Rapid Prototyping Mobile Projects with Arduino and Open Hardware

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Acknowledgement & Disclaimer

Part of my talk covers products that are for sale by different companies. Some by my employer. I am not a sales person, and am not on any sort of commission. I'm here sharing stuff I'm excited about. I will point out free options and discuss the differences too.

About Your Presenter - Jim McKeeth

- Chief Developer Advocate & Engineer
  - Long time software developer
- Invented and patented pattern and swipe to unlock
  - US Patent # 8352745 & 6766456, etc.
- Built thought controlled drone with Google Glass
- Host of Podcast at Delphi.org
- Lives near Boise, Idaho, USA with family & dogs
- Improvisational comedy performer with CSz Boise
- Contributing author to *Internet of Things and Big Data Handbook*

About Embarcadero Technologies

- Elite Developer tools
- Tools used by 90% of the Fortune 100 companies
- Over 30 years of award winning products
- Emphasis on performance, productivity and platforms
- Active developer community of over 1 million developers
- Products include:
  - RAD Studio, RAD Server, Delphi, C++Builder, RAD Server, BeaconFence & InterBase
- Supported platforms: Windows, Android, iOS, macOS & Linux

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"THE BEST WAY TO PREDICT THE FUTURE IS TO INVENT IT."
- ALAN KAY
PICTUREQUOTES.ME

Session Goal

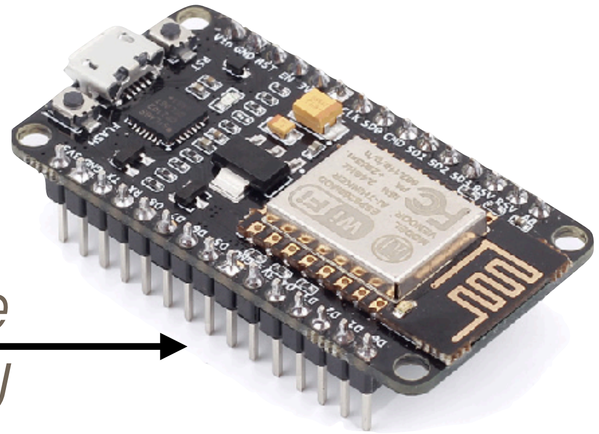
Overview of tools to get from idea to prototype *quickly*

Agenda

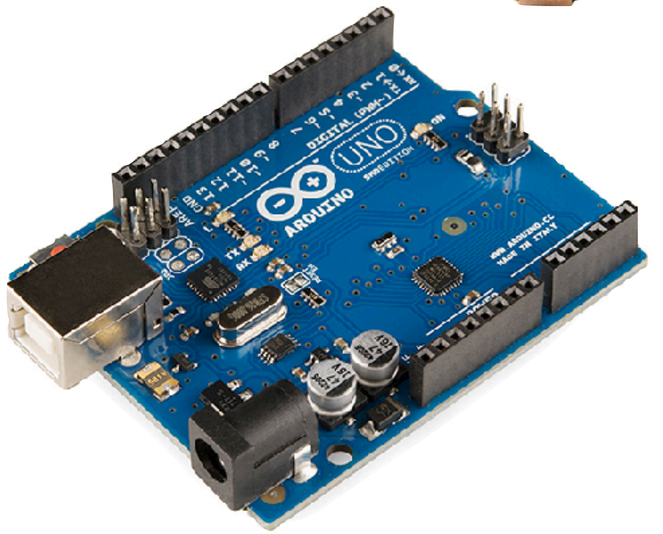
- Introduction to Arduino & development
- Looking at a *few* different hardware pieces
- Overview of Visuino - Visual Arduino development IDE
- Arduino connection options
- Mobile app development
- Architectural considerations
- Cloud options

What is Arduino

- A Company & A Brand
- Open source software & hardware (GPL, LGPL & CC)
- A Maker Community
- There are *compatible* & *derived* boards
- Beware the *clones*



Compatible NodeMCU

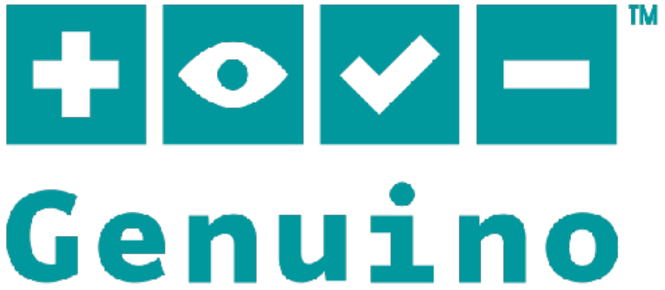


The Different Faces of Arduino

The Company
www.arduino.cc

Open Source
Platform / Ecosystem
www.arduino.org

Brand Outside USA

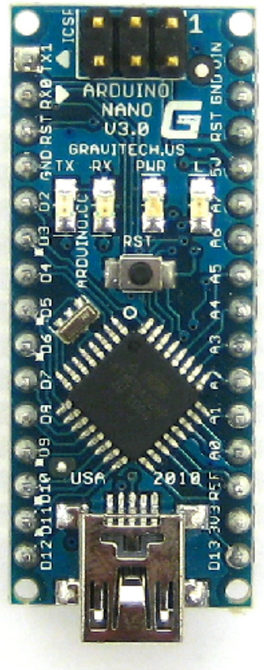


Built w/Arduino
Compatible
Microprocessors

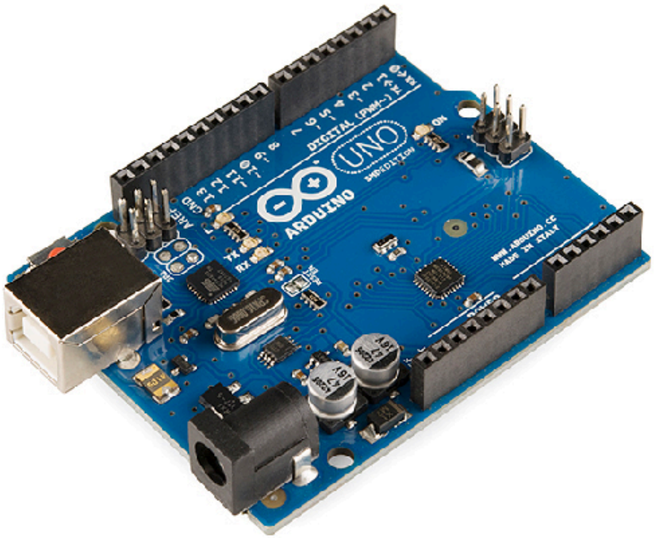
Community Groups
(Not hardware)

Manufacturing Partners

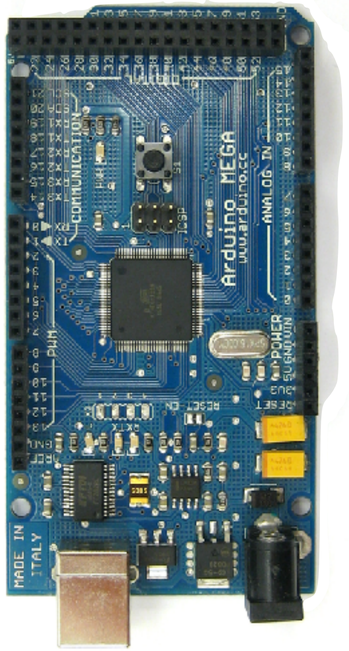
Some Official Arduino Boards



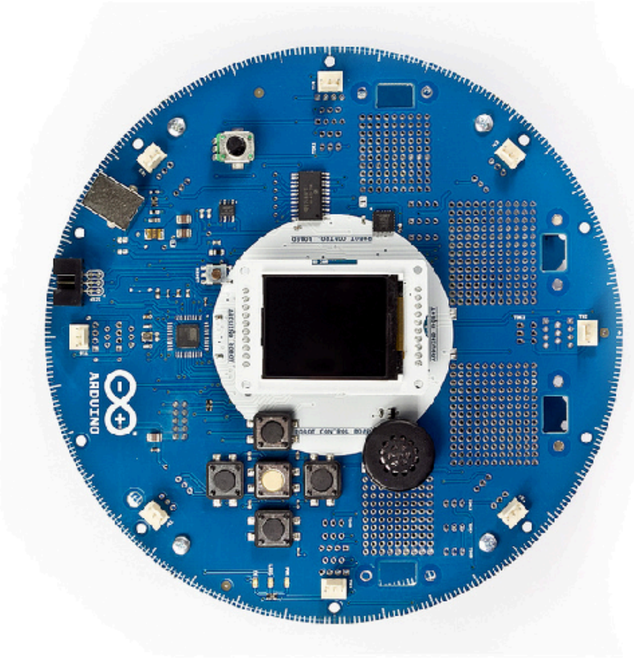
Nano



Uno



Mega



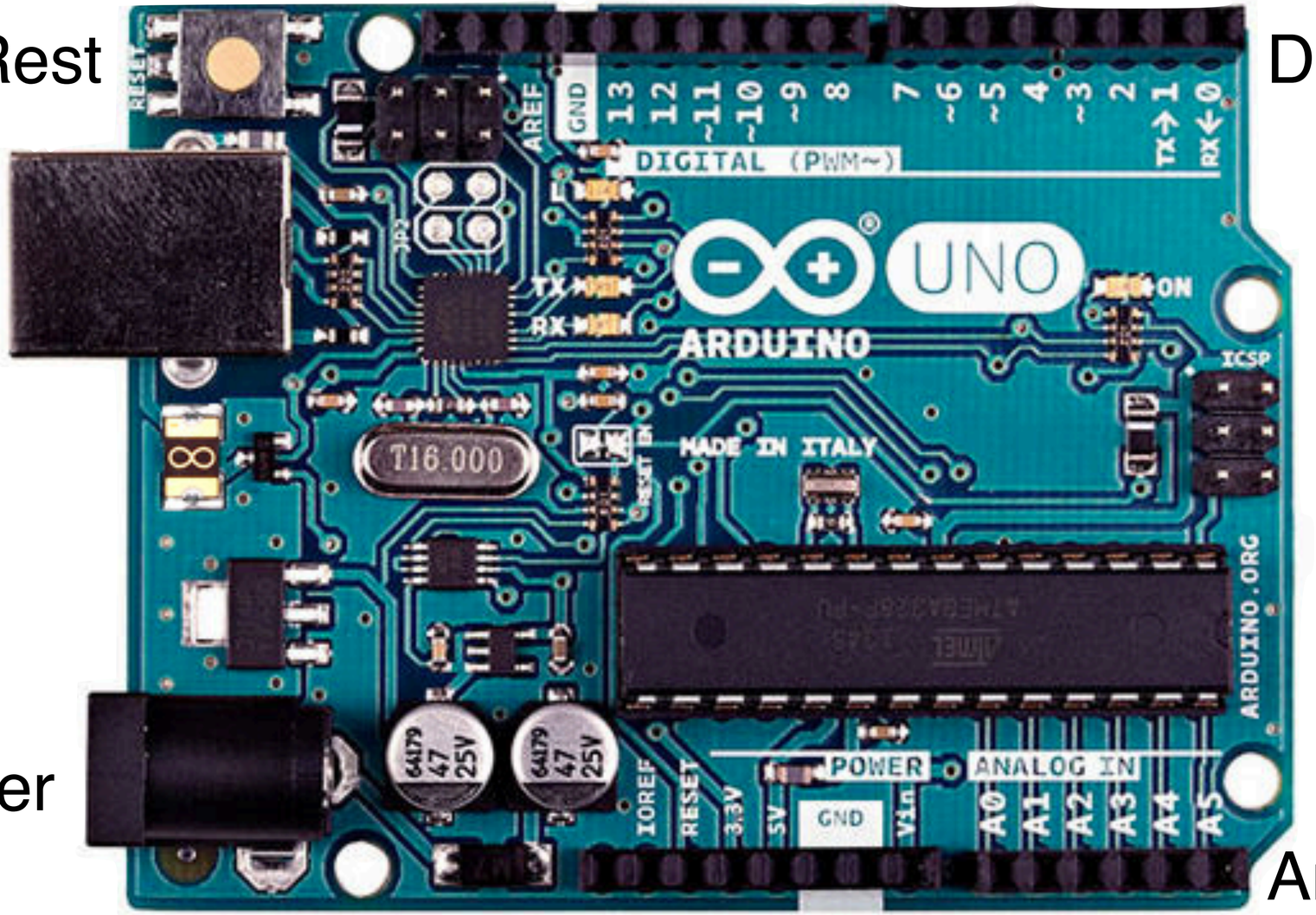
Robot

Images: en.wikipedia.org/wiki/Arduino

Rest

Digital I/O Pins

USB Port
(Data & Power)

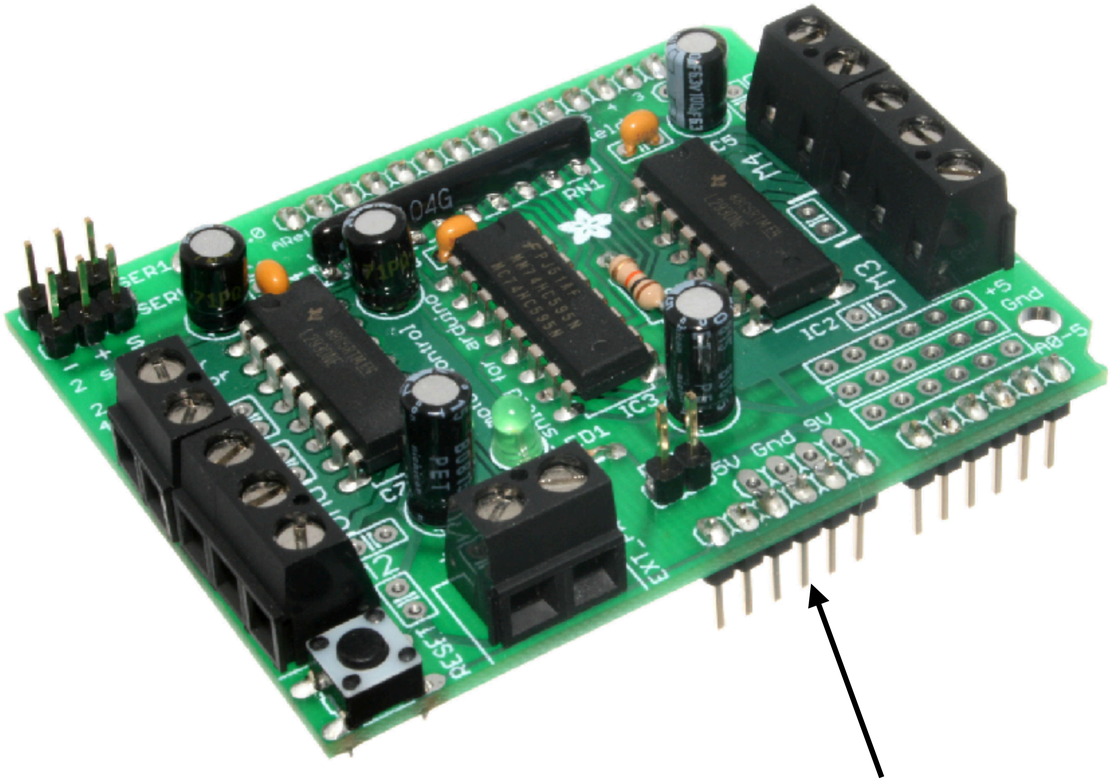


Power

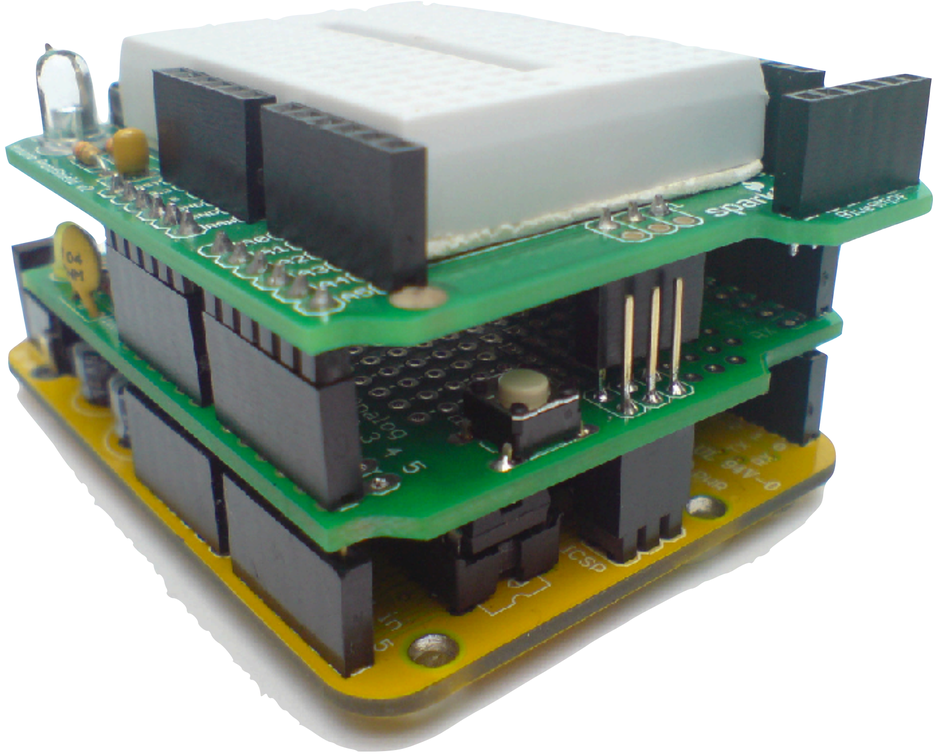
Analog I/O Pins

Power
Pins

SHIELDS - EXPAND THE HARDWARE

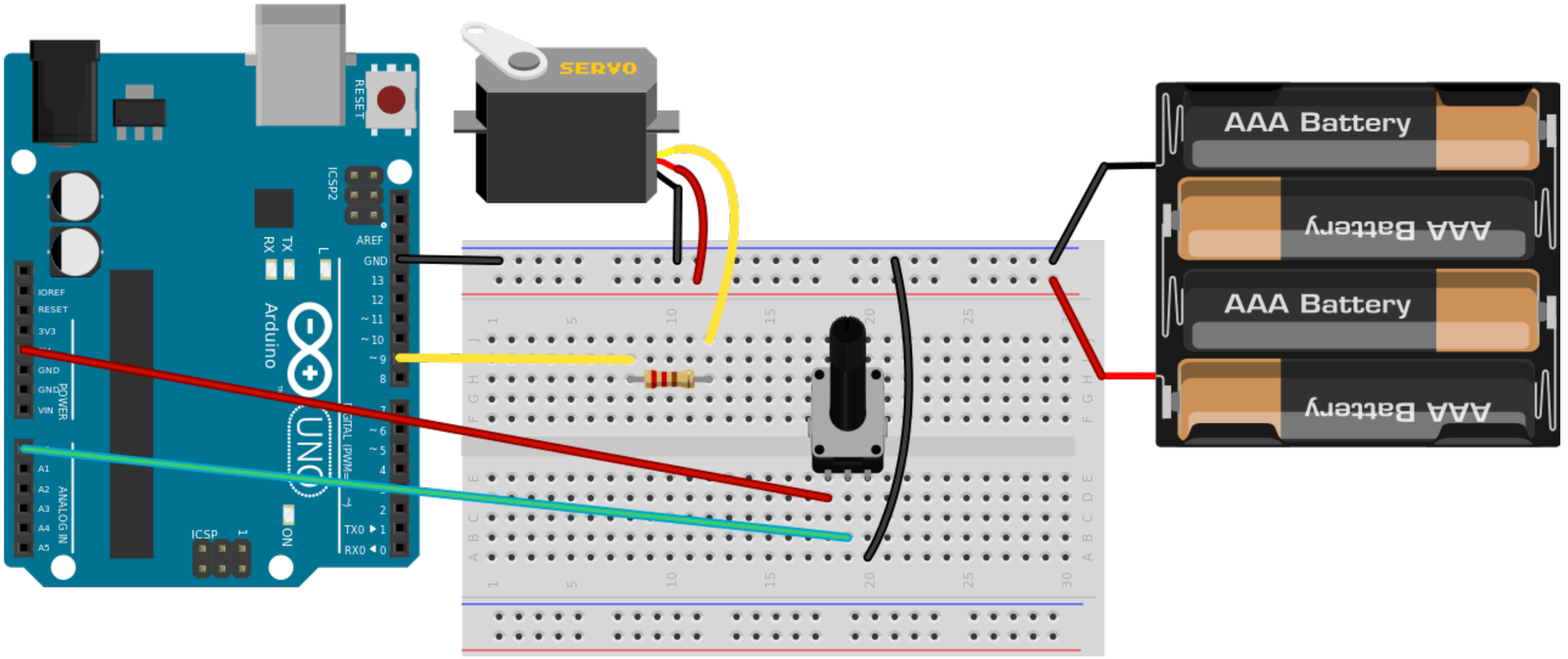


Plugs on top of
micro controller board



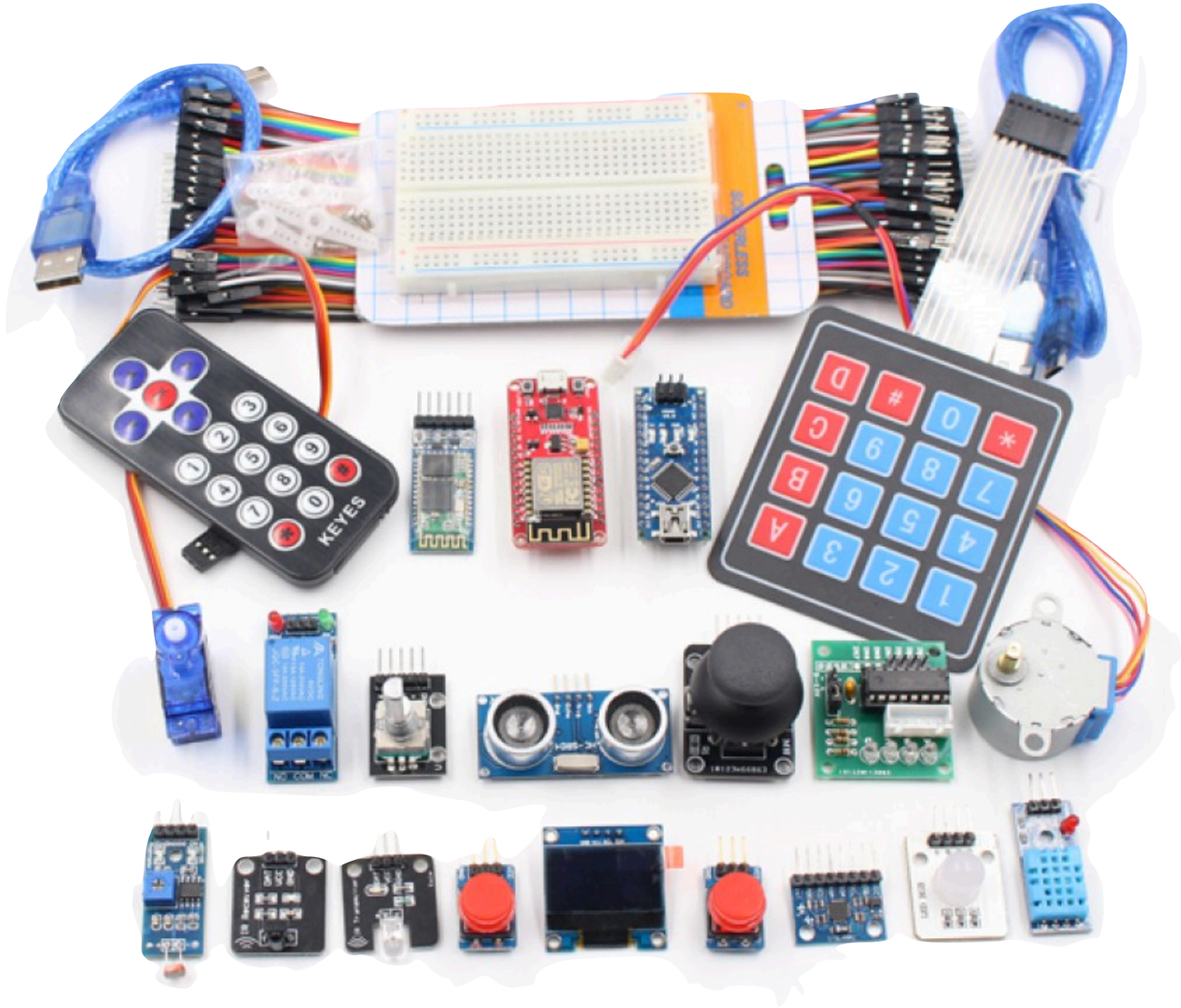
Multiple shields
can be stacked

Shields Not Required



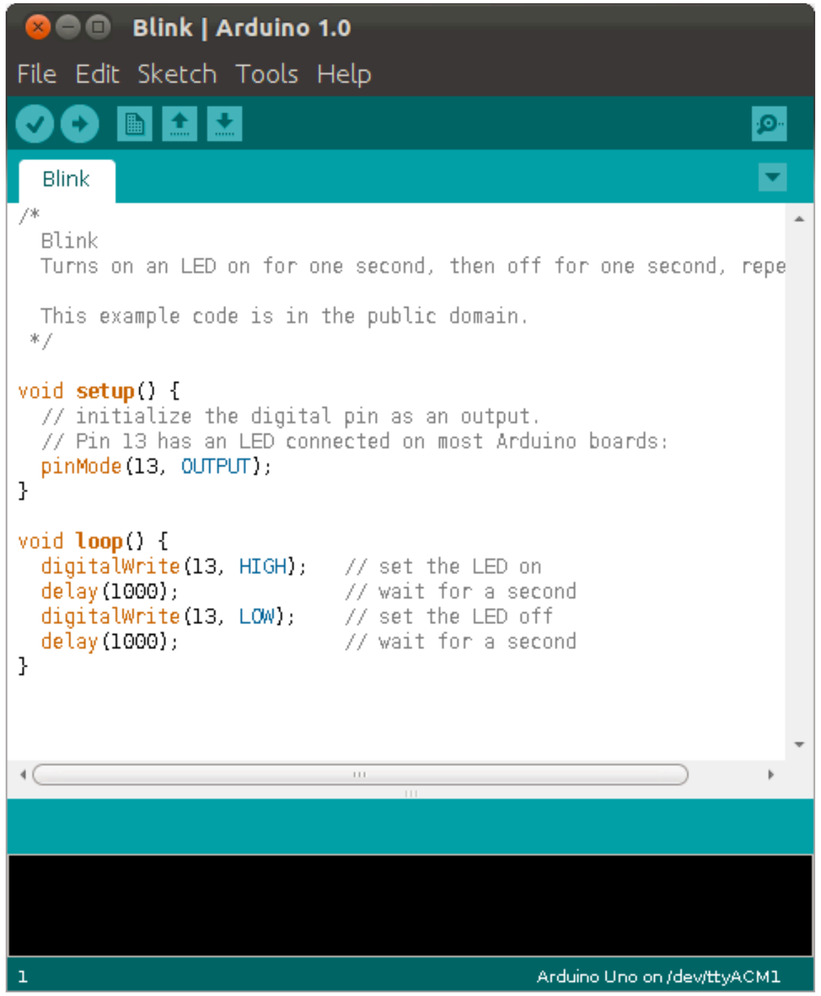
https://commons.wikimedia.org/wiki/File:Servo_motor_Arduino_and_a_potentiometer.svg

Typical Collection of Components



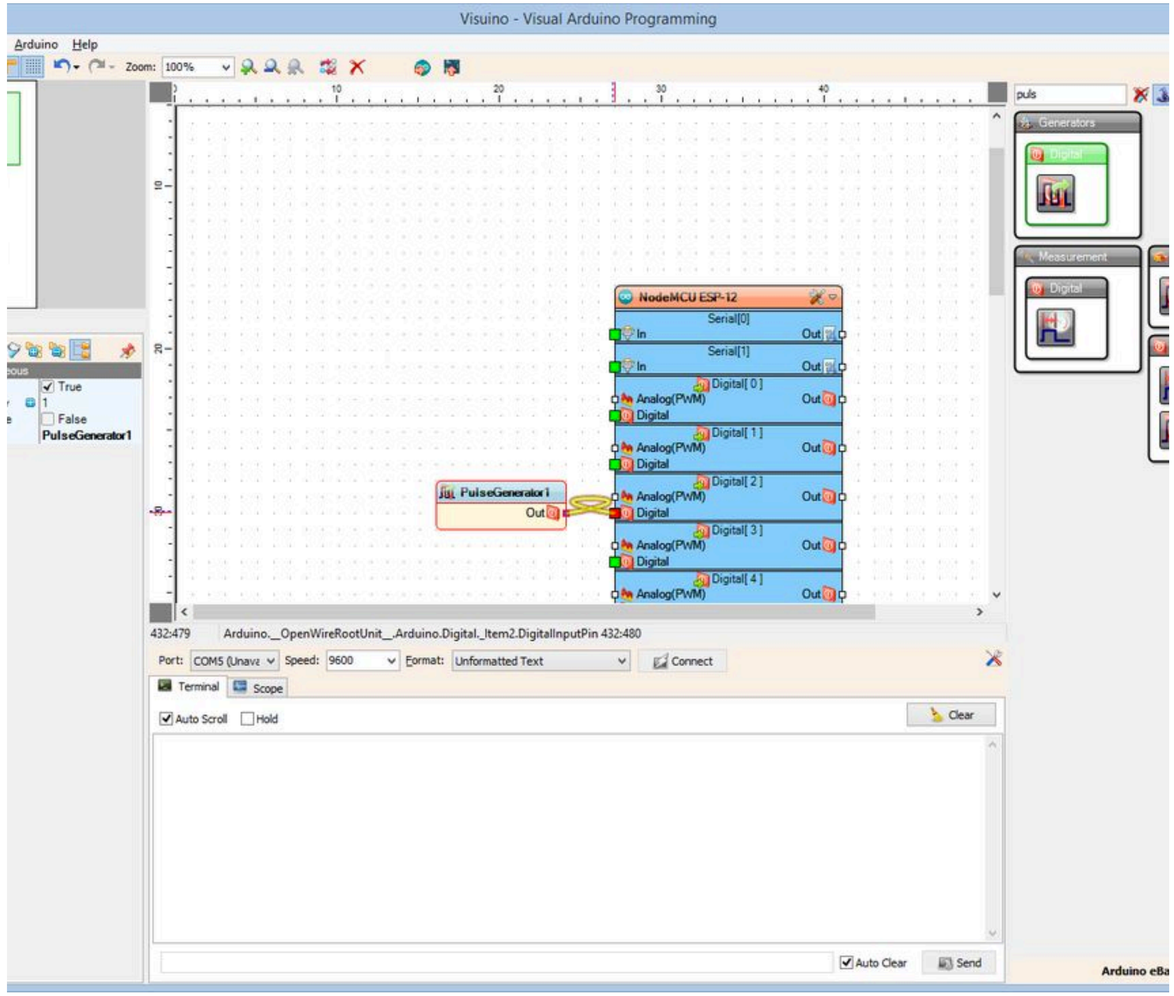
Arduino IDE

- The free & open source Arduino IDE
- Uses C / C++ derived language
- Includes libraries
- Supports downloading support for other chipsets and libraries
- A program is called a *sketch*
- Most programs are pretty simple input and output



VISUINO IDE BY MITOV SOFTWARE

- Uses visual design
- Forward engineers to C
- Uses Arduino IDE behind the scenes
- Free to use or $9 to buy
- Supports most common hardware
- Runs on Windows
- Extensible and expandable
- www.visuino.com



VISUINO DEMOS

Main Site - www.visuino.com

Documentation - www.visuino.com/wiki

Instructables - www.instructables.com/member/BoianM/instructables/

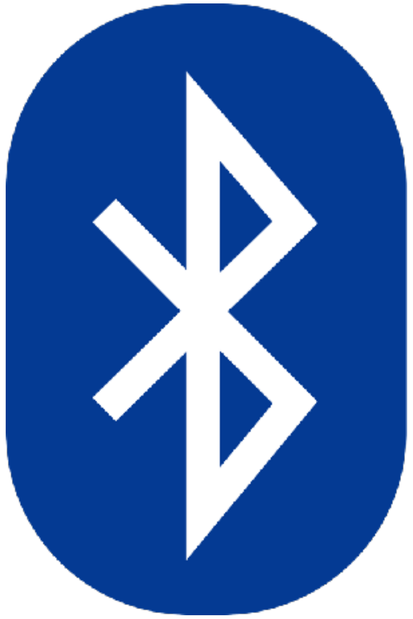
Hackster.IO - www.hackster.io/visuino

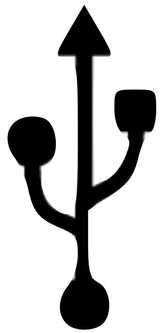
YouTube - bit.ly/MitovYT

Blog - labpacks.blogspot.com

Arduino Communication Options

- WiFi
- Bluetooth Serial
- Bluetooth LE
- USB Serial
- RS232 Serial
- NFC
- Infrared
- Cellular data
- Other radio



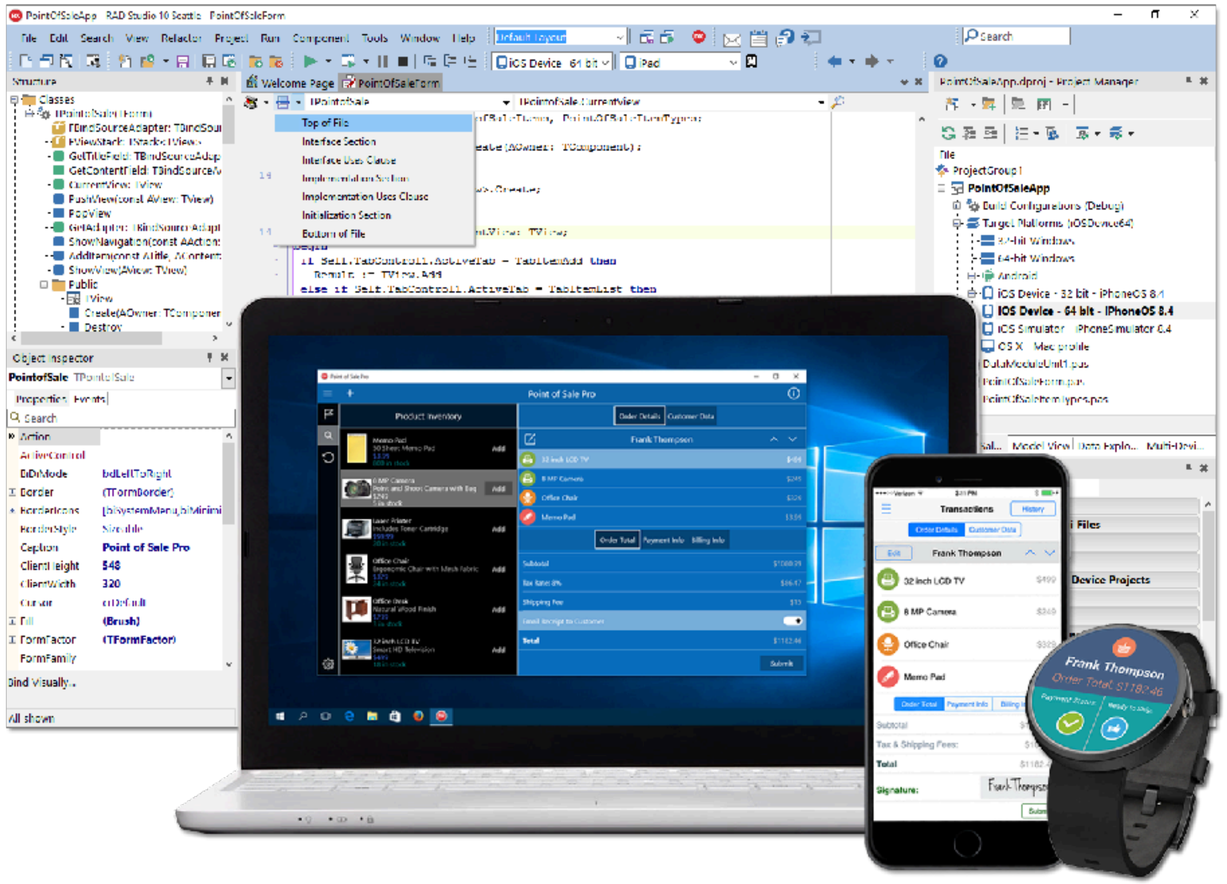


ARCHITECTURAL CONSIDERATIONS

- Direct mobile device communication (Bluetooth or NFC)
- Direct device to cloud (Cellular or WiFi)
- Relay through device to cloud (Bluetooth or WiFi)
- Device to device mesh (other radio)
- Local connection (USB, serial, IR)

RAPID MOBILE APP DEVELOPMENT

- RAD Studio / Delphi / C++Builder
- Supports Windows, macOS, iOS, Android & Linux from same project
- Bluetooth, Bluetooth LE, REST, HTTP, RS232, P2P, etc.
- Rapid visual design
- Native compiled performance
- Included embedded databases
- Free Windows only version
- Paid for other platforms
- www.embarcadero.com



Cloud Options

- firebase.google.com
- PubNub.com
- kinvey.com
- ParsePlatform.org
- api.shephertz.com (App42)
- Embarcadero RAD Server (self hosted)
- Amazon, Azure, Google, etc. cloud platforms
- *Roll your own*

App Development Demos

Using RAD Studio / Delphi

www.embarcadero.com

docwiki.embarcadero.com

community.embarcadero.com

embt.co/IoTBootCamp2017

Q&A

email -> jim.mckeeth@embarcadero.com

@JimMcKeeth <- Twitter

Blog -> delphi.org

embt.co/IoTBootCamp2017 <- Useful link