A PRACTICAL GUIDE TO CONNECTING HARDWARE TO FLEX
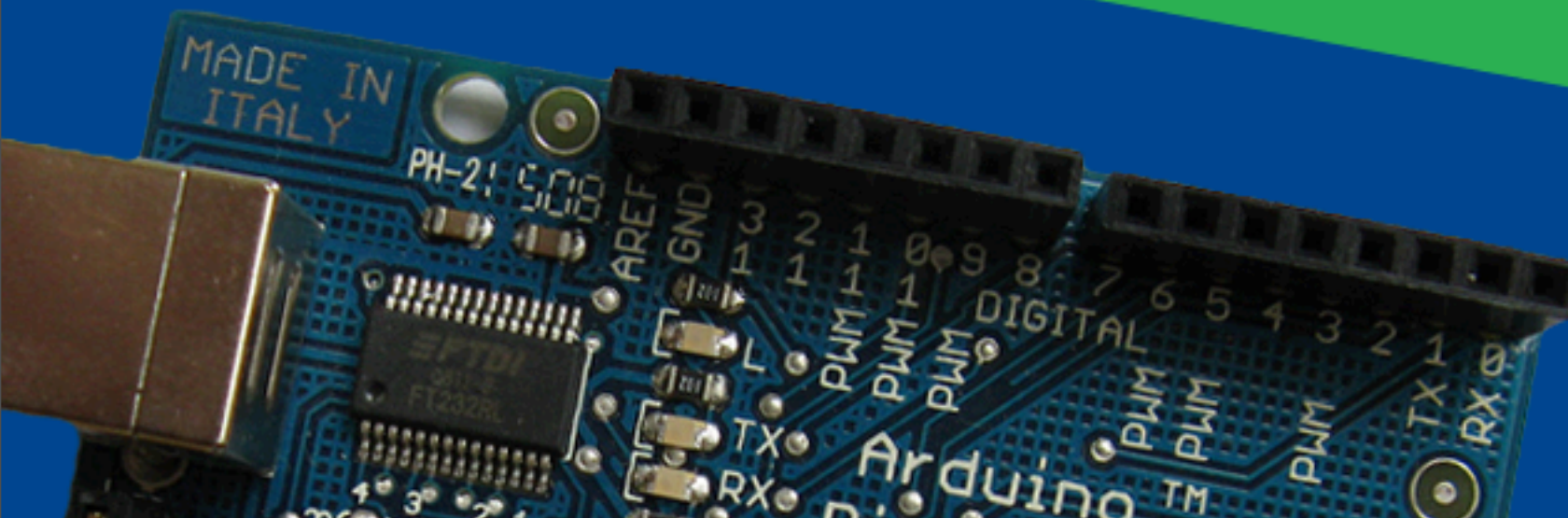
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Blog: http://blog.classsoftware.com

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Who am I?

- Director of Class Software for almost 15 years

- Developing and creating web applications for 15 years

- Programming for 25 years

- Adobe certified developer and trainer in Flex and ColdFusion

- Adobe Community Champion

- Based in Sydney Australia

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Electronics Trends

- Low cost components

- Small components

- Complex components with simple standard interfaces

Computing Trends

- Easier to program

- Use of high level languages

- Software tools

- Open source

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Are We There Yet?

- Low cost fast devices

- It's easy to communicate between devices and computers

- Can build complex systems from off the shelf components

Arduino

Overview of the Arduino Platform
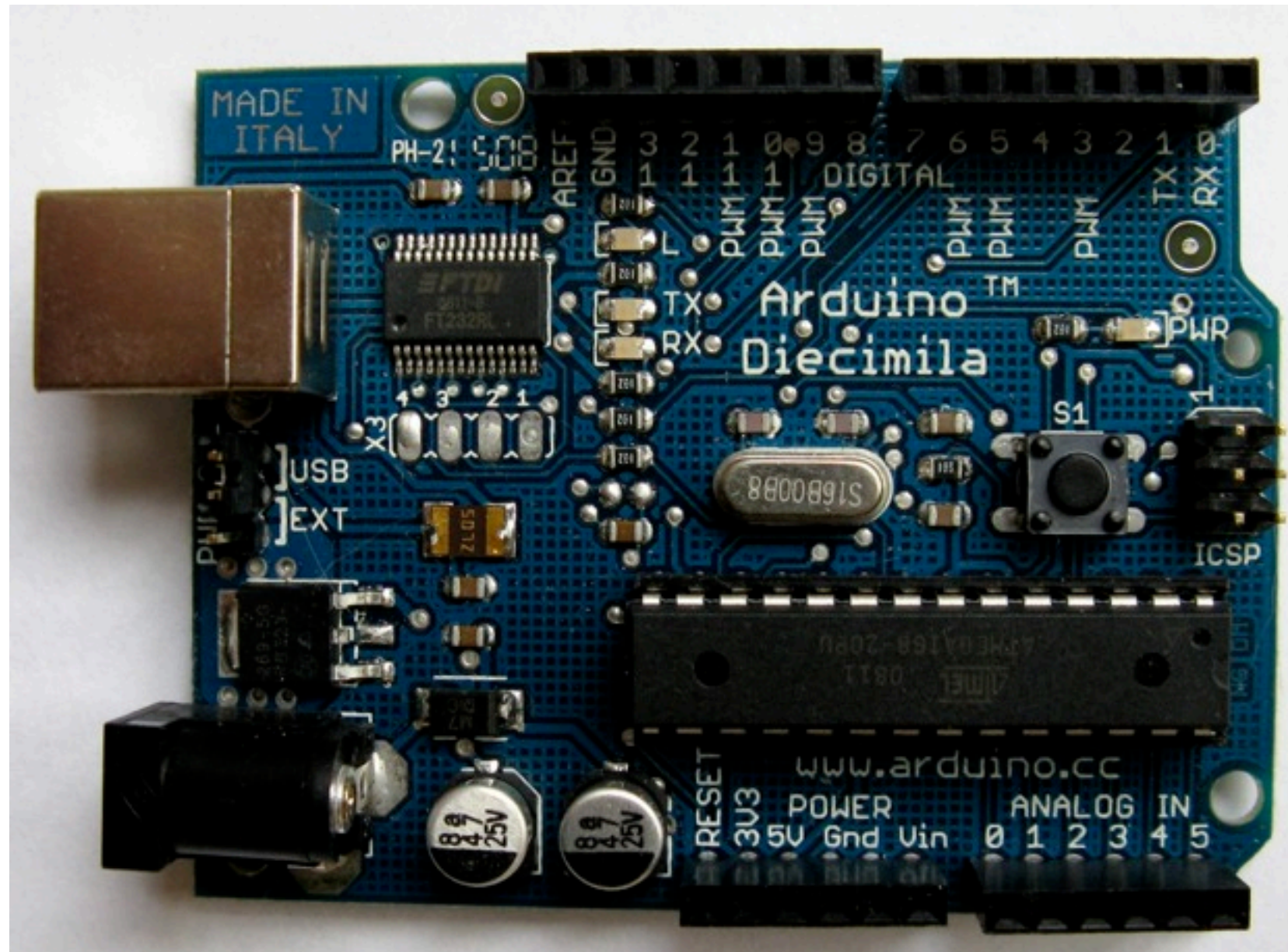
Arduino Platform

- Open source hardware and software platform

- Easy to program

- Hardware is flexible, fast, consumes very little power and is cheap
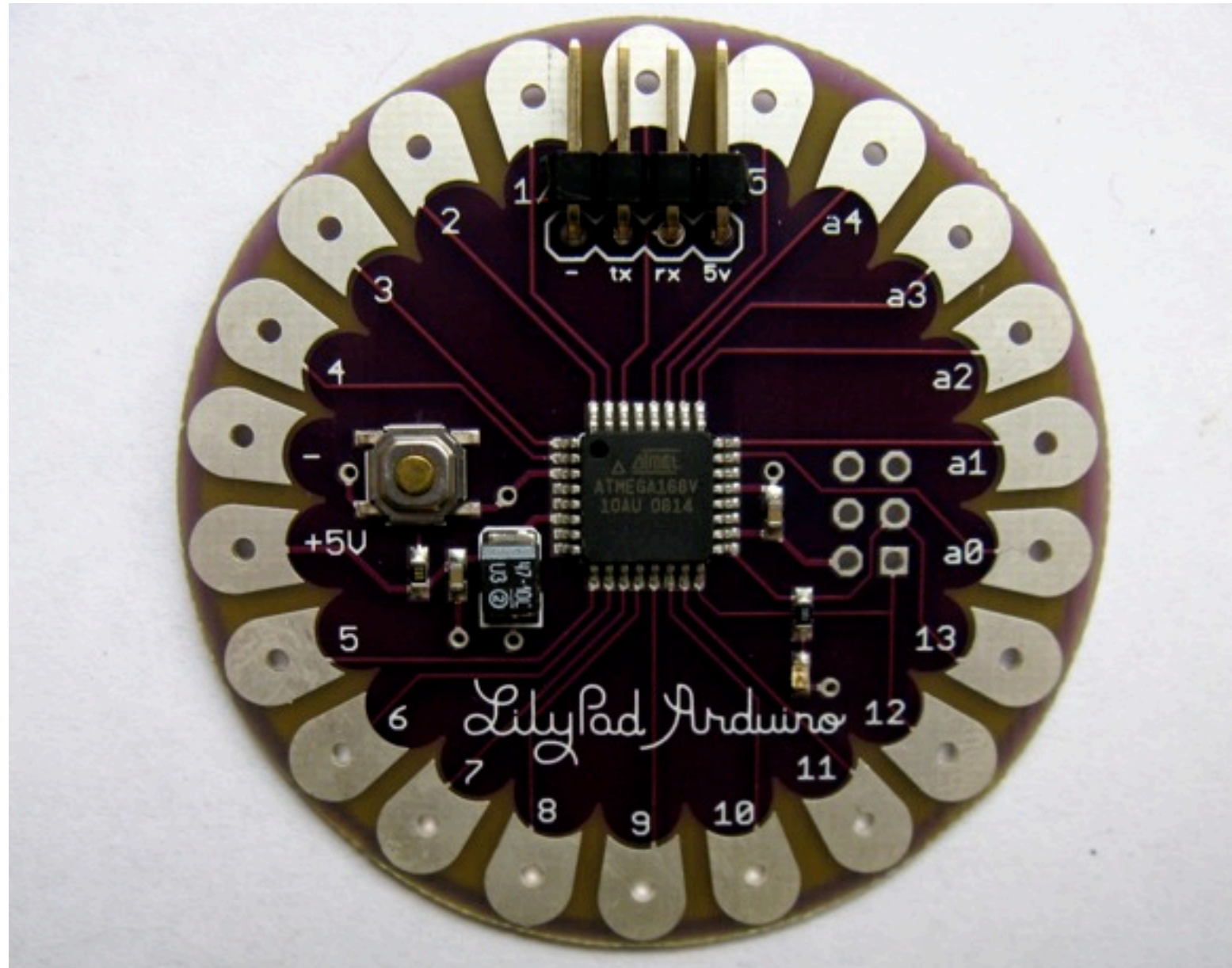
Arduino Hardware

- Comes in a number of shapes and sizes

- Low cost

- Easy to extend

- Digital inputs/outputs

- Analog inputs

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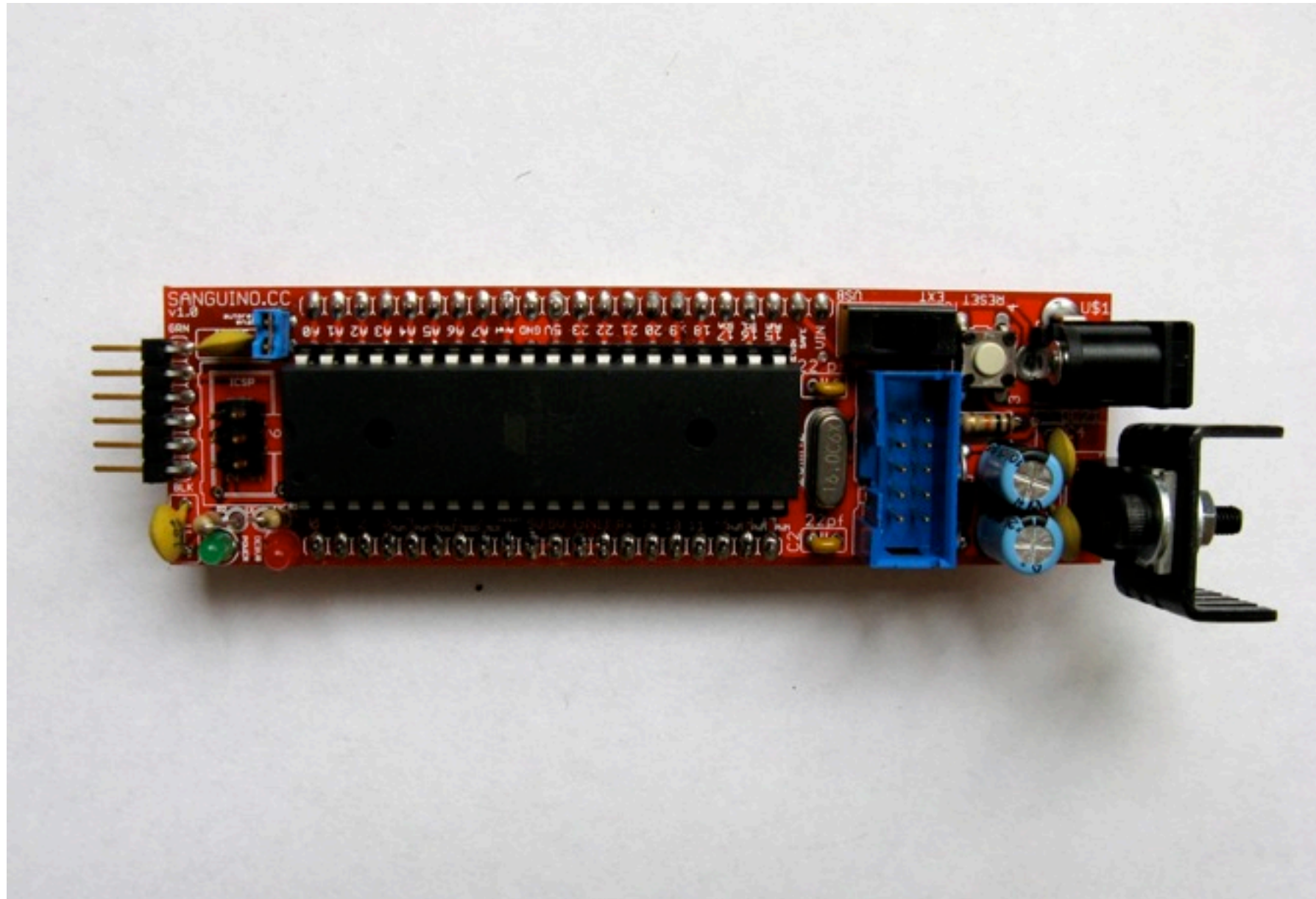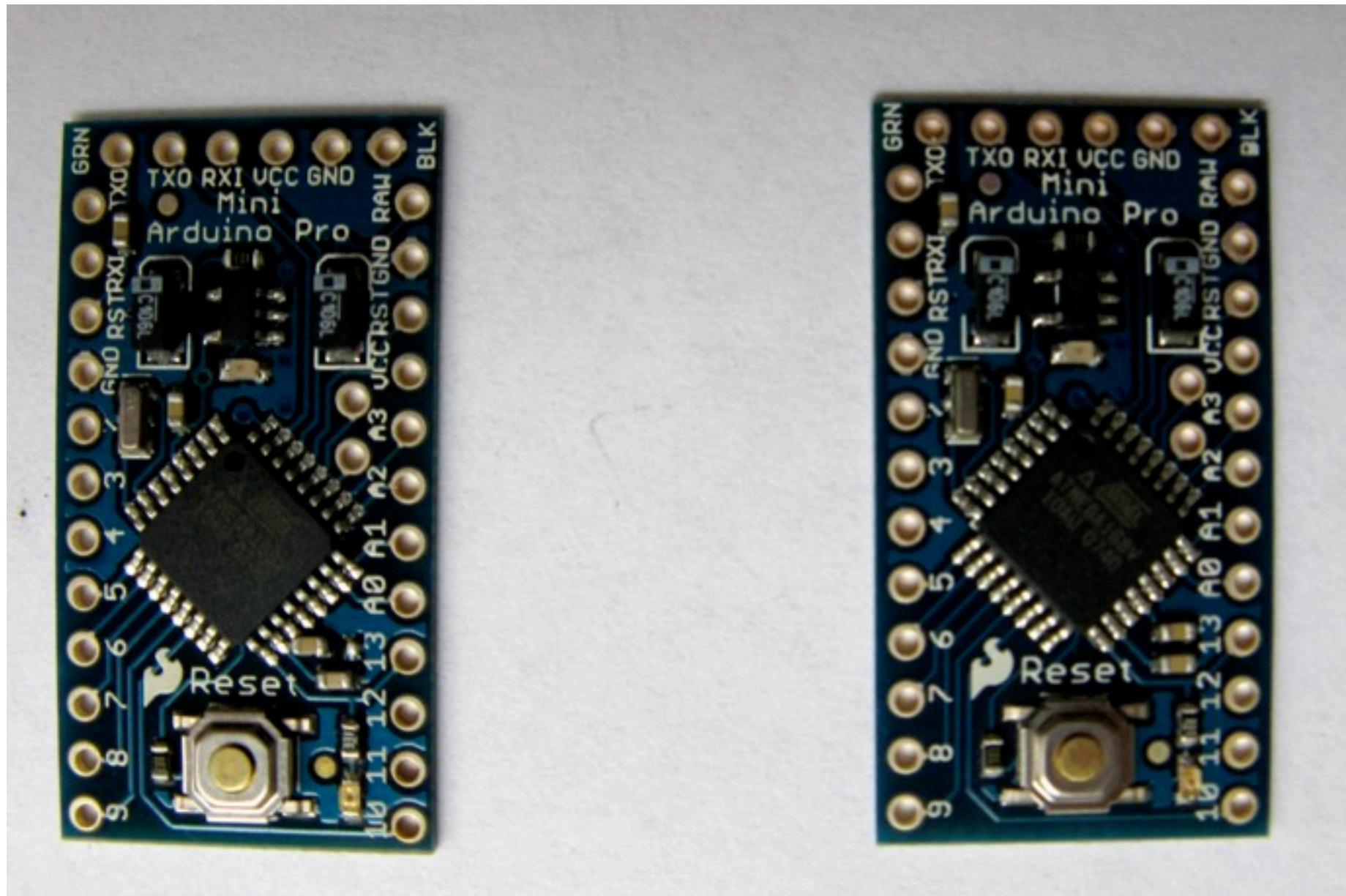andthecity

Arduino Boards

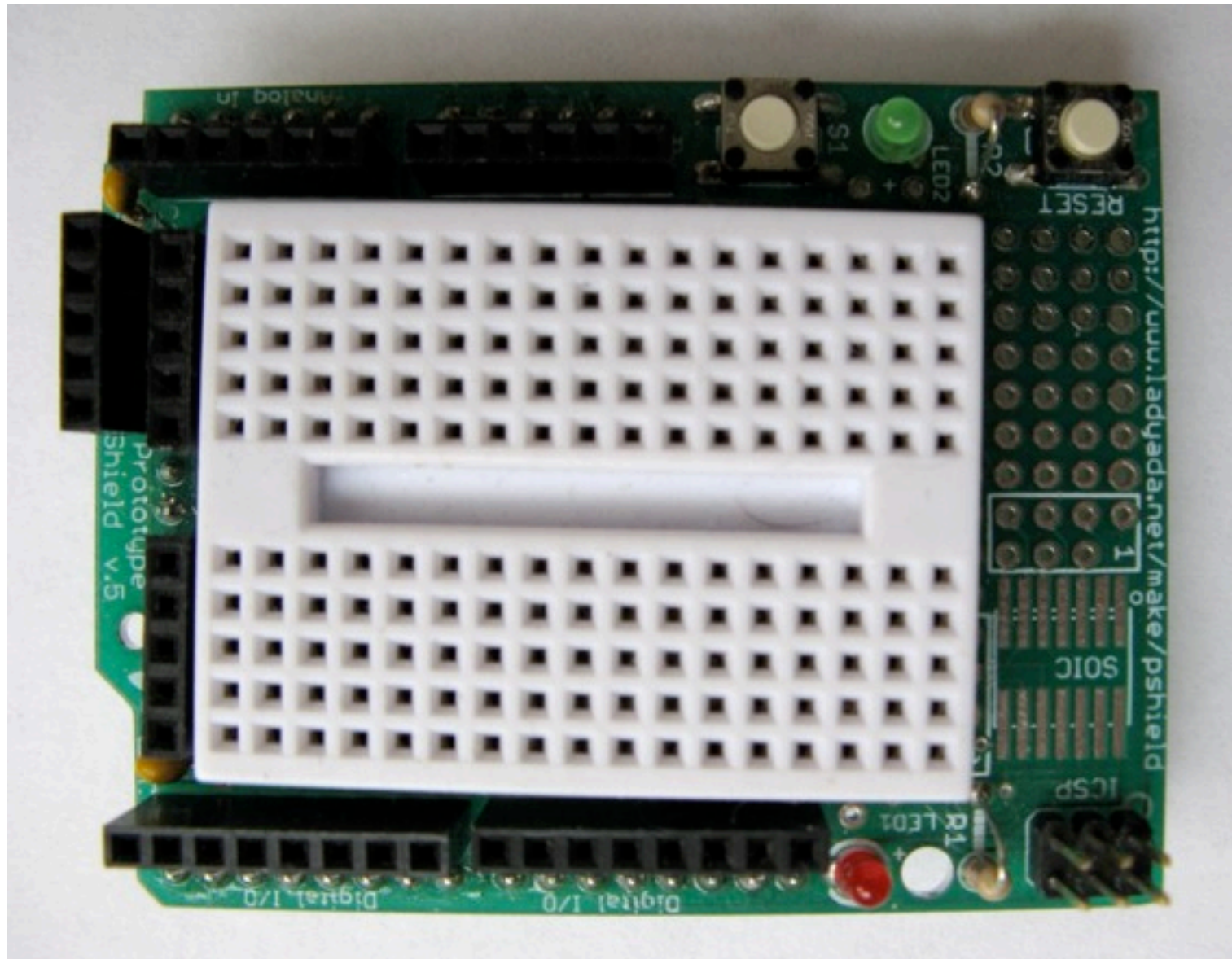# Arduino Boards

Arduino Boards

Arduino Boards
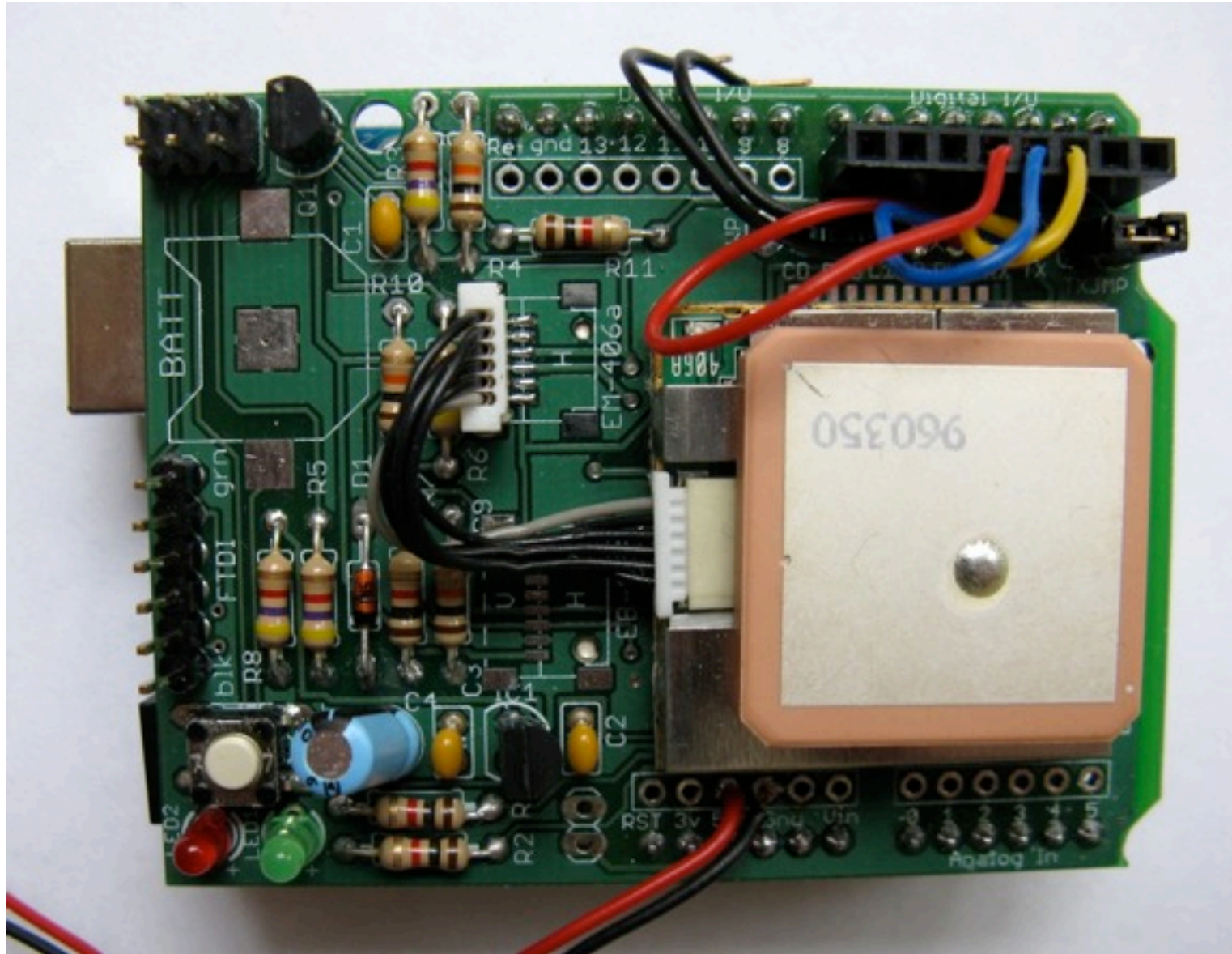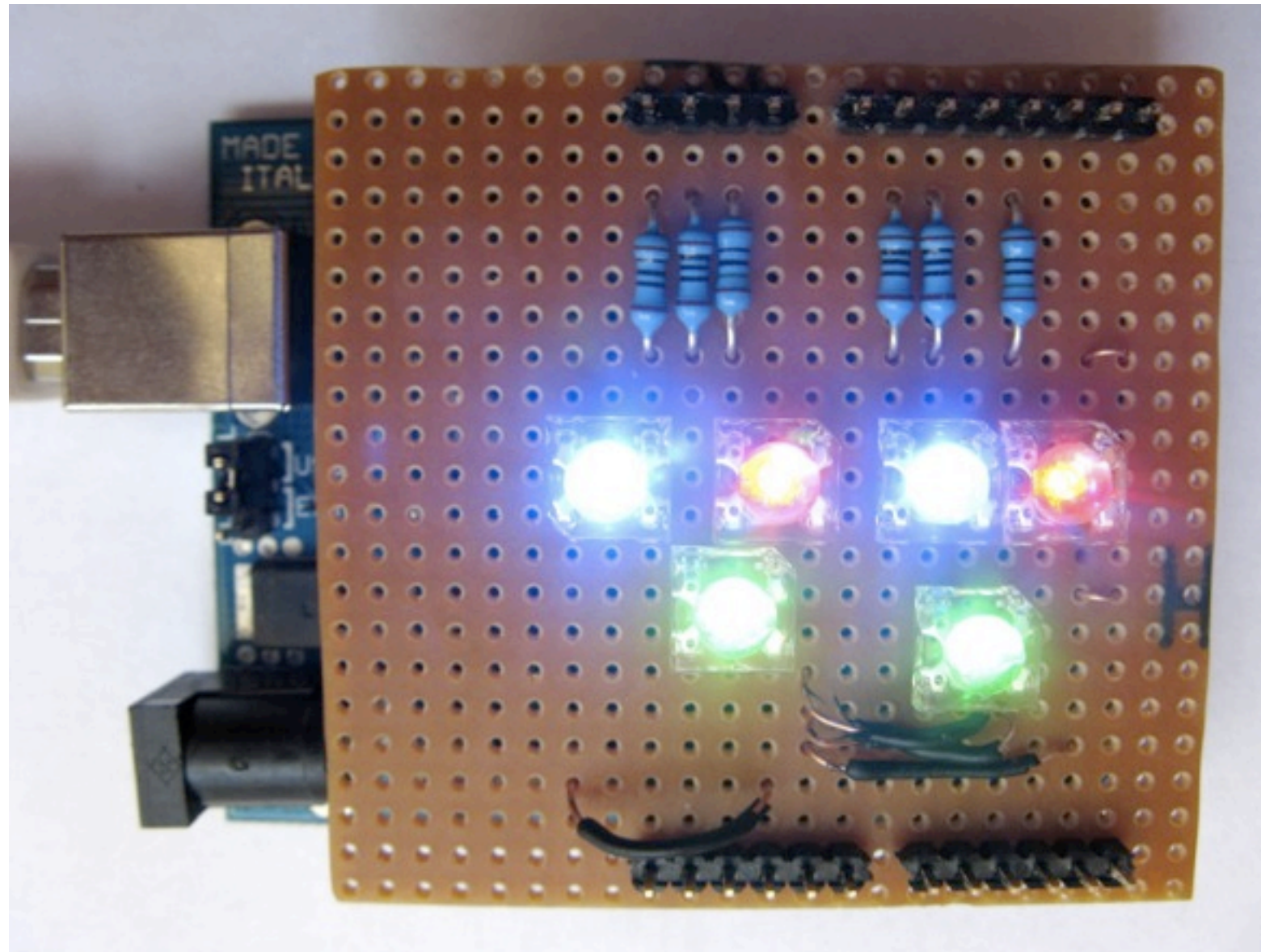
Arduino Shields

Arduino Shields

Arduino Shields

Arduino Shields

Arduino Software Platform
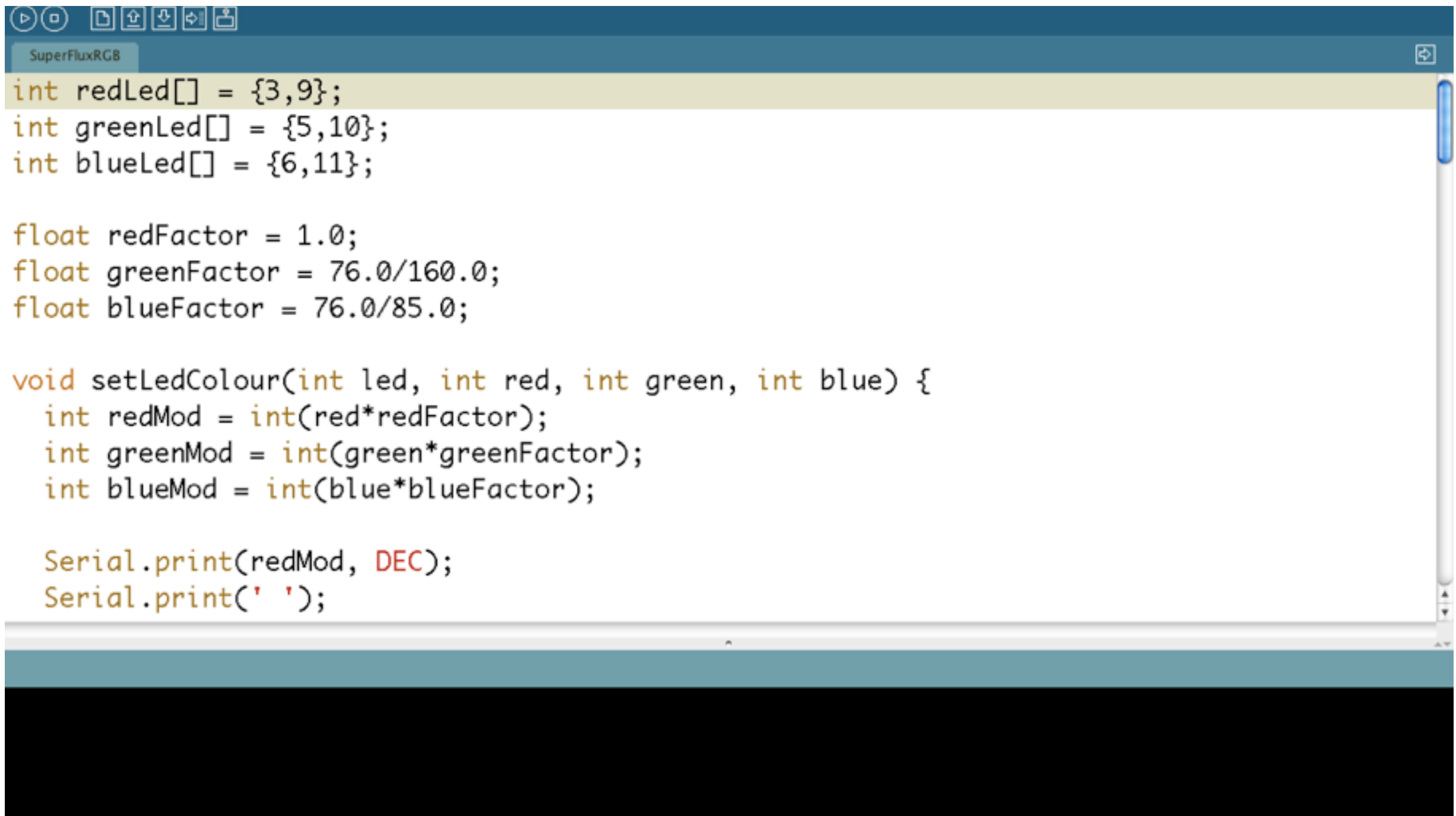
- Open source cross platform IDE

- Alpha but very stable

- Version 1.0 out in the next month

- Updated frequently

- Growing and active community

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Arduino Code

- C/C++ but not scary!

- Inbuilt functions to read and set digital and analog inputs and outputs

- Includes libraries to perform common hardware or software tasks

- Once uploaded programs are permanent

Arduino IDE

```
SuperFluxRGB

int redLed[] = {3,9};
int greenLed[] = {5,10};
int blueLed[] = {6,11};

float redFactor = 1.0;
float greenFactor = 76.0/160.0;
float blueFactor = 76.0/85.0;

void setLedColour(int led, int red, int green, int blue) {
  int redMod = int(red*redFactor);
  int greenMod = int(green*greenFactor);
  int blueMod = int(blue*blueFactor);

  Serial.print(redMod, DEC);
  Serial.print(' ');
```
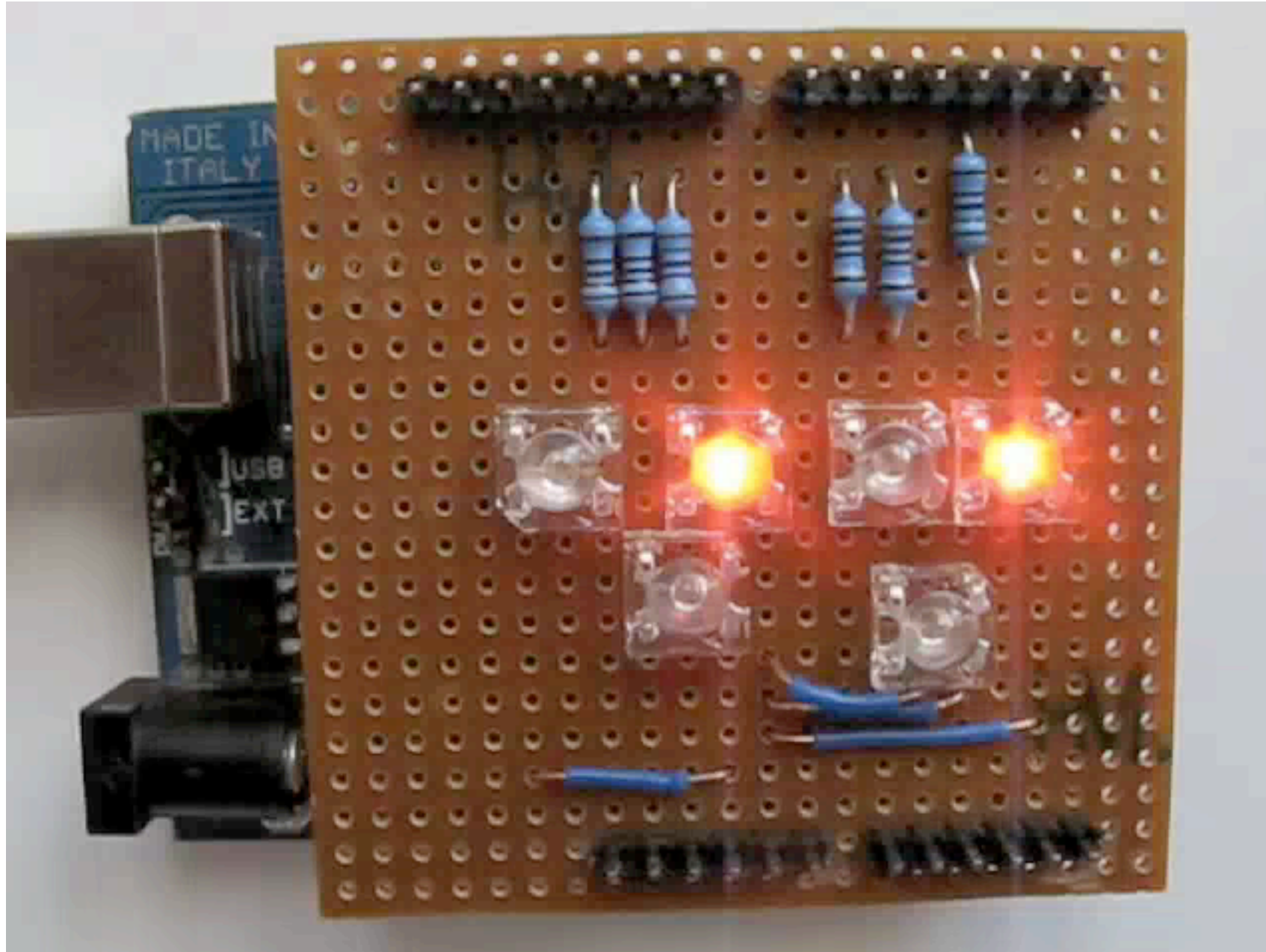
Led Shield Demo

Led Shield Demo

Issues

- Debugging can be hard

- No simulator

- Memory, power and speed limits

- Helps to have a little electronics knowledge

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Connecting to the Web

How Arduinos can communicate with the world

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Connection Methods

- Direct to computer (USB)

- Wireless (XBee modems)

- Ethernet or WiFi

- "The Cloud"

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Supported Languages

- Flash and Flex

- Processing

- Python

- Ruby

- Java

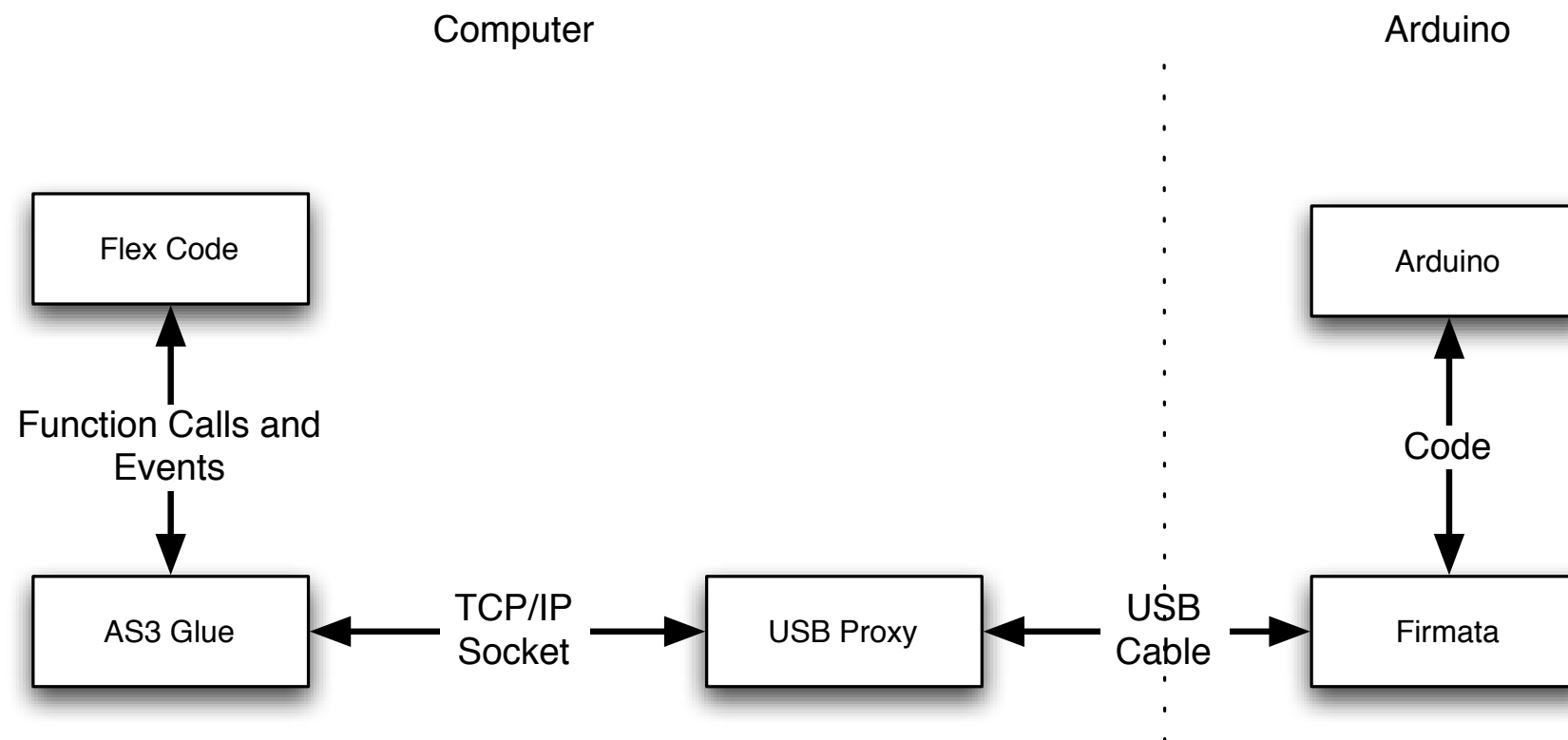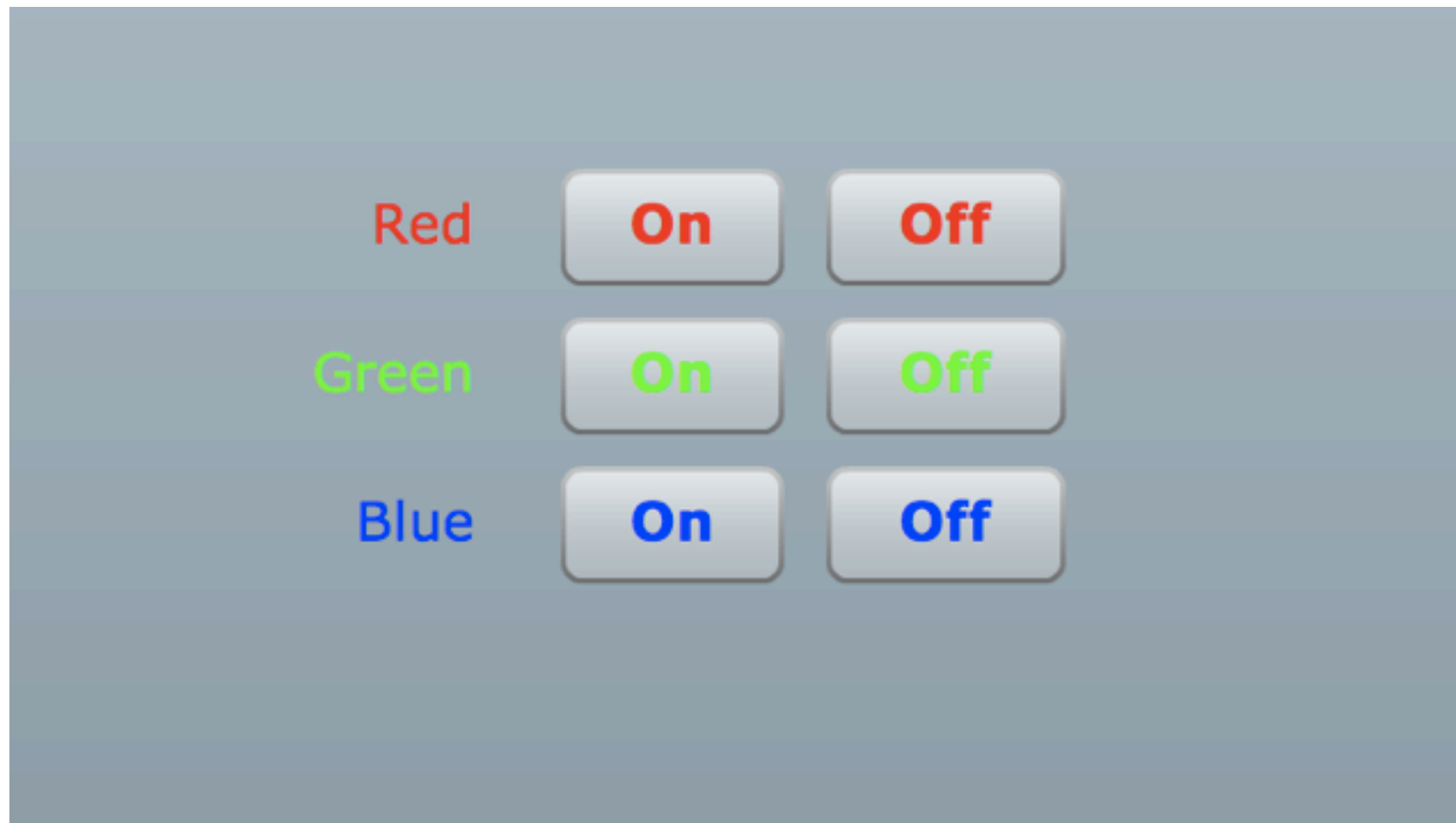- C, C++, C# and Objective C

- .NET

Flex

Flex to Arduino direct connection

Layers of Communication

- Flex to proxy via an Actionscript library

- Proxy to USB communication

- USB to arduino

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Flex to Arduino

Flex Led Demo

AS3Glue Digital Output

- Create arduino instance
  var arduino:Arduino = new Arduino();

- Wait for firmware version

- Set digital pin as output
  arduino.setPinMode(pin, Arduino.OUTPUT);

- Turn digital output on
  arduino.writeDigitalPin(pin, Arduino.HIGH);

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Danger Shield Demo

AS3Glue Analog Input

- Turn on analog reporting
  arduino.setAnalogPinReporting(pin, Arduino.ON);

- Listen for changes via event listener
  arduino.addEventListener
  (ArduinoEvent.ANALOG_DATA,
  onReceiveData);

  ```
  public function onReceiveData
  (event:ArduinoEvent):void { ... }
  ```
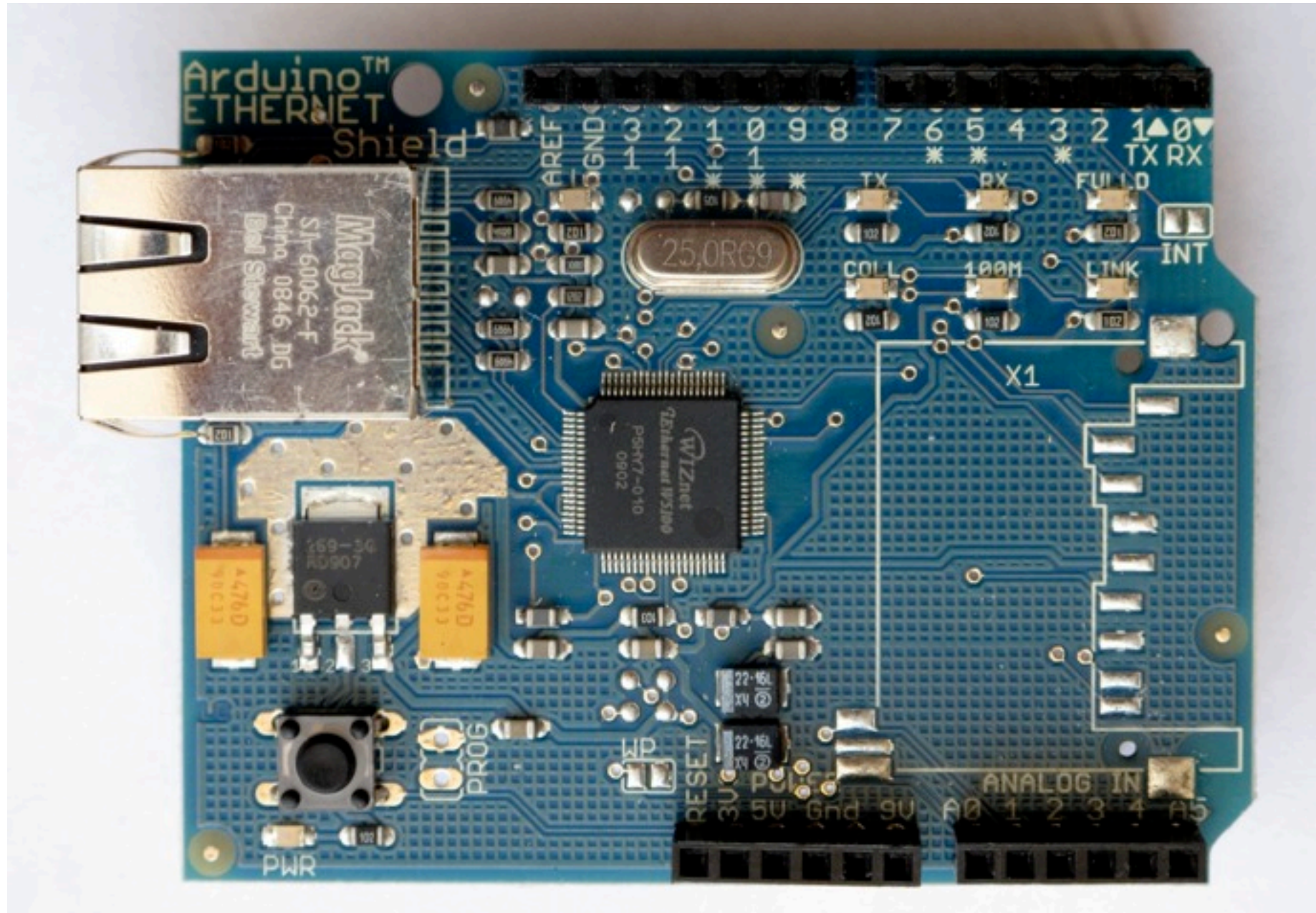
Ethernet

Using Arduino Ethernet Shields
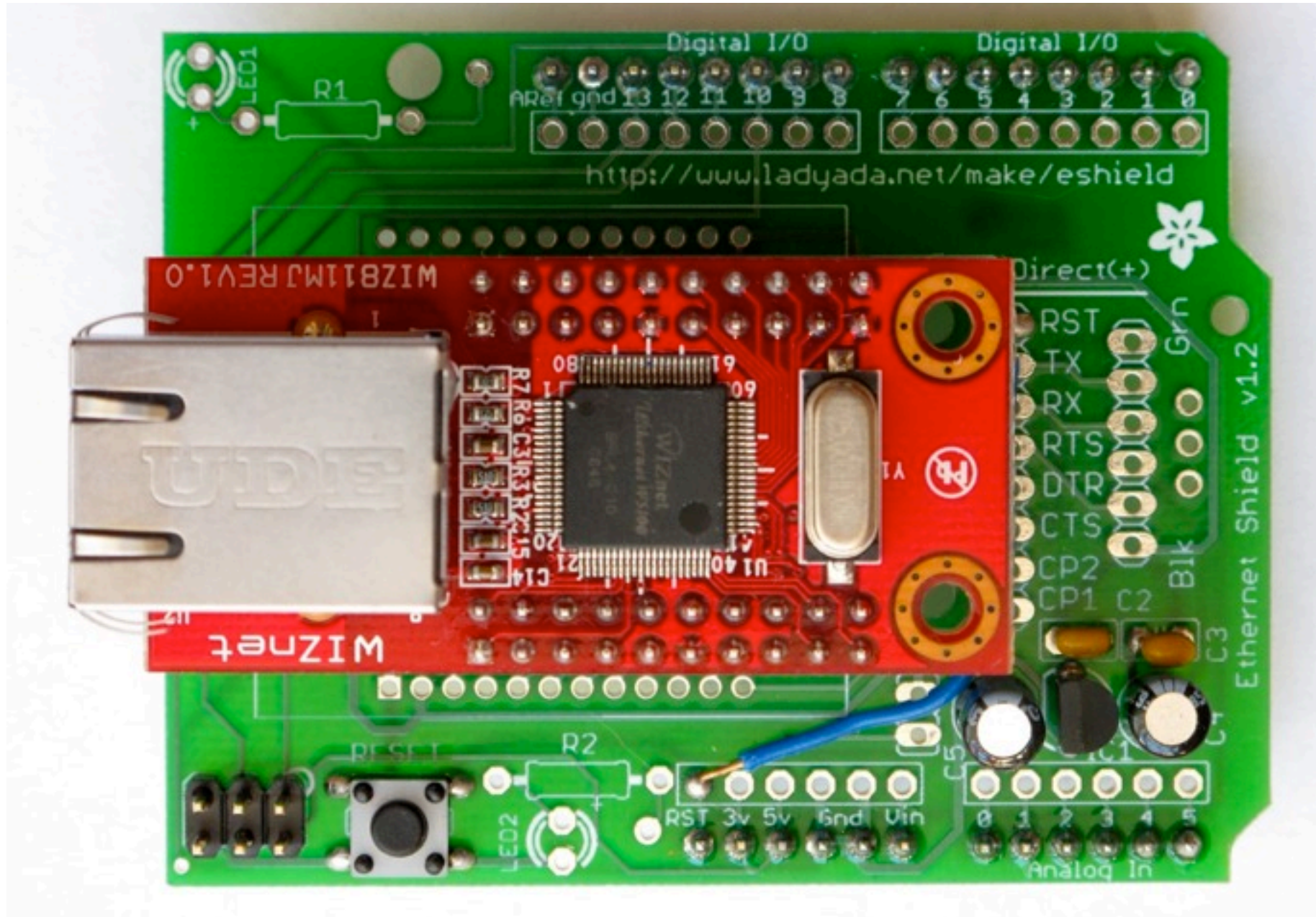
Ethernet Shields

- Allow direct internet connection

- No dedicated PC needed

- Shields need a little config

- Can act as web server or client
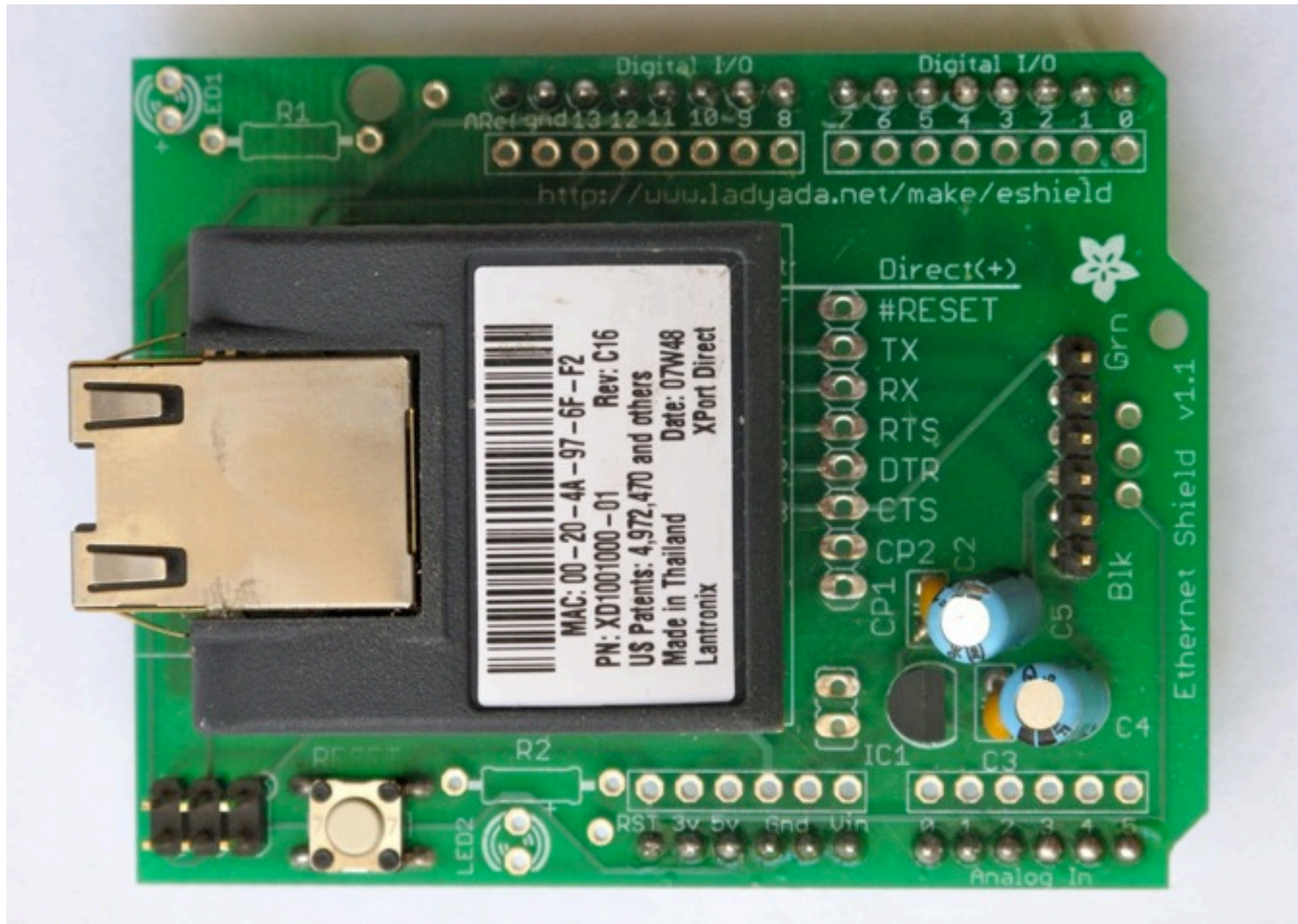
Ethernet Shields

Ethernet Shields

Ethernet Shields

Web Servers

- Simpler than you think

- A web server:

  - Listens for connections

  - Parse requests

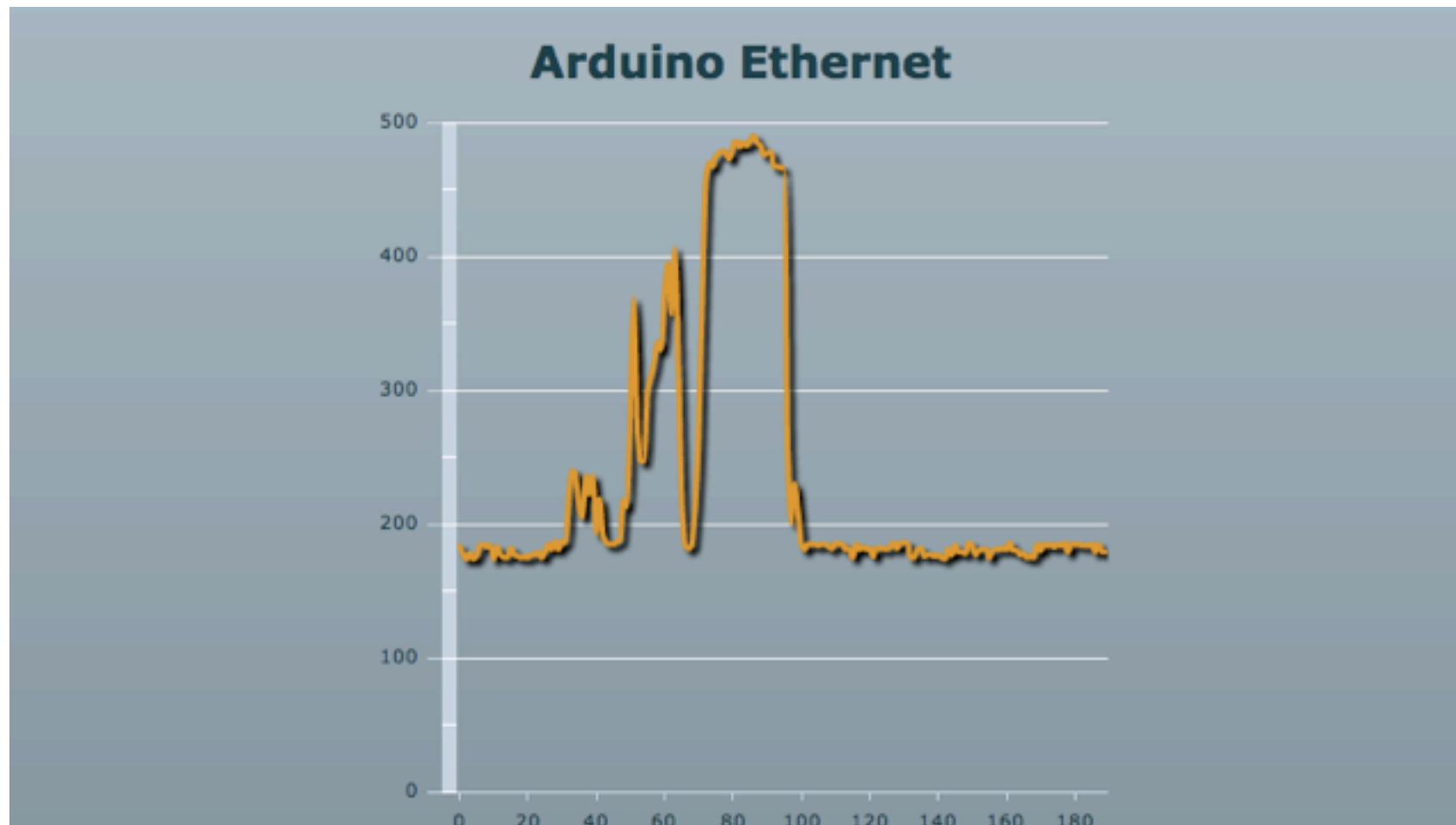 - Send back status messages/resources requested

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HTTP Requests

- Start with request "GET index.html HTTP/1.1"

- Optional headers "Accept-Language: en"

- Empty line

- Optional message body (POST and other requests)

Ethernet Arduino Code

- Web server code

- Easy to modify

Ethernet Demo

Applications

Ideas on how and where to use this technology

Environmental Monitoring

- Indoors or outdoors

- Wide range of sensors

- Sleep mode/low power consumption

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Home Automation

- Power and utilities monitoring

- Controlling Lights and Heating/Cooling

- Garden watering/monitoring

Security and Safety

- Security systems

- Location reporting

- Bike jackets

Why do this?

- Expose yourself to new ideas and new ways of solving problems

- Involves interaction with the real world

- Encourages creativity

- Makes you a better programmer

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It's Fun!

Questions?

Ask now, see me after the session,
follow me on twitter @justinmclean
or email me at justin@classsoftware.com.

Code and slides can be found at
http://blog.classsoftware.com

Resources

Finding out more information

Arduino Sites

- Ardunio (http://ardunio.cc)

- Spark fun (http://www.sparkfun.com)

- Lady Ada (http://ladyada.net)

- Seeed Studio (http://www.seeedstudio.com)

- Modern Device (http://moderndevice.com)

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Electronic Components Suppliers

- Electric Goldmine (http://www.goldmine-elec-products.com/)

- Digikey (http://www.digikey.com/)

- Farnell (http://ww.farnell.com/)

Other Sites

- Make magazine (http://makezine.com/)

- Evil Mad Scientist (http://evilmadscientist.com)

- NYC Resistor (http://nycresistor.com)