

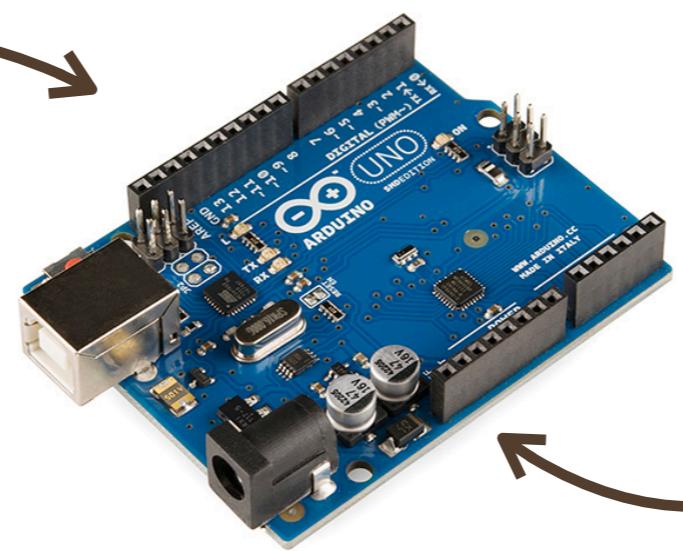
USING ARDUINO FOR ORCHID CARE

“AUTOMATIC FOR THE ORCHIDS”

Al Fischer

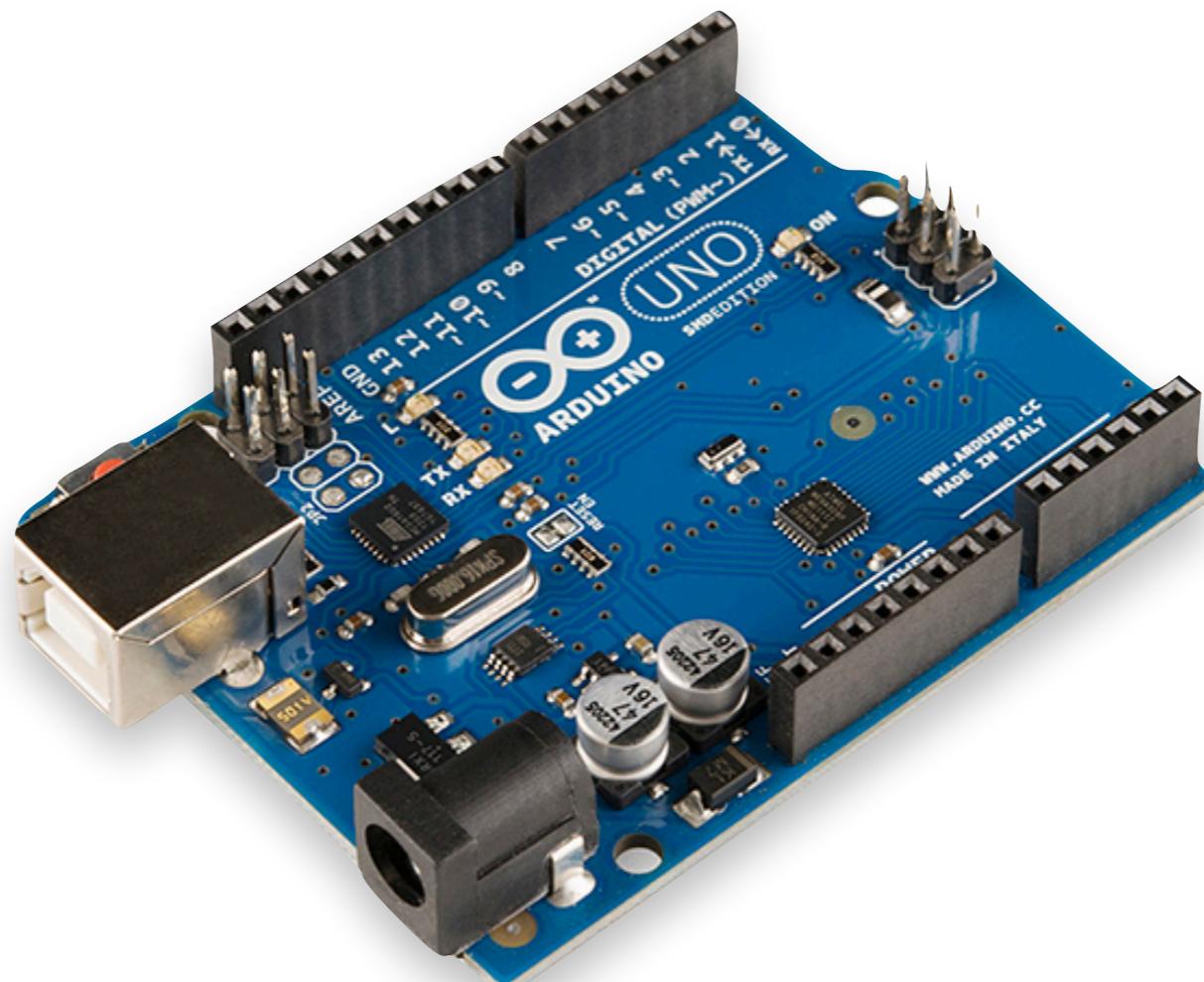
Northeast Georgia Orchid Society

June 25, 2017



Introduction | What is Arduino?

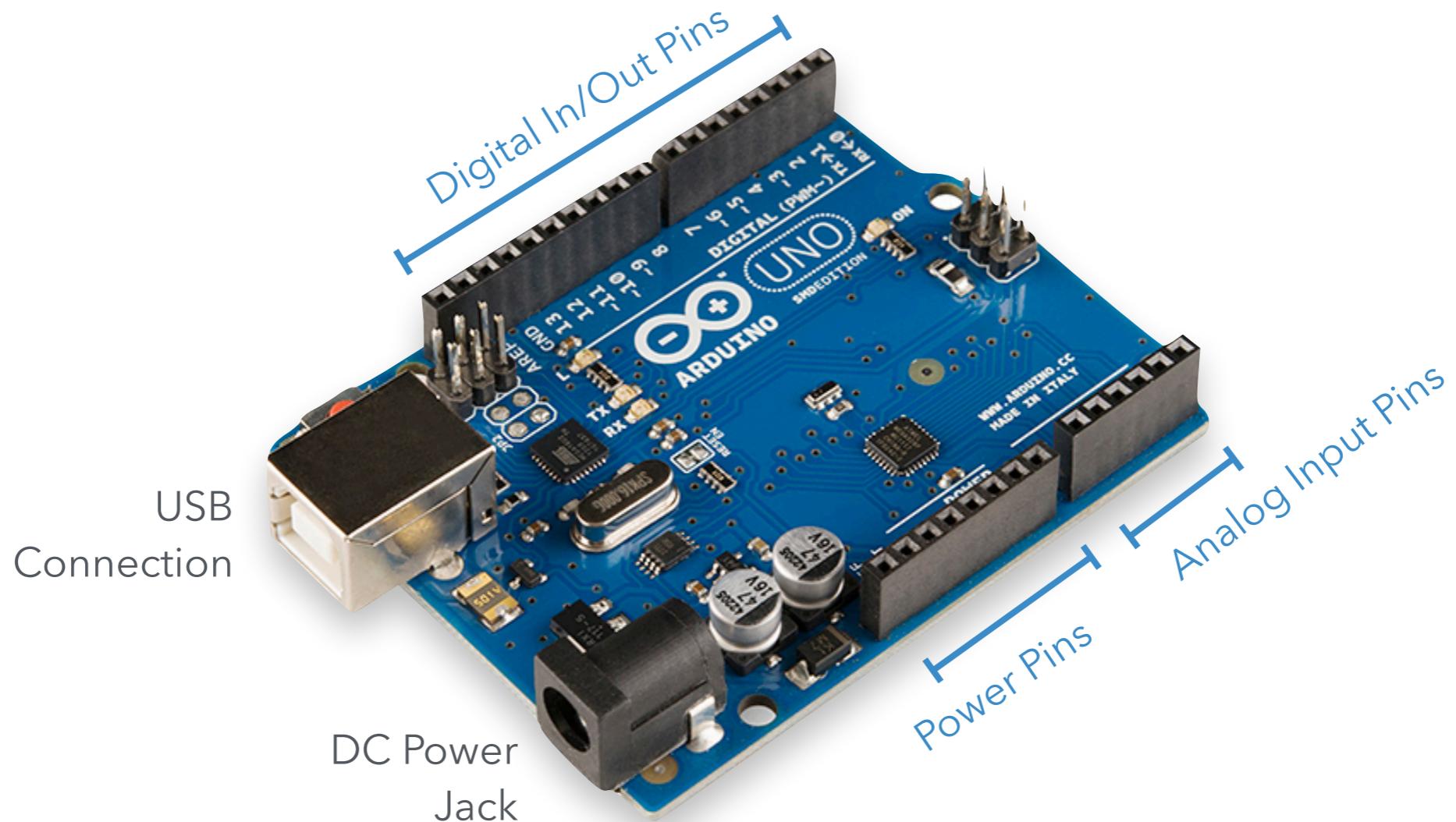
Arduino is a customizable microcomputer capable of [almost] anything.



Sparkfun, via Wikimedia

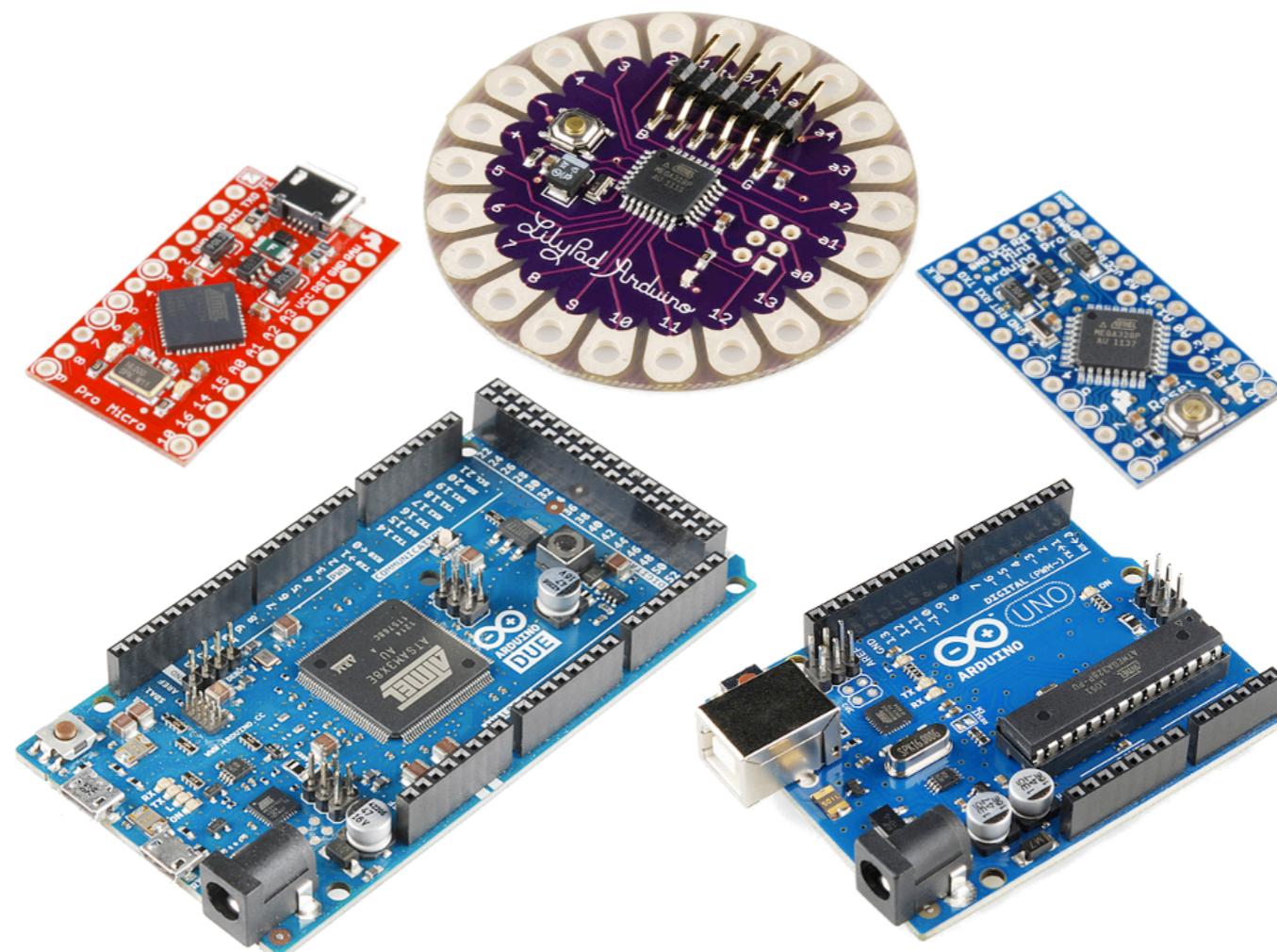
The Basics | Arduino layout

Sensors, motors, etc., connect to Arduino via wires and pins.



The Basics | Arduino layout

The UNO is most common, but Arduino comes in many “flavors”.



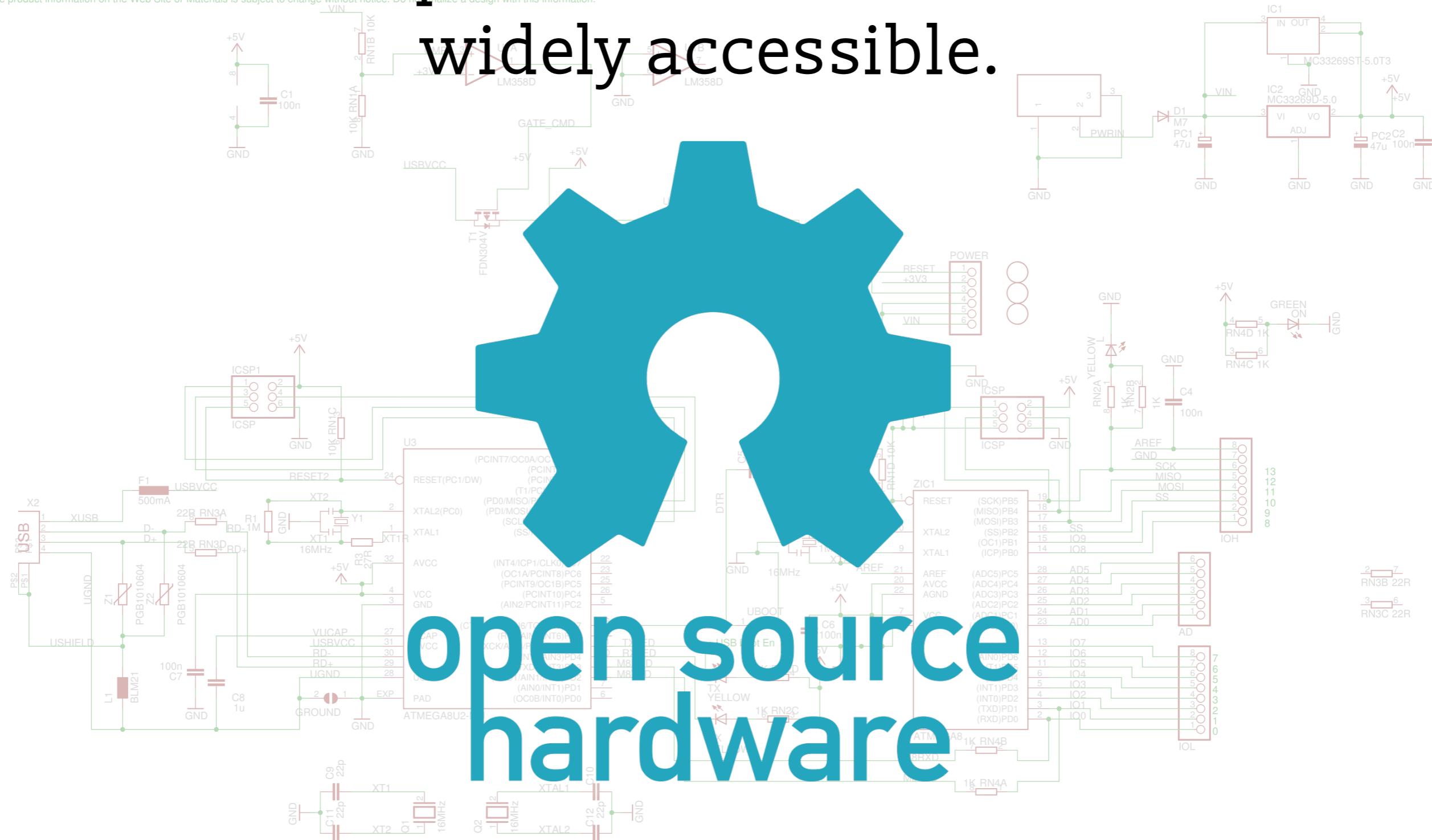
Why use Arduino | Open Source

Arduino™ UNO Reference Design

Reference Designs ARE PROVIDED "AS IS" AND "WITH ALL FAULTS". Arduino DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, REGARDING PRODUCTS, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

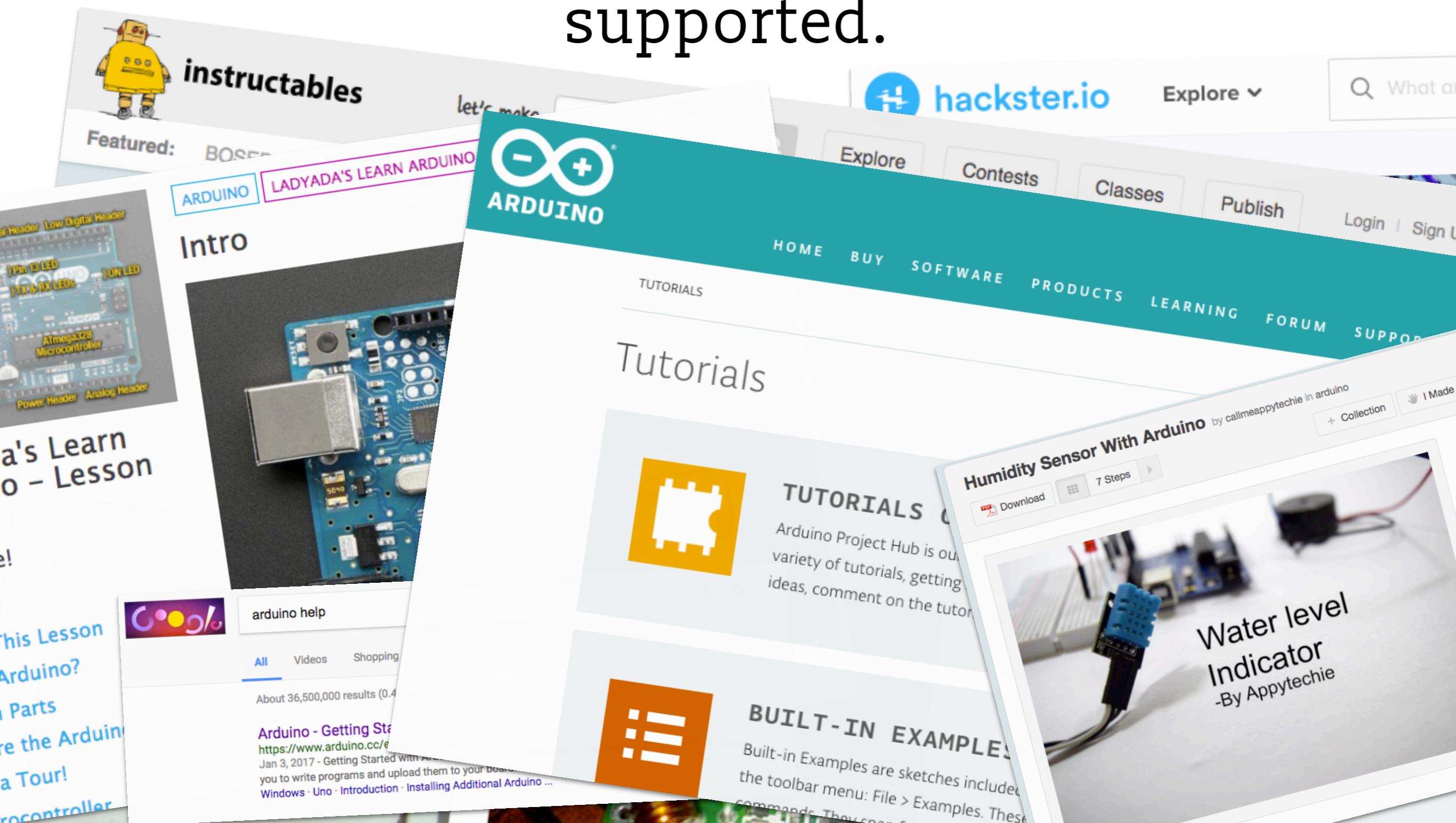
Arduino may make changes to specifications and product descriptions at any time, without notice. The Open Source must not rely on the absence of characteristics of any features or instructions marked as "reserved" or "undefined". Arduino reserves these for future definition and shall have no liability for commitments arising from interpretation, application, change to or removal of these features or instructions.

The product information on the Web Site or Materials is subject to change without notice. Do not finalize a design with this information.

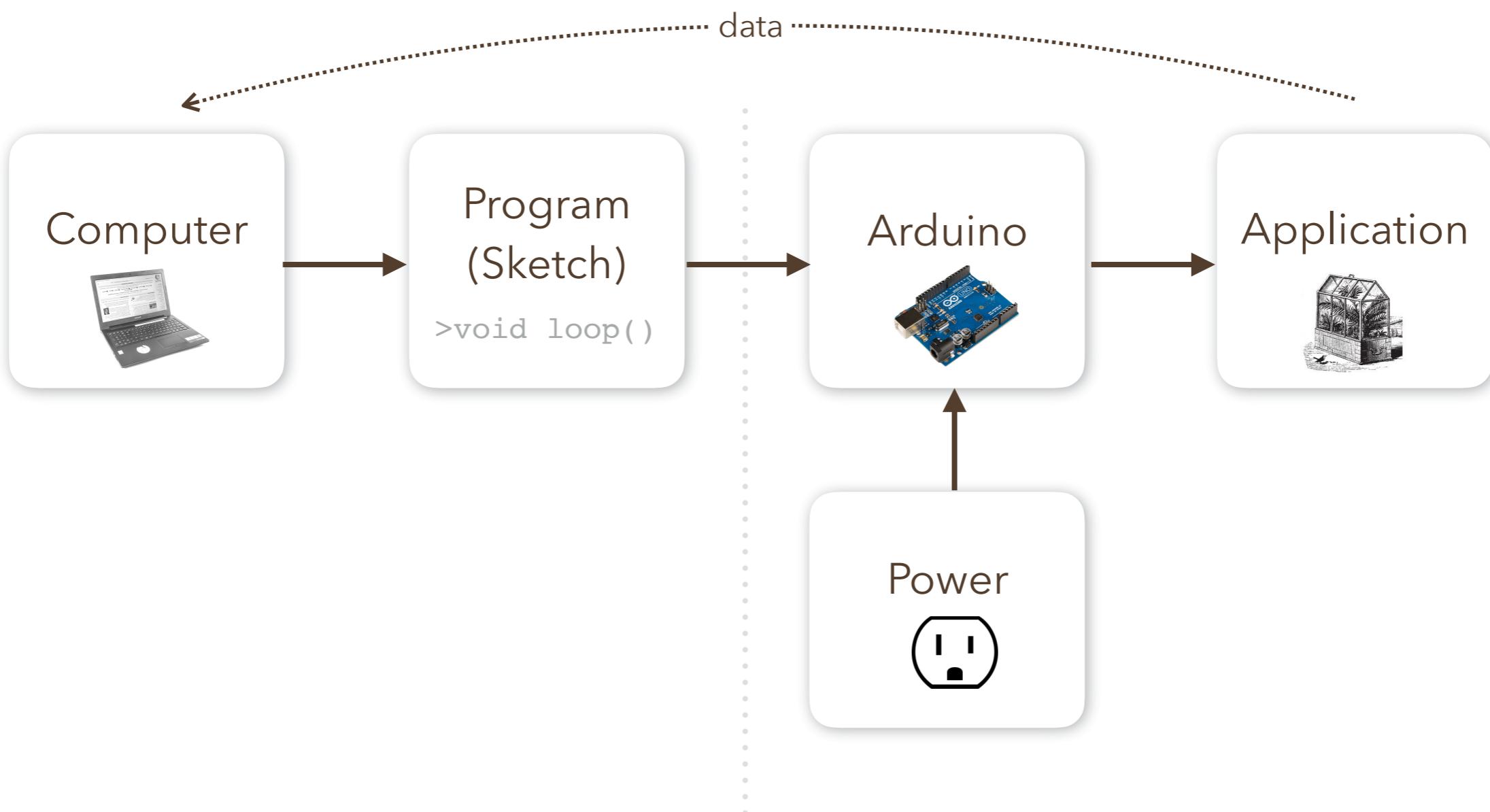


Introduction | Why use Arduino?

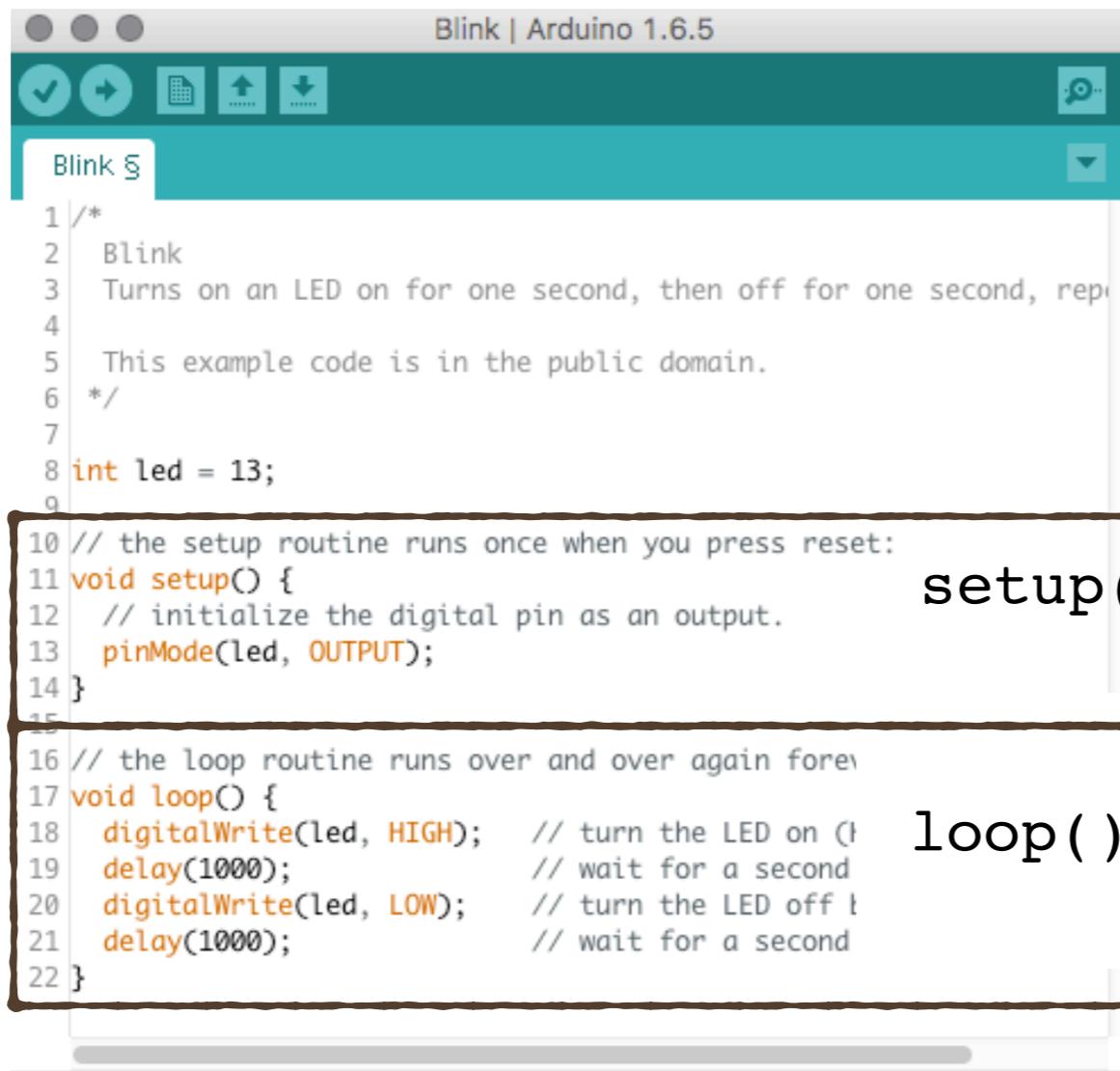
Arduino is well documented and widely supported.



Arduino must be first programmed via a PC,
but then can run autonomously.



Arduino programs are called sketches, written in dialects of the C/C++ languages.



The screenshot shows the Arduino IDE interface with the title bar "Blink | Arduino 1.6.5". The code editor displays the "Blink" sketch. The code is as follows:

```
1 /*  
2  * Blink  
3  * Turns on an LED on for one second, then off for one second, repeating.  
4  * This example code is in the public domain.  
5  */  
6  
7 int led = 13;  
8  
9 // the setup routine runs once when you press reset:  
10 void setup() {  
11     // initialize the digital pin as an output.  
12     pinMode(led, OUTPUT);  
13 }  
14  
15 // the loop routine runs over and over again forever:  
16 void loop() {  
17     digitalWrite(led, HIGH);    // turn the LED on (HIGH is the voltage level)  
18     delay(1000);              // wait for a second  
19     digitalWrite(led, LOW);   // turn the LED off (LOW is the ground level)  
20     delay(1000);              // wait for a second  
21 }  
22 }
```

C++

setup(): runs once,
for setup tasks

loop(): runs indefinitely,
for main program

The Basics | Arduino Language

<http://www.arduino.cc>



HOME BUY SOFTWARE PRODUCTS LEARNING FORUM SUPPORT BLOG

Structure

- `setup()`
- `loop()`

Control Structures

- `if`
- `if...else`
- `for`
- `switch case`
- `while`
- `do... while`
- `break`
- `continue`
- `return`
- `goto`

Further Syntax

`(semicolon)`

Variables

Constants

- `HIGH | LOW`
- `INPUT | OUTPUT | INPUT_PULLUP`
- `LED_BUILTIN`
- `true | false`
- `integer constants`
- `floating point constants`

Data Types

- `void`
- `boolean`
- `char`
- `unsigned char`
- `byte`
- `int`
- `unsigned int`

Functions

Digital I/O

- `pinMode()`
- `digitalWrite()`
- `digitalRead()`

Analog I/O

- `analogReference()`
- `analogRead()`
- `analogWrite() - PWM`

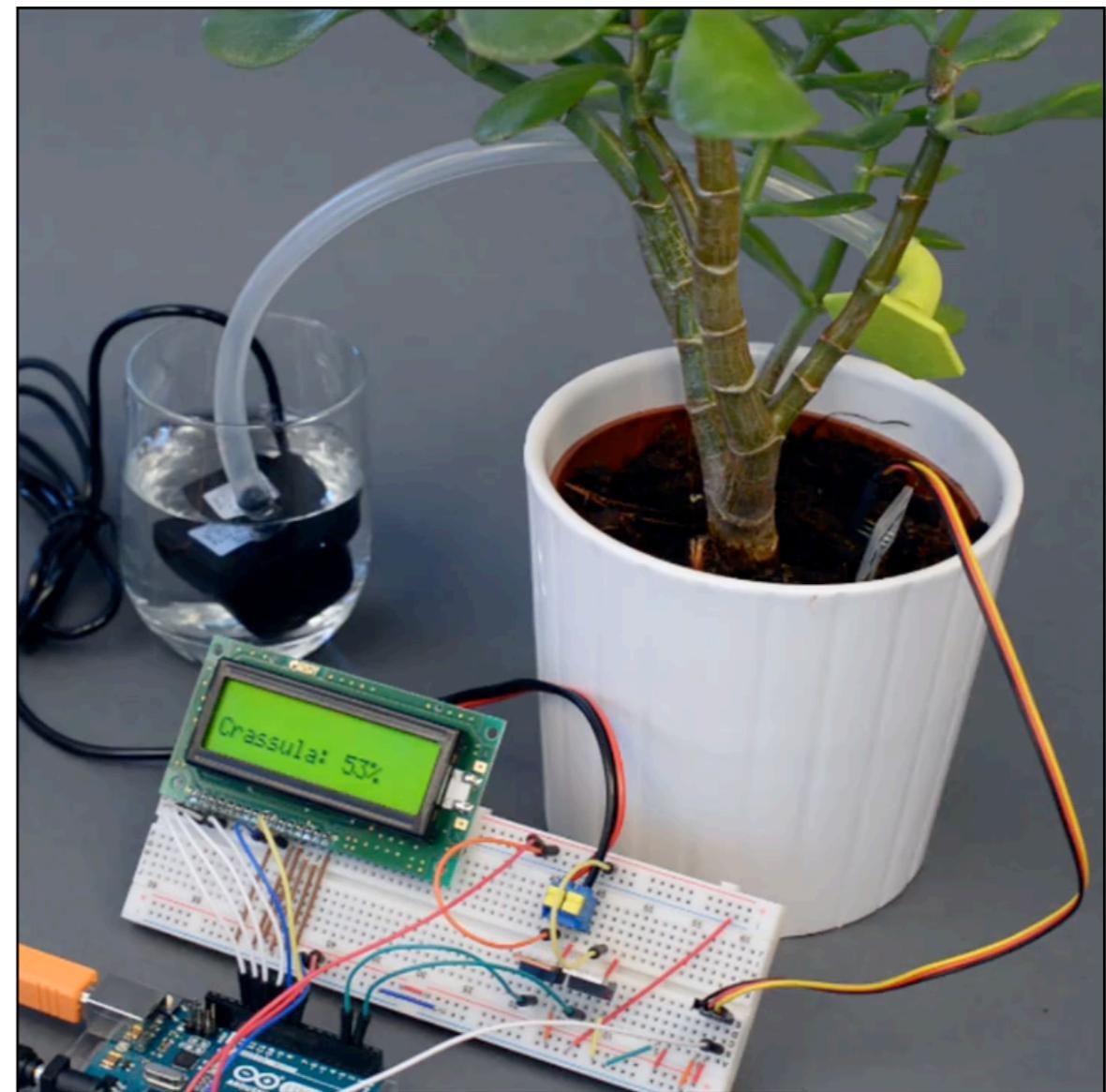
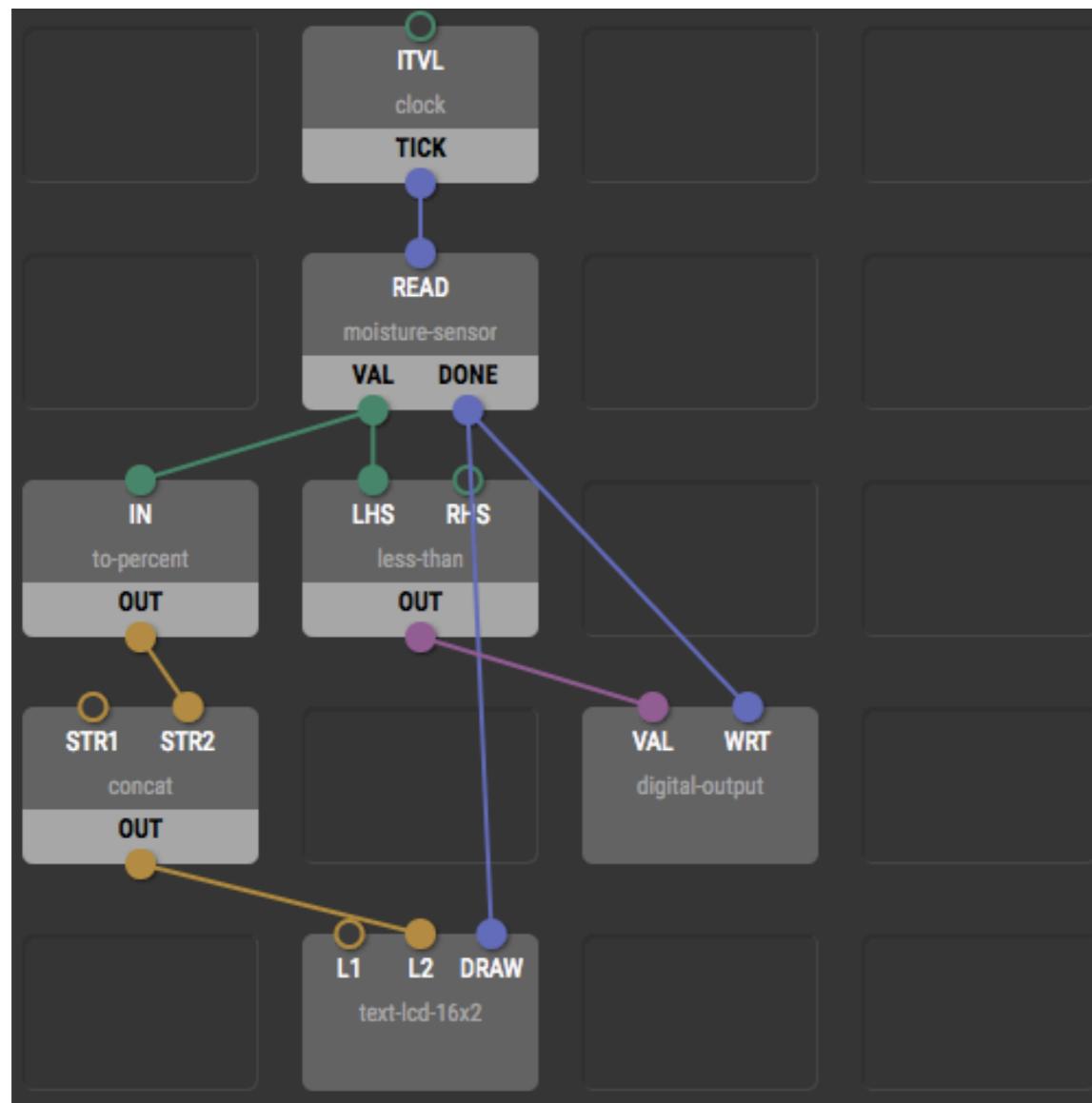
Due & Zero only

- `analogReadResolution()`
- `analogWriteResolution()`

Advanced I/O

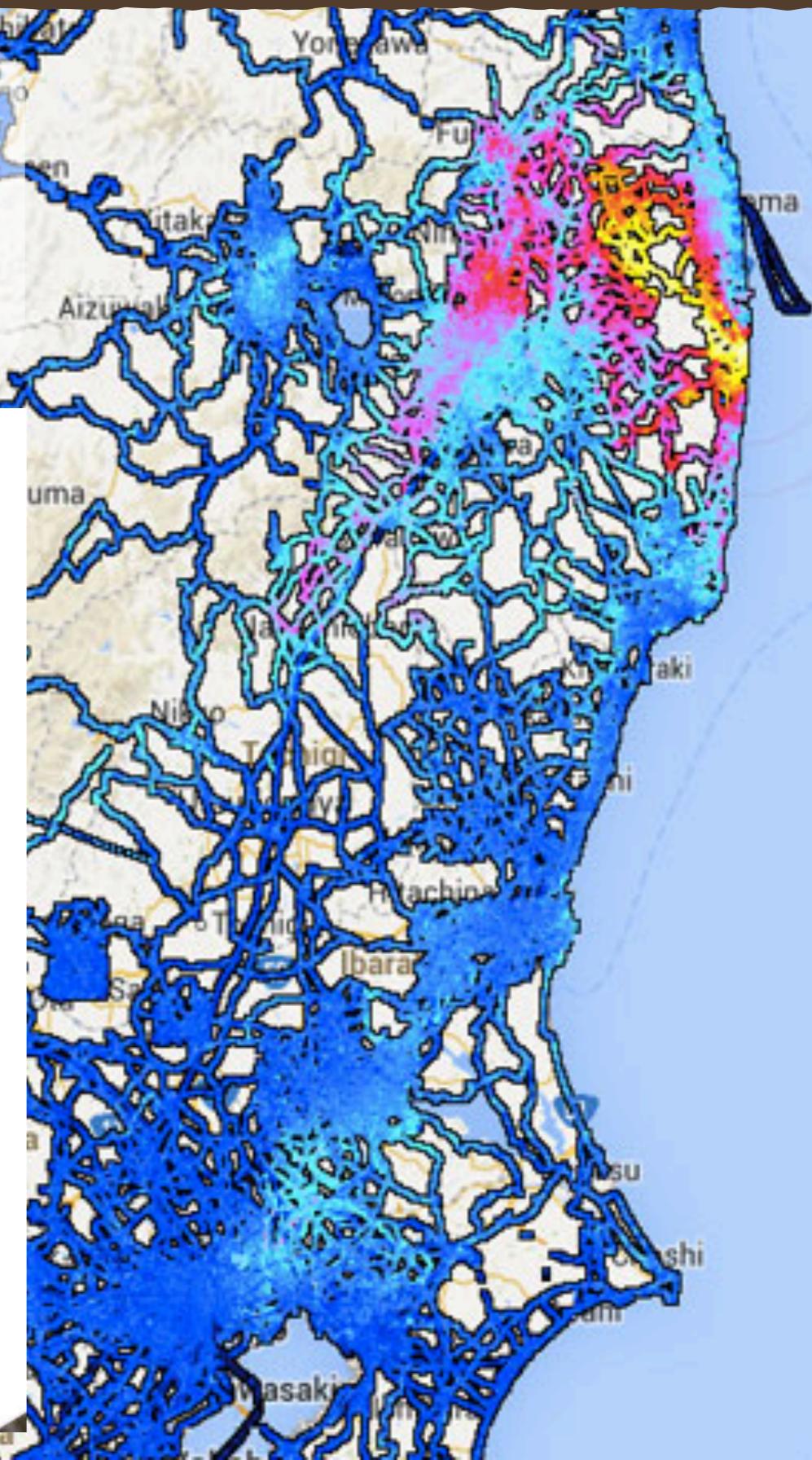
- `tone()`

Visual programming languages are under development (XOD).

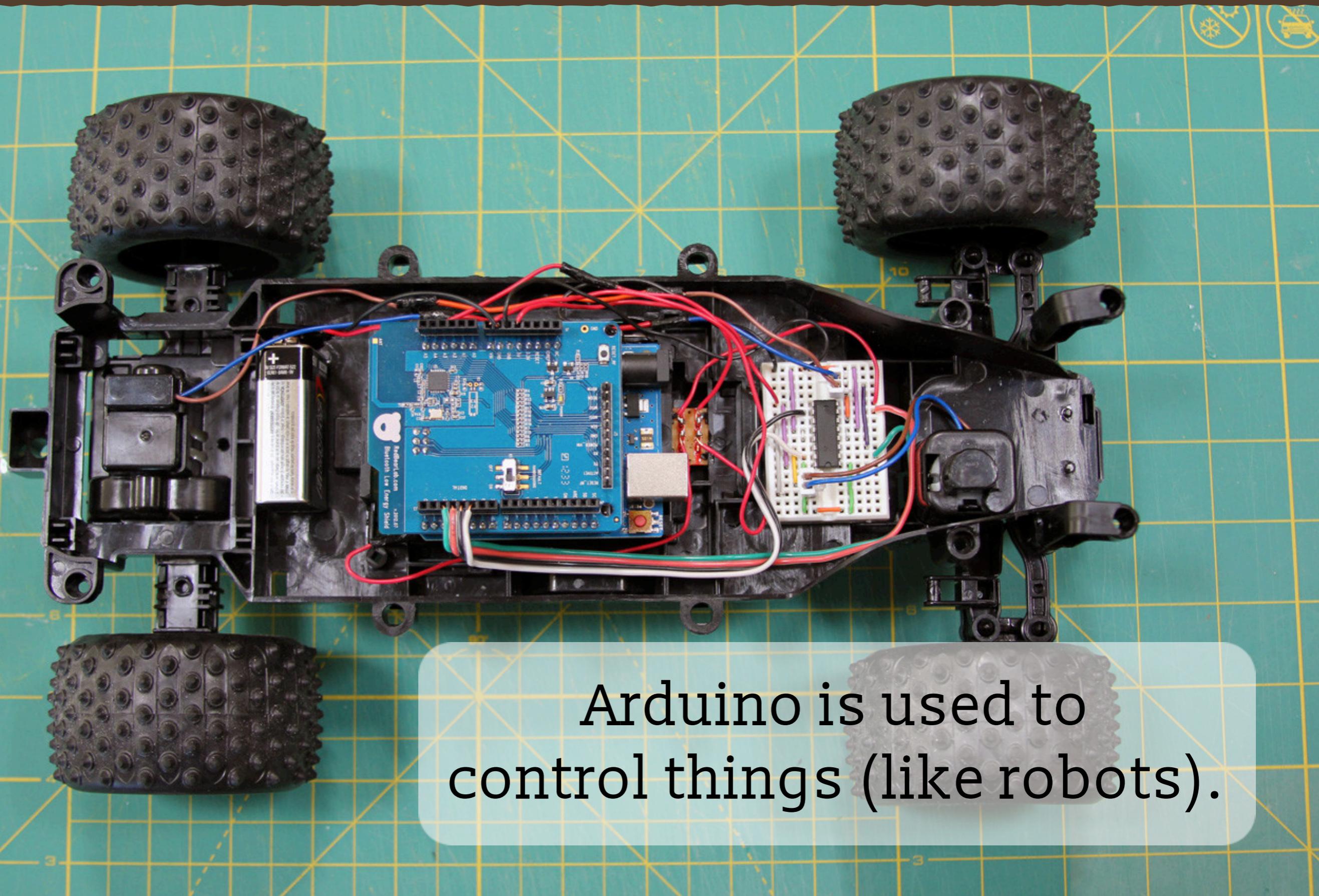


Introduction | What can Arduino do?

Arduino is used to interface with sensors.



Introduction | What can Arduino do?



Arduino is used to
control things (like robots).

Introduction | What can Arduino do?

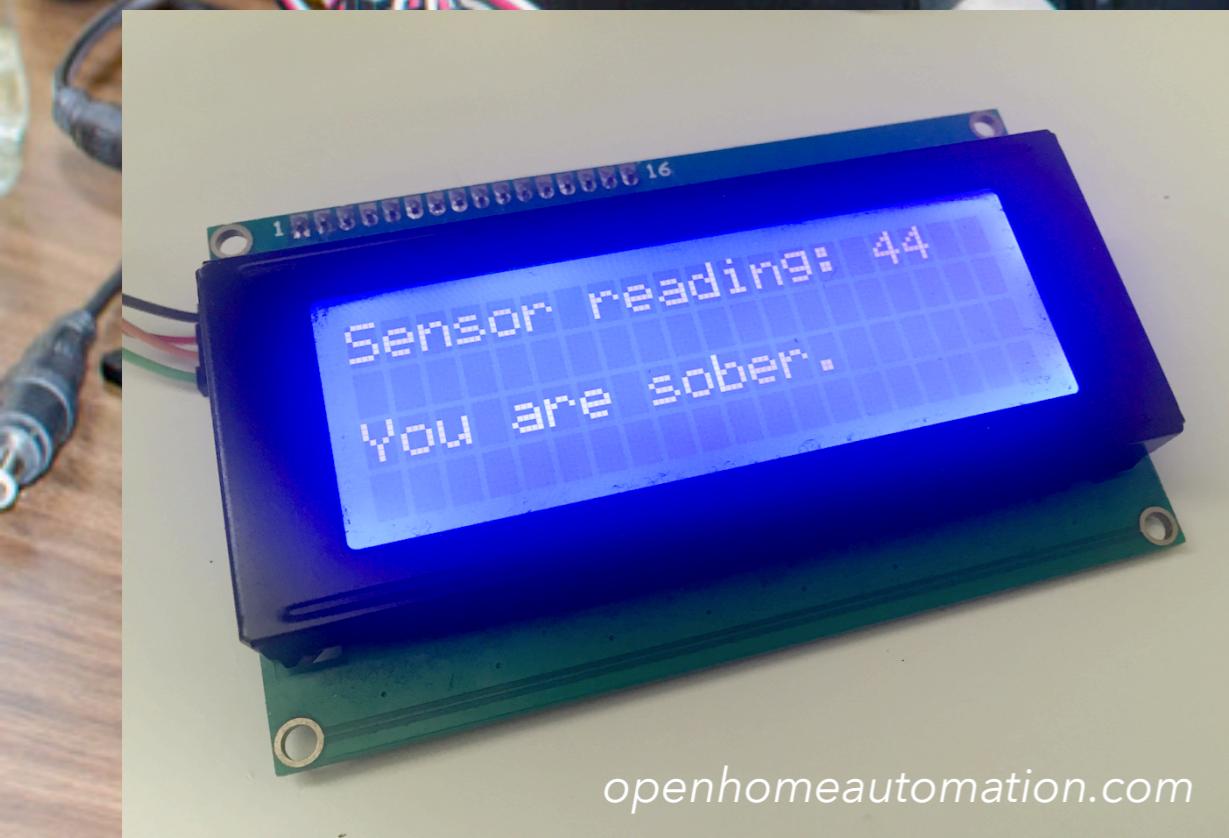
Arduino can even
pour you a drink!



Introduction | What can Arduino do?



...and keep
your keys.



openhomeautomation.com

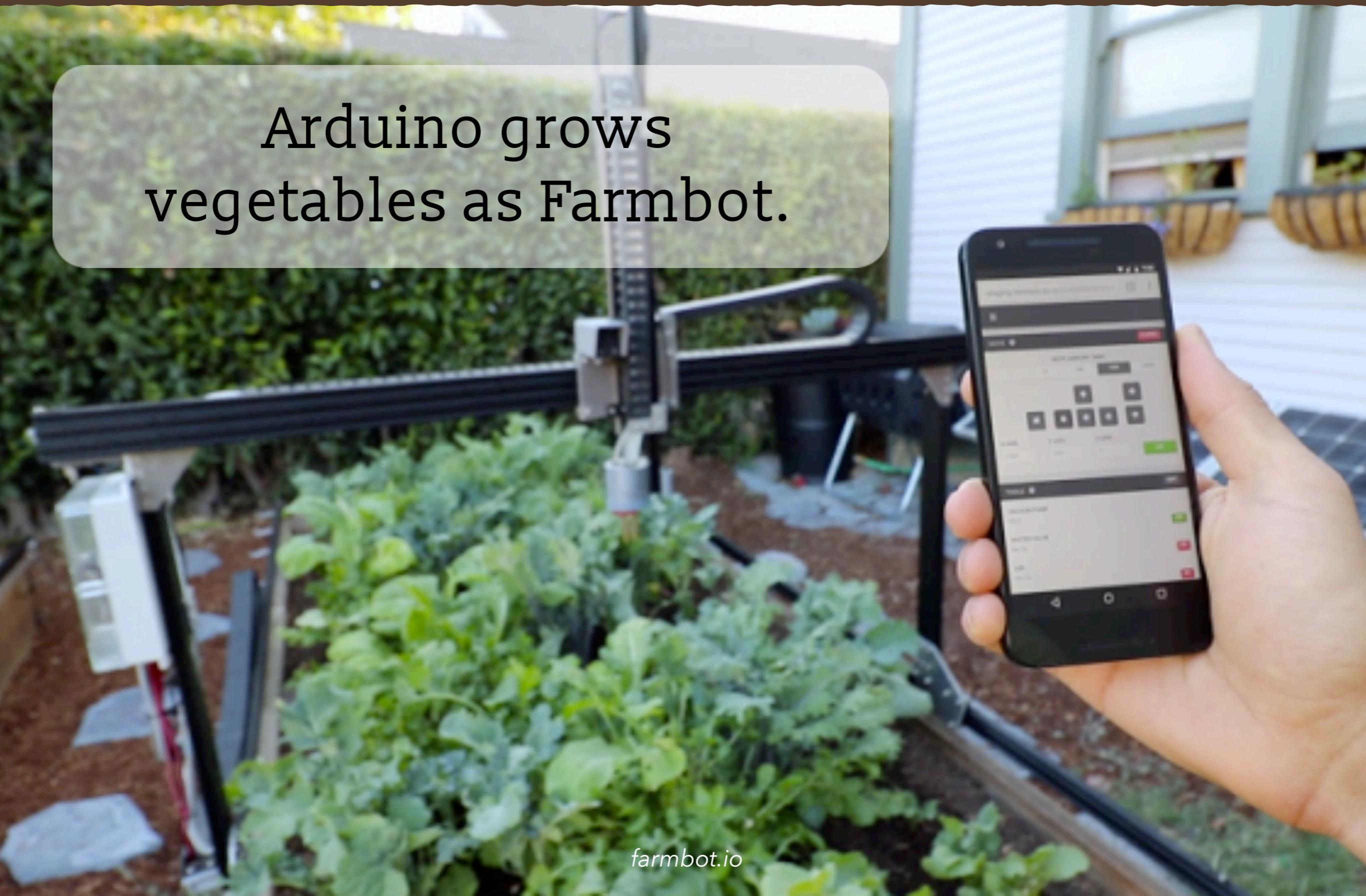
robotgeek - instructables.com



adafruit.com

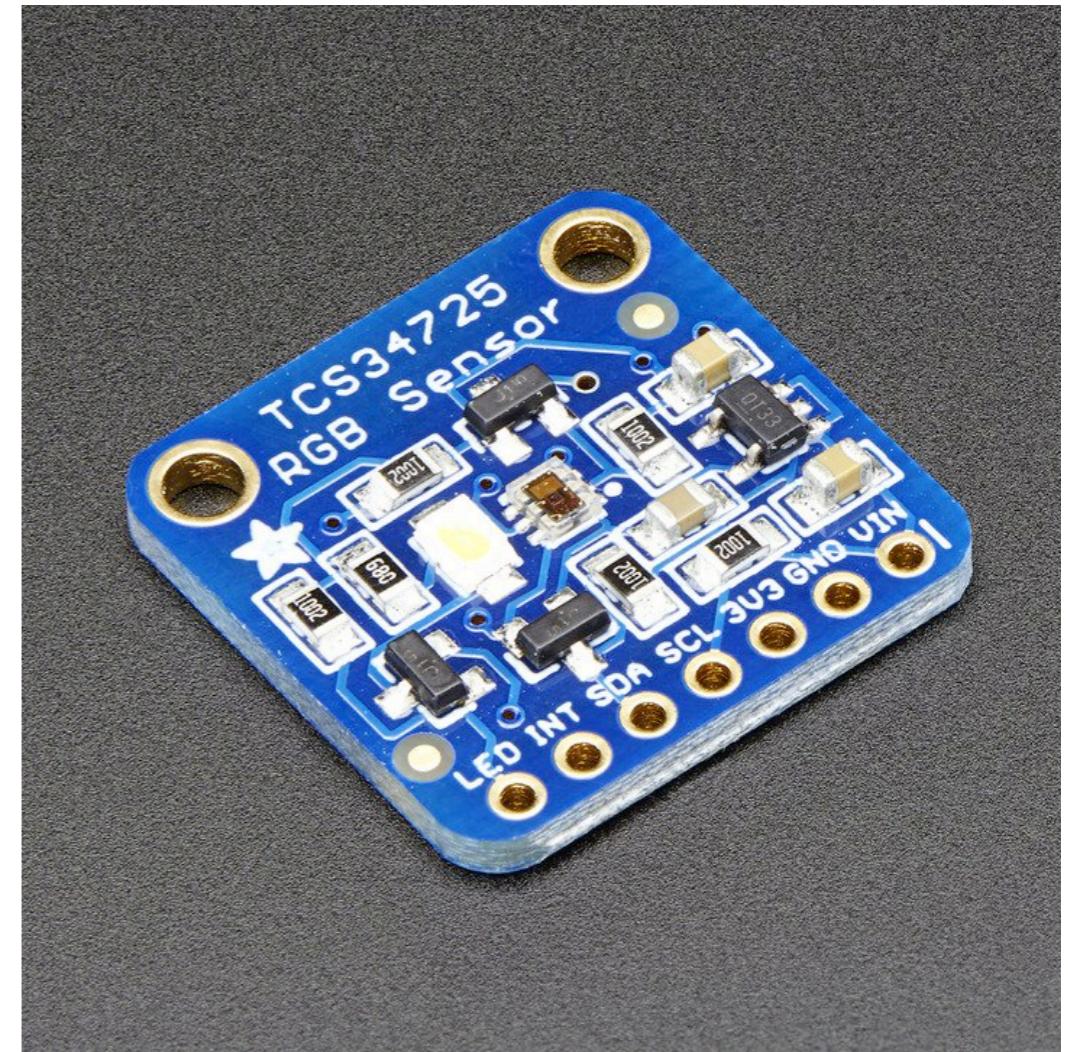
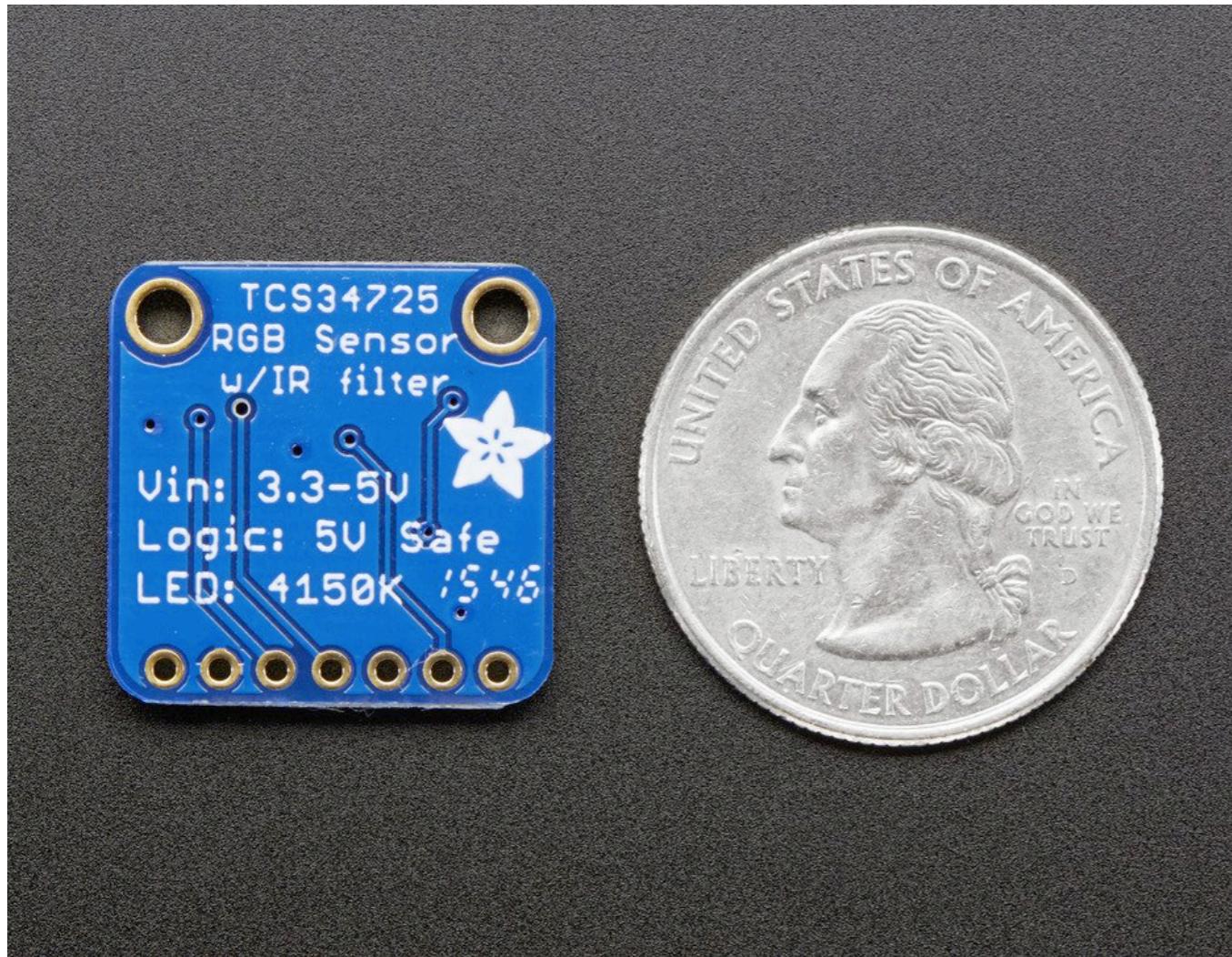
Introduction | What can Arduino do?

Arduino grows
vegetables as Farmbot.



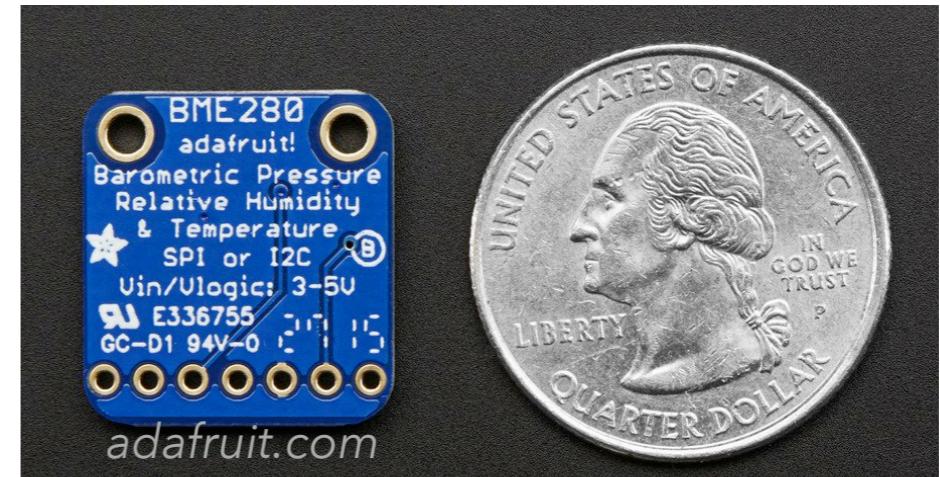
Automatic Orchids | Measuring Light Levels

Taos TCS34725: Luminosity & Color Temperature



Automatic Orchids | Measuring Temperature, etc.

Bosch BME280:
Temperature,
humidity, & pressure.



► **LiveSlides** web content

To view

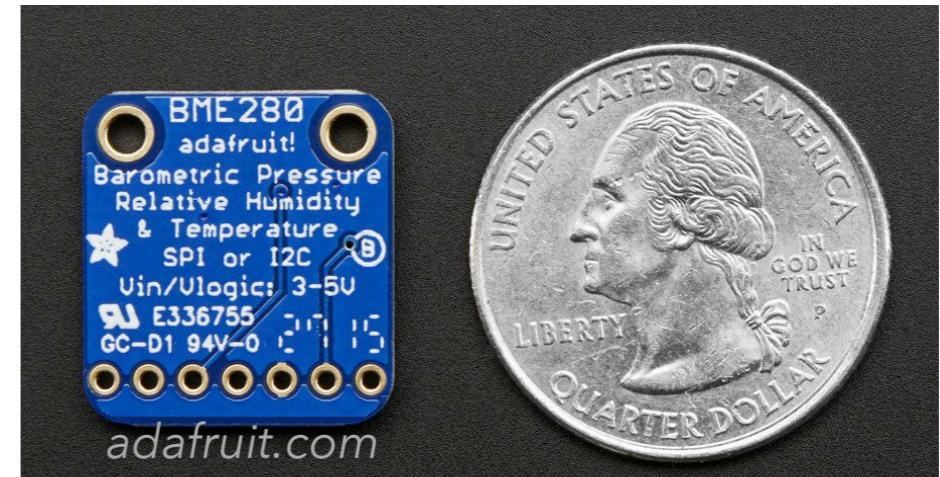
Download the add-in.

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Start the presentation.

Automatic Orchids | Measuring Temperature, etc.

Bosch BME280:
Temperature,
humidity, & pressure.



► **LiveSlides** web content

To view

Download the add-in.

liveslides.com/download

Start the presentation.

Getting Started | Sourcing Supplies

Myriad sensors and controllers are available for Arduino

adafruit.com

The Adafruit Sensors category page features a search bar at the top. Below it, a main heading reads "SENSE your way into Open Source Hardware glory with Adafruit's sensor category! Here you can find everything you need to start measuring temperature, motion, force, flow, and more. Check out the [Sensor Pack 900](#) for your beginner sensor needs or the [Soil Temperature/Moisture Sensor](#) for more advanced projects. With a wide and growing range of sensors, Adafruit's Sensors category is the best place for all your needs!"

On the left, there are links to various sensor categories: GAS (1), BAROMETRIC PRESSURE (8), BIOMETRIC (5), CAMERAS (6), COIN (2), HUMIDITY (12), LIGHT/COLOR/PHOTO (14), LIQUID/FLOW (8), LOCATION (GPS) (8), MOTION (21), PROXIMITY (23), RADIATION / GEICER (2), READERS/SCANNERS (4), SOUND/NOISE (11), TEMPERATURE (34), and TOUCH (39).

Two products are highlighted:

- Adafruit Ultimate GPS Breakout - 66 channel w/10 Hz updates - Version 3**
PRODUCT ID: 746
We carry a few different GPS modules here in the Adafruit shop, but none that satisfied our every desire that's why we designed this little GPS...
\$39.95 IN STOCK
[ADD TO CART](#)
- Electret Microphone Amplifier - MAX4466 v**
PRODUCT ID: 1063
Add an ear to your project with this well-designed electret microphone amplifier. This fully assembled and tested board comes with a 20-20Khz...

sparkfun.com

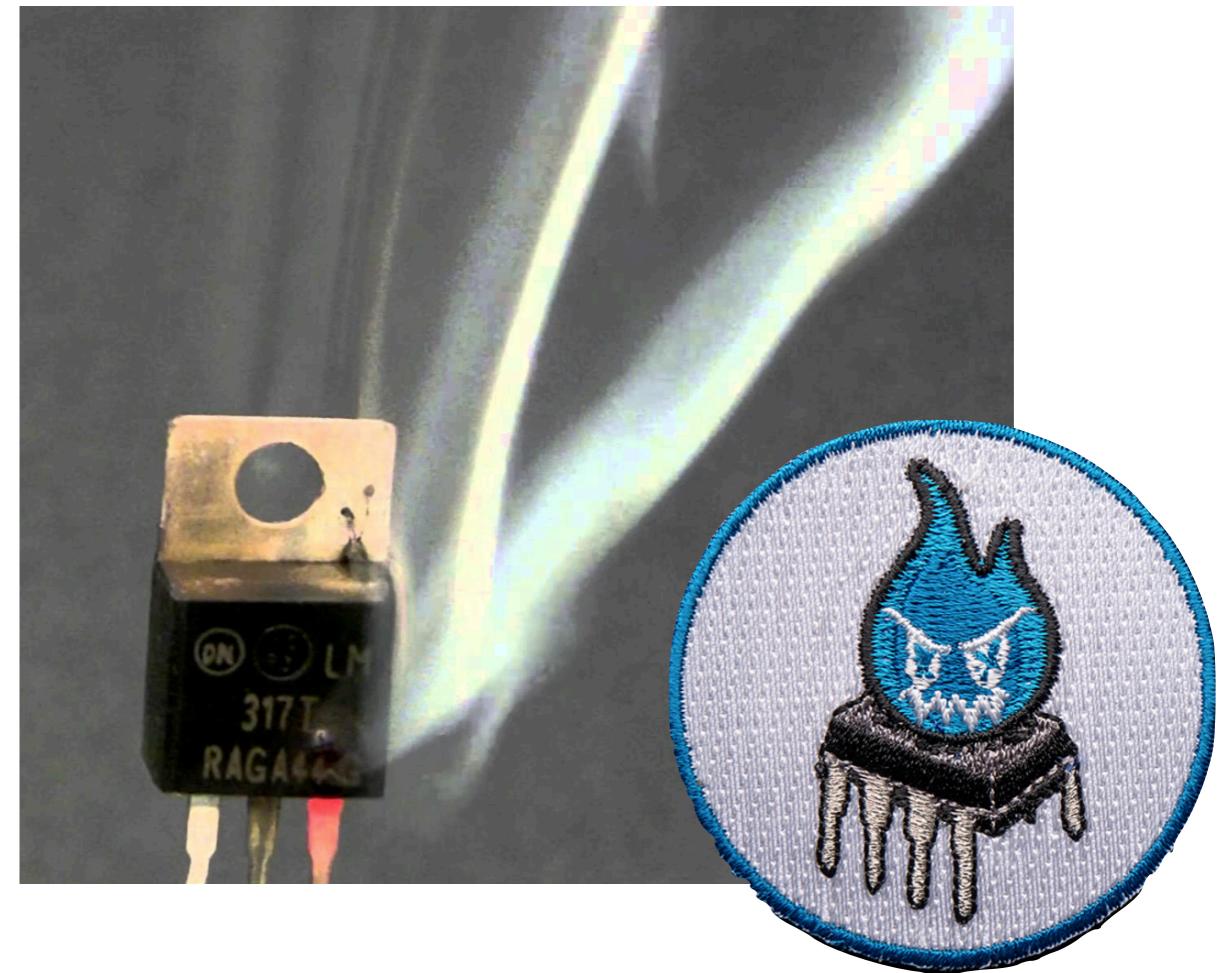
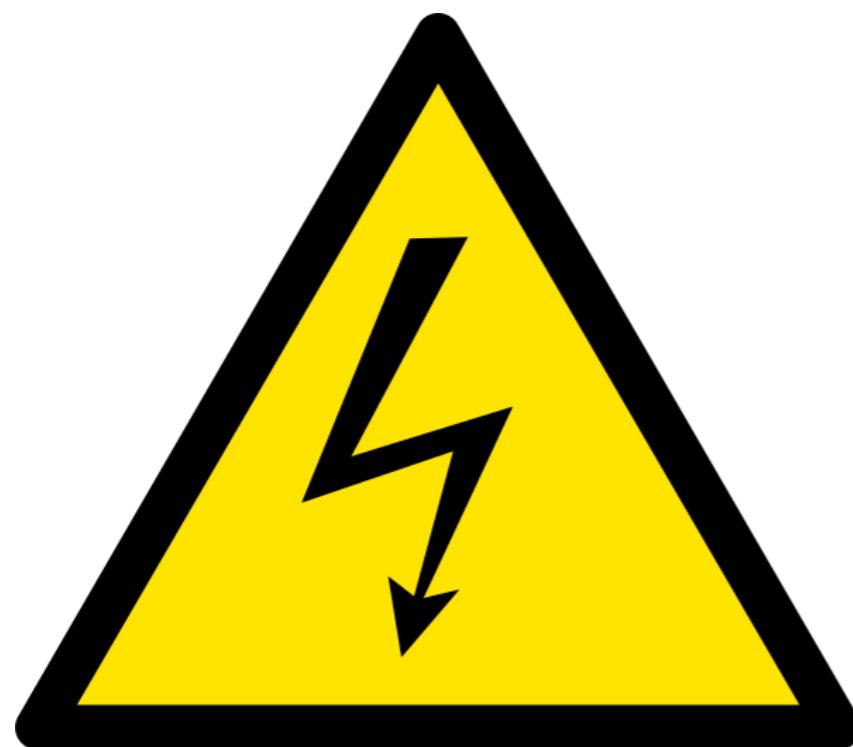
The SparkFun Shields product category page shows a sidebar with "START A PROJECT" and a list of categories: New Products, Top Sellers, SparkFun Originals, Spectacle, Sale, Gift Certificates, Arduino, Boards, Other, Shields (which is selected), Audio, Books, Breakout Boards, Cables, Components, Development Tools, Android, Boards, Other, Shields, ARM, AVR, Beagle, FPGA, LPC, mbed, micro:bit, .NET, pcDuino, PIC, and PICAVE.

The main content area displays a grid of 14 shield products:

- CAN-BUS Shield (DEV-13262) \$24.95 ★★★★☆ 11
- SparkFun Weather Shield (DEV-13956) \$39.95 ★★★★☆ 11
- SparkFun XBee Shield (WRL-12847) \$14.95 ★★★★☆ 17
- SparkFun MP3 Player Shield (DEV-12660) \$24.95 ★★★★★ 6
- SparkFun WiFi Shield - ESP8266 (WRL-13287) \$14.95 ★★★★☆ 31
- SparkFun Monster Moto Shield (DEV-10182) \$69.95 ★★★★☆ 2
- EasyVR Shield 3.0 - Voice Recognition Shield (COM-13316) \$49.95 ★★★★☆ 8
- SparkFun GPS Logger Shield (GPS-13750) \$44.95
- SparkFun Vernier Interface
- Arduino Ethernet Shield 2
- SparkFun Ardumoto Shield
- SparkFun Ardumoto Shield

Wrapping Up | Notes on Electrical Safety

Arduino's are low voltage & low current.
However, use caution when connecting to
the AC mains!



Wrapping Up | Additional Resources

TED Ideas worth spreading

WATCH

DISCOVER

ATTEND

A video thumbnail for a TED talk by Massimo Banzi. The thumbnail features a close-up of Massimo Banzi, a man with a beard, looking upwards and to the right. He is wearing a dark shirt. The title of the talk, "How Arduino is open-sourcing imagination", is displayed in large white text across the middle of the thumbnail. Below the title, the text "TEDGlobal 2012 · 15:46 · Filmed Jun 2012" is shown. To the left of the title, there are two links: "26 subtitle languages" and "View interactive transcript". A large play button icon is positioned in the lower right corner of the thumbnail.

Massimo Banzi:

How Arduino is open-sourcing imagination

TEDGlobal 2012 · 15:46 · Filmed Jun 2012

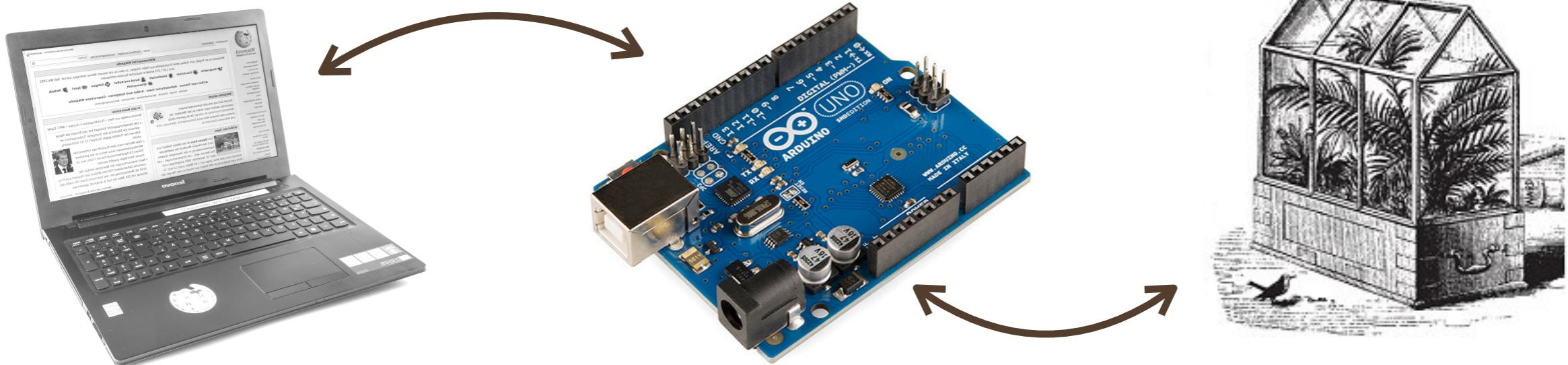
26 subtitle languages

View interactive transcript

Many online Resources for Arduino:

- arduino.cc
- learn.adafruit.com + learn.sparkfun.com
- search Google — many more...

Thank you!



Questions?
al@uga.edu