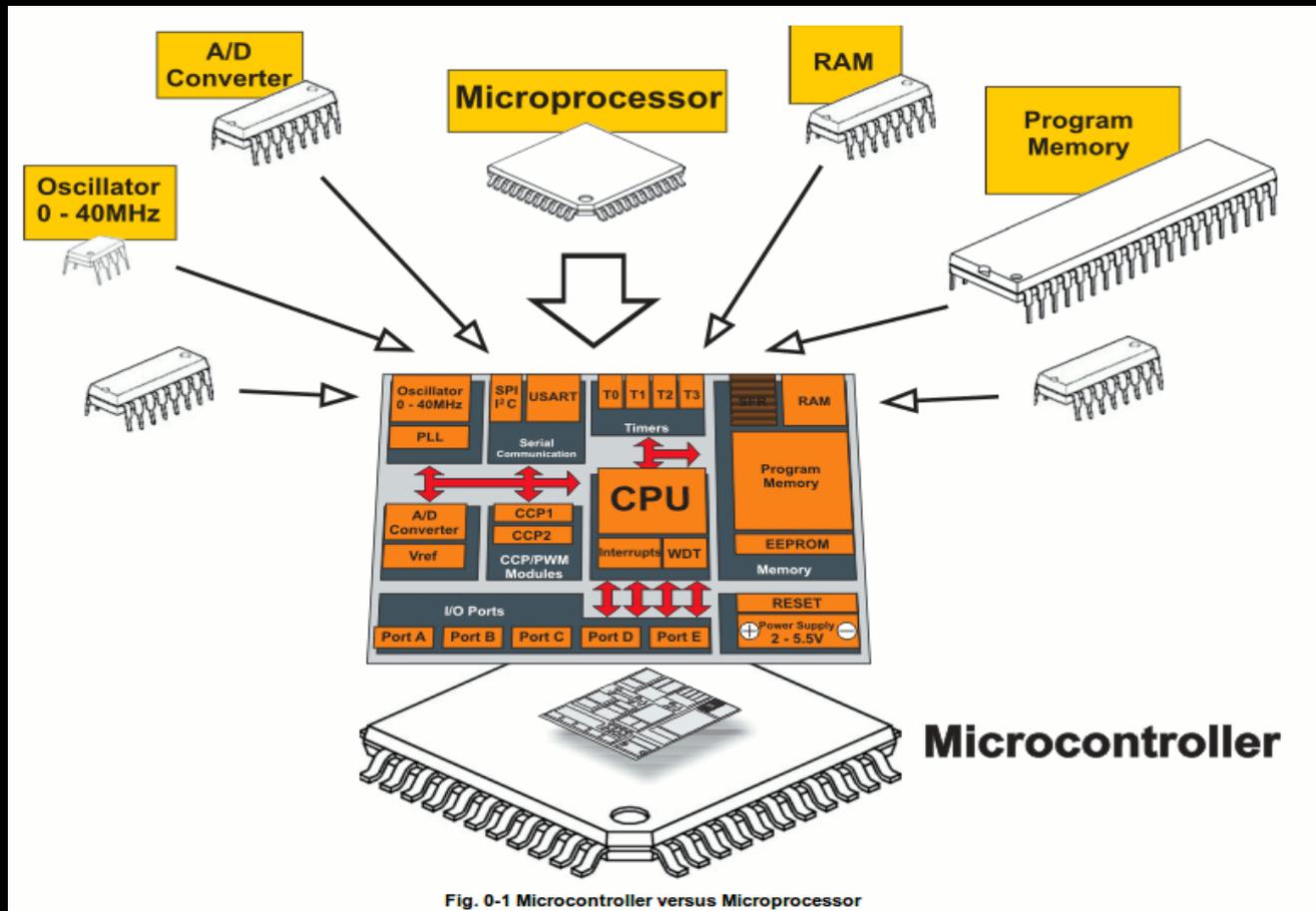


# Arduino

By Shubham Patel

# Microcontroller



- A small computer on a single chip containing a processor, memory and input/output

# What is Arduino??

- Physical computing platform
- Open source
- USB programmable
- Large community
- Inexpensive(Rs.750 to 6000)
- Based on ATmega328
- Voltage Regulator
- Can be Programmed Through Any O.S.



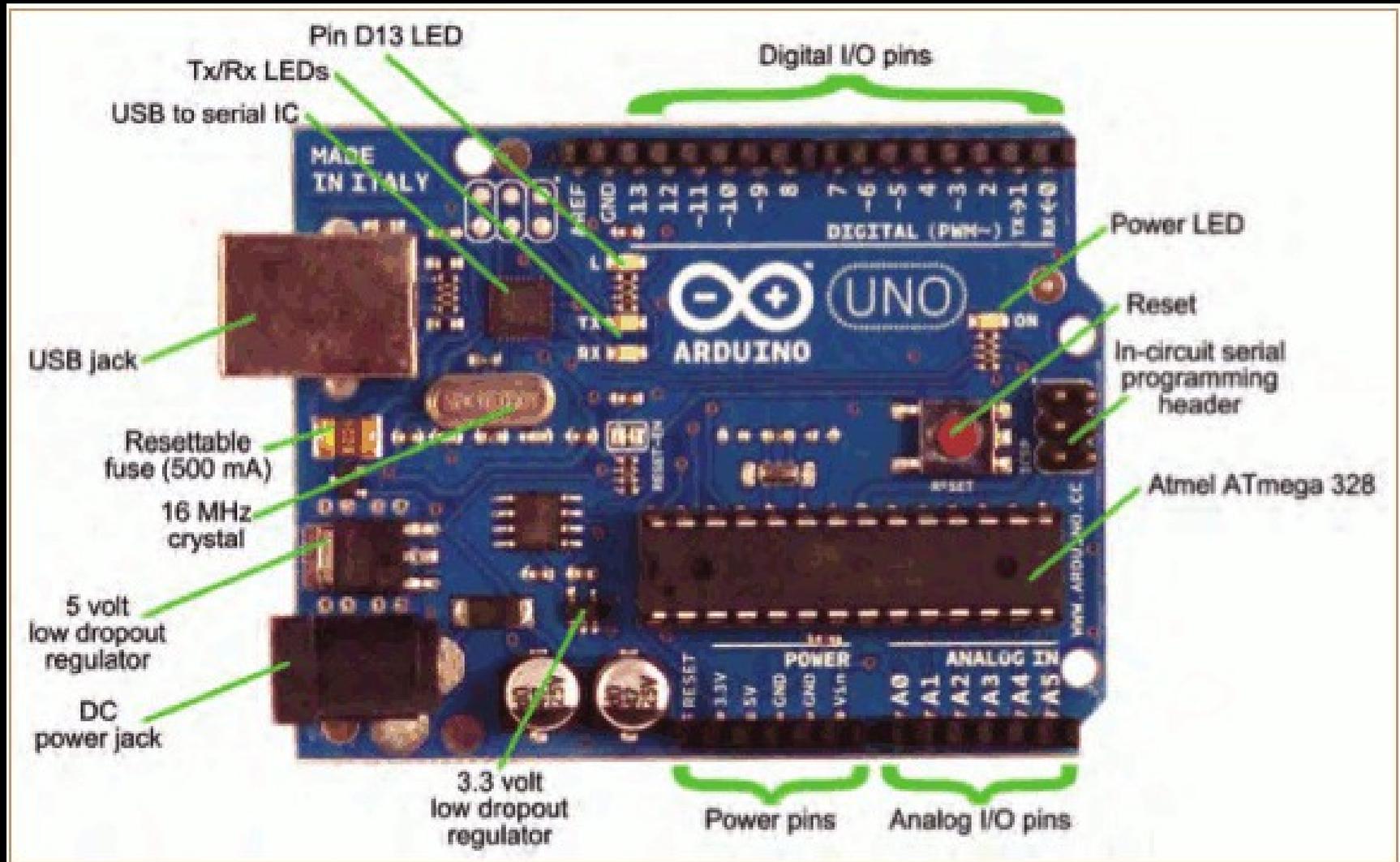
# What Arduino Can Do??

- Arduino can sense the environment by receiving input from a variety of sensors and can affect its surroundings by controlling lights, motors, and other actuators.
- The microcontroller on the board is programmed using the Arduino programming language and the Arduino development environment .
- Arduino projects can be stand-alone or they can communicate with software running on a computer.

# Features Summary

- Operating Voltage 5V
- Input Voltage (limits) 6-20V
- Clock Speed 16 MHz
- Digital I/O Pins 14
- Analog Input Pins 6
- Flash Memory 32 KB
- SRAM 2 KB
- EEPROM 1 KB

# Arduino Development Board



# Arduino Products



Arduino Diecimila in  
Stoicheia



Arduino Duemilanove (rev  
2009b)



Arduino UNO



Arduino Leonardo



Arduino Mega

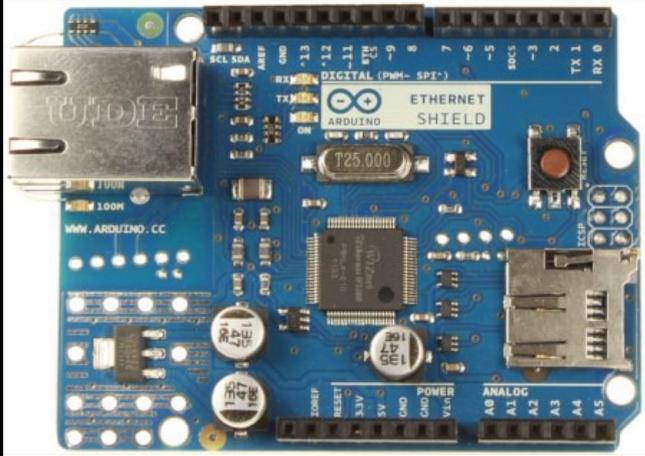


Arduino Nano



Arduino Due (ARM-  
based)

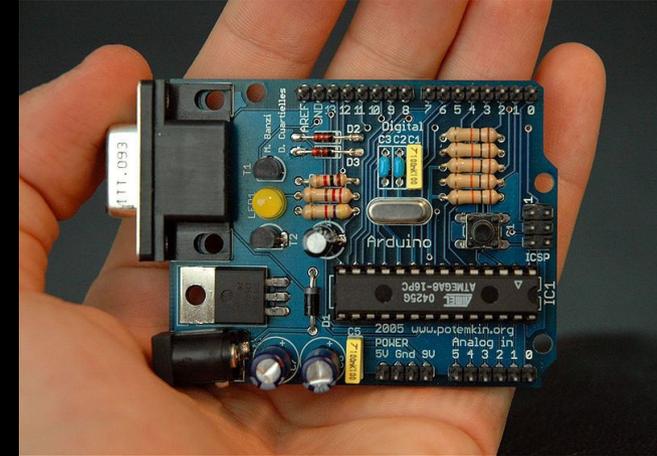
# Arduino Shields



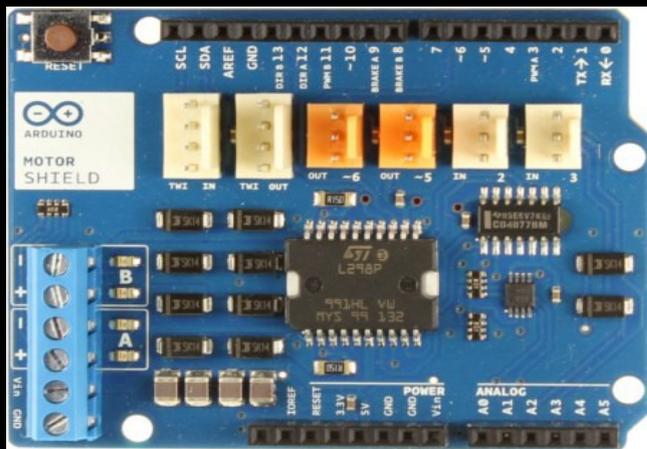
Ethernet Shield



USB-Host Shield



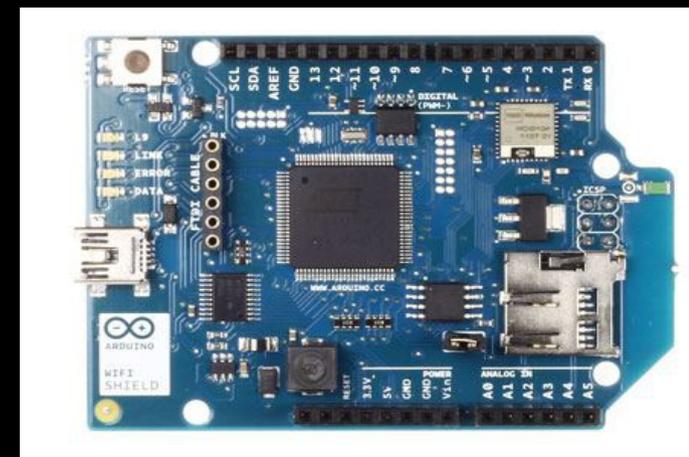
Arduino Board with RS-232



Motor Shield



GSM Shield



WiFi Shield

# Arduino Software

- The Arduino programming platform was designed in JAVA to help newcomers become familiar with programming. The language used to write code is C/C++ and only uses TWO functions to make a functional program.
- `void setup ( ) { }` - All of the code within the curly braces will be run ONCE when the program first runs.
- `void loop ( ) { }` - This function is run AFTER setup has finished. All of the code within the curly braces will be run again, and again, until the power is removed.

# Arduino Programming

- **Syntax**(Similiar To C/C++)
- **Data Types**(void,char,int,string,float etc.)
- **Math Operators**(sqrt(),pow() etc.)
- **Control Structures**(Loops,If..Else,continue etc.)
- **Comparison Operators**(==,!=,>,<= etc.)
- **Boolean Operators**(&&,||,!)
- **Compund Operators**(++,--,+=,-= etc.)
- **Digital I/O**(digitalWrite(),digitalRead())
- **Analog I/O**(analogWrite(),analogRead() etc.)

# Arduino Programming-Digital

- `pinMode(pin, mode);` - Used to address the pin # on the Arduino board you would like to use 0-19. The mode can either be INPUT or OUTPUT.
- `digitalWrite (pin, value);` - Once a pin is set to output it can be set to either HIGH (5 Volts) or LOW(0 volts). This basically means turn ON and OFF.
- `digitalRead (pin, value);` - Once a pin is set to input it can be set to read either HIGH (5 Volts) or LOW(0 volts).

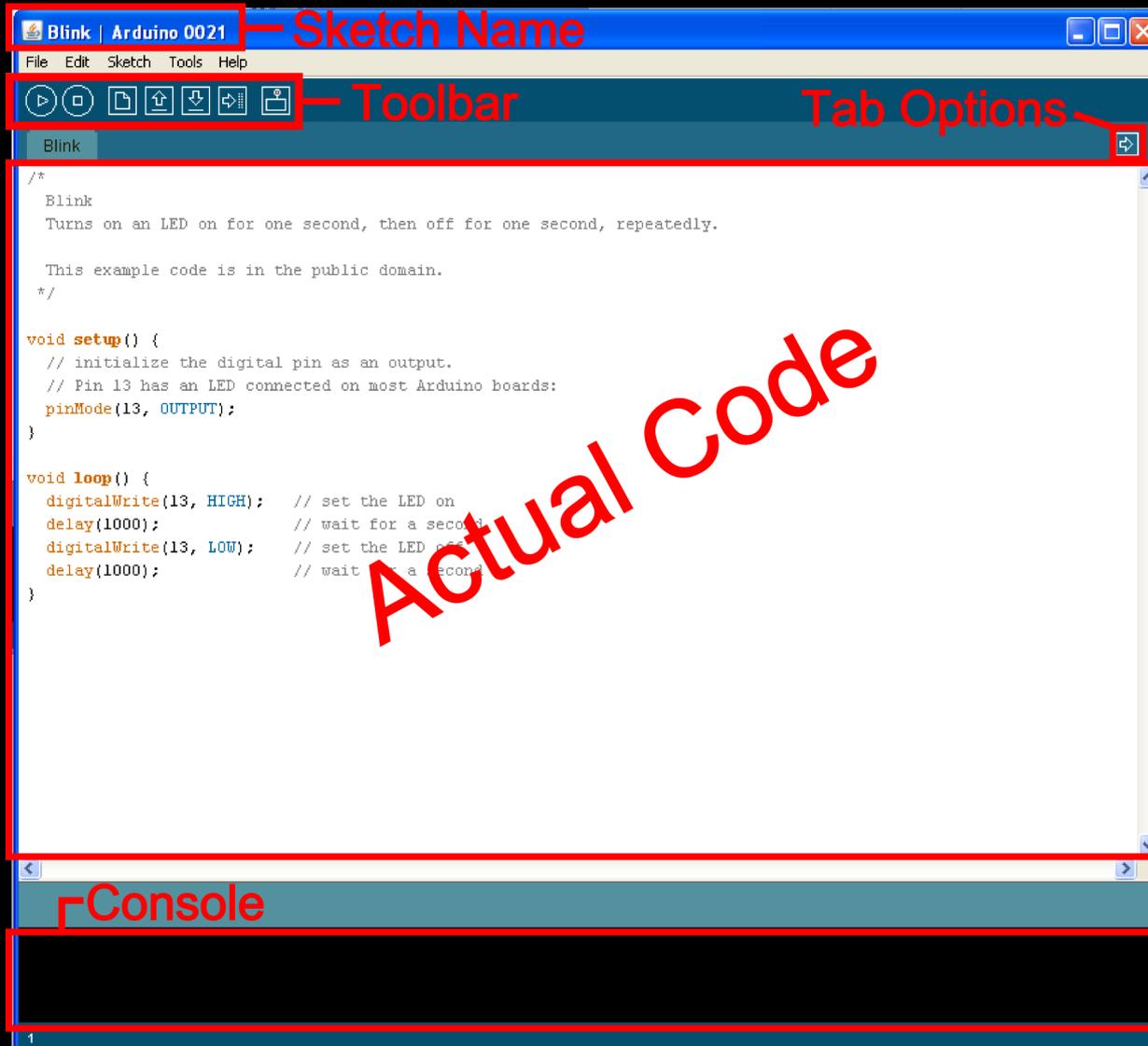
# Arduino Programming-Analog

- `analogRead(pin);`-Reads the value from the specified analog pin. The Arduino board contains a 6 to 16 channel .This means that it will map input voltages between 0 and 5 volts into integer values between 0 and 1023.
- `analogWrite(pin,value);`-Writes the value on the specified analog pin.This means that it will Write output voltages between 0 and 5 volts into integer values between 0 and 255.

# Arduino Delay Functions

- `delay(time);` - Pauses the program for the amount of time (in milliseconds) specified as parameter.
- `delayMicroseconds(time);` - Pauses the program for the amount of time (in microseconds) specified as parameter.
- `millis();` - Returns the number of milliseconds since the Arduino board began running the current program.
- `micros();` - Returns the number of microseconds since the Arduino board began running the current program.

# Arduino Environment



# Arduino Blink Programme

```
int led = 13;

void setup()           // the setup routine runs once
{
  pinMode(led, OUTPUT); //Set Pin 13 as OUTPUT
}

void loop()           //the loop runs over and over
{
  digitalWrite(led, HIGH); //Turn led on
  delay(1000);           //Delay for 1 Second
  digitalWrite(led, LOW); //Turn led off
  delay(1000);           //Delay for 1 Second
}
```

# How To Use Arduino??

## Using Arduino

- Write your sketch
- Press Compile button (to check for errors)
- Press Upload button to program Arduino board with your sketch

Try it out with the “Blink” sketch!

Load “File/Sketchbook/Examples/Digital/Blink”

```
void setup() {  
  pinMode(ledPin, OUTPUT); // sets t  
}  
void loop() {  
  digitalWrite(ledPin, HIGH); // sets t  
  delay(1000); // waits  
  digitalWrite(ledPin, LOW); // sets t  
  delay(1000); // waits  
}
```



compile

Done compiling.



upload



TX/RX flash



sketch runs

# How To Use Android Phone To Upload Arduino

- Start ArduinoDroid.
- Write Your Code in ArduinoDroid Or Select the file from your android device.
- Connect your Arduino device.
- Upload the sketch.

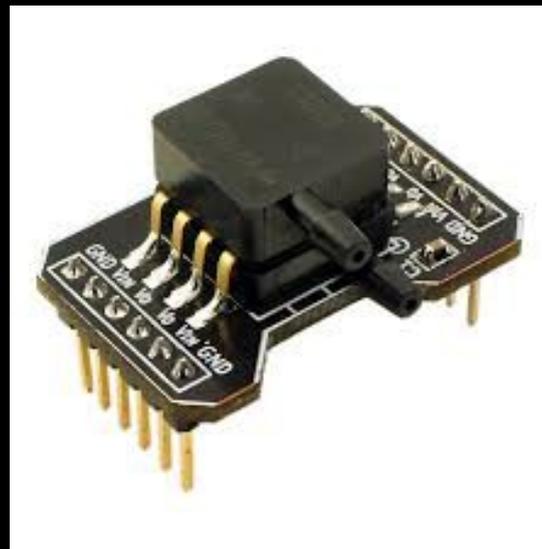
# Sensors

A **Sensor** is a device that detects events or changes in quantities and provides a corresponding output, generally as an electrical or optical signal.

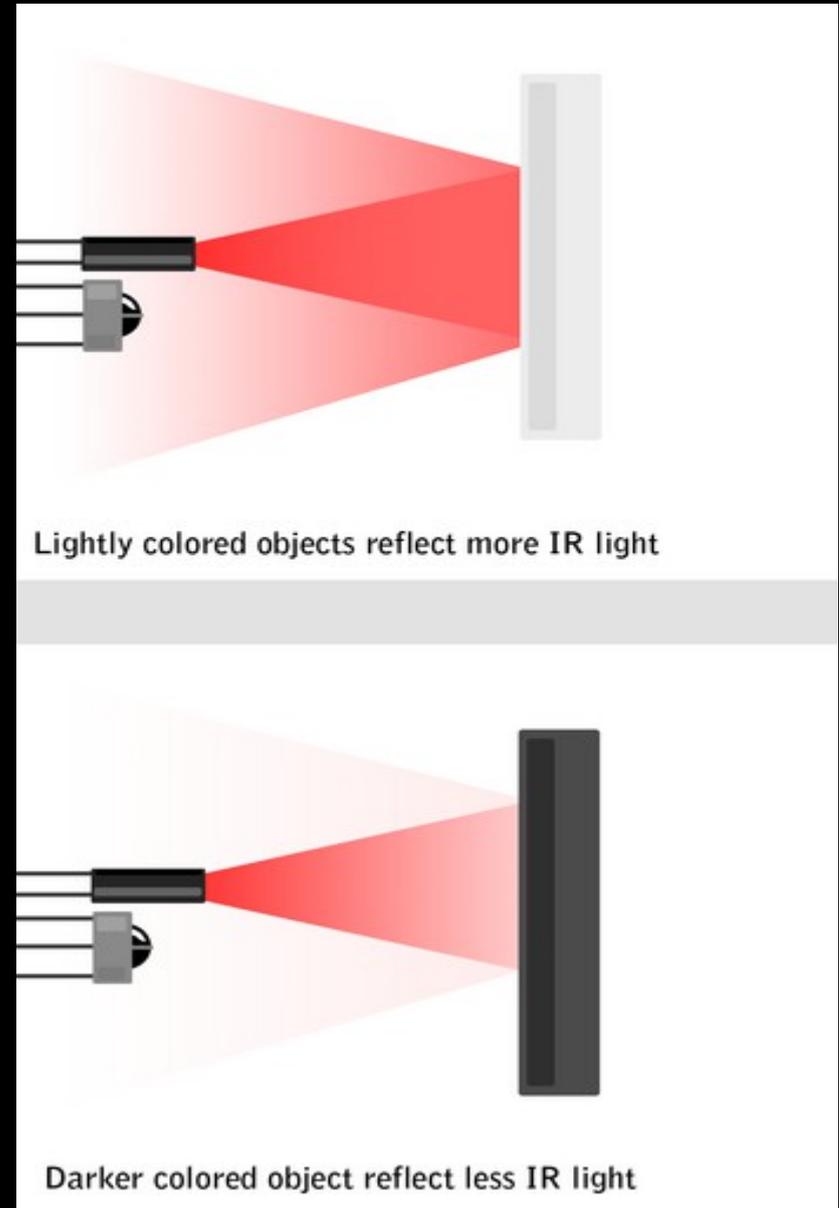
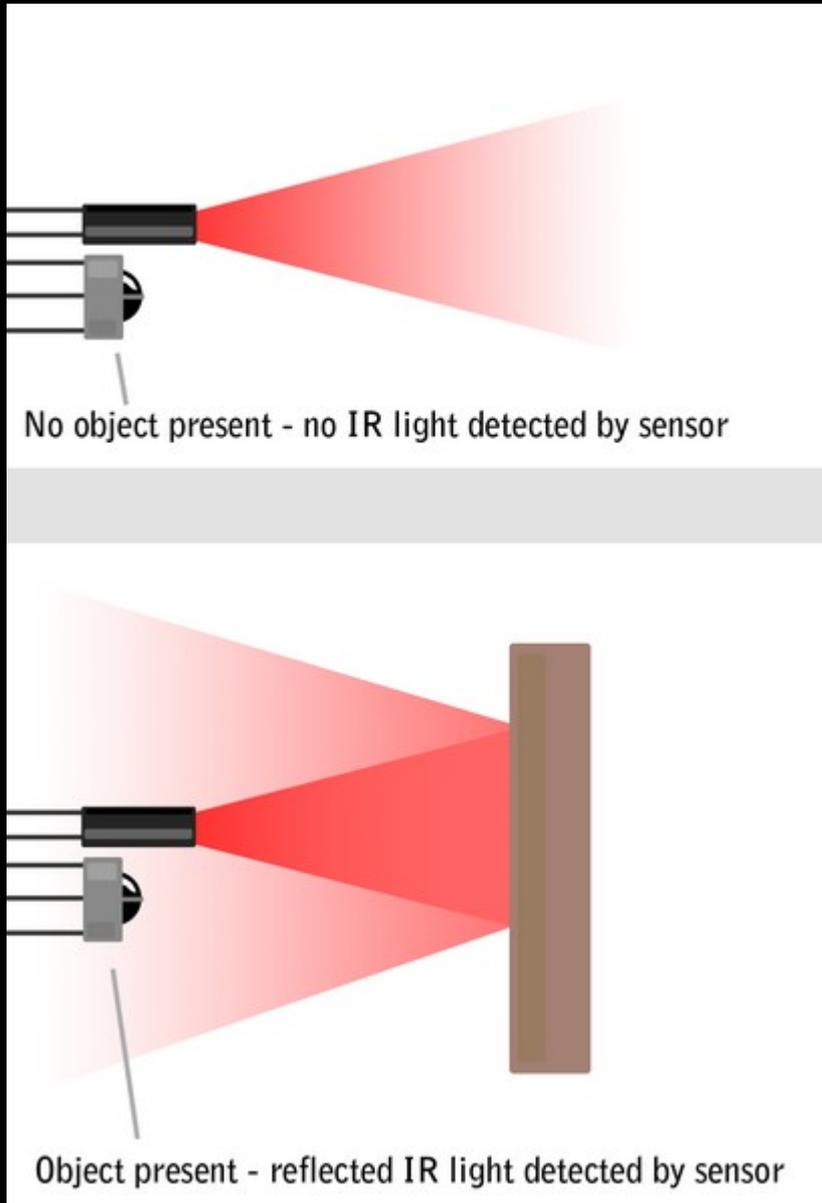
## Types Of Sensors:-

- 1) IR Sensor
- 2) Photo Sensor
- 3) Temperature Sensor
- 4) Gas Sensor
- 5) Biometric Sensor
- 6) Pressure Sensor
- 7) Tilt Sensor

# Types Of Sensors



# IR Sensor



# Arduino Programming-Analog

- `analogRead( pin );`- 0 to 1023.(Reads Analog Value)
- `analogWrite( pin , value );`- 0 to 255.(Writes Analog Value)
- `map( value, fromLow, fromHigh, toLow , toHigh );`  
( Re-maps a number from one range to another)

# Analog Write

-This function is used to control instruments like LEDs , Motors.

Code:-

```
int ledpin = 11;
```

```
void setup() {
```

```
    pinMode(ledpin, OUTPUT);
```

```
}
```

```
void loop() {
```

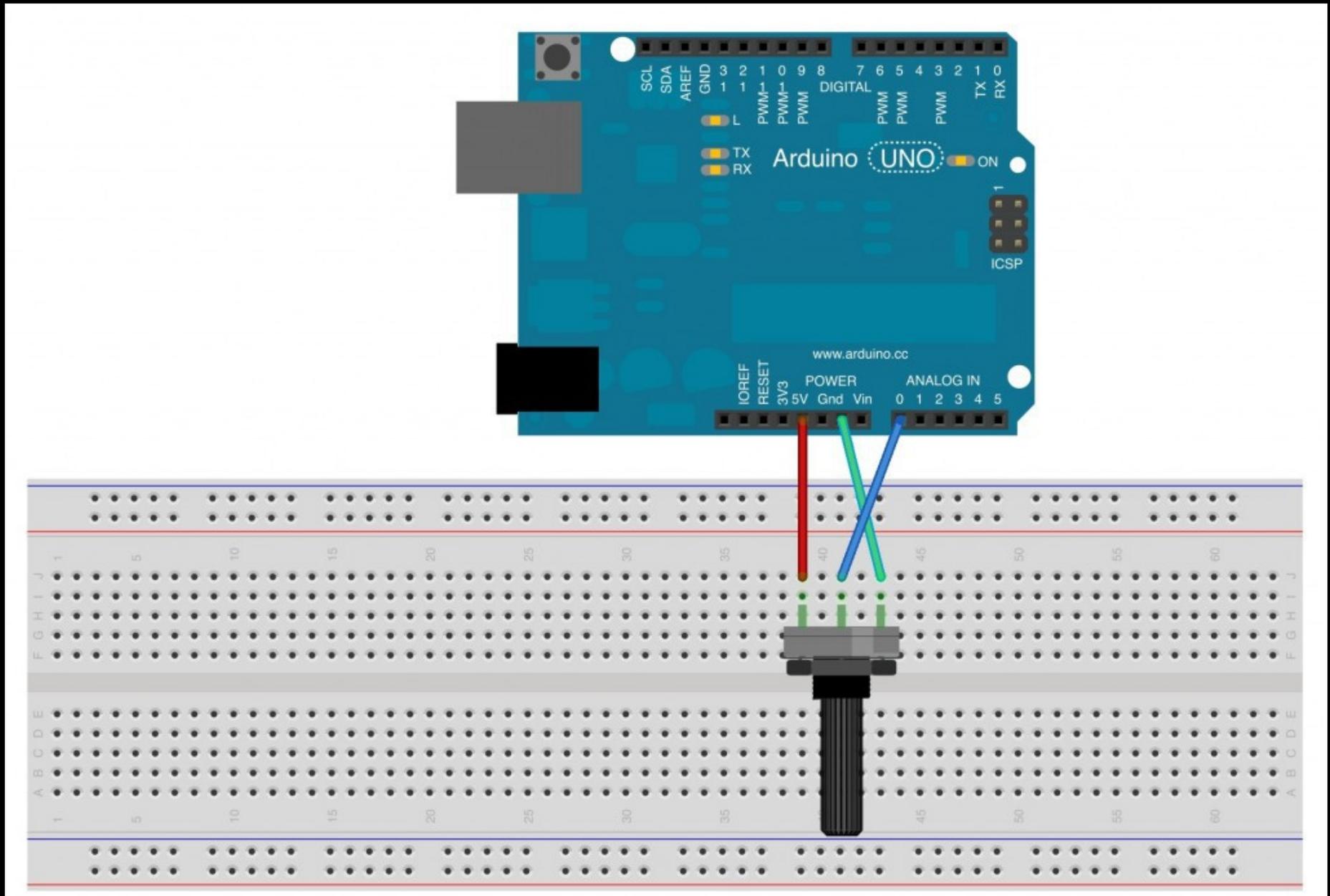
```
for (int brightness = 0; brightness < 255; brightness++){
```

```
    analogWrite(ledpin, brightness);
```

```
}
```

```
}
```

# Analog Read Hardware



# Analog Read Code

```
int sensorPin = A0; // select the input pin for the potentiometer
int ledPin = 13; // select the pin for the LED
int sensorValue = 0; // variable to store the value coming from the sensor
void setup()
{
  pinMode(ledPin, OUTPUT);
}

void loop()
{
  sensorValue = analogRead(sensorPin); //Read The Sensor Value
  digitalWrite(ledPin, HIGH); //Turn LED On
  delay(sensorValue); //Delay
  digitalWrite(ledPin, LOW); //Turn LED Of
  delay(sensorValue);
}
```

# Automatic Sliding Door

```
int sensorPin = A0; // select the input pin for the potentiometer
int sensorValue = 0; // variable to store the value coming from the sensor
void setup()
{
  pinMode(sensorPin, INPUT);
}
void loop()
{
  sensorValue = analogRead(sensorPin); //Read The Sensor Value
  if(sensorValue<120){
    doorsopen();
    delay(10000);
  }
  else{
    doorsclose();
  }
}
```

# Reference

- [Arduino.cc](http://arduino.cc)
- [Wikipedia](https://en.wikipedia.org/)

# Thank You

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