

Applying IoT

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Slideshare: <http://slideshare.net/NorseDisc/applying-iot>



WTF is IoT and Why Do I Care?

Making objects intelligent in a way that's connected to other devices

Successful IoT Based Businesses:

- ▶ Nest
- ▶ FitBit
- ▶ Parrot (drones, not birds)

Teaching coding

FUN!



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Microcontroller

- ▶ Small instruction set
- ▶ Small, read-only memory
- ▶ Designed for embedded
- ▶ Great at doing one thing

System on a Chip

- ▶ Single-chip solution
- ▶ Other functionality built-in
- ▶ Run an OS
- ▶ Have some memory on-board

Microcontroller Examples

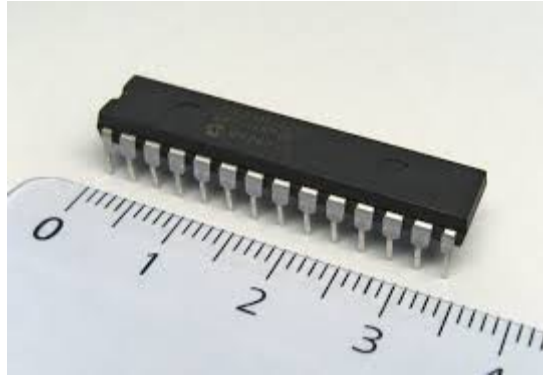


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Pic



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Arduino

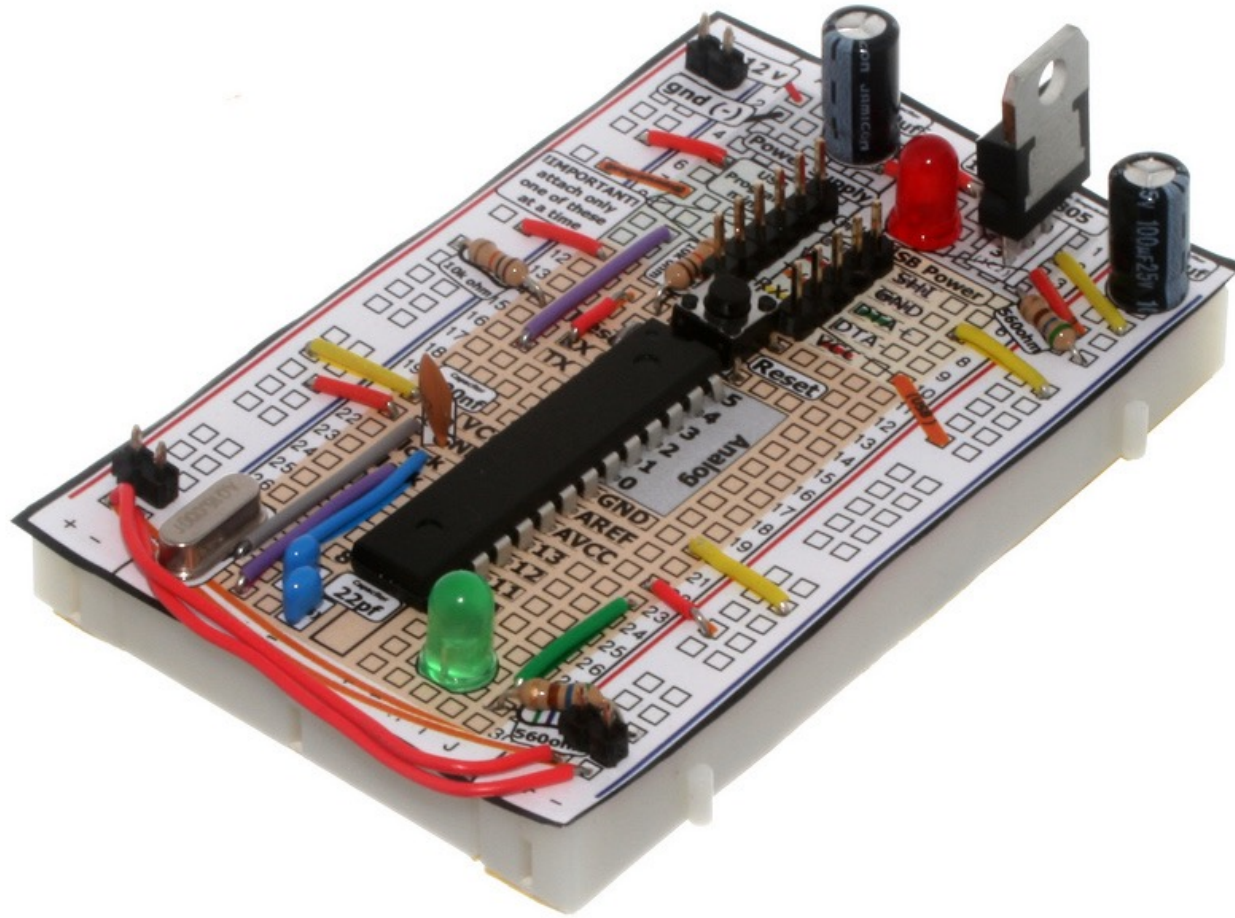


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Microcontroller Examples

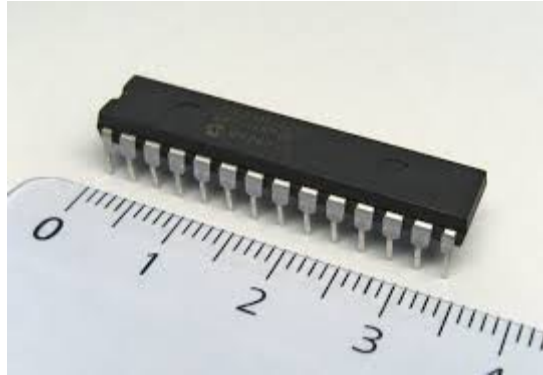


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Arduino

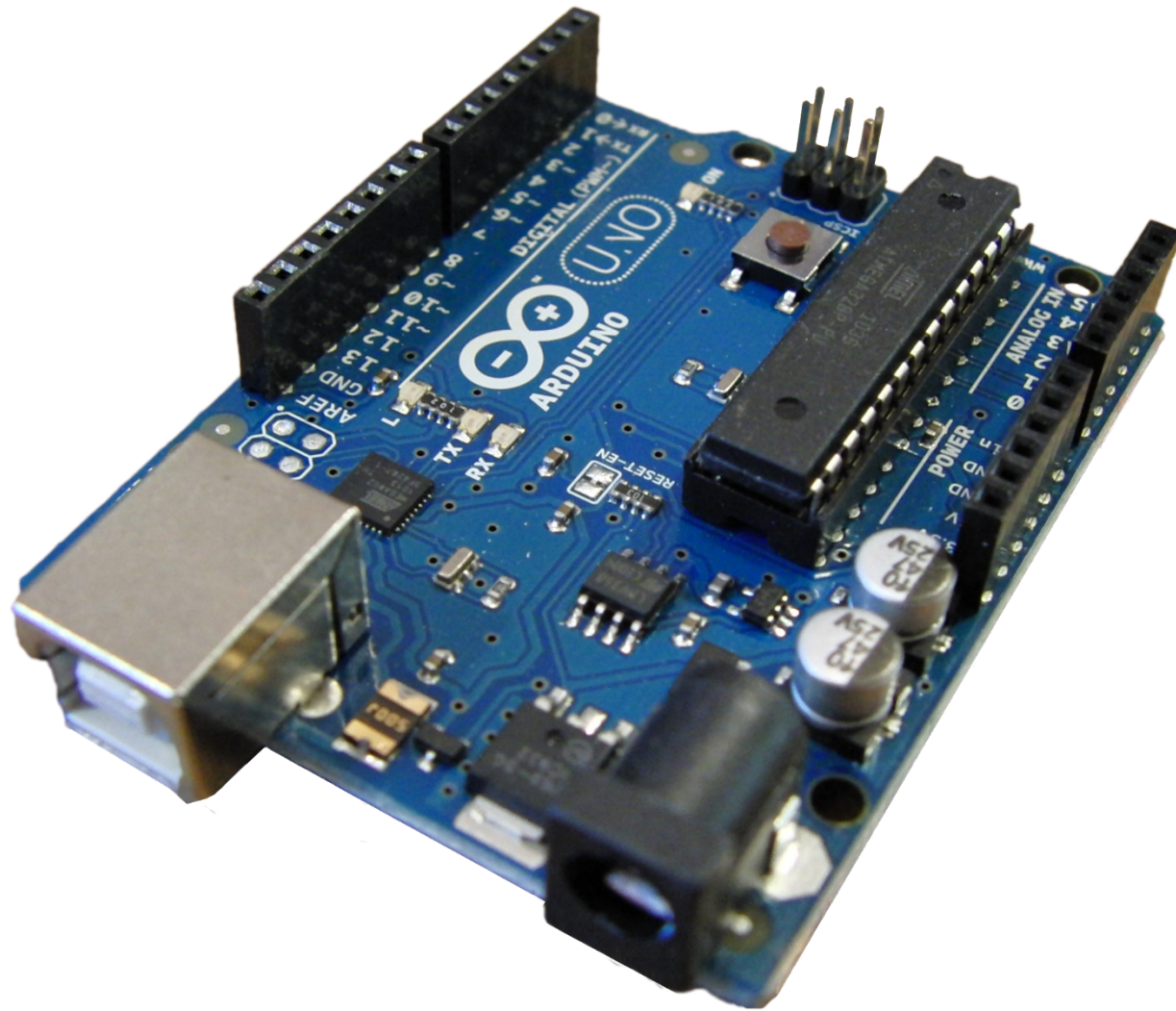


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System on a Chip Examples



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Raspberry Pi



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Intel Edison

Other Devices



Particle (formerly Spark)

BeagleBone

MinnowBoard MAX

Tessel



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Ethernet



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Wifi



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Bluetooth (LE)



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RF



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XBee



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GSM

were on ur puter



reprogramin
evryfing in LOLcode

C/C++

What Arduino Uses

Write a “sketch”

Don't necessarily need to *know* C

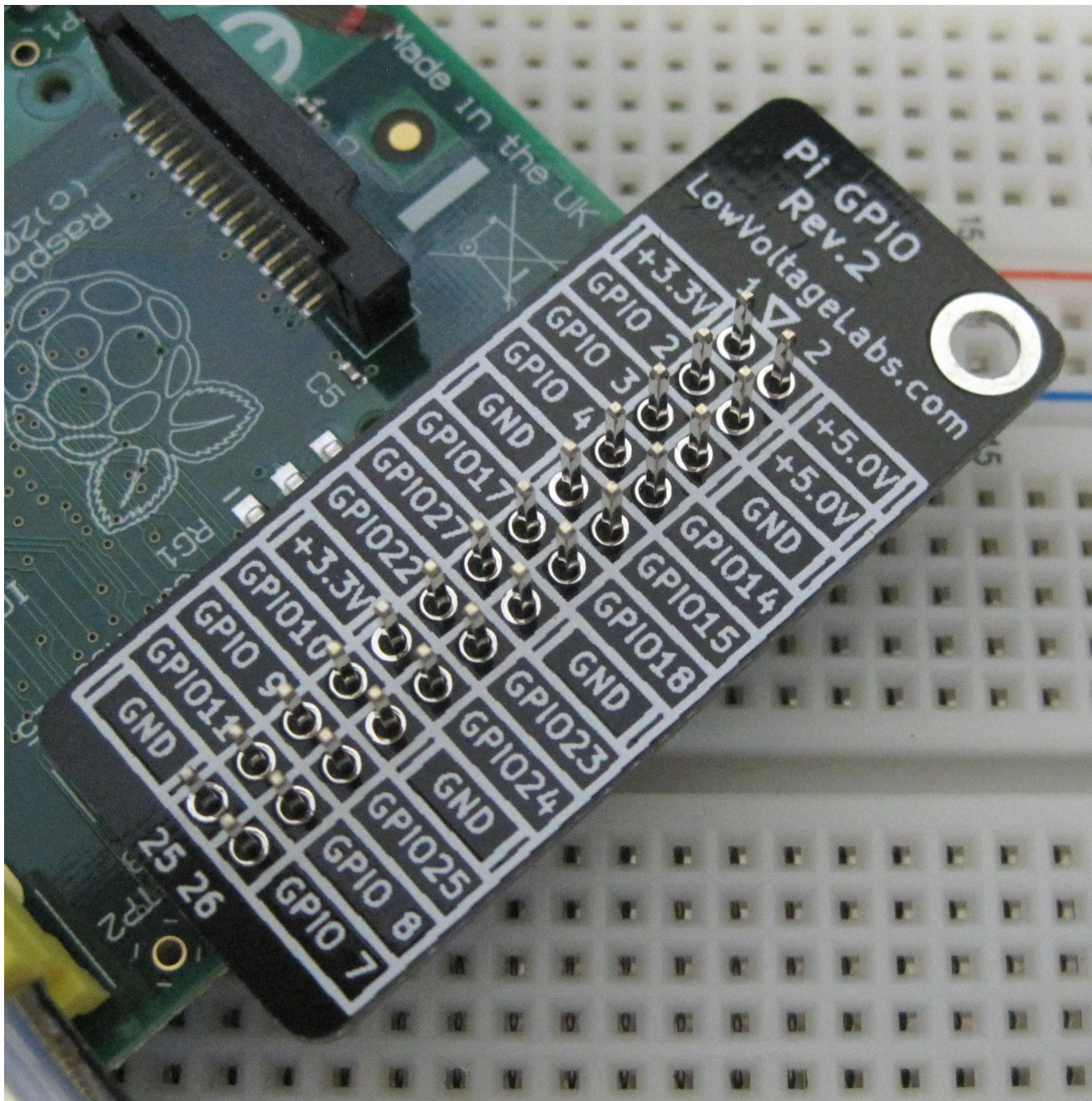
```
1 const int ledOutPin = 13;
2
3 void setup() {
4     pinMode(ledOutPin, OUTPUT);
5 }
6
7 void loop() {
8     digitalWrite(ledOutPin, HIGH);
9     delay(1000);
10    digitalWrite(ledOutPin, LOW);
11    delay(1000);
12 }
```


Python

Comes on the Raspberry Pi (both 2 and 3)

RPi.GPIO package for accessing GPIO pins

```
1  import RPi.GPIO
2  import time
3
4  RPi.GPIO.setmode(RPi.GPIO.BCM)
5  RPi.GPIO.setup(2, RPi.GPIO.OUT)
6
7  while True:
8      RPi.GPIO.output(2, True)
9      time.sleep(1)
10     RPi.GPIO.output(2, False)
11     time.sleep(1)
```



Python

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```
1  import RPi.GPIO
2  import time
3
4  RPi.GPIO.setmode(RPi.GPIO.BCM)
5  RPi.GPIO.setup(2, RPi.GPIO.OUT)
6
7  while True:
8      RPi.GPIO.output(2, True)
9      time.sleep(1)
10     RPi.GPIO.output(2, False)
11     time.sleep(1)
```

JavaScript

Johnny5

```
1  var five = require('johnny-five');
2  var Edison = require('edison-io');
3  var board = new five.Board({
4      io: new Edison(),
5      repl: false
6  });
7
8  board.on('ready', function() {
9      var led = new five.Led(6);
10     led.blink(1000);
11 });
```

More JavaScript

Cylon

```
1  var Cylon = require('cylon');
2
3  Cylon.robot({
4    connections: {
5      edison: { adaptor: 'intel-iot' }
6    },
7
8    devices: {
9      led: { driver: 'led', pin: 6 }
10   },
11
12   work: function(myEdison) {
13     every((1).second(), myEdison.led.toggle);
14   }
15 }).start();
```

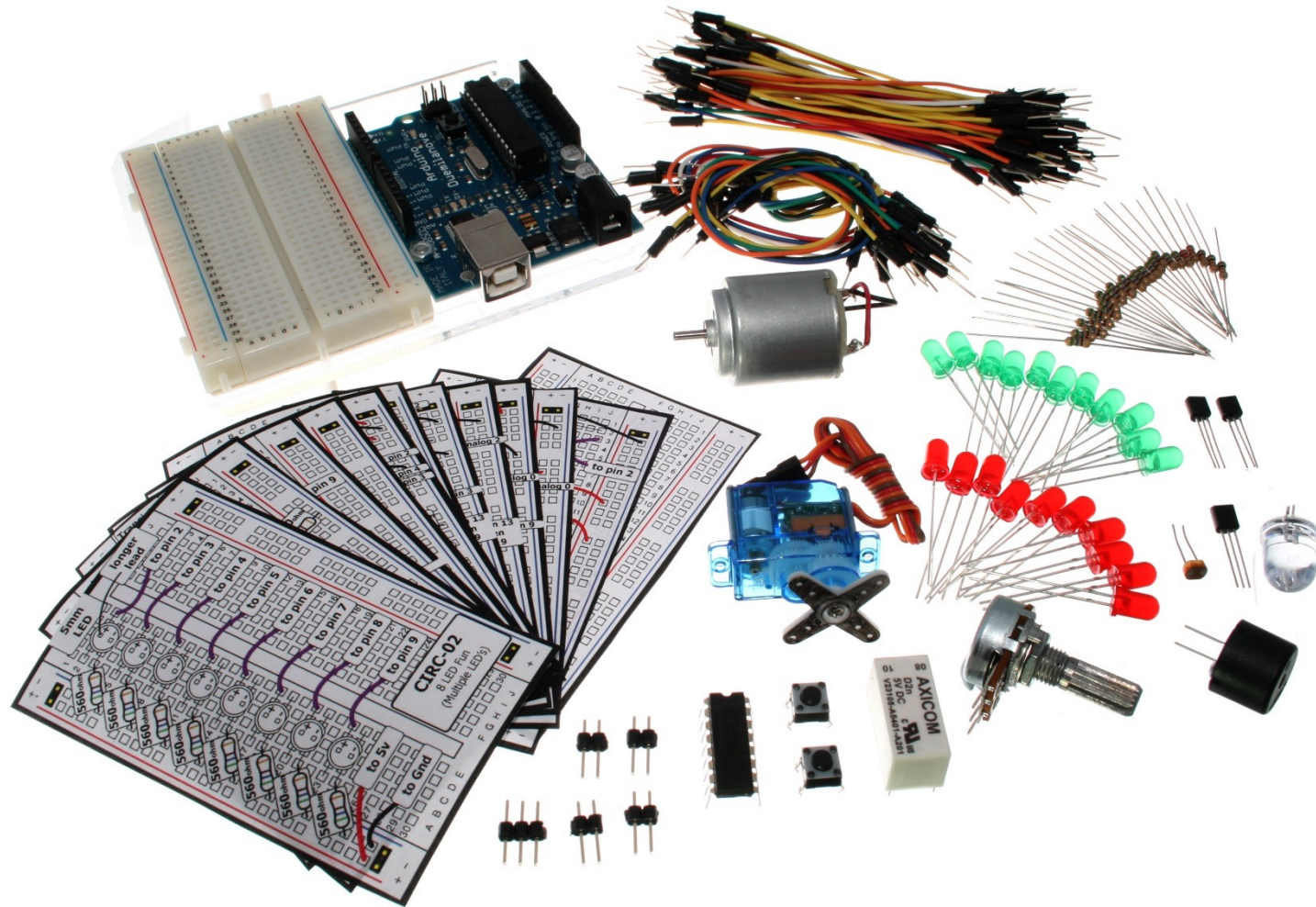


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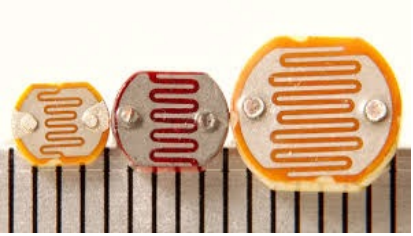


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```
1  var Cylon = require('cylon');
2
3  Cylon.robot({
4    connections: {
5      edison: { adaptor: 'intel-iot' }
6    },
7
8    devices: {
9      button: { driver: 'button', pin: 2 },
10     led: { driver: 'led', pin: 6 }
11   },
12
13   work: function(myEdison) {
14     myEdison.led.turnOff();
15
16     myEdison.button.on('push', function() {
17       myEdison.led.turnOn();
18     });
19
20     myEdison.button.on('release', function() {
21       myEdison.led.turnOff();
22     });
23   }
24   }).start();
```



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[Photo by SparkFunElectronics / CC BY](#)

```
1  var Cylon = require('cylon');
2
3  Cylon.robot({
4    connections: {
5      edison: { adaptor: 'intel-iot' }
6    },
7
8    devices: {
9      lightSensor: { driver: 'analog-sensor', pin: 0, lowerLimit: 0, upperLimit: 1027 },
10     led: { driver: 'led', pin: 6 }
11   },
12
13   work: function(myEdison) {
14     myEdison.led.turnOn();
15     myEdison.led.brightness(10);
16
17     every((1).second(), function() {
18       var brightness = myEdison.lightSensor.analogRead();
19       var mappedBrightness = brightness / 4;
20       myEdison.led.brightness(mappedBrightness, function(err, val) {
21         if (err) {
22           console.log(err);
23         } else {
24           console.log('val was: ' + val);
25         }
26       });
27     });
28   }
29 }).start();
```

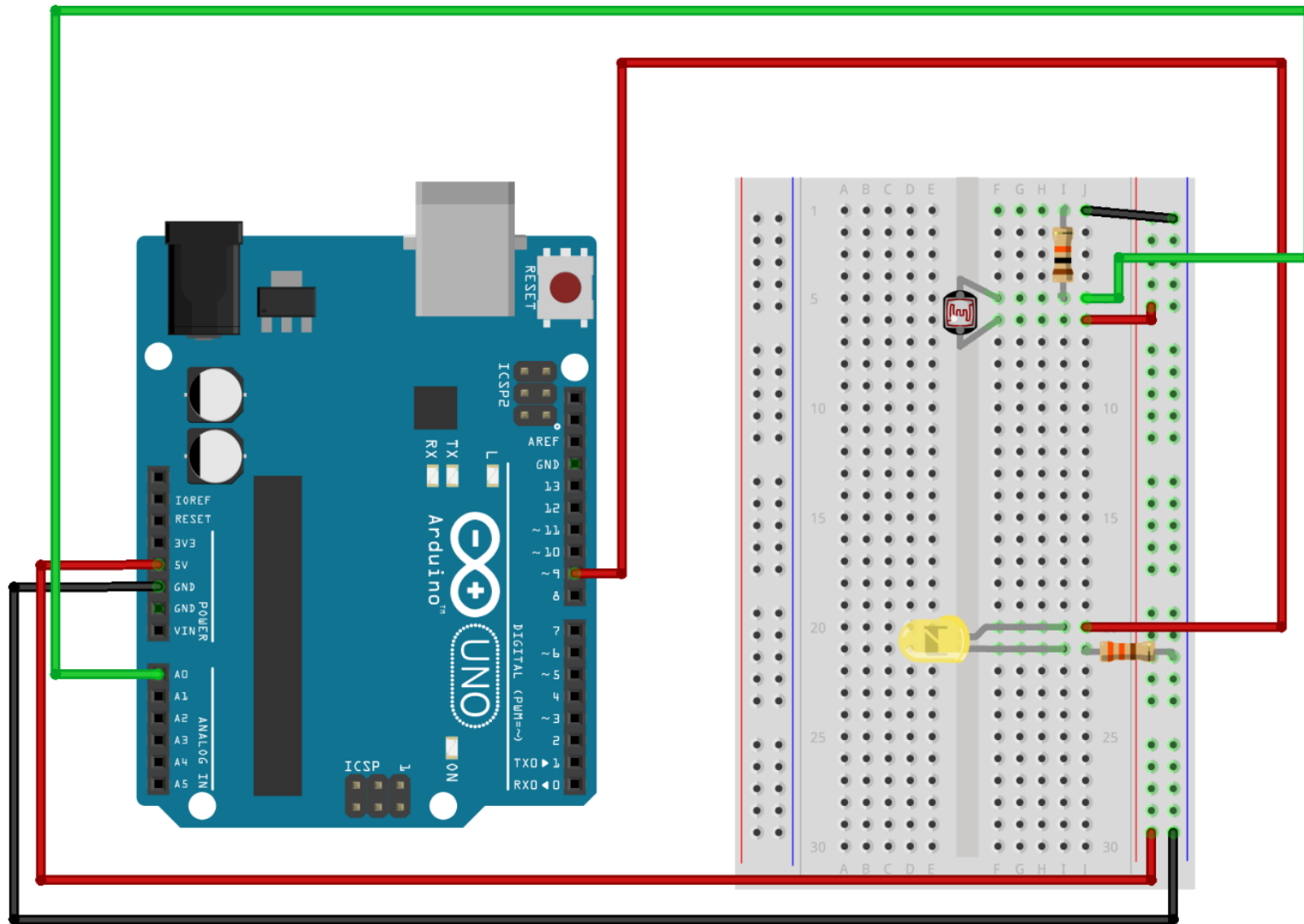



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fritzing



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```
1  var Cylon = require('cylon');
2
3  Cylon.robot({
4    connections: {
5      edison: { adaptor: 'intel-iot' }
6    },
7
8    devices: {
9      servo: { driver: 'servo', pin: 9 }
10   },
11
12   work: function(myEdison) {
13     var angle = 10;
14     every((1).second(), function() {
15       angle = angle + 15;
16       if (angle > 100) {
17         angle = 10;
18       }
19
20       myEdison.servo.angle(angle);
21     });
22   }
23
24 }).start();
```



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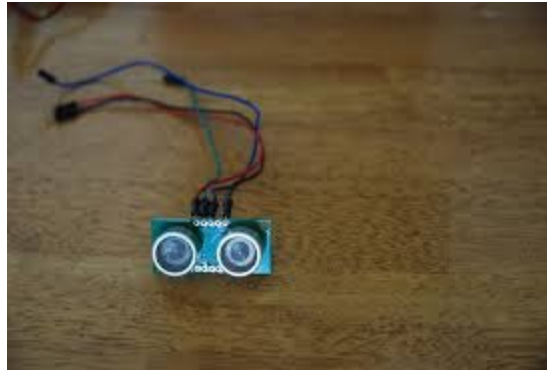


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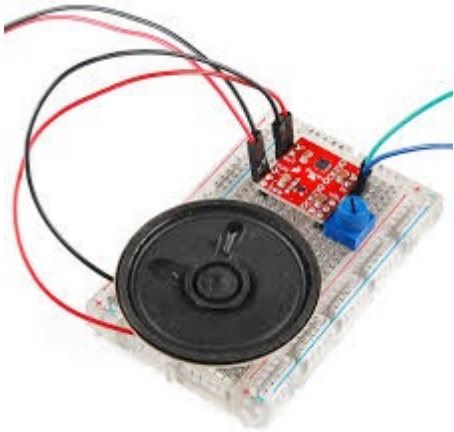


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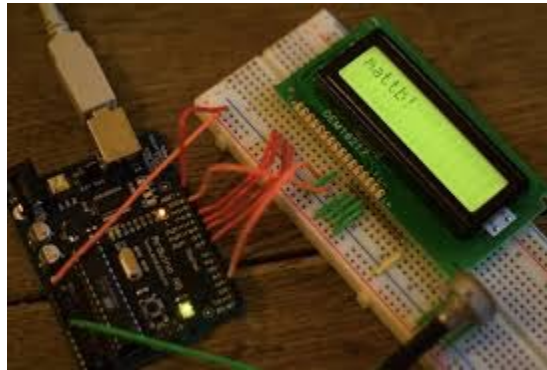
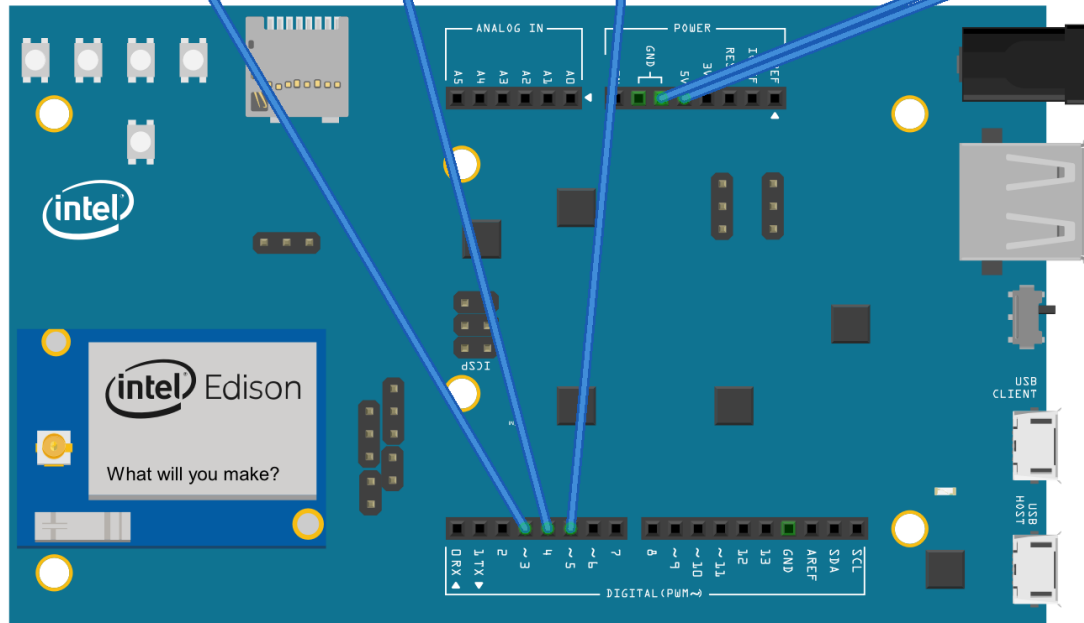
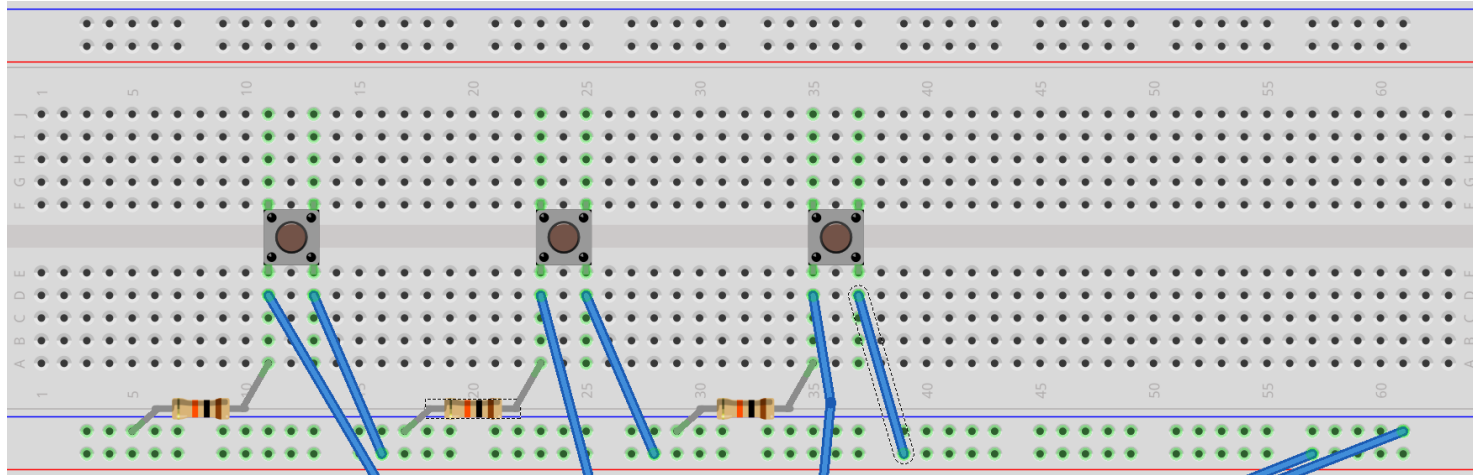


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OWASP 2014 IoT Top 10 - Developer Focus

1. Insecure Web Interface
2. Insufficient Authentication/Authorization
3. Insecure Network Services
4. Lack of Transport Encryption
5. “Privacy Concerns” (quotes mine)
6. Insecure Cloud Interface
7. Insecure Mobile Interface
8. Insufficient Security Configurability
9. Insecure Software/Firmware
10. Poor Physical Security

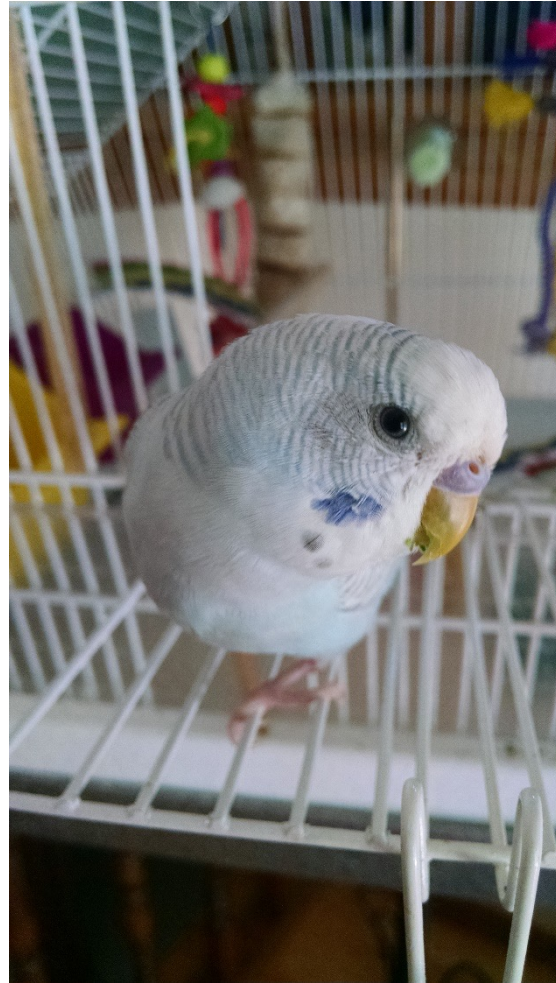
▶ Places to Buy Things

- ▶ SparkFun (sparkfun.com)
- ▶ AdaFruit (adafruit.com)
- ▶ Amazon

▶ Resources of Projects

- ▶ Hackaday.io
- ▶ Arduino (arduino.cc)
- ▶ Raspberry Pi Foundation (raspberrypi.org)
- ▶ Pluralsight courses
 - ▶ Node.js and the Internet of Things Using Intel Edison
 - ▶ Introduction to Arduino
 - ▶ Raspberry Pi for Developers

Questions?



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Slideshare: <http://slideshare.net/NorseDisc/applying-iot>

Demo Code: <https://github.com/bhazen/mdc-pingpong>