Internet of Things 101

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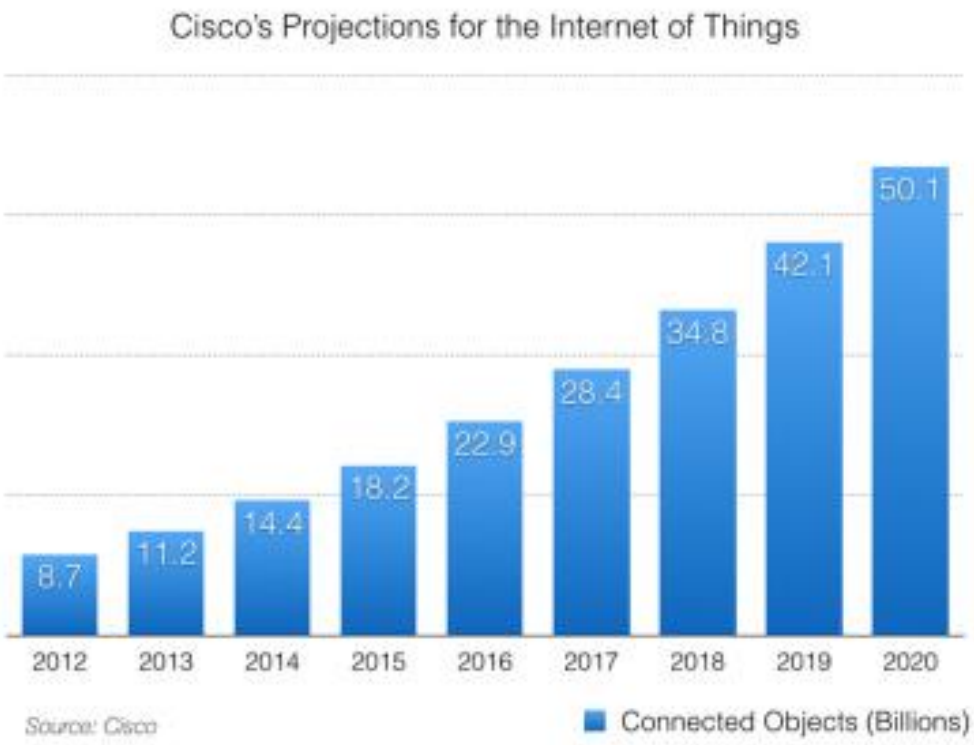
Overview

- What is IoT
- Why IoT
- Requirements
- Sample code
- Problems with IoT

Internet of Things

- "The interconnection via the Internet of computing devices embedded in everyday objects, enabling them to send and receive data."
- Everything is connected
- Fridge senses what is inside it
- Alarm clock checks train schedule

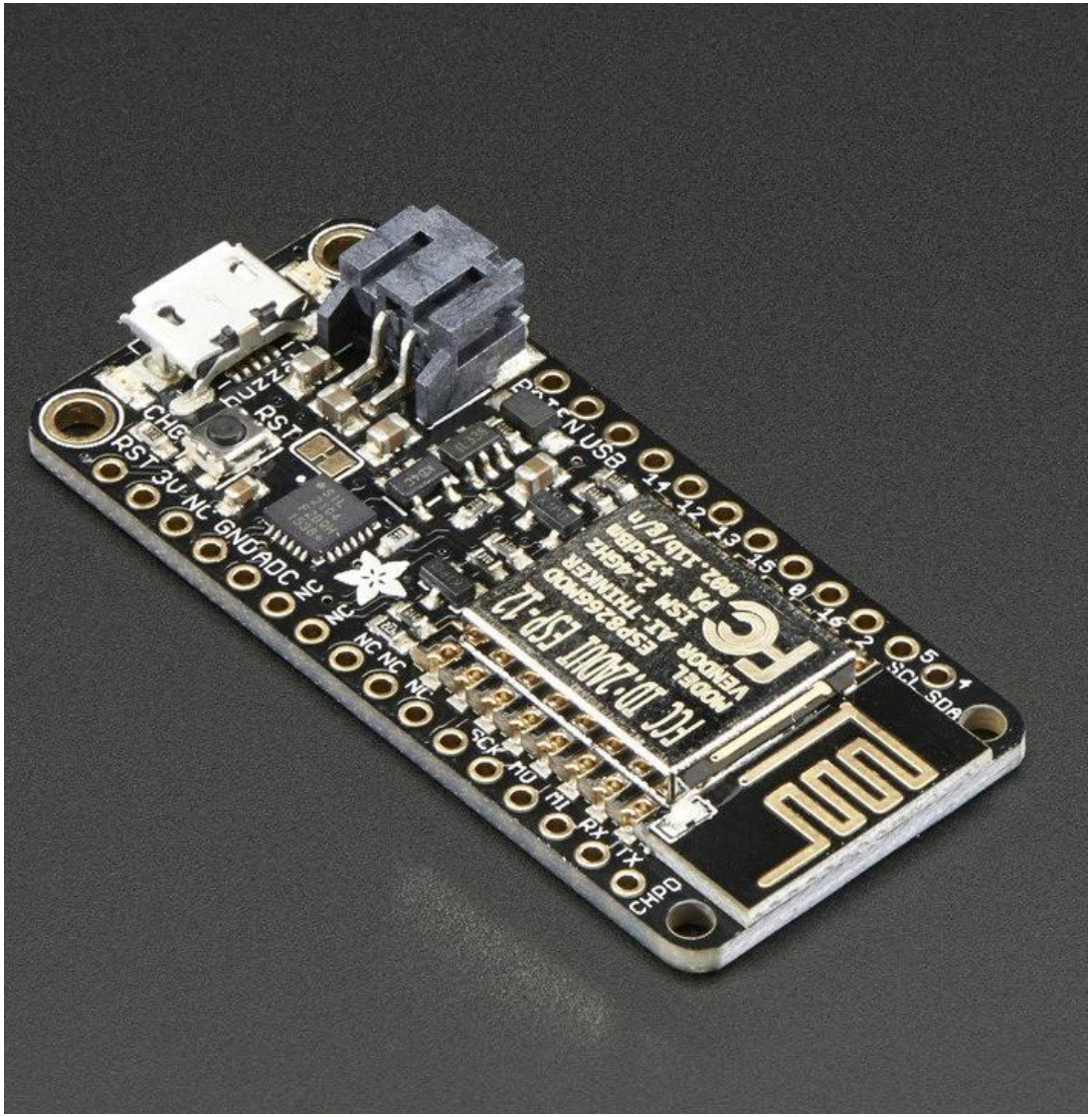


Why now

- Cheap, ubiquitous connection modules
- The world is more connected every day

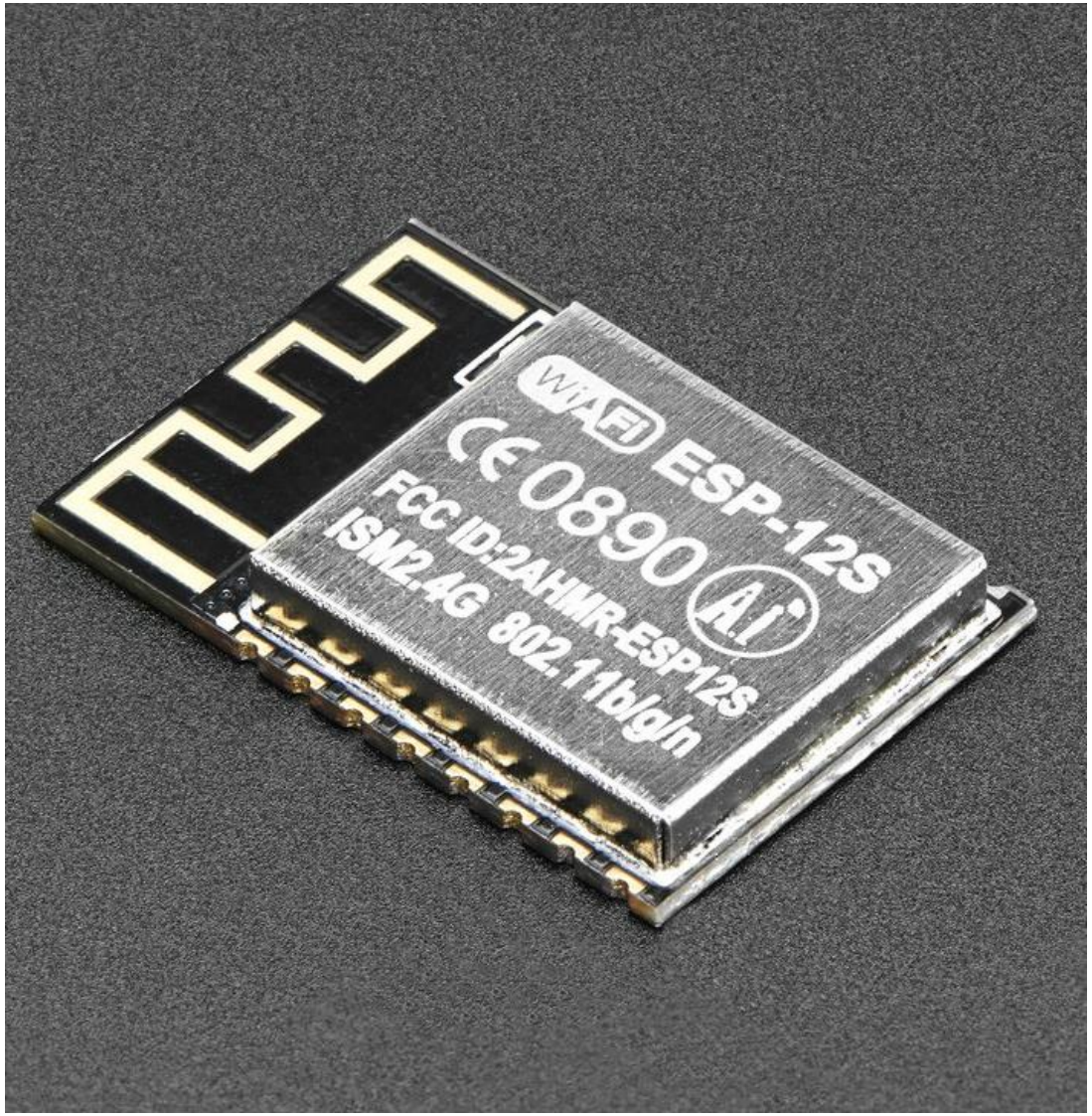
Why you

- Good to know what is possible
- You know what your field needs



Requirements

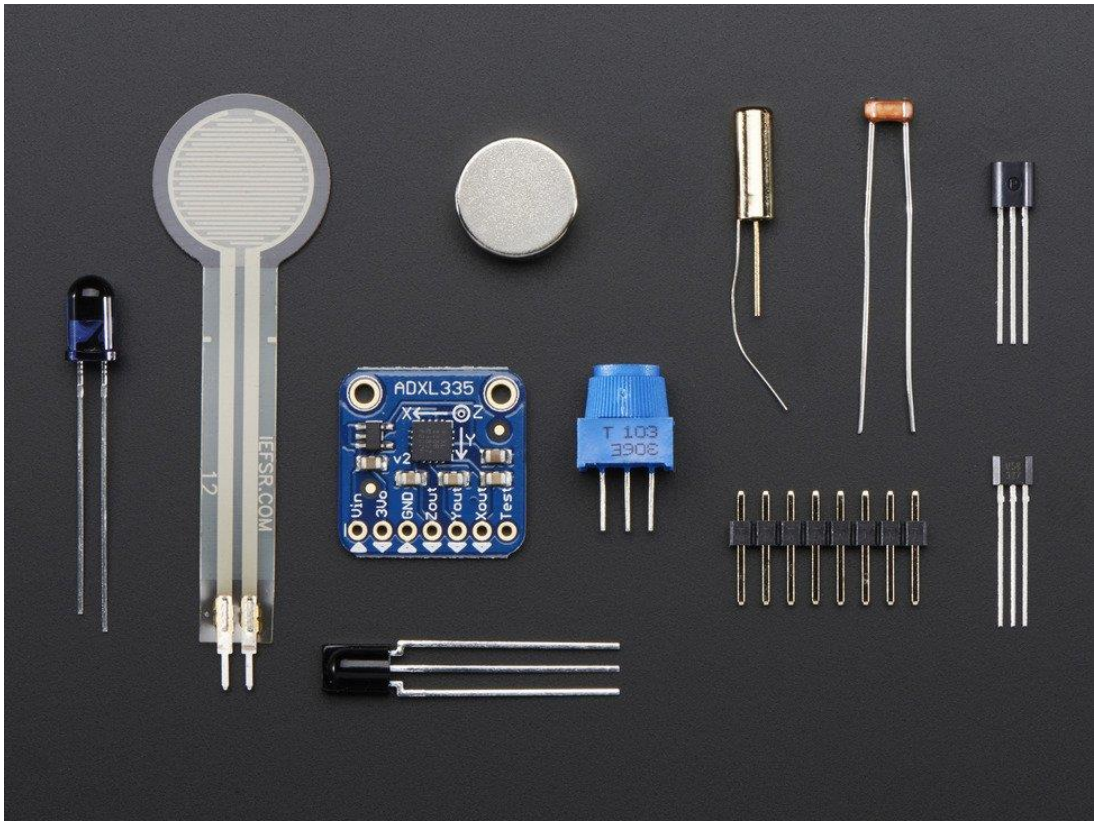
- Development Board with connectivity



Note

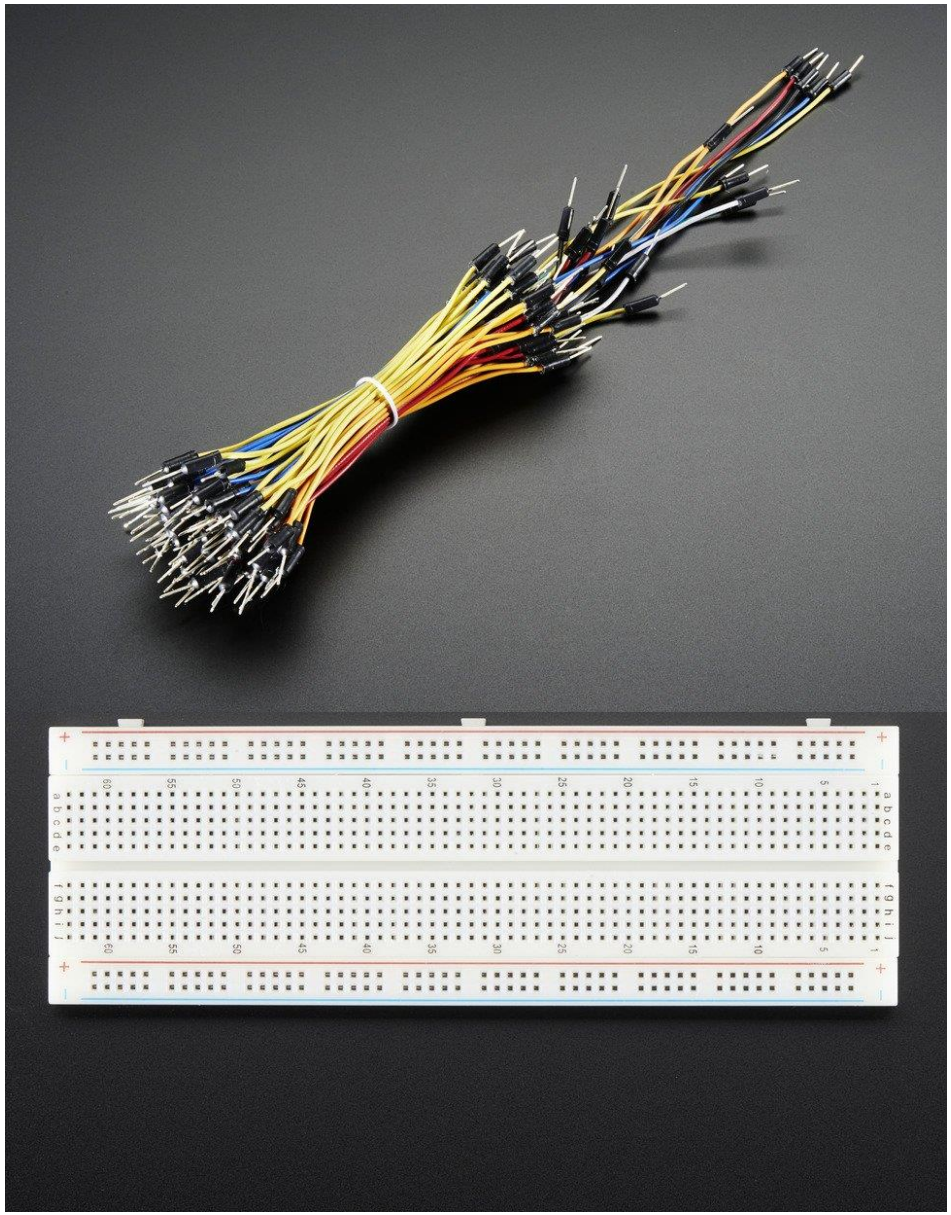
Modules are cheaper,

but very hard to use



Requirements

- Development Board with connectivity
- Sensors, Motors



Requirements

- Development Board with connectivity
- Sensors, Motors
- Wires and a breadboard

Requirements

- Development Board with connectivity
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- PC

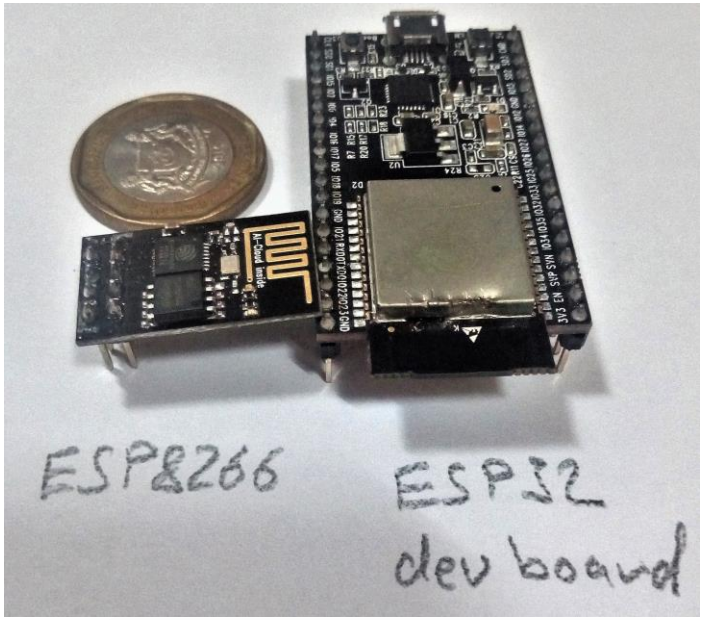
Requirements

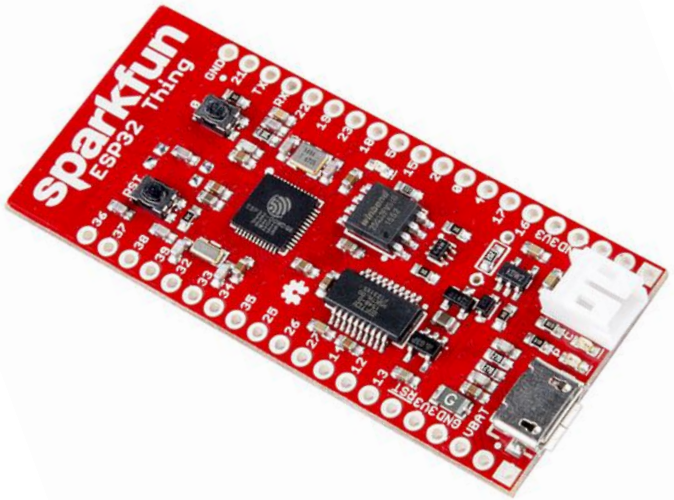
- Development Board with connectivity
- Sensors, Motors
- Wires and a breadboard
- PC
- Soldering Iron

Connectivity

- What are the requirements?

- Wireless
  - WiFi
  - BlueTooth
  - Zigbee
- Wired
  - Ethernet





ESP32 and ESP8266

- Wifi (ESP32 also bluetooth)
- Processor onboard
- Cheap
- Lots of IO for connecting peripherals
- Programmable with arduino

Software setup

- Go to github of ESP32 or ESP8266 Arduino core
- Follow steps

Toggling LEDs

```
const char* ssid     = "yourssid";
const char* password = "yourpasswd";

pinMode(LEDPin, OUTPUT); // set the LED pin mode

WiFi.begin(ssid, password);
while (WiFi.status() != WL_CONNECTED) {
  delay(500);       Serial.print(".");}
server.begin();
```

Continued

```
 WiFiClient client = server.available(); // listen for
incoming clients


client.print("Click <a href="/H">here</a> turn the LED on
pin 5 on<br>");

client.print("Click <a href=\"/L\">here</a> turn the LED on
pin 5 off<br>");


        // GET /H turns the LED on

if (currentLine.endsWith("GET /H")) digitalWrite(LEDPin, HIGH);

        // GET /L turns the LED off

if (currentLine.endsWith("GET /L")) digitalWrite(LEDPin, LOW);
```

Existing platforms

- Blynk
- Nodemcu
- Many others

ESP8266 Mbed IoT Web Controller

Hit count: 2
Last hit (based on mbed RTC time): 12:34:46 Wed 26 Aug 15

Analog 1: 0.944 V
Analog 2: 0.832 V

- flip LED1
- flip LED2
- flip LED3
- flip LED4

send-refresh

How to use:

- Select a checkbox to flip on/off
- Click Send-Refresh to send data and refresh values

Problems

- Fridge won’t let you in
- Temperature profile to find when you’re in
- Control your heartbeat with your pacemaker

Summary

- Overview of IoT
- Why IoT
- Requirements to start an IoT project
- Sample code
- Problems with IoT

Questions?

Manufacturer: https://espressif.com/

Projects: Instructables, hackaday etc.

Arduino setup: ESP32 or ESP8266 Arduino Core

Buy at: Aliexpress, Ebay, Sparkfun, etc.

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Thank you for your attention