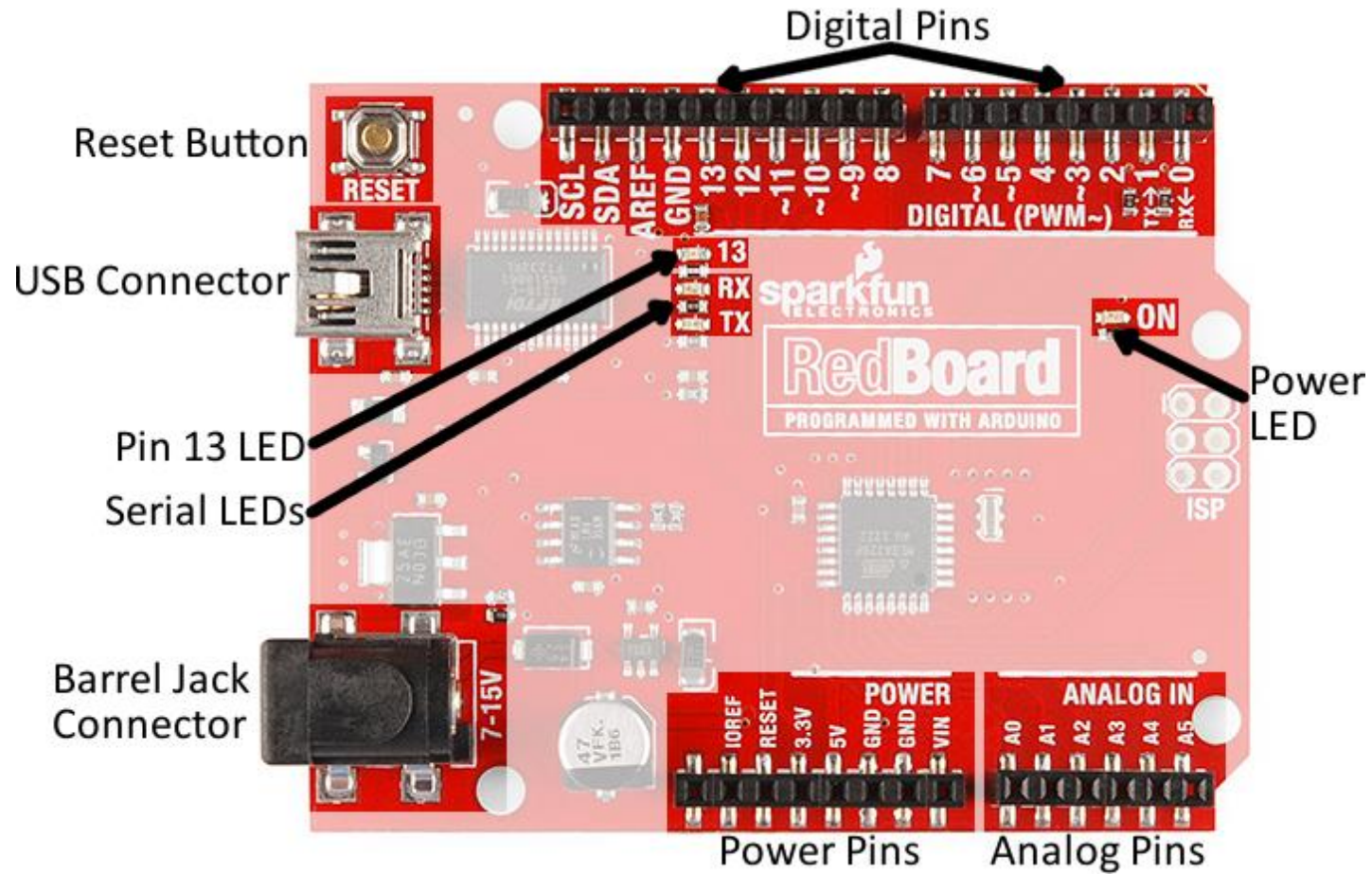


Fig 4. Arduino Redboard basic hardware

# Some projects based on Arduino Redboard:

- DC MOTORS AND MOTOR DRIVERS
- Autonomous Driving Vehicle

# Arduino Mega (R3)

- The Arduino Mega is similar to the UNO's big brother.
- It includes lots of digital I/O pins (from that, 14-pins can be used as PWM o/ps).
- It includes 6-analog inputs, a reset button, a power jack, a USB connection and a reset button.
- It includes everything required to hold up the microcontroller.

# Arduino Mega (R3)

- Simply attach it to a PC with the help of a USB cable.
- Give the supply to get started with a AC-to-DC adapter or battery.
- The huge number of pins make this Arduino board very helpful for designing the projects .
- It need a bunch of digital i/ps or o/ps like lots buttons.

# Arduino Mega (R3)

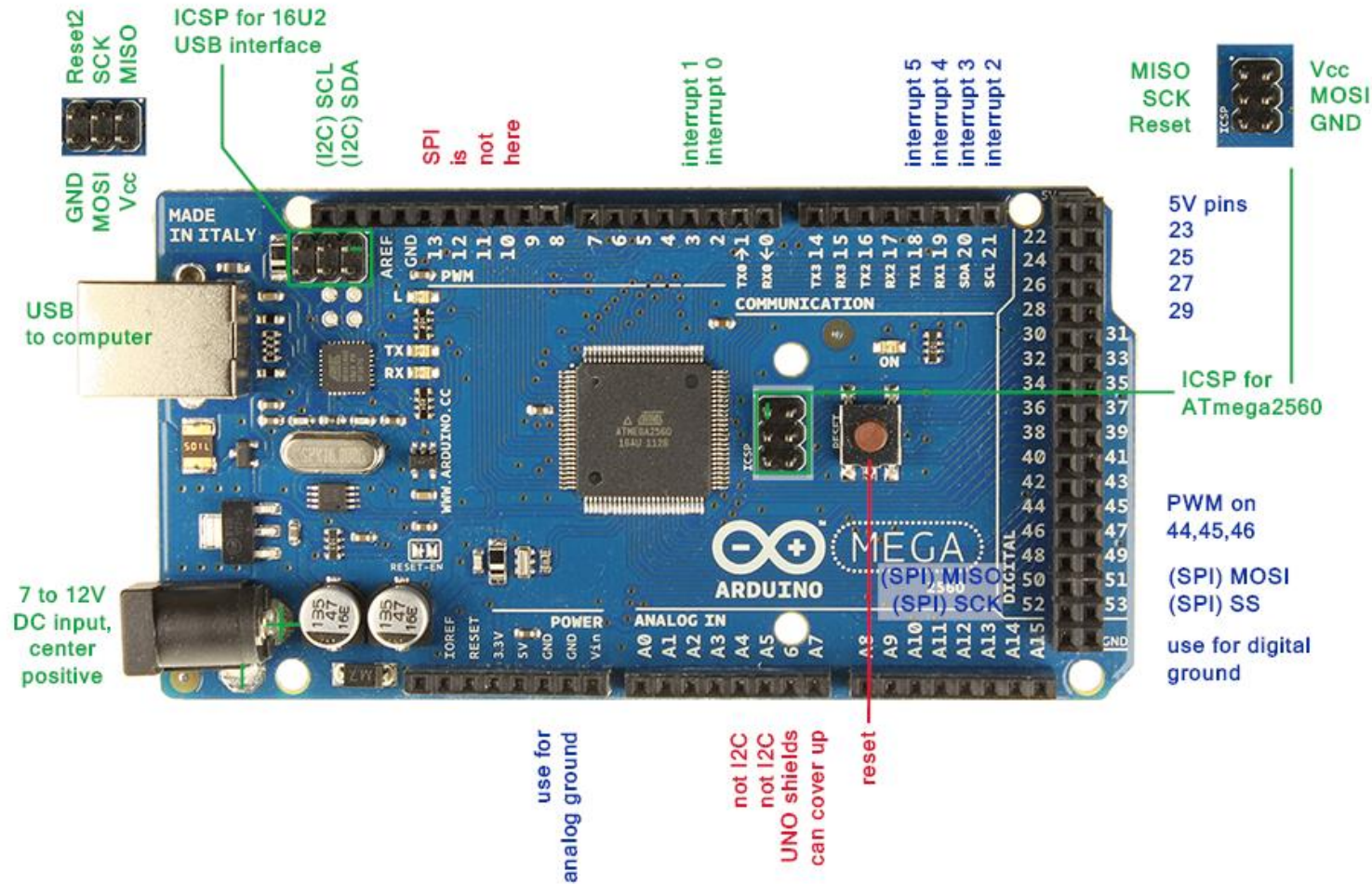


Fig 5. Arduino Mega (R3) basic hardware

# Some projects based on Arduino Mega:

- Arduino Serial Communication
- Arduino Solar Tracker
- Arduino RFID Reader
- Frequency Counter Using Arduino

# Arduino Leonardo:

- The first developed board of an Arduino series is the Leonardo board.
- This board uses one microcontroller along with the USB.
- It can be very simple and cheap also.
- This board handles USB directly.
- The program libraries are obtainable which let the Arduino board to follow a keyboard of the computer, mouse, etc.



# Arduino Leonardo:

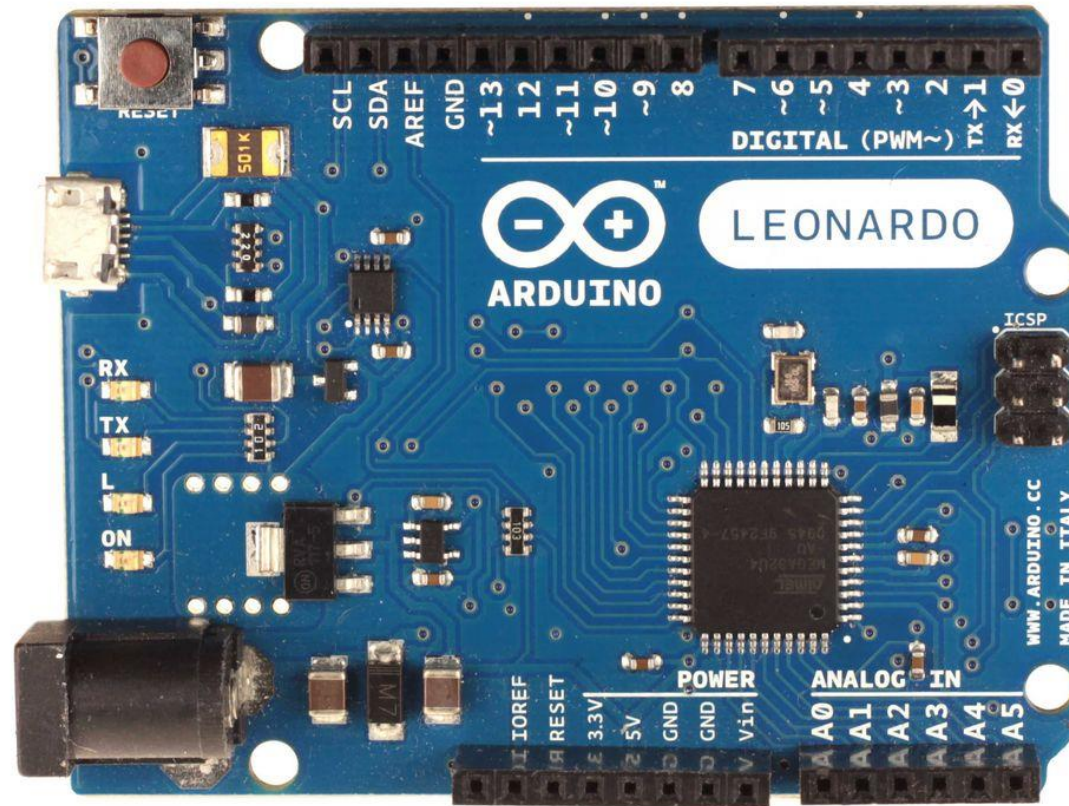


Fig 6. Arduino Leonardo basic hardware



# Some projects based on Arduino leonardo:

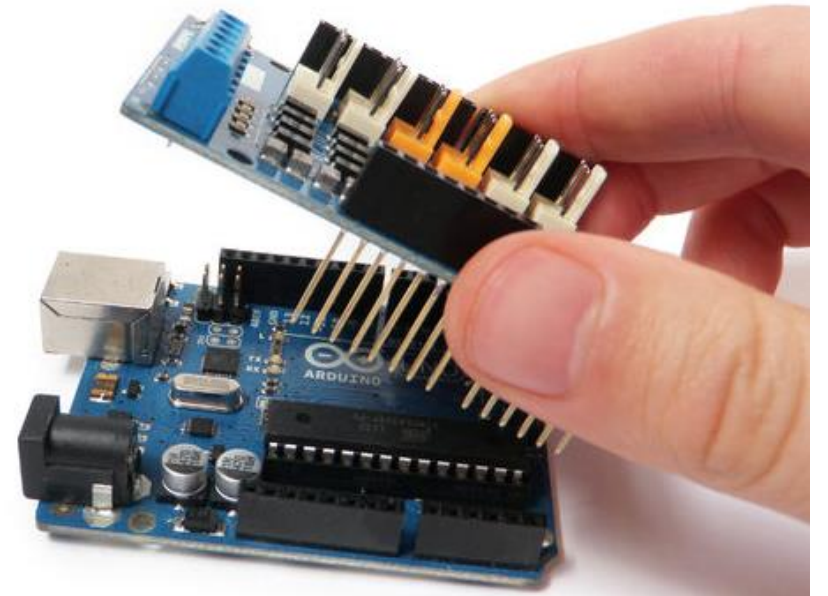
- Humanoid Arm
- Arduino PC Monitor
- Autonomous Navigation and 2D Mapping
- Arduino PowerPoint Pointer
- Rangefinder for Garage Parking with Arduino

# Arduino Shields:

- Arduino shields are pre built circuit boards used to connect to a number of Arduino boards.
- These shields fit on the top of the Arduino compatible boards
- It provide an additional capabilities like connecting to the following:
  - Internet
  - Motor controlling
  - Providing wireless communication
  - LCD screen controlling

# Arduino Shields:

- Shields are useful to extend the capacity of your Arduino.



# Different types of Shields:



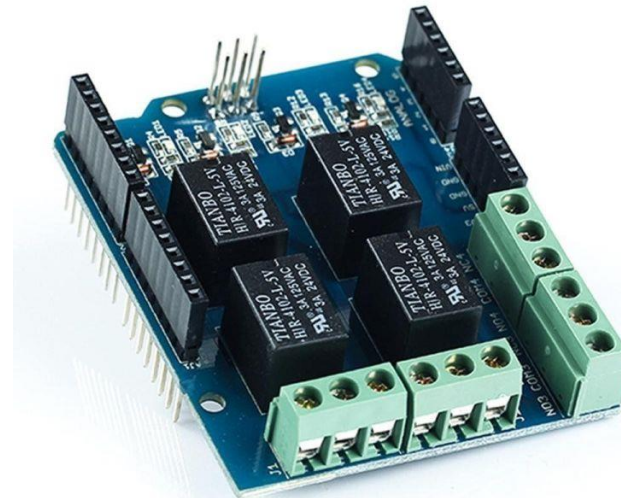
- **1. Ethernet Shield**

The Ethernet Shield allows you to connect your Arduino to the internet. You just have to plug the shield onto the Arduino board and then, connect it to your network.



- **2. Relay Shield**

The Relay Shield is a module with 4 mechanical relays that provides you an easy way to control high voltage.



- **3. ProtoShield**

The ProtoShield is a prototyping Shield that makes it easy to prototype. It allows for easy connections between the breadboard and the Arduino.



- **4. Motor Shield**

This Shield allows an easy control of motor direction and speed. It makes it easy to incorporate a motor into any of your projects.





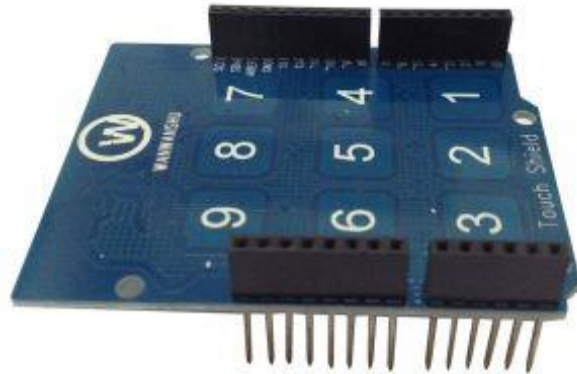
- **5. LCD Shield**

This Shield makes it easy to use a 16×2 Character LCD. With this, it is possible to control a 16×2 Character LCD, up to 3 backlight pins and 5 keypad pins using only the two I2C pins on the Arduino.



- **6. Capacitive Touchpad Shield**

The Touchpad Shield allows you to build simple capacitive touch interfaces.



- **7. Smoke Detector Shield**

This Shield can detect concentrations of combustible gas in the air and read it as an analogue value. Useful to make a smoke detector system.



- **8. 64-Button Shield**

With this Shield you can connect up to 64 buttons to your Arduino. Some cool projects with this shield include musical instruments, cool computer interfaces, etc.



- **9. Joystick Shield Kit**

The joystick Shield provides simple analog inputs and four separate buttons and one button under the joystick itself.



- **10. GSM/GPRS Shield**

The GSM/GPRS Shield allows you to connect your Arduino to GSM/GPRS cell phone network. It allows you to dial a phone number or send a text message to a friend via easy to use AT commands.



- **11. GPS Logger Shield**
- **12. Wireless SD Shield**
- **13. cc300 Wi-Fi Shield**
- **14. HC-05 Bluetooth Shield**
- **15. MP3 Player Shield**

You must know at least twenty-twenty five Arduino shields with it functionalities.

**Thank you**