



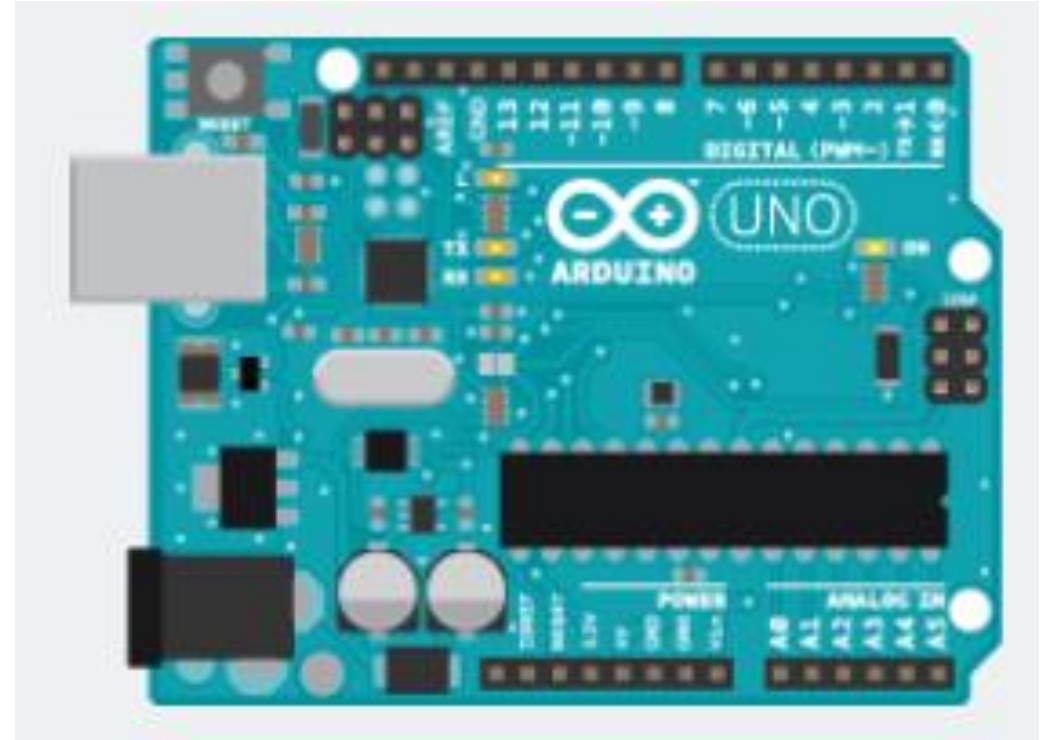
NUSPACE

Balloon Satellite – Lesson 2
Refresher to Arduino

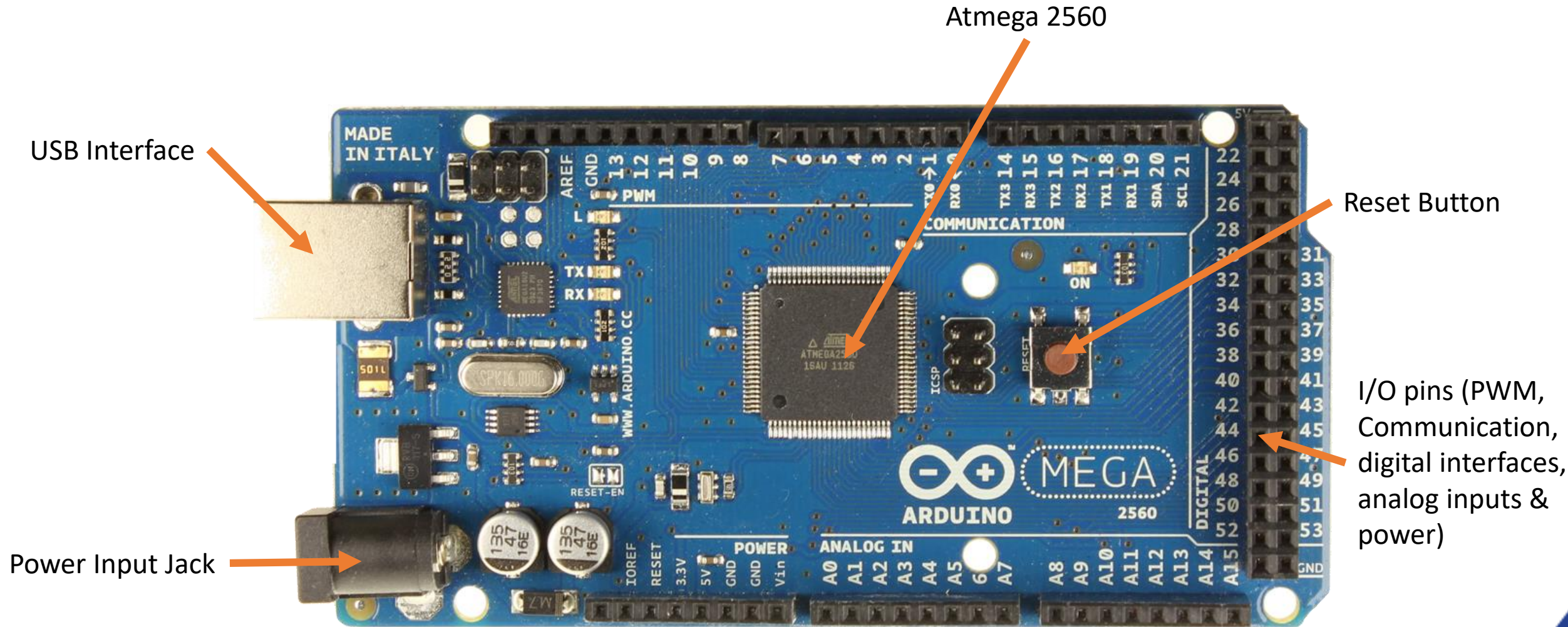


▷ What is Arduino

- Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists and anyone interested in creating interactive objects or environments
- <http://www.arduino.cc>



➤ Arduino Mega 2560

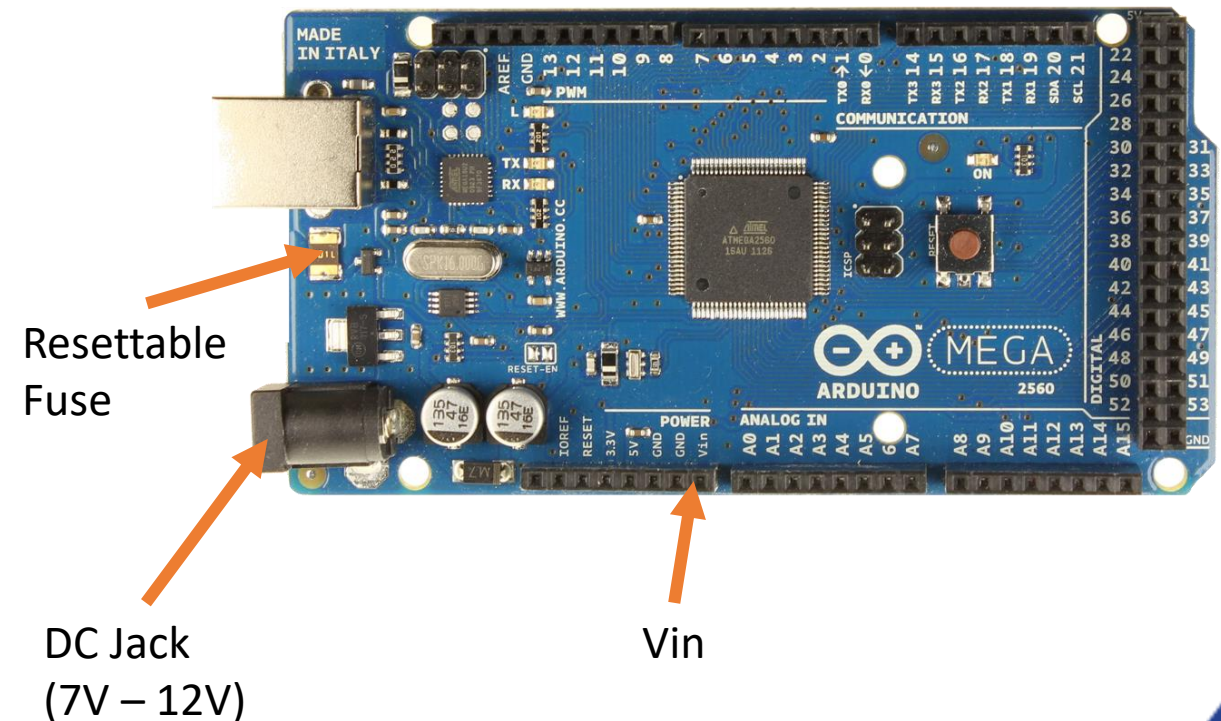


▮ Technical Specifications – Arduino Mega 2560

Operating Voltage	5V (4.5V – 5.5V)
Input Voltage (DC Jack)	7V – 12V
Digital (I/O) pins	54 (including PWM & Communication)
PWM Output	15 Output Pins
Analog Input	16 Input Pins (10-bit ADC)
UART	4 Channels (8 I/O pins)
Two-wire Serial Communication (I2C)	1 Channel (2 I/O pins)
SPI Serial Communication	1 Channel (4 I/O pins)
DC Current per I/O pin	< 40mA
DC Output Current for 3.3V pin	< 50mA
DC Output Current for 5V pin	< 500mA

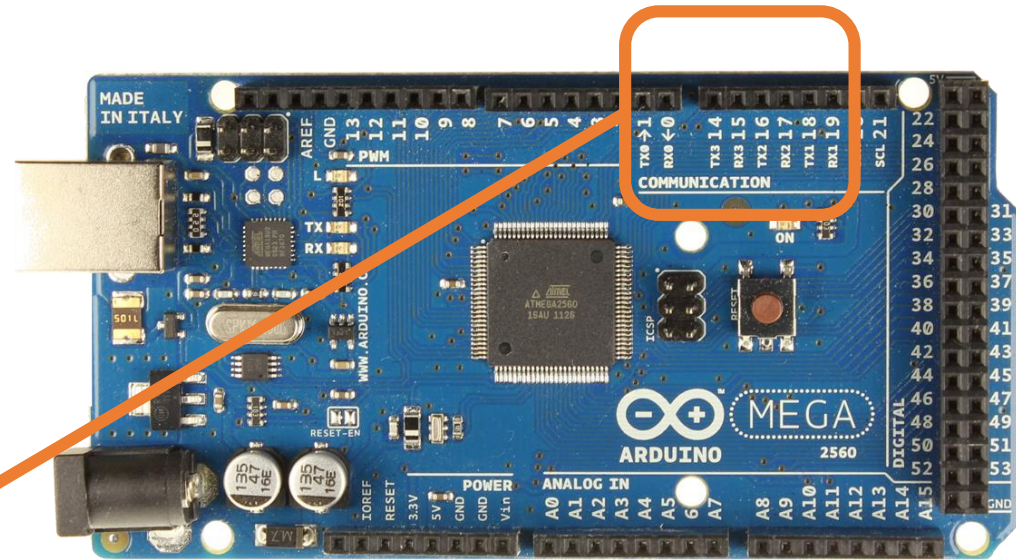
▷ Power Supply

- 2 power supply options
 - USB
 - External Power Supply
- Resettable fuse on board for USB power to prevent Arduino board from damaging PC that is powering it. Fuse limit, 500mA.
- External power is fed to the board through DC Jack or Vin pin. Recommended input Vin range, 7V – 12V.
- 5V Supply (Max 500mA output)
- 3.3V Supply (Max 50mA output)



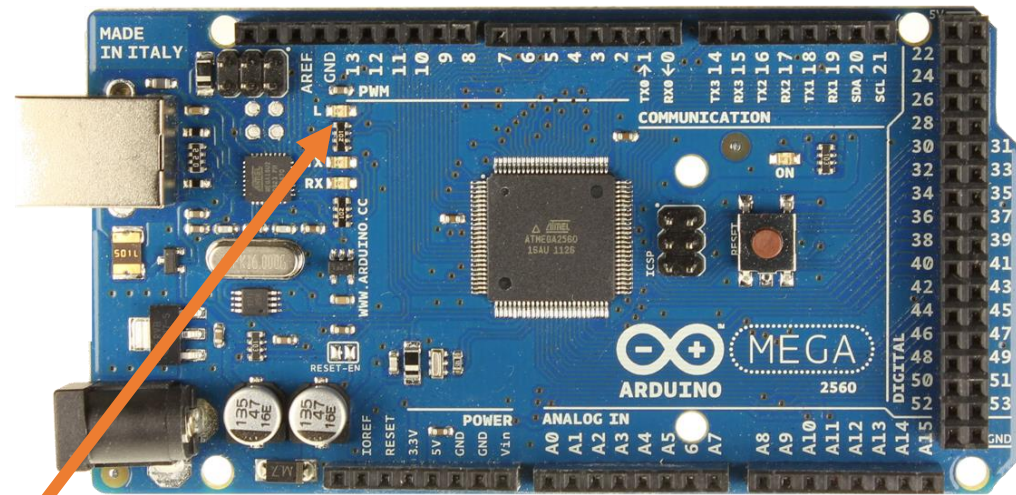
Input & Output (I/O)

- Digital pins on the board are programmable to be input or output pins. Function of pins are set by coding functions:
 - `pinMode()`
 - `digitalWrite()`
 - `digitalRead()`
- I/O lines operate at 5V logic level
- Each line can give out / take in max current of 40mA
- Pins with special functions
 - Serial [0 (RX0), 1 (TX0)]
 - Serial1 [19 (RX1), 18 (TX1)]
 - Serial2 [17 (RX2), 16 (TX2)]
 - Serial3 [15 (RX3), 14 (TX3)]



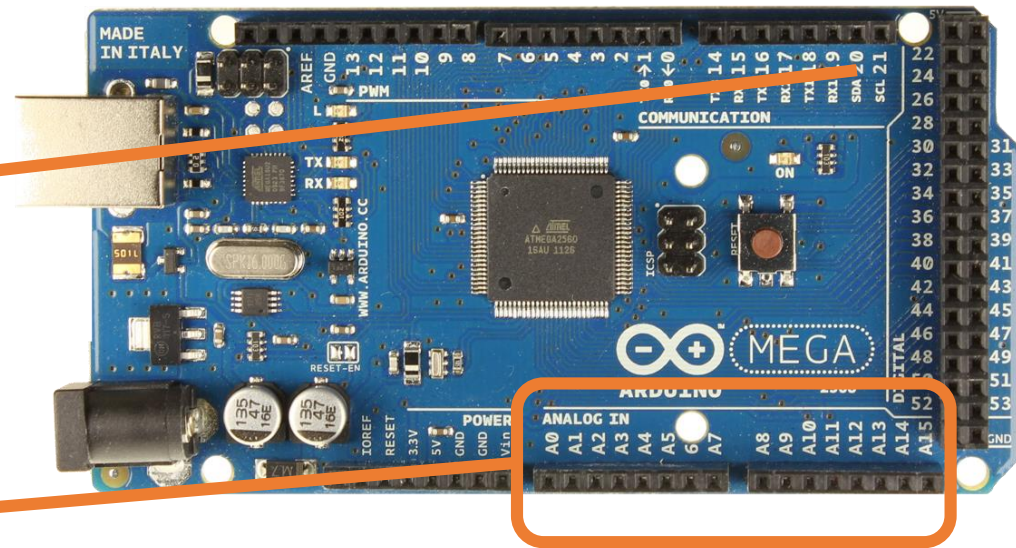
Input & Output (I/O) [cont]

- External Interrupt pins can be used to run a specific section of the code when trigger conditions are met. `attachInterrupt()`
 - Trigger Conditions
 - Low value
 - Rising Edge
 - Falling Edge
 - Change in Value
 - Pins
 - 2 [Interrupt 0], 3 [1], 21 [2], 20 [3], 19 [4], 18 [5]
- PWM pins, `analogWrite()`
 - 2-13, 44-46
- There is an onboard LED that is permanently linked to digital pin 13



Input & Output (I/O) [cont]

- Serial Peripheral Interface (SPI)
 - 50 (MISO)
 - 51 (MOSI)
 - 52 (SCK)
 - 53 (_SS)
- Two Wire Interface (I2C)
 - 20 (SDA)
 - 21 (SCL)
- Analog Input
 - A0 – A15
 - Each input provides 10bit of resolution (1024 steps)
 - Default measures from 0V to 5V



➤ Arduino Software

- Follow the instructions in the links to install the Arduino IDE and drivers on your PC
 - Mac (<https://www.arduino.cc/en/Guide/MacOSX>)
 - Windows (<https://www.arduino.cc/en/Guide/Windows>)

➤ Arduino Coding

- Codes found inside void setup() only run once upon booting up
- Codes found inside void loop() runs sequentially, infinitely till system shuts down
- Reference for Arduino functions:
<https://www.arduino.cc/reference/en/>

```
Blink | Arduino 1.8.5
File Edit Sketch Tools Help

Blink

it is attached to digital pin 13, on MKR1000 on pin 6. LED_BUILTIN is set to
the correct LED pin independent of which board is used.
If you want to know what pin the on-board LED is connected to on your Arduino
model, check the Technical Specs of your board at:
https://www.arduino.cc/en/Main/Products

modified 8 May 2014
by Scott Fitzgerald
modified 2 Sep 2016
by Arturo Guadalupi
modified 8 Sep 2016
by Colby Newman

This example code is in the public domain.

http://www.arduino.cc/en/Tutorial/Blink
*/

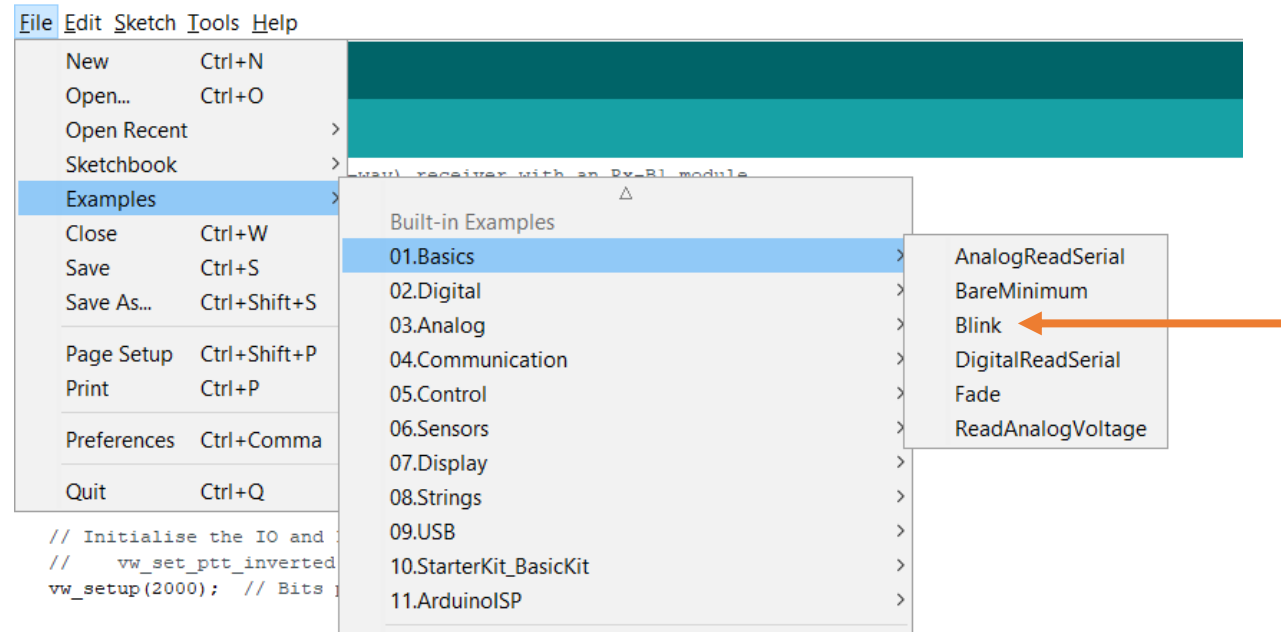
// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin LED_BUILTIN as an output.
  pinMode(LED_BUILTIN, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(LED_BUILTIN, HIGH); // turn the LED on (HIGH is the voltage level)
  delay(1000); // wait for a second
  digitalWrite(LED_BUILTIN, LOW); // turn the LED off by making the voltage LOW
  delay(1000); // wait for a second
}
```

32 Arduino/Genuino Mega or Mega 2560, ATmega2560 (Mega 2560) on COM11

Try out the LED Blink Sketch Example

- You should see the LED on the board (pin 13) blink
- Notes:
 - Need to select proper board under **Tools > Board**
 - Need to select proper COM port under **Tools > Serial Port**



The NUSPACE logo features the word "NUSPACE" in a bold, white, sans-serif font. A thick orange swoosh curves around the letters "P" and "A". Above the "P" is a small white icon of a satellite with two rectangular solar panels.

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Thank You

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