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Introduction to Hardware and IoT

University of Pittsburgh

What is IoT

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what is the “internet of things”

What is IoT

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Internet of things

Syllabification (Inter•net of things)

noun

A proposed development of the Internet in which everyday objects have network connectivity, allowing them to send and receive data:

"If one thing can prevent the Internet of things from transforming the way we live and work, it will be a breakdown in security."

Source: Oxford Dictionary, yep, it's really in the Oxford Dictionary. It got added mid 2013

~nifty~ IoT Projects

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Smart Trash Can IoT System

Made by Amol Disale - Published in MediaTek Labs, SeeedStudio, and Ubidots

ABOUT THIS PROJECT

Making Garbage Collection System smart and cloud linked. Thus, helping in optimization of route for garbage collection; saving fuel.

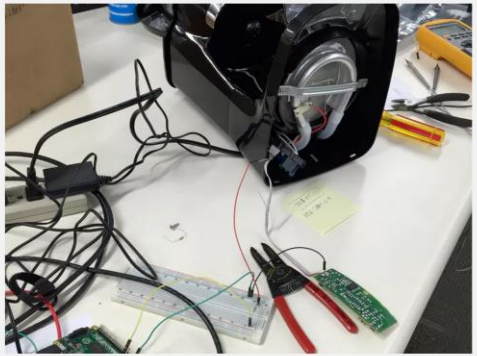
monitoring · internet of things · embedded

PROJECT INFO

Type	Full instructions provided
Difficulty	Intermediate
Estimated time	Over 1 day

Raspberry Coffee

Made by Team Windows IoT (Tre'Von McKay and Windows IoT) - Published in Microsoft and Raspberry Pi



ABOUT THIS PROJECT

What do you get when mix a Coffee M
Raspberry Pi, and Windows 10 IoT Core
voice enabled coffee maker

smart appliances · remote control

home automation

PROJECT INFO

Type	Work in progress
Difficulty	Intermediate
Published	January 23, 2016
License	CC BY-NC

11,914 · 32

Respect project · I made one

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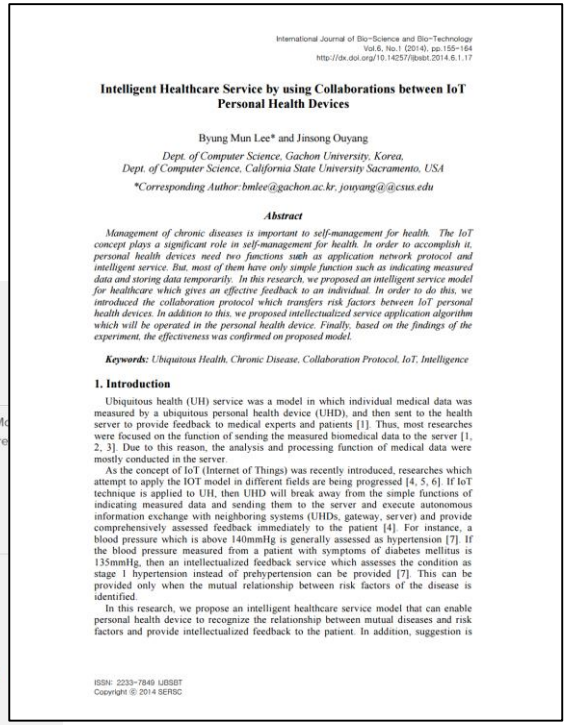

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http://dx.doi.org/10.14257/ijbsbt.2014.6.1.17

Intelligent Healthcare Service by using Collaborations between IoT Personal Health Devices

Byung Mun Lee* and Jinsong Ouyang

Dept. of Computer Science, Gachon University, Korea,
Dept. of Computer Science, California State University Sacramento, USA

**Corresponding Author: bmlee@gachon.ac.kr, jouyang@@csus.edu*

Abstract

Management of chronic diseases is important to self-management for health. The IoT concept plays a significant role in self-management for health. In order to accomplish it, personal health devices need two functions such as application network protocol and intelligent service. But, most of them have only simple function such as indicating measured data and storing data temporarily. In this research, we proposed an intelligent service model for healthcare which gives an effective feedback to an individual. In order to do this, we introduced the collaboration protocol which transfers risk factors between IoT personal health devices. In addition to this, we proposed intellectualized service application algorithm which will be operated in the personal health device. Finally, based on the findings of the experiment, the effectiveness was confirmed on proposed model.

Keywords: *Ubiquitous Health, Chronic Disease, Collaboration Protocol, IoT, Intelligence*

1. Introduction

Ubiquitous health (UH) service was a model in which individual medical data was measured by a ubiquitous personal health device (UHD), and then sent to the health server to provide feedback to medical experts and patients [1]. Thus, most researches were focused on the function of sending the measured biomedical data to the server [1, 2, 3]. Due to this reason, the analysis and processing function of medical data were mostly conducted in the server.

As the concept of IoT (Internet of Things) was recently introduced, researches which attempt to apply the IOT model in different fields are being progressed [4, 5, 6]. If IoT technique is applied to UH, then UHD will break away from the simple functions of indicating measured data and sending them to the server and execute autonomous information exchange with neighboring systems (UHDs, gateway, server) and provide comprehensively assessed feedback immediately to the patient [4]. For instance, a blood pressure which is above 140mmHg is generally assessed as hypertension [7]. If the blood pressure measured from a patient with symptoms of diabetes mellitus is 135mmHg, then an intellectualized feedback service which assesses the condition as stage 1 hypertension instead of prehypertension can be provided [7]. This can be provided only when the mutual relationship between risk factors of the disease is identified.

In this research, we propose an intelligent healthcare service model that can enable personal health device to recognize the relationship between mutual diseases and risk factors and provide intellectualized feedback to the patient. In addition, suggestion is

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What is IoT

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how do we build IoT projects

What is Hardware

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Hardware

Syllabification (hard•ware)

noun

The machines, wiring, and other physical components of a computer or other electronic system.

'select a software package that suits your requirements and buy the hardware to run it on'

Source: Oxford Dictionary, also the Oxford Dictionary

Boards, Modules, Shields

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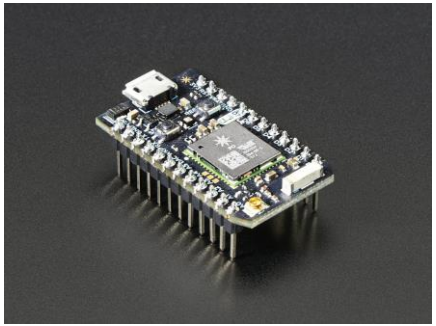
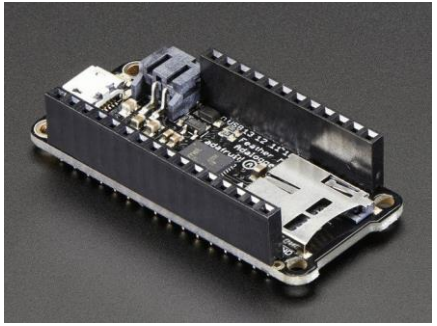
Microcontroller



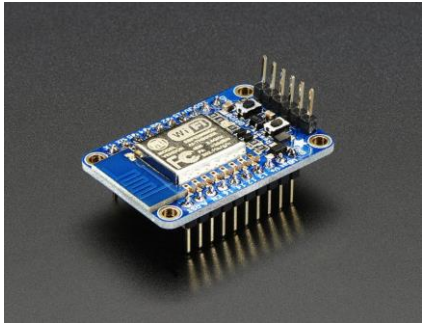
Particle
Photon

Microcontroller



Adafruit
Feather M0

Wi-Fi Module

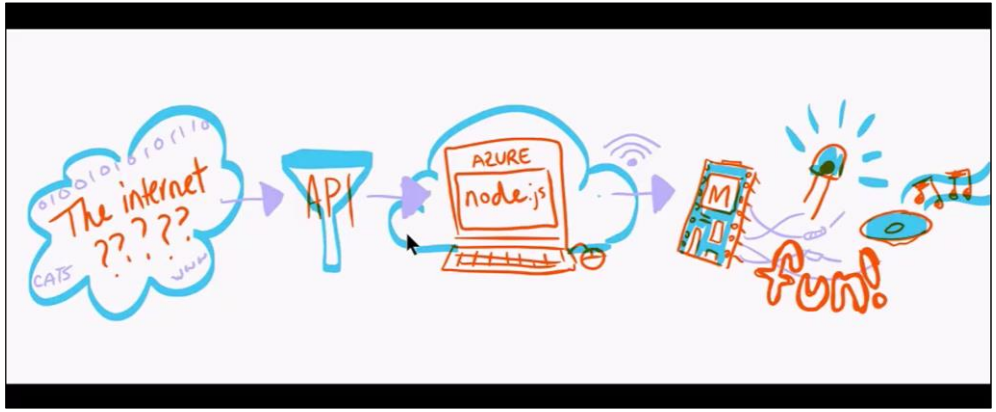


Espressif
ESP8266

Module or Shield

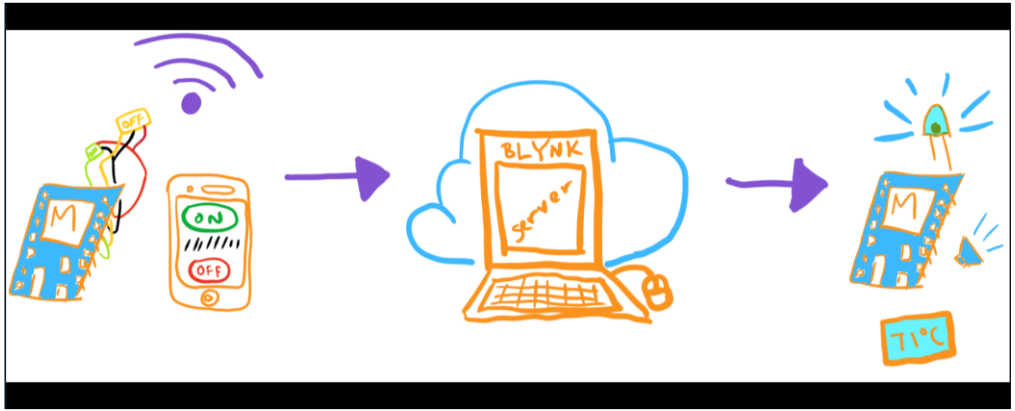
Adafruit
CC3000

The general idea

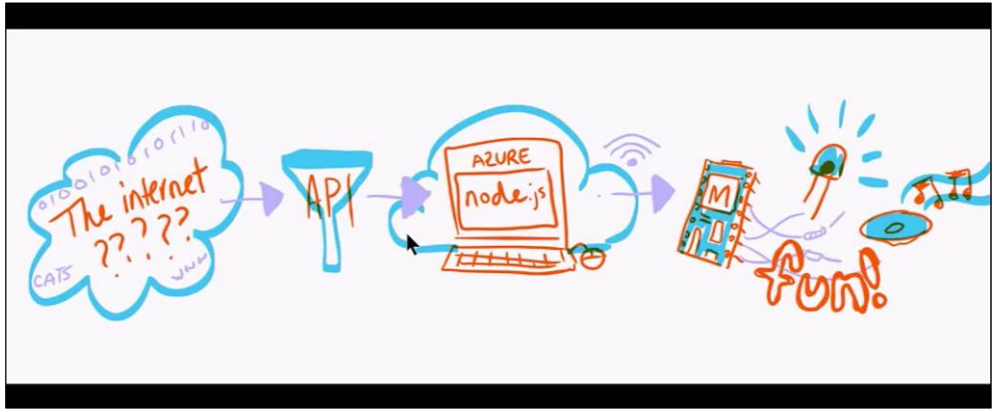


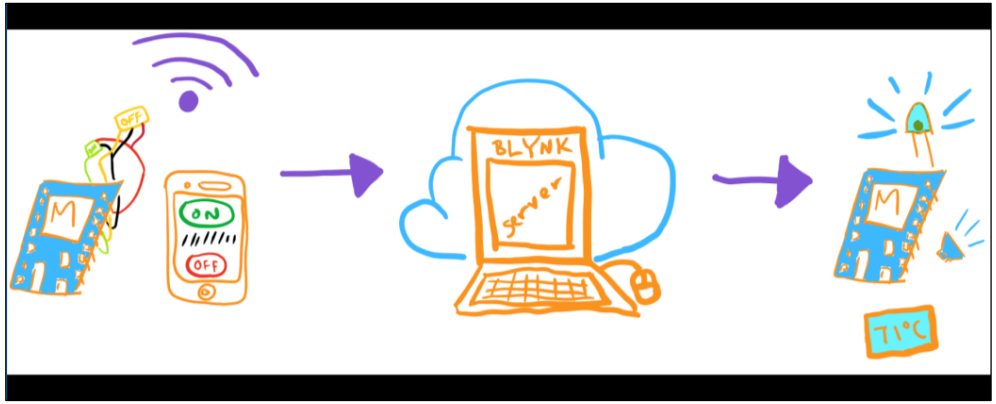
Passive Data Acquisition

Active Control



Breaking it down





Hardware
(code, microcontrollers)

Cloud server
(data processing, comms)

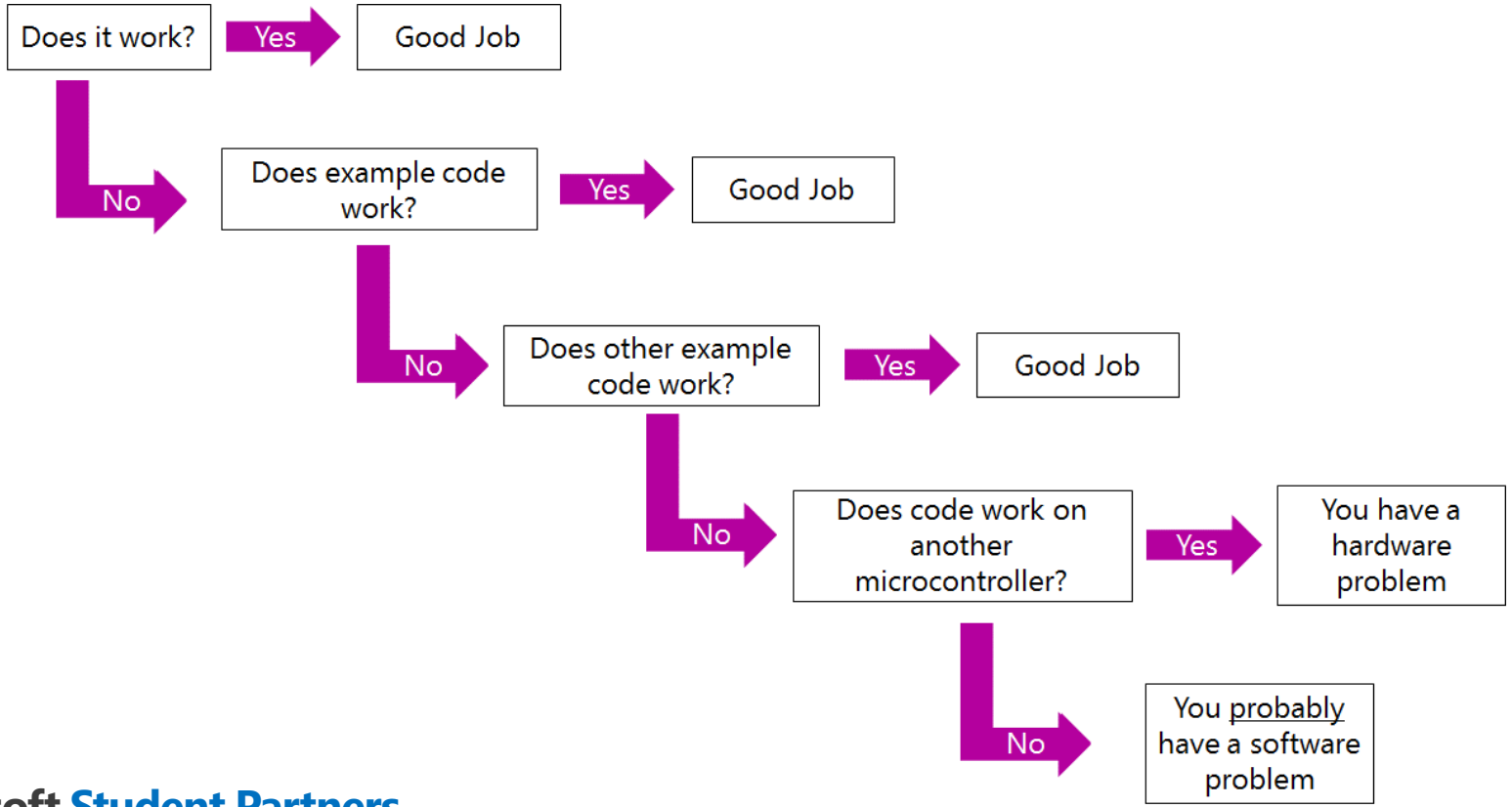
API
free [big] data

Hardware
(breadboard, components)

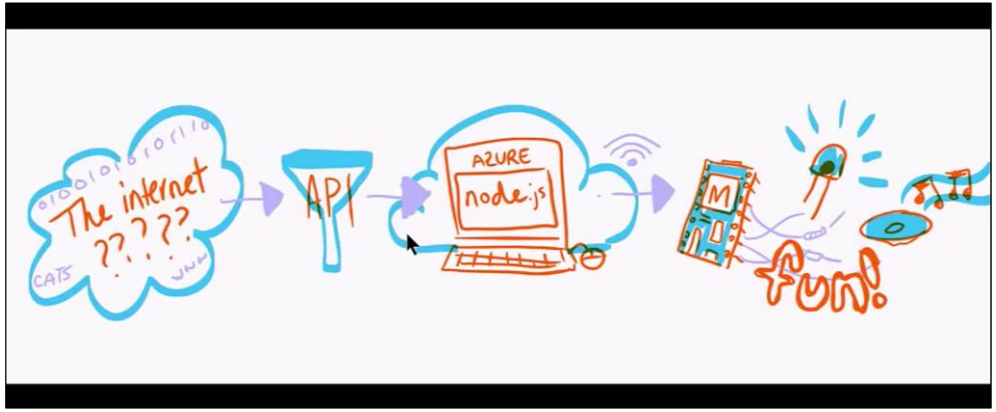
What are we doing?

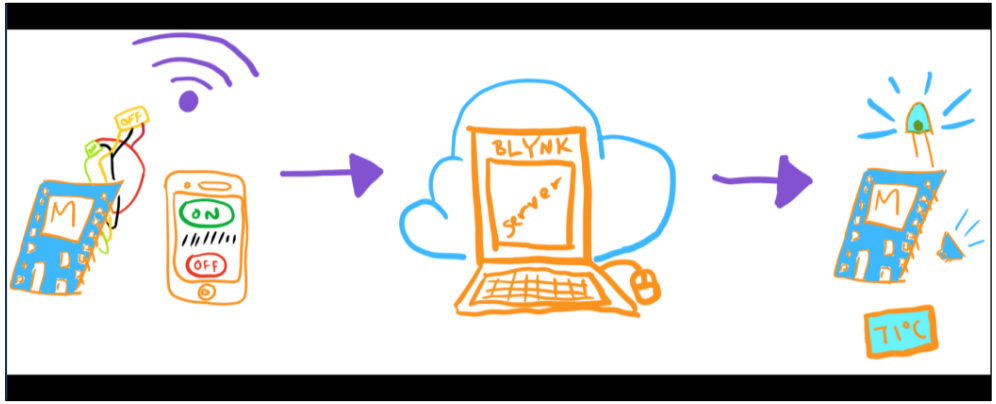
Using the Microsoft Azure IoT Starter kits to learn the basics of working with microcontrollers, inputs and outputs.

The Hierarchy of Debugging



Breaking it down





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What are we doing?

Using the Microsoft Azure IoT Starter kits to learn the basics of working with microcontrollers, inputs and outputs.

Tetris!!!

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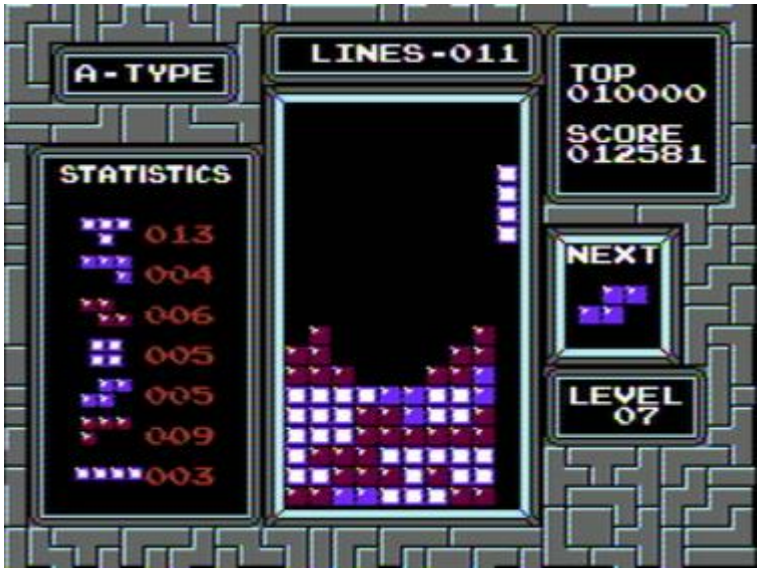
But actually?



Hardware

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What do I get out of this?

- Working with a new type of microcontroller
- Getting familiar with installing board support and new libraries
- Experiencing GitHub and exploring the internet for fun projects
- ***Play Tetris***

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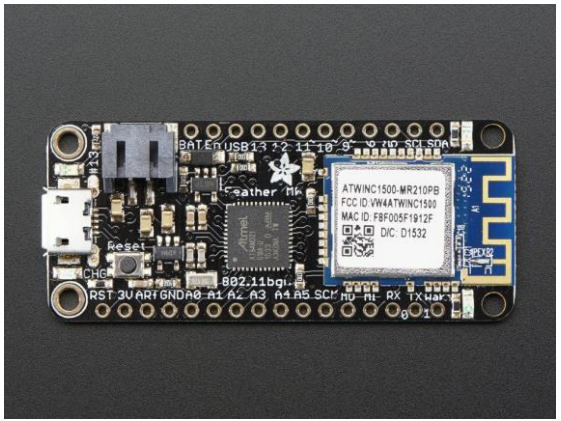
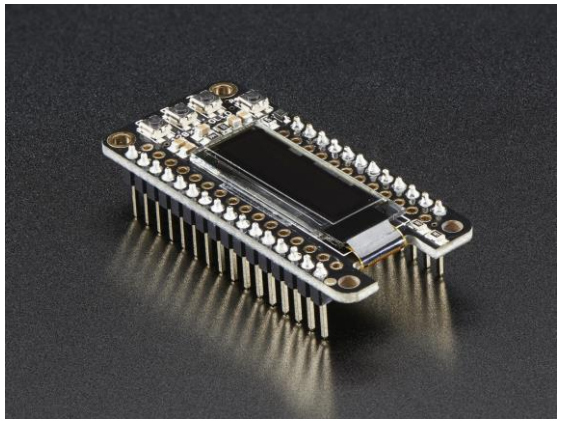
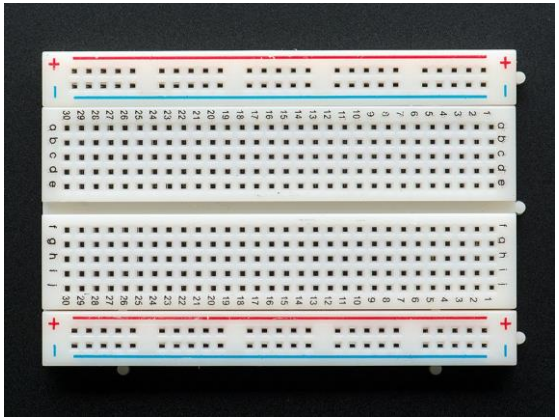
What we're using:



Adafruit Feather M0

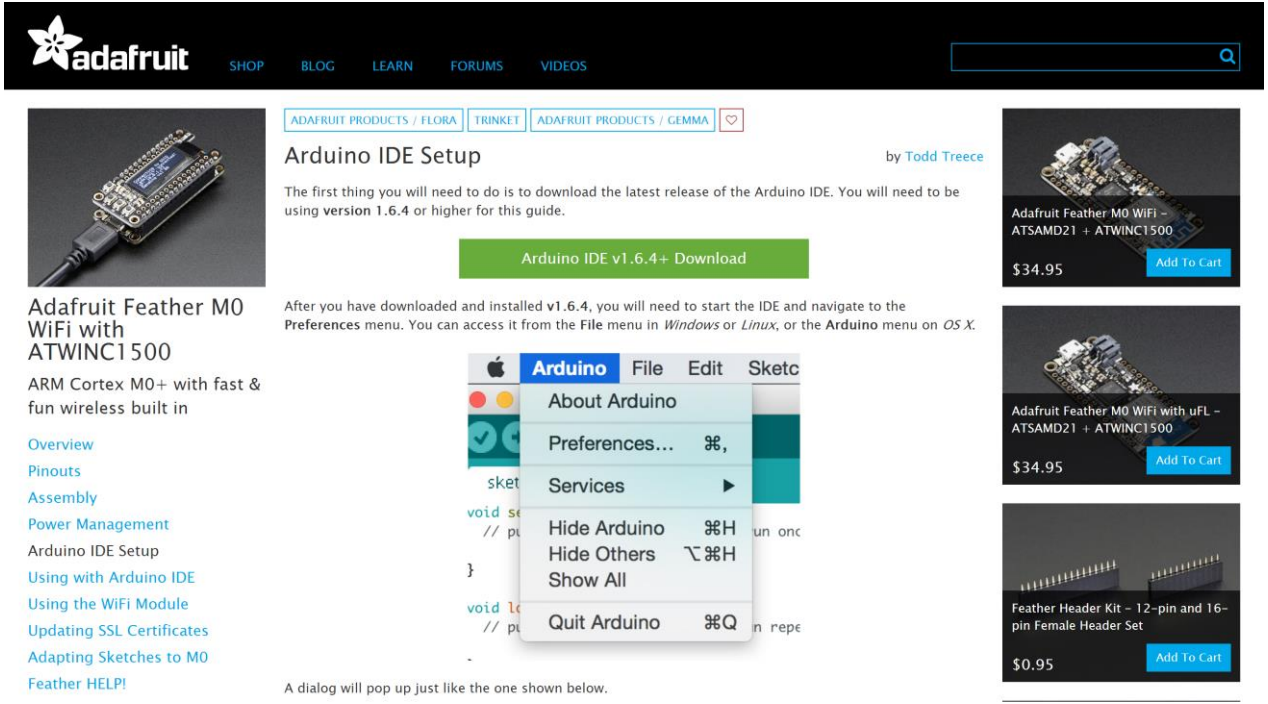


FeatherWing OLED



Breadboard

Getting started & set up



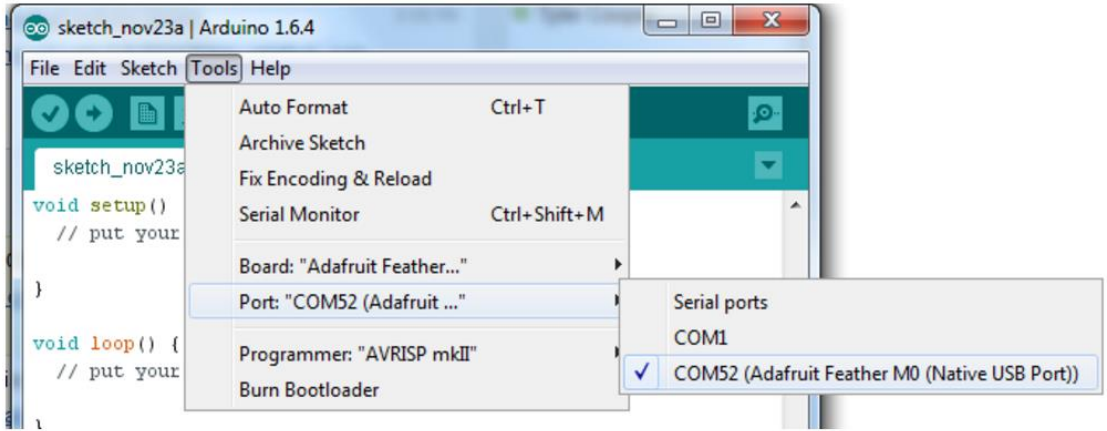
https://learn.adafruit.com/adafruit-feather-m0-wifi-atwinc1500/setup

Blink test part 1

Blink

Now you can upload your first blink sketch!

Plug in the Feather M0 and wait for it to be recognized by the OS (just takes a few seconds). It will create a serial/COM port, you can now select it from the dropdown, it'll even be 'indicated' as Feather M0!



Blink Test- Checking your hardware

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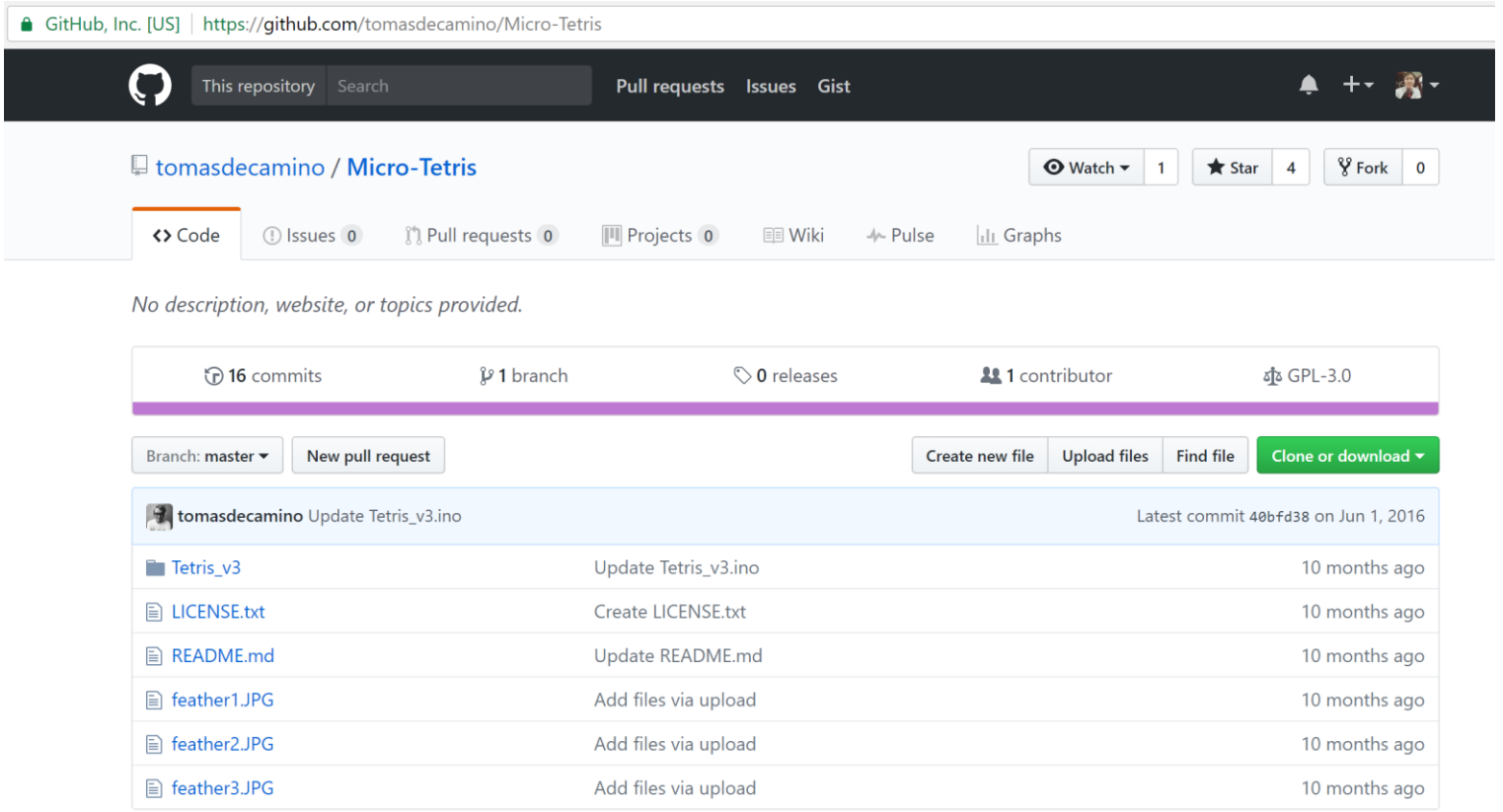
Copy Code

```
// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin 13 as an output.
  pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
  digitalWrite(13, HIGH);   // turn the LED on (HIGH is the voltage level)
  delay(1000);              // wait for a second
  digitalWrite(13, LOW);    // turn the LED off by making the voltage LOW
  delay(1000);              // wait for a second
}
```

And click upload! That's it, you will be able to see the LED blink rate change as you adapt the **delay()** calls.

GitHub: An open source playground

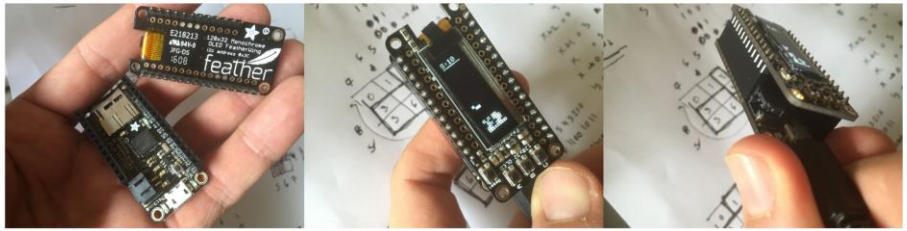


Downloading the required libraries

README.md

Micro-Tetris

Juego de Tetris para la placa Adafruit Feather M0 y la pantalla Adarfruit FeatherWing OLED. No es estrictamente teris sino toma la idea de allí.



Hay mucho espacio para mejorara el código (work in progress). Fue creado con propósitos didácticos como parte de los materiales de la Fundación Costa Rica para la Innovación

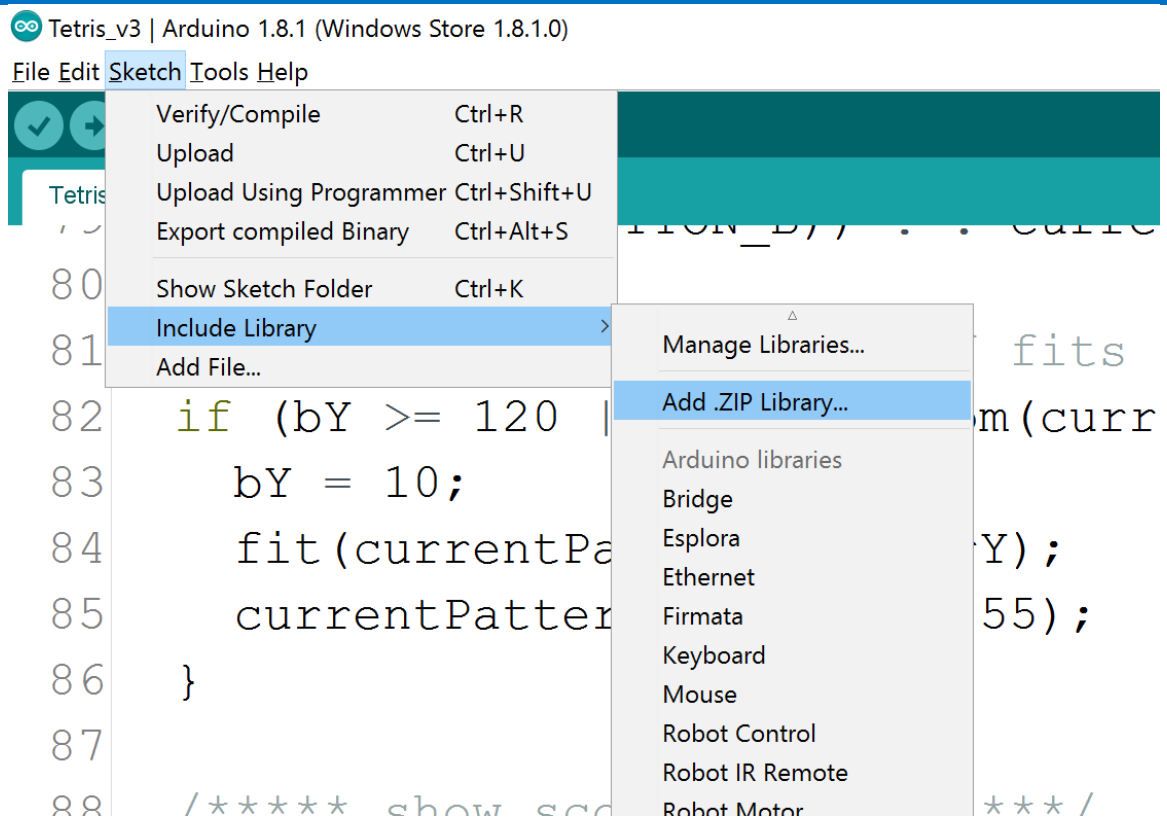
En Costa Rica los componentes los puede encontrar en CrCibernetica.com

##Librerias adicionales

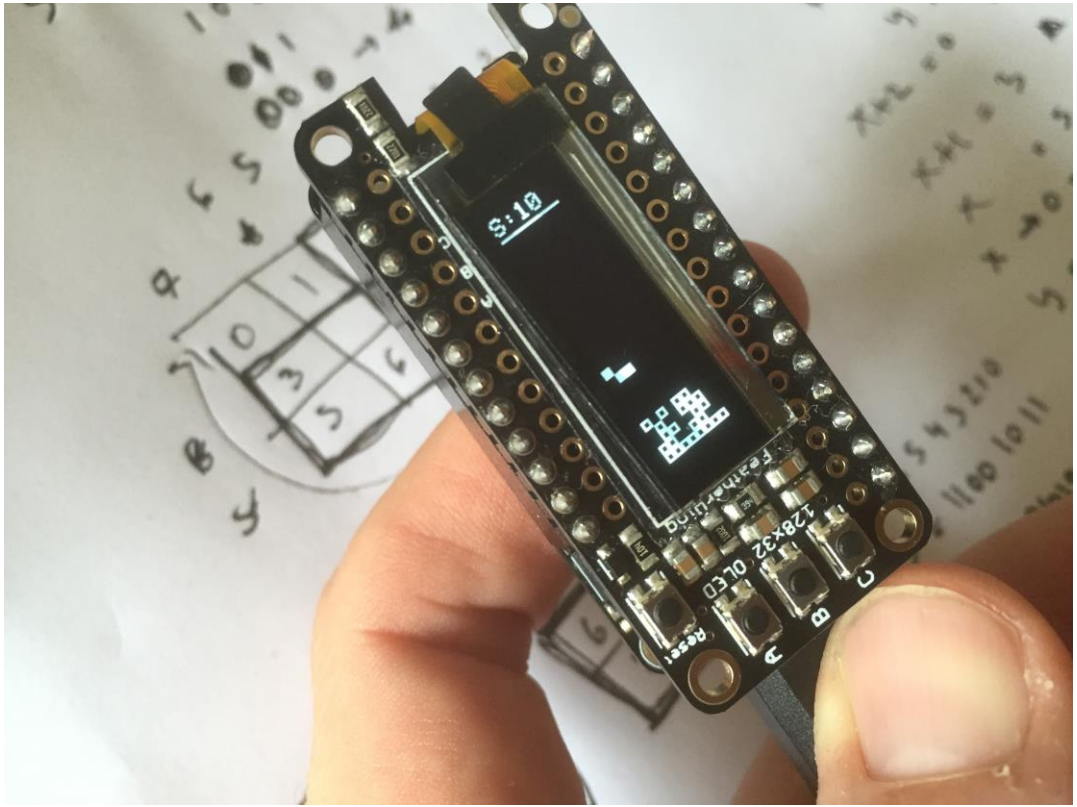
Requiere de las siguientes librerias de Adafruit:

- Adafruit SSD1306
- Adafruit GFX

Including libraries in IDE



Implementing



More IoT Resources Here

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IFTTT

adafruit.io

Empowering People To Build An Internet of Things They Trust

Windows 10 IoT

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Shout outs and shameless plugs

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