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What is an Arduino ?

- **Open Source** electronic prototyping **platform** based on flexible **easy to use** hardware and software.

Arduino Family

Arduino Uno

Arduino Leonardo

Arduino Mega ADK

Arduino Ethernet

Arduino Due

Arduino Yún

Arduino Mega 2560

Arduino Mini

The Accessories

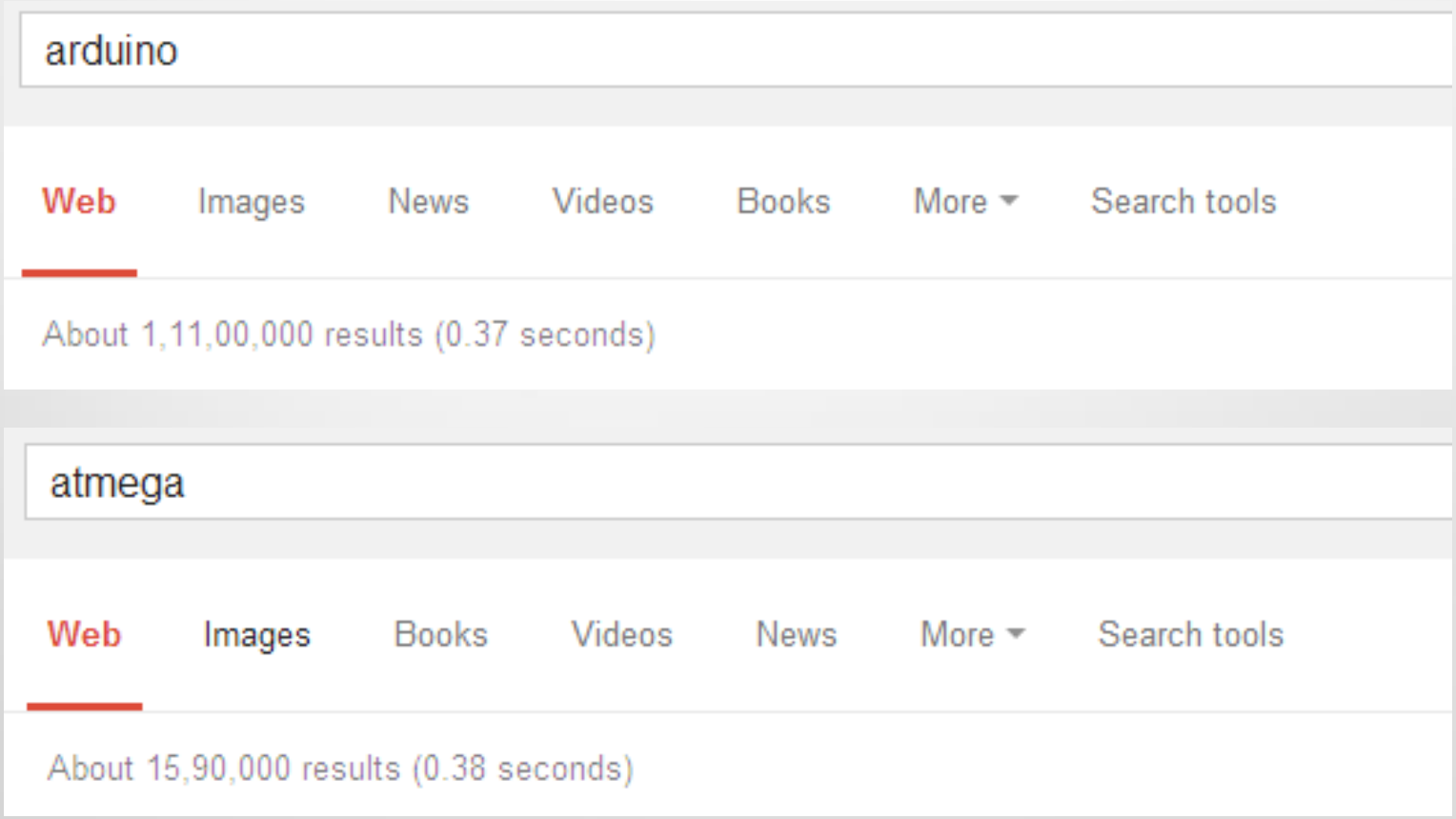
Arduino

Arduino Shield

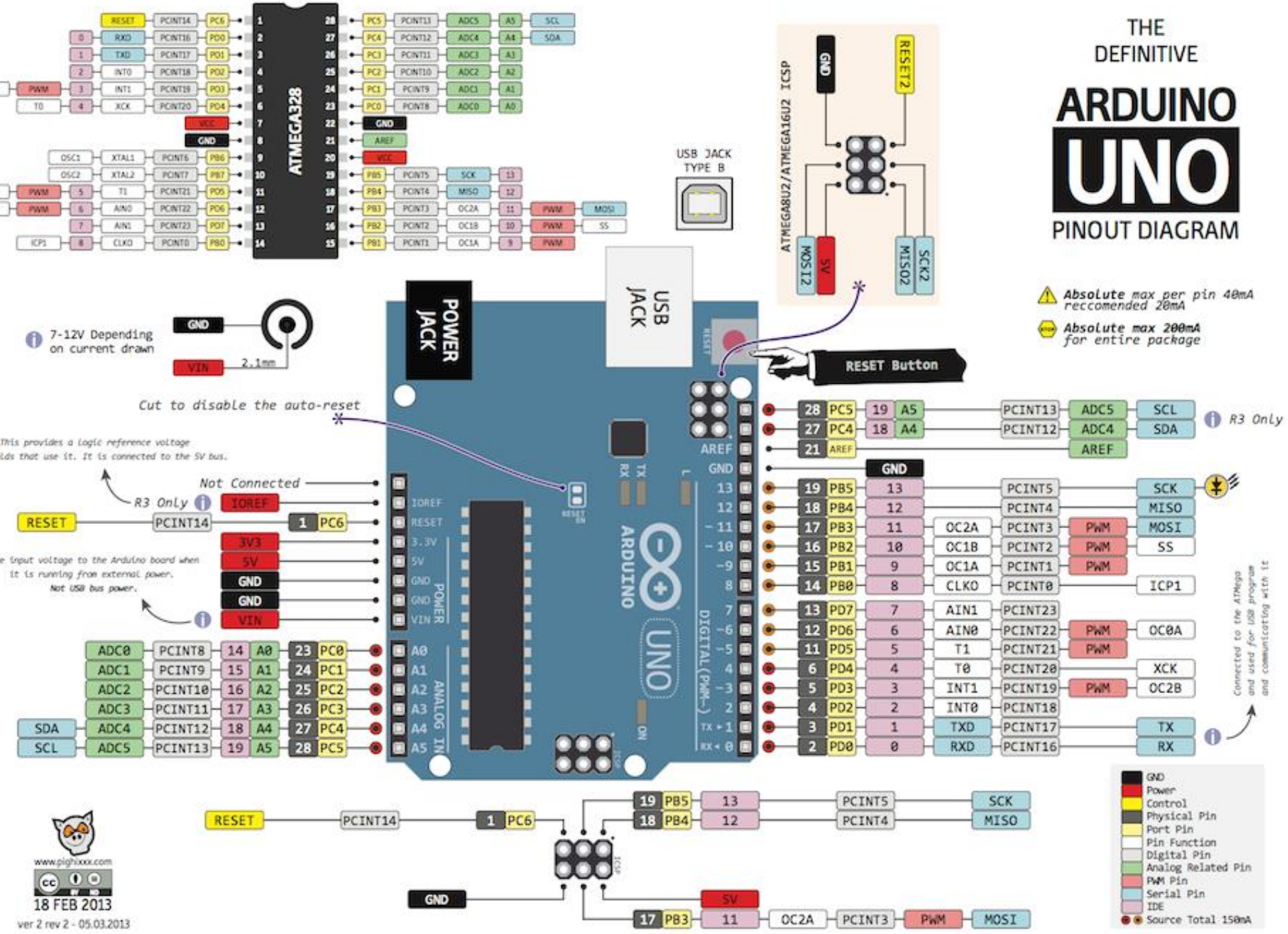
A Summary of Arduino power

Name	Processor	Operating Voltage/Input Voltage	CPU Speed	Analog In/Out	Digital IO/PWM	EEPROM [KB]	SRAM [KB]	Flash [KB]	USB	UART
Uno	ATmega328	5 V/7-12 V	16 Mhz	6/0	14/6	1	2	32	Regular	1
Due	AT91SAM3X8E	3.3 V/7-12 V	84 Mhz	12/2	54/12	-	96	512	2 Micro	4
Leonardo	ATmega32u4	5 V/7-12 V	16 Mhz	12/0	20/7	1	2.5	32	Micro	1
Mega 2560	ATmega2560	5 V/7-12 V	16 Mhz	16/0	54/15	4	8	256	Regular	4
Mega ADK	ATmega2560	5 V/7-12 V	16 Mhz	16/0	54/15	4	8	256	Regular	4

Who is more popular Atmega or Arduino?



THE DEFINITIVE ARDUINO UNO PINOUT DIAGRAM



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Bare minimum code

```
void setup() {
    // put your setup code here, to run once:

}


void loop() {
    // put your main code here, to run repeatedly:

}
```

Bare minimum code

- setup : It is called only when the Arduino is powered on or reset. It is used to initialize variables and pin modes
- loop : The loop functions runs continuously till the device is powered off. The main logic of the code goes here. Similar to while (1) for micro-controller programming.

PinMode

- A pin on arduino can be set as input or output by using pinMode function.
- pinMode(13, OUTPUT); // sets pin 13 as output pin
- pinMode(13, INPUT); // sets pin 13 as input pin

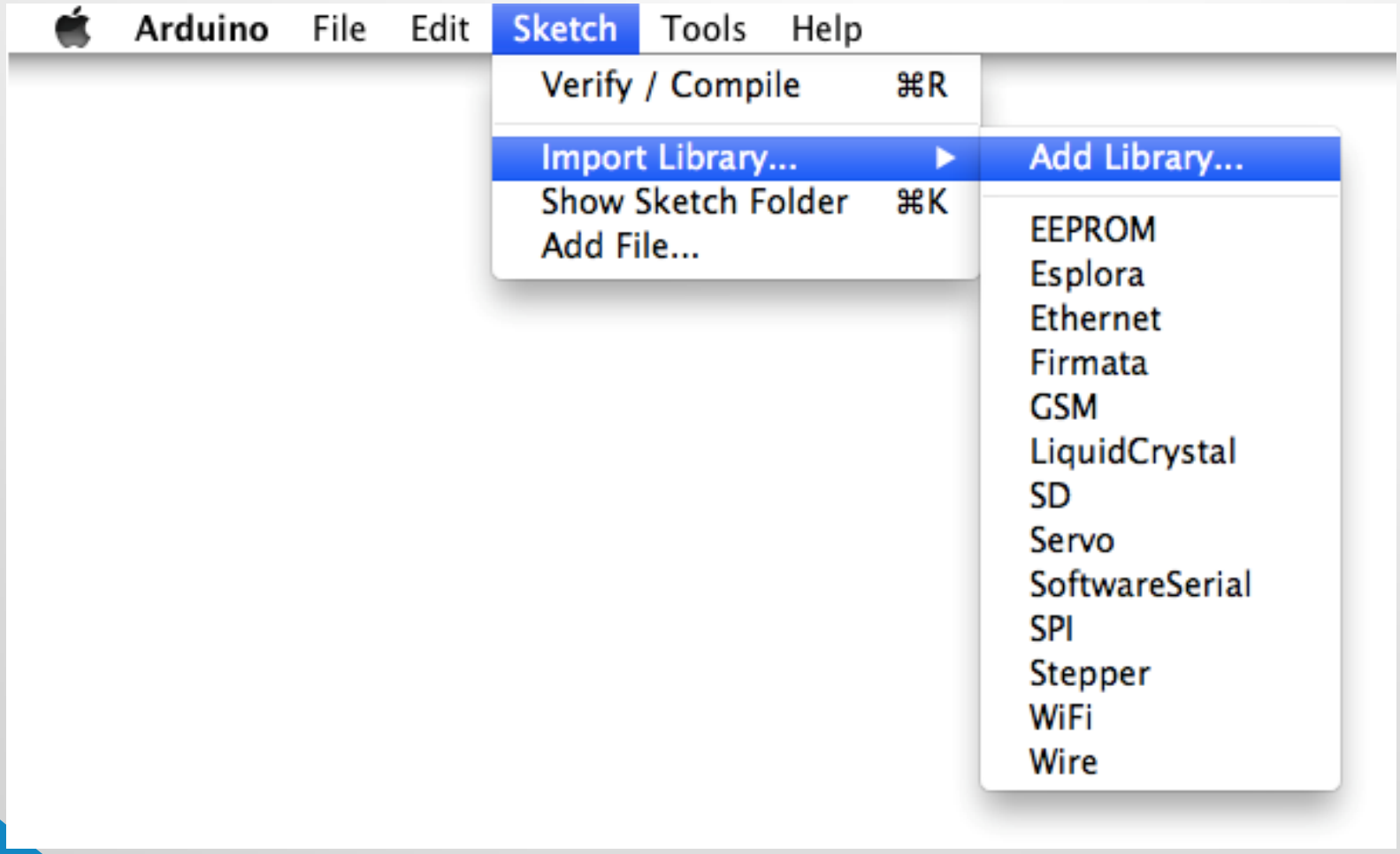
Reading/writing digital values

- digitalWrite(13, LOW); // Makes the output voltage on pin 13 , 0V
- digitalWrite(13, HIGH); // Makes the output voltage on pin 13 , 5V
- int buttonState = digitalRead(2); // reads the value of pin 2 in buttonState

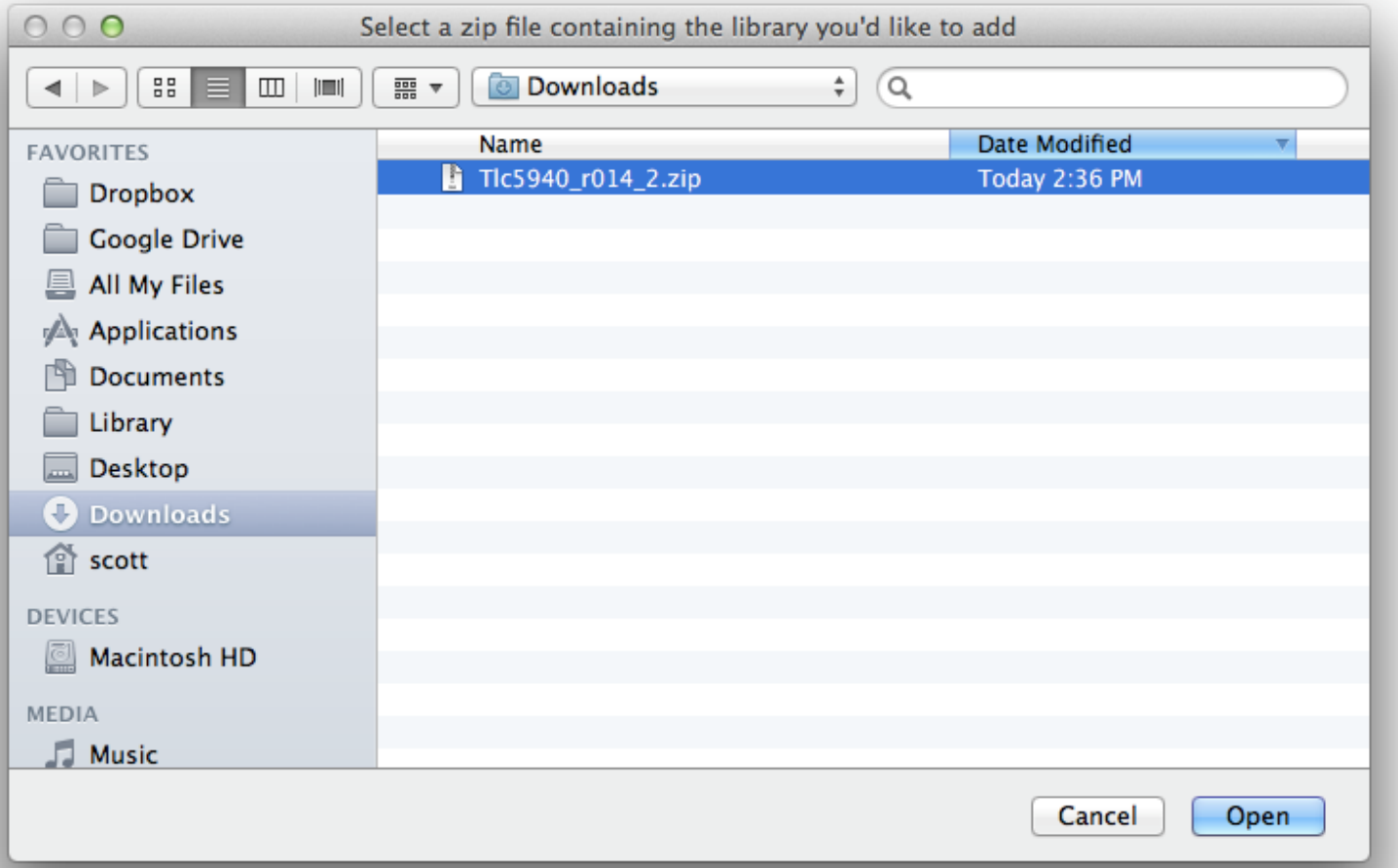
What are Libraries?

- Libraries are a collection of code that makes it easy for you to connect to a sensor, display, module, etc. For example, the built-in LiquidCrystal library makes it easy to talk to character LCD displays. There are hundreds of additional libraries available on the Internet for download.

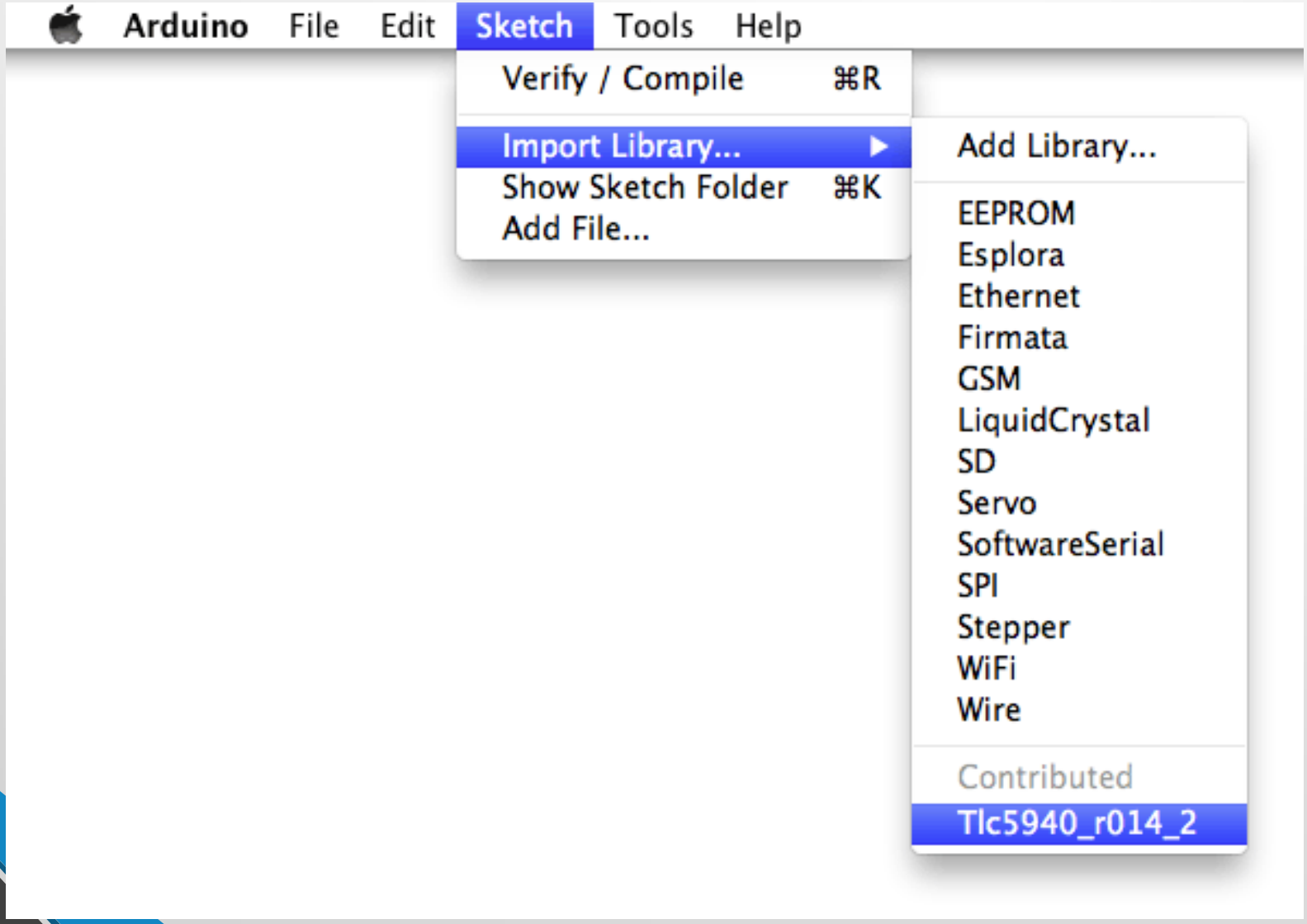
How to use them?



How to use them?



How to use them?



Arduino day

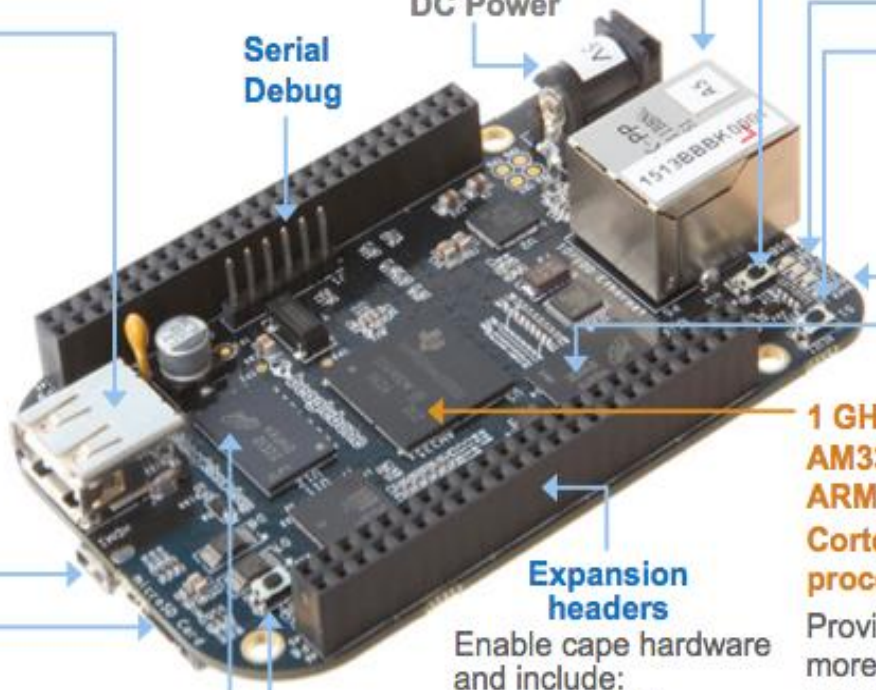
Think Make Share

Single Board Devices

Single Board Devices

- Early microcomputers typically consisted of a half dozen (or more) circuit boards--plugged into a backplane--that implemented the central processor unit (CPU), memory, disk controllers and serial/parallel port functions. These backplane-based microcomputers were used for data acquisition, process control and R&D projects, but were generally too bulky to be used as embedded systems within devices.

BeagleBone Black
1 GHz performance ready to use for $45



10/100 Ethernet

USB Host
Easily connects to almost any everyday device such as mouse or keyboard

microHDMI
Connect directly to monitors and TVs

microSD
Expansion slot for additional storage

512MB DDR3
Faster, lower power RAM for enhanced user-friendly experience

Serial Debug

DC Power

Boot Button

Power Button

LEDS

Reset Button

USB Client
Development interface and directly powers board from PC

2GB on-board storage using eMMC
- Pre-loaded with Ångström Linux Distribution
- 8-bit bus accelerates performance
- Frees the microSD slot to be used for additional storage for a less expensive solution than SD cards

1 GHz Sitara AM335x ARM® Cortex™-A8 processor
Provides a more advanced user interface and up to 150% better performance than ARM11

Expansion headers
Enable cape hardware and include:
- 65 digital I/O
- 7 analog
- 4 serial
- 2 SPI
- 2 I2C
- 8 PWMs
- 4 timers
- And much much more!

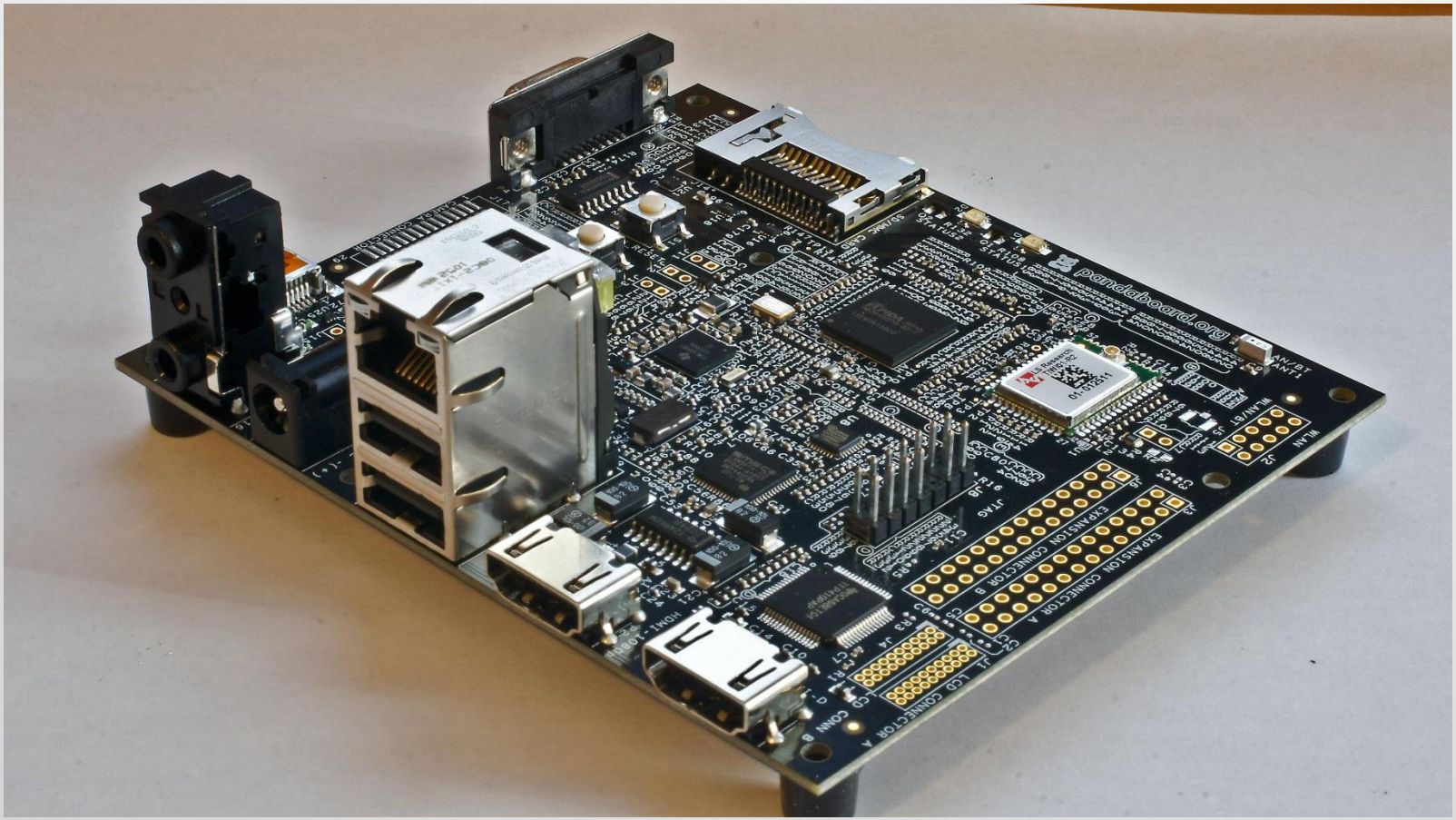
Included in price:
- Power supply ~ $10
- USB network cable ~ $3
- 2GB on-board storage $5-$10
- PRU for real-time tasks typically on FPGA ~ $20

Beagle board Family	BeagleBone Black	BeagleBone	BeagleBoard-xM	BeagleBoard
Processor	AM3358 ARM Cortex-A8	AM3358 ARM Cortex-A8	DM3730 ARM Cortex-A8	OMAP3530 ARM Cortex-A8
Maximum Processor Speed	1GHz	720MHz	1GHz	720MHz
Video	microHDMI, cape add-ons	cape add-ons	DVI-D (via HDMI connectors), S-Video	DVI-D (via HDMI connectors), S-Video
Audio	microHDMI, cape add-ons	cape add-ons	3.5mm stereo jack	3.5mm stereo jack
Supported Interfaces	4x UART, 8x PWM, LCD, GPMC, MMC1, 2x SPI, 2x I2C, A/D Converter, 2xCAN Bus, 4 Timers	4x UART, 8x PWM, LCD, GPMC, MMC1, 2x SPI, 2x I2C, A/D Converter, 2xCAN Bus, 4 Timers, FTDI USB to Serial, JTAG via USB	McBSP, DSS, I2C, UART, LCD, McSPI, PWM, JTAG, Camera Interface	McBSP, DSS, I2C, UART, McSPI, PWM, JTAG

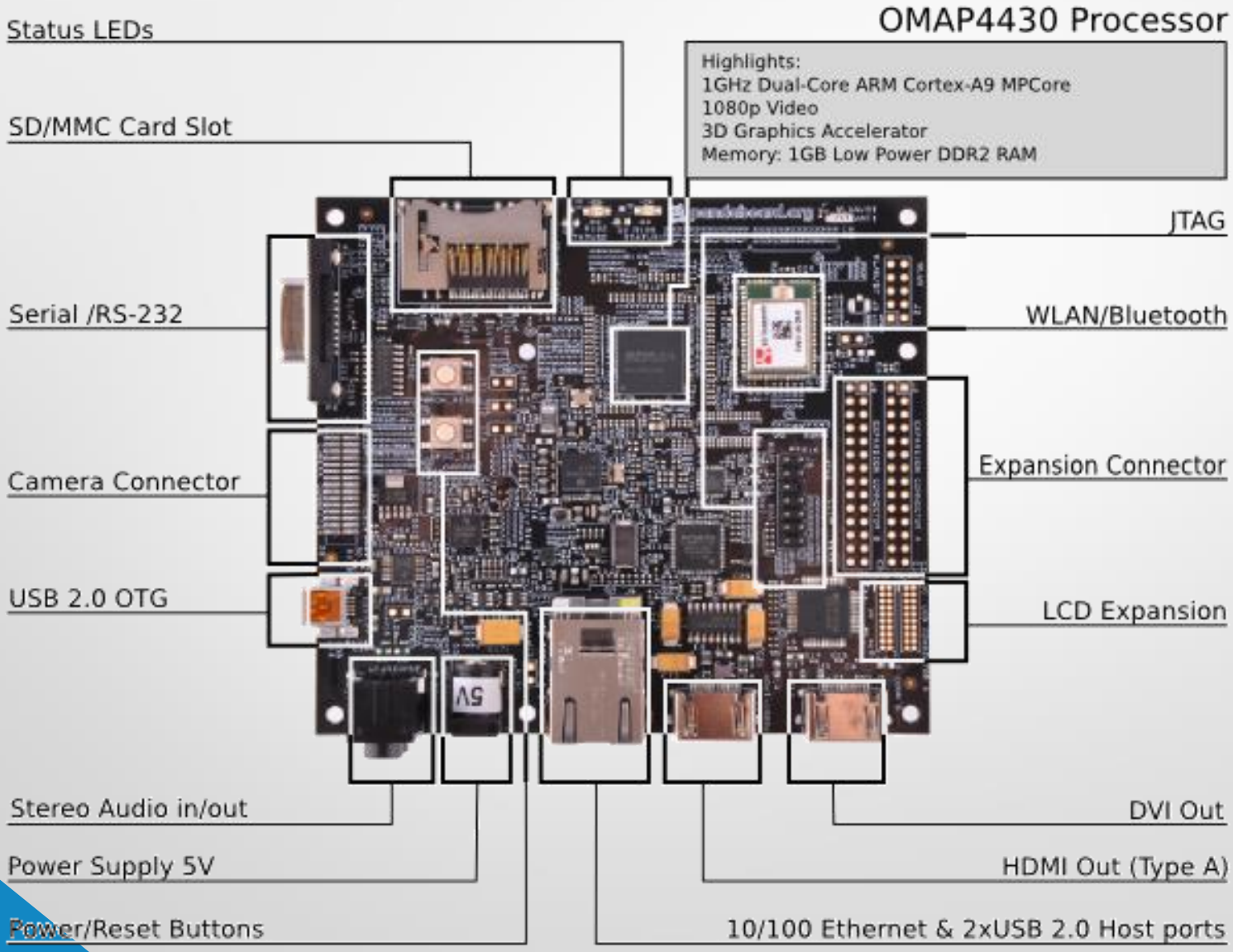
Software Compatibilty

- Ångström Linux
- Android
- Ubuntu
- Cloud9 IDE on Node.js w/ BoneScript library
- plus much more

Pandaboard

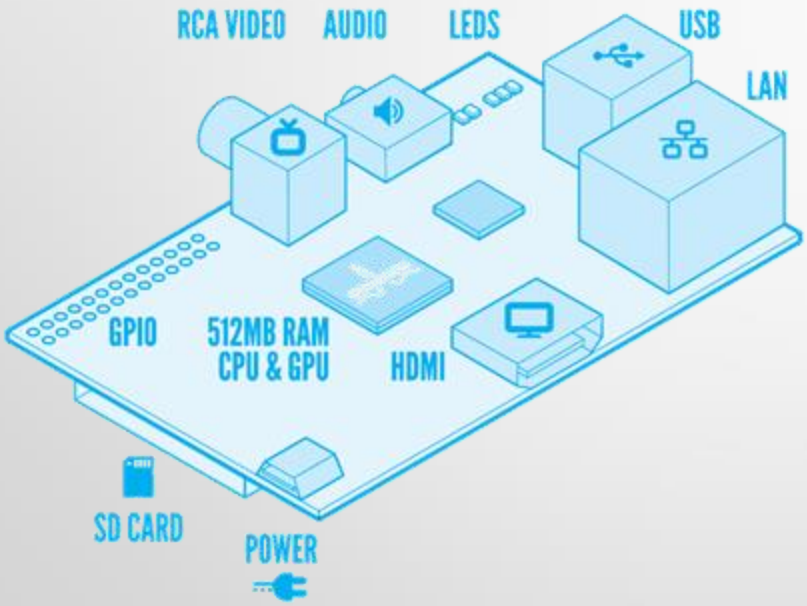


Pandaboard


Status LEDs
SD/MMC Card Slot
Serial /RS-232
Camera Connector
USB 2.0 OTG
Stereo Audio in/out
Power Supply 5V
Power/Reset Buttons
OMAP4430 Processor
Highlights:
1GHz Dual-Core ARM Cortex-A9 MPCore
1080p Video
3D Graphics Accelerator
Memory: 1GB Low Power DDR2 RAM
JTAG
WLAN/Bluetooth
Expansion Connector
LCD Expansion
DVI Out
HDMI Out (Type A)
10/100 Ethernet & 2xUSB 2.0 Host ports
5V
Board Dimensions: W:4.0" (101.6 mm) X H: 4.5" (114.3 mm)

Raspberry Pi

RASPBERRY PI MODEL B



Mbed

Specifications of core		
Core	ARM Cortex-M0	ARM Cortex-M3
Frequency	48MHz	96MHz
FLASH	32KB	512KB
RAM	8KB	32KB
Power	1-16mA (Vb)	60-120mA (Vin)

Any Doubts?