Best Practice for Open Training Materials

Source on GDocs

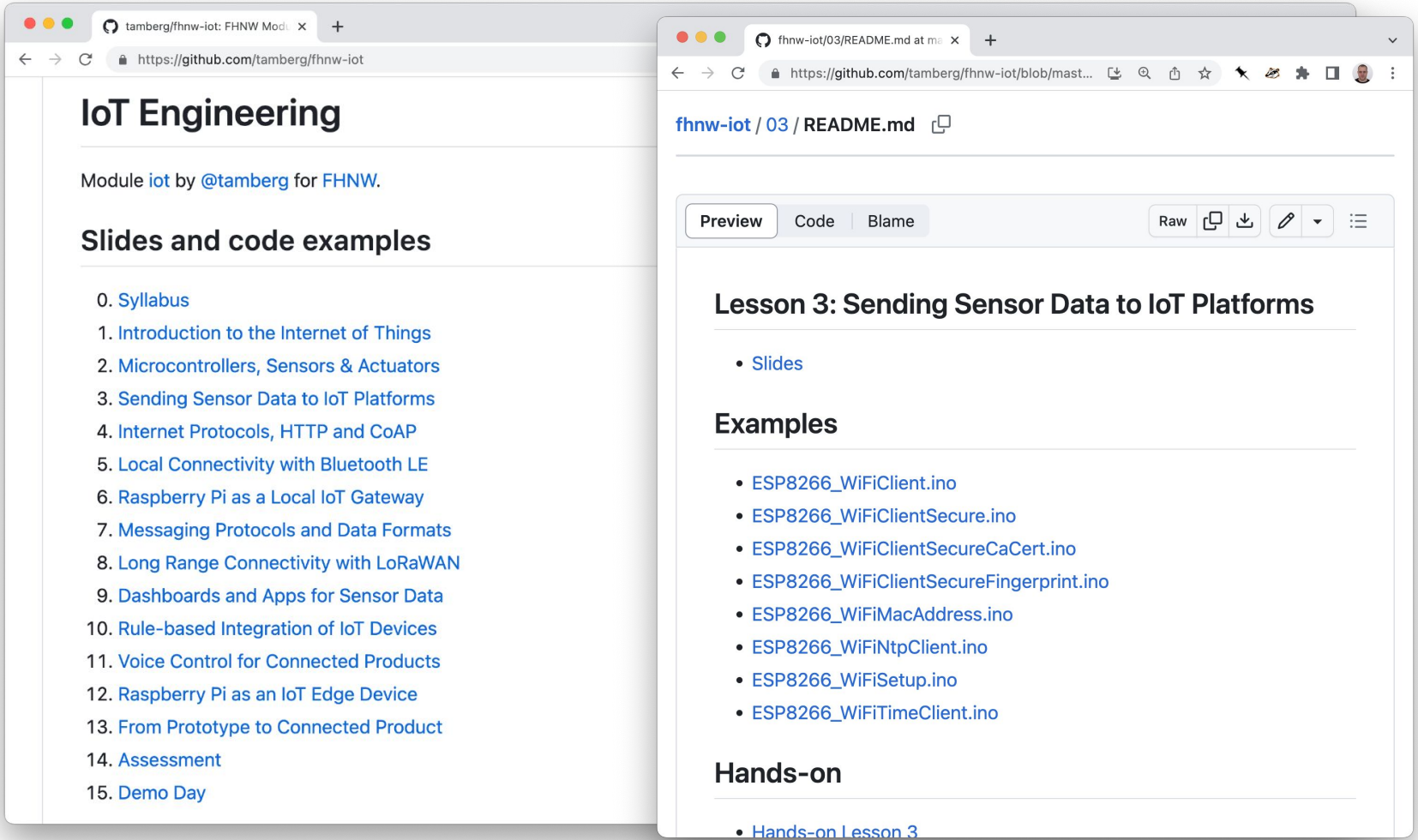
Keep it simple

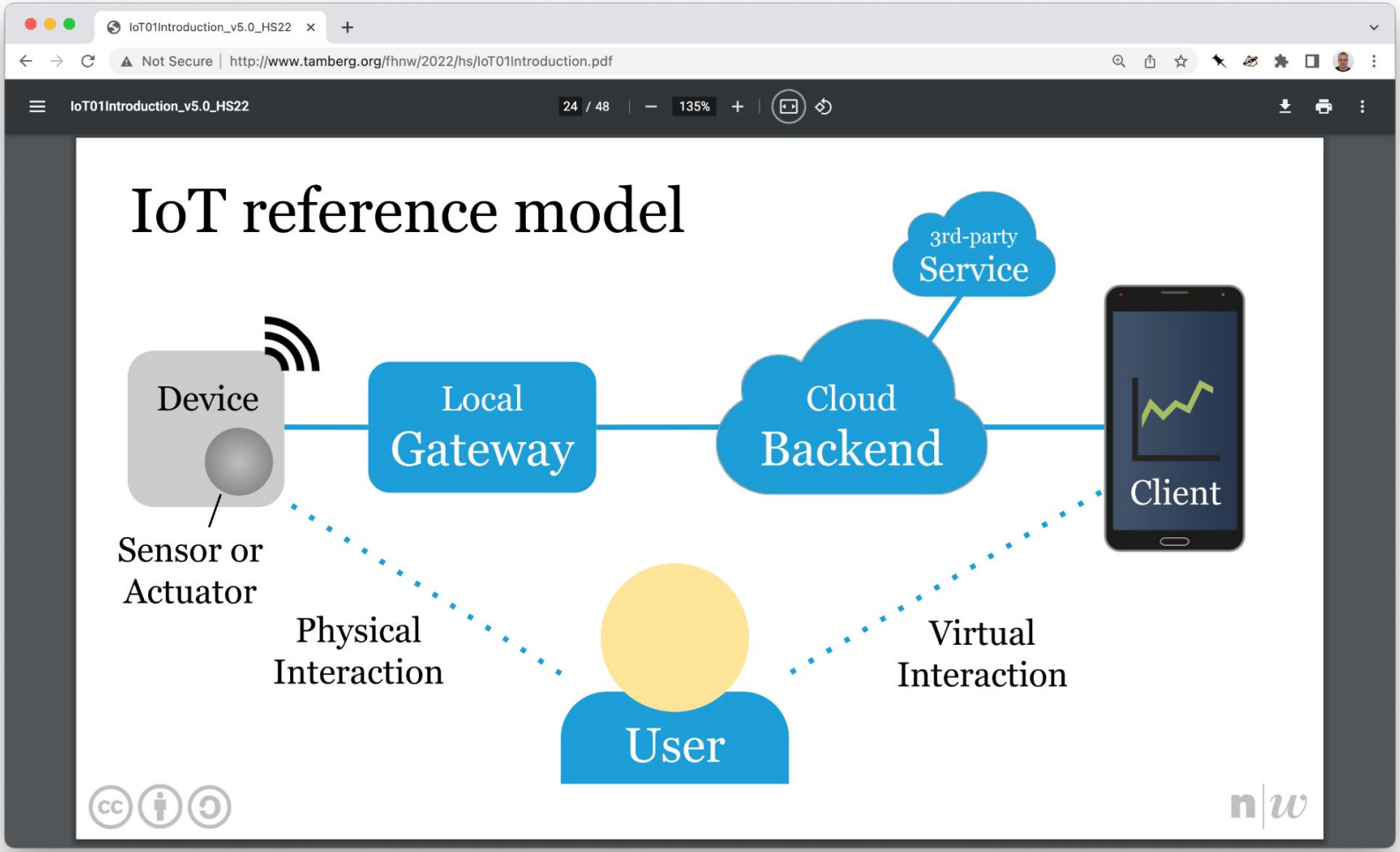
Github repo as a single point of entry.

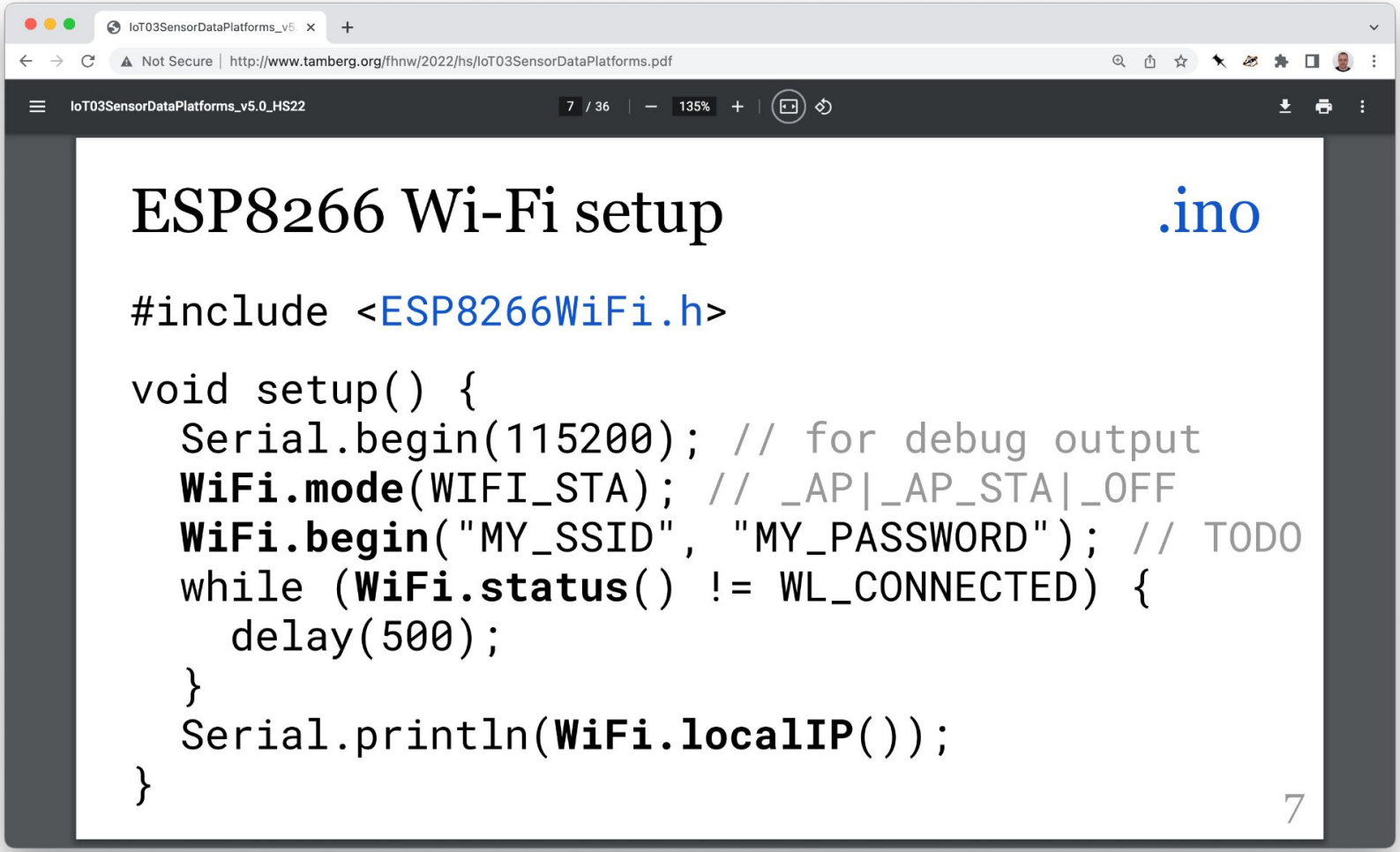
Slides per topic / lesson, links into repo.

Provide short, focused, working examples.

Simple to get started, possible to learn more.


tamberg/fhnw-iot: FHNW Mod
https://github.com/tamberg/fhnw-iot
IoT Engineering
Module iot by @tamberg for FHNW.
Slides and code examples
0. Syllabus
1. Introduction to the Internet of Things
2. Microcontrollers, Sensors & Actuators
3. Sending Sensor Data to IoT Platforms
4. Internet Protocols, HTTP and CoAP
5. Local Connectivity with Bluetooth LE
6. Raspberry Pi as a Local IoT Gateway
7. Messaging Protocols and Data Formats
8. Long Range Connectivity with LoRaWAN
9. Dashboards and Apps for Sensor Data
10. Rule-based Integration of IoT Devices
11. Voice Control for Connected Products
12. Raspberry Pi as an IoT Edge Device
13. From Prototype to Connected Product
14. Assessment
15. Demo Day
fhnw-iot/03/README.md at ma
https://github.com/tamberg/fhnw-iot/blob/mast...
fhnw-iot / 03 / README.md
Preview
Code
Blame
Raw
Lesson 3: Sending Sensor Data to IoT Platforms
Slides
Examples
ESP8266_WiFiClient.ino
ESP8266_WiFiClientSecure.ino
ESP8266_WiFiClientSecureCaCert.ino
ESP8266_WiFiClientSecureFingerprint.ino
ESP8266_WiFiMacAddress.ino
ESP8266_WiFiNtpClient.ino
ESP8266_WiFiSetup.ino
ESP8266_WiFiTimeClient.ino
Hands-on
Hands-on Lesson 3


IoT01Introduction_v5.0_HS22
Not Secure | http://www.tamberg.org/fhnw/2022/hs/IoT01Introduction.pdf
IoT01Introduction_v5.0_HS22
24 / 48
135%
IoT reference model
3rd-party
Service
Device
Local
Gateway
Cloud
Backend
Client
Sensor or
Actuator
Physical
Interaction
Virtual
Interaction
User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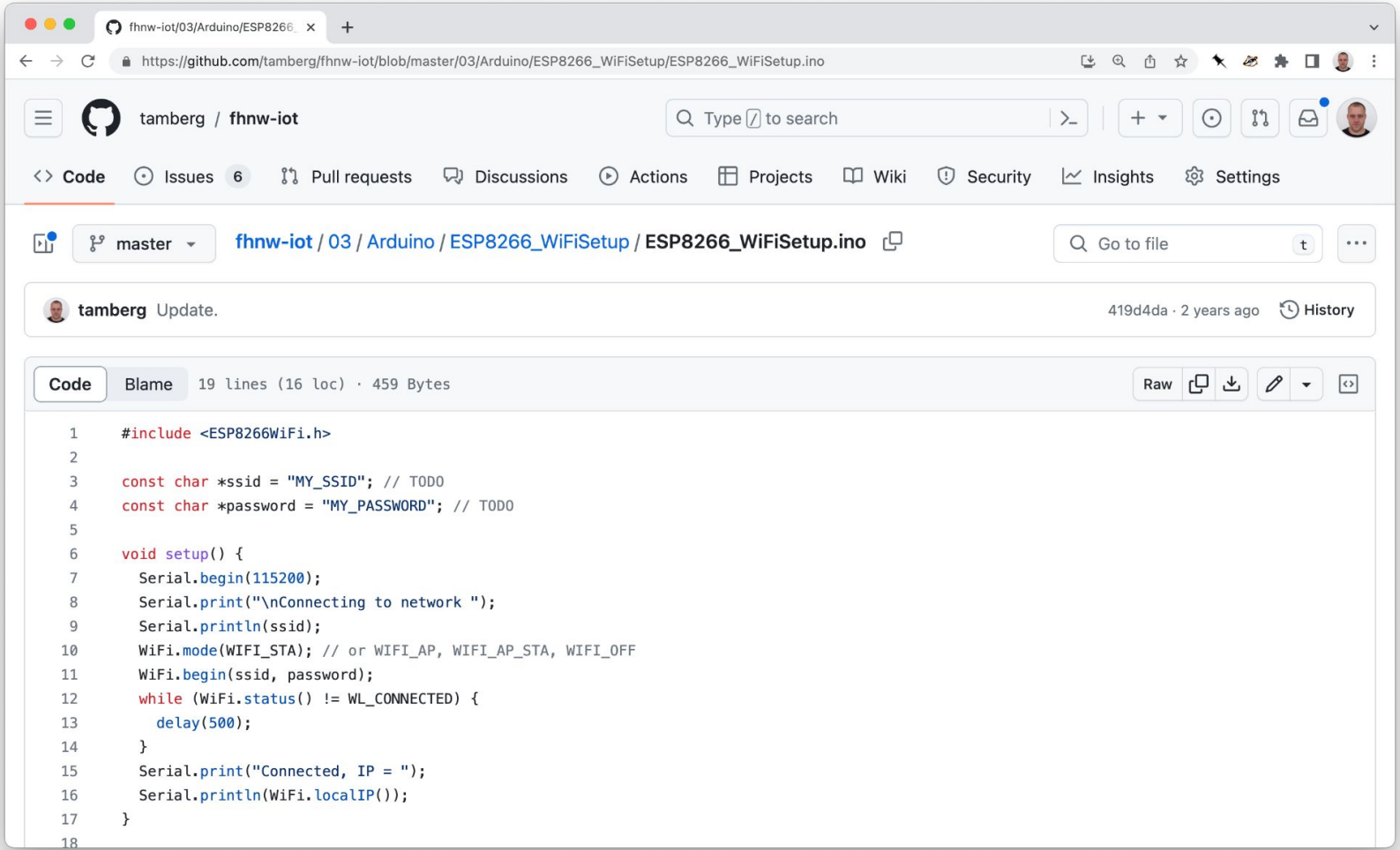
IoT03SensorDataPlatforms_v5.0_HS22
7 / 36
135%
ESP8266 Wi-Fi setup
.ino
#include <ESP8266WiFi.h>
void setup() {
Serial.begin(115200); // for debug output
WiFi.mode(WIFI_STA); // _AP|_AP_STA|_OFF
WiFi.begin("MY_SSID", "MY_PASSWORD"); // TODO
while (WiFi.status() != WL_CONNECTED) {
delay(500);
}
Serial.println(WiFi.localIP());
}
7


fhnw-iot/03/Arduino/ESP8266_WiFiSetup/ESP8266_WiFiSetup.ino
https://github.com/tamberg/fhnw-iot/blob/master/03/Arduino/ESP8266_WiFiSetup/ESP8266_WiFiSetup.ino
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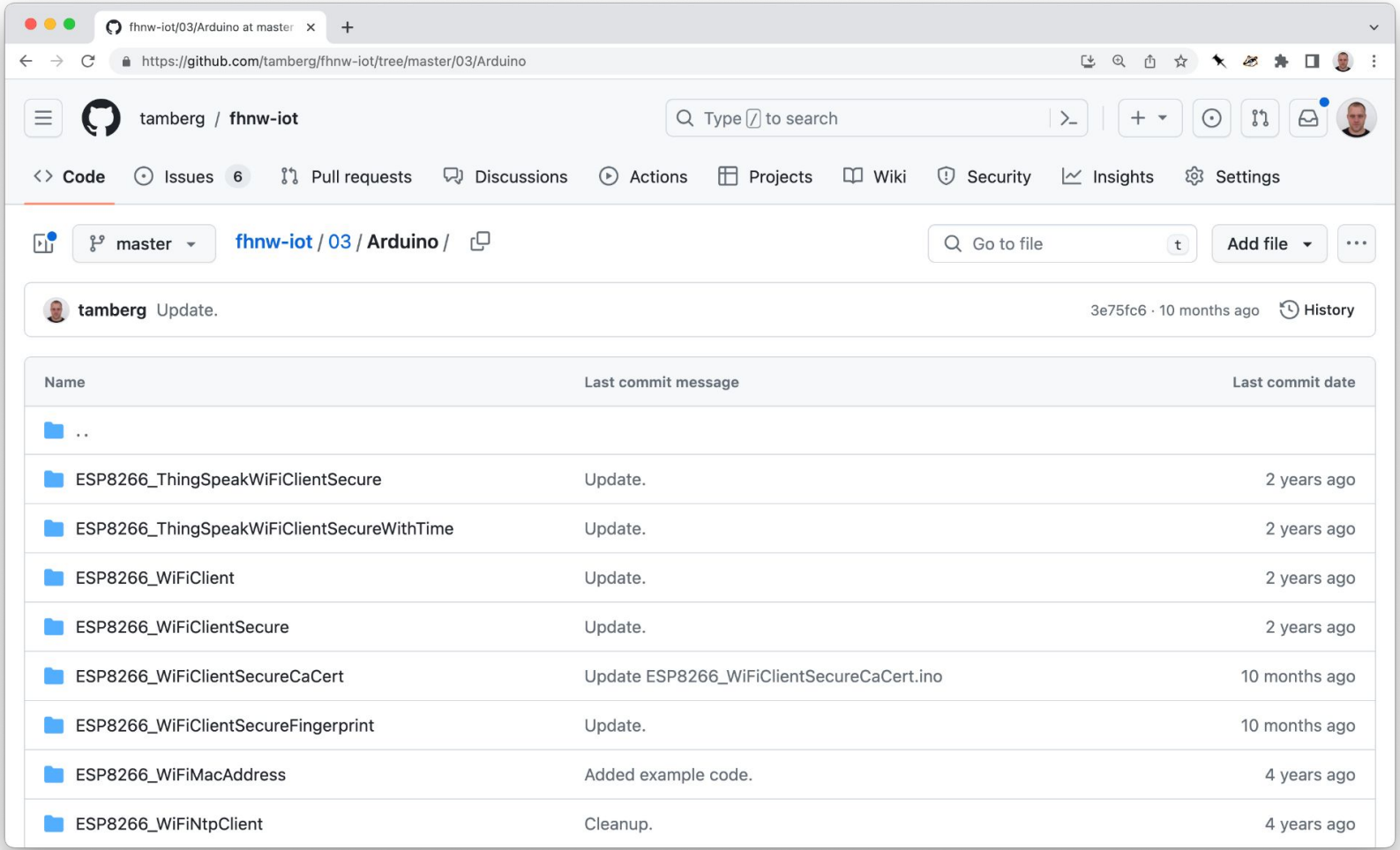
Go to file t
tamberg Update.
419d4da · 2 years ago
History
Code
Blame
19 lines (16 loc) · 459 Bytes
Raw
#include <ESP8266WiFi.h>
const char *ssid = "MY_SSID"; // TODO
const char *password = "MY_PASSWORD"; // TODO
void setup() {
Serial.begin(115200);
Serial.print("\nConnecting to network ");
Serial.println(ssid);
WiFi.mode(WIFI_STA); // or WIFI_AP, WIFI_AP_STA, WIFI_OFF
WiFi.begin(ssid, password);
while (WiFi.status() != WL_CONNECTED) {
delay(500);
}
Serial.print("Connected, IP = ");
Serial.println(WiFi.localIP());
}


fhnw-iot/03/Arduino at master
https://github.com/tamberg/fhnw-iot/tree/master/03/Arduino
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Code
Issues 6
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Add file
tamberg Update.
3e75fc6 · 10 months ago
History
Name
Last commit message
Last commit date
..
ESP8266_ThingSpeakWiFiClientSecure
Update.
2 years ago
ESP8266_ThingSpeakWiFiClientSecureWithTime
Update.
2 years ago
ESP8266_WiFiClient
Update.
2 years ago
ESP8266_WiFiClientSecure
Update.
2 years ago
ESP8266_WiFiClientSecureCaCert
Update ESP8266_WiFiClientSecureCaCert.ino
10 months ago
ESP8266_WiFiClientSecureFingerprint
Update.
10 months ago
ESP8266_WiFiMacAddress
Added example code.
4 years ago
ESP8266_WiFiNtpClient
Cleanup.
4 years ago

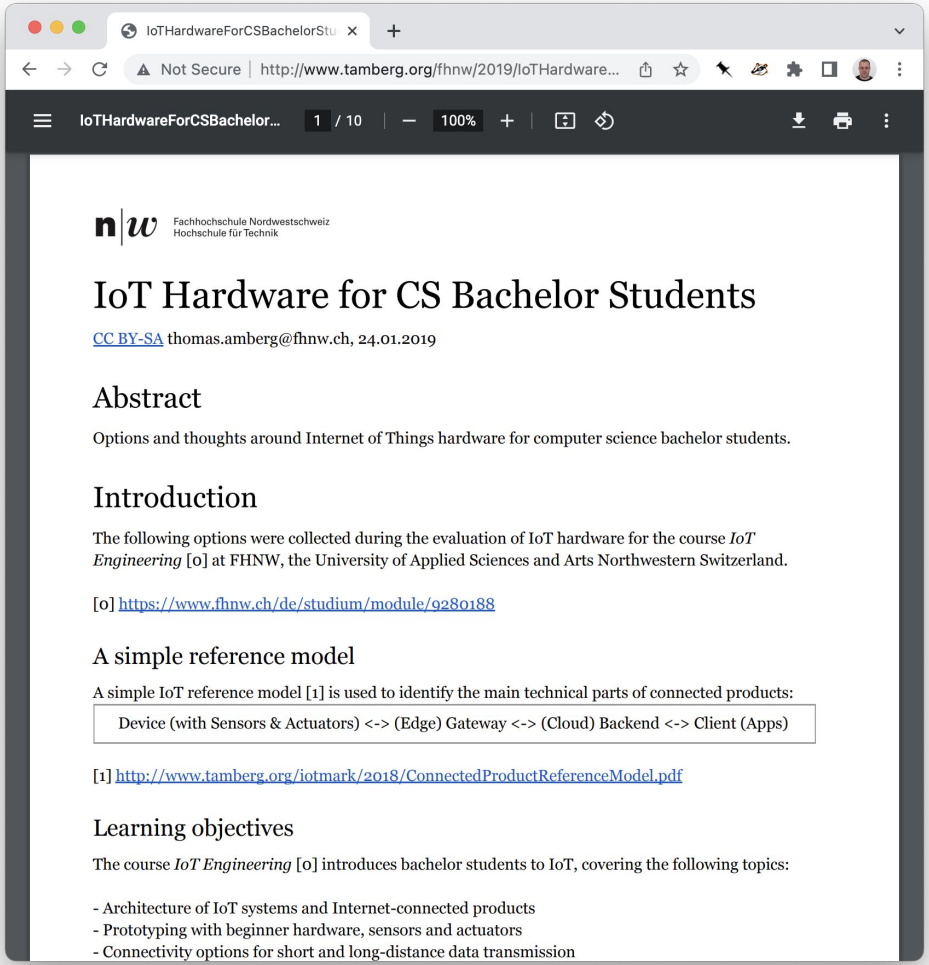
Provide support

Hardware kit with MCU, basic sensors, actuators.

Curated Github Wiki for details and troubleshooting.

Github issues to report bugs, typos, specific fixes, etc.

Github Classroom for individual, private copies of a repo.



Fachhochschule Nordwestschweiz
Hochschule für Technik

IoT Hardware for CS Bachelor Students

 thomas.amberg@fhnw.ch, 24.01.2019

Abstract

Options and thoughts around Internet of Things hardware for computer science bachelor students.

Introduction

The following options were collected during the evaluation of IoT hardware for the course *IoT Engineering* [0] at FHNW, the University of Applied Sciences and Arts Northwestern Switzerland.

[0] https://www.fhnw.ch/de/studium/module/9280188

A simple reference model

A simple IoT reference model [1] is used to identify the main technical parts of connected products:

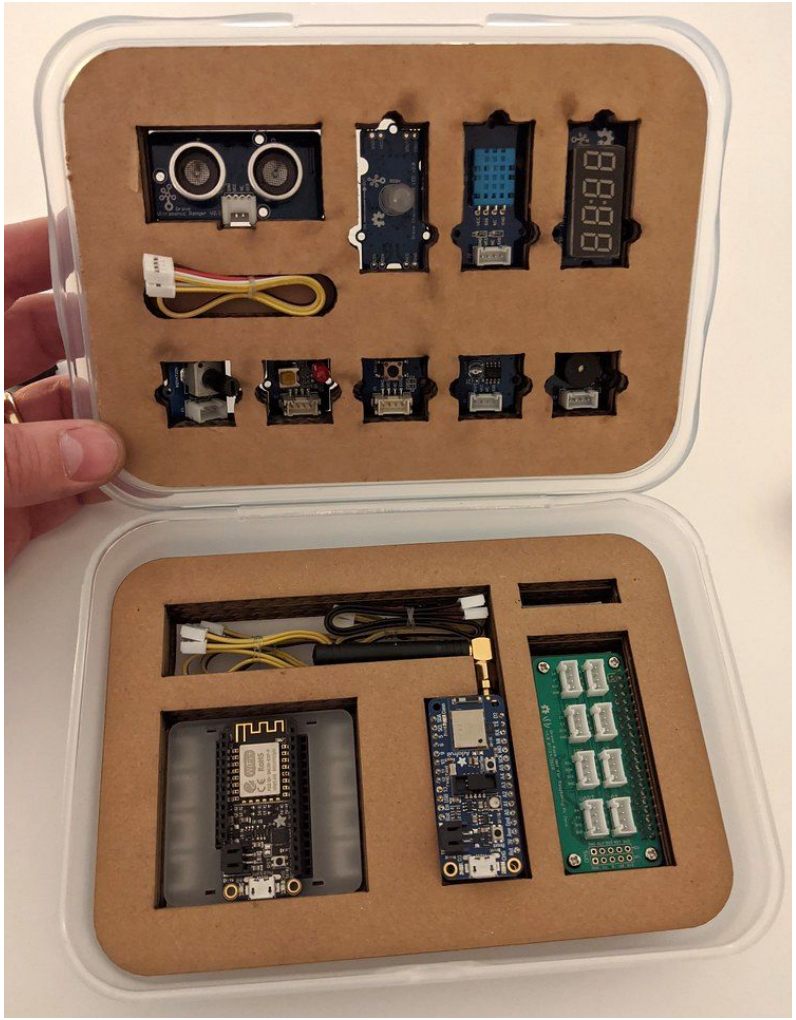
> Device (with Sensors & Actuators) <-> (Edge) Gateway <-> (Cloud) Backend <-> Client (Apps)

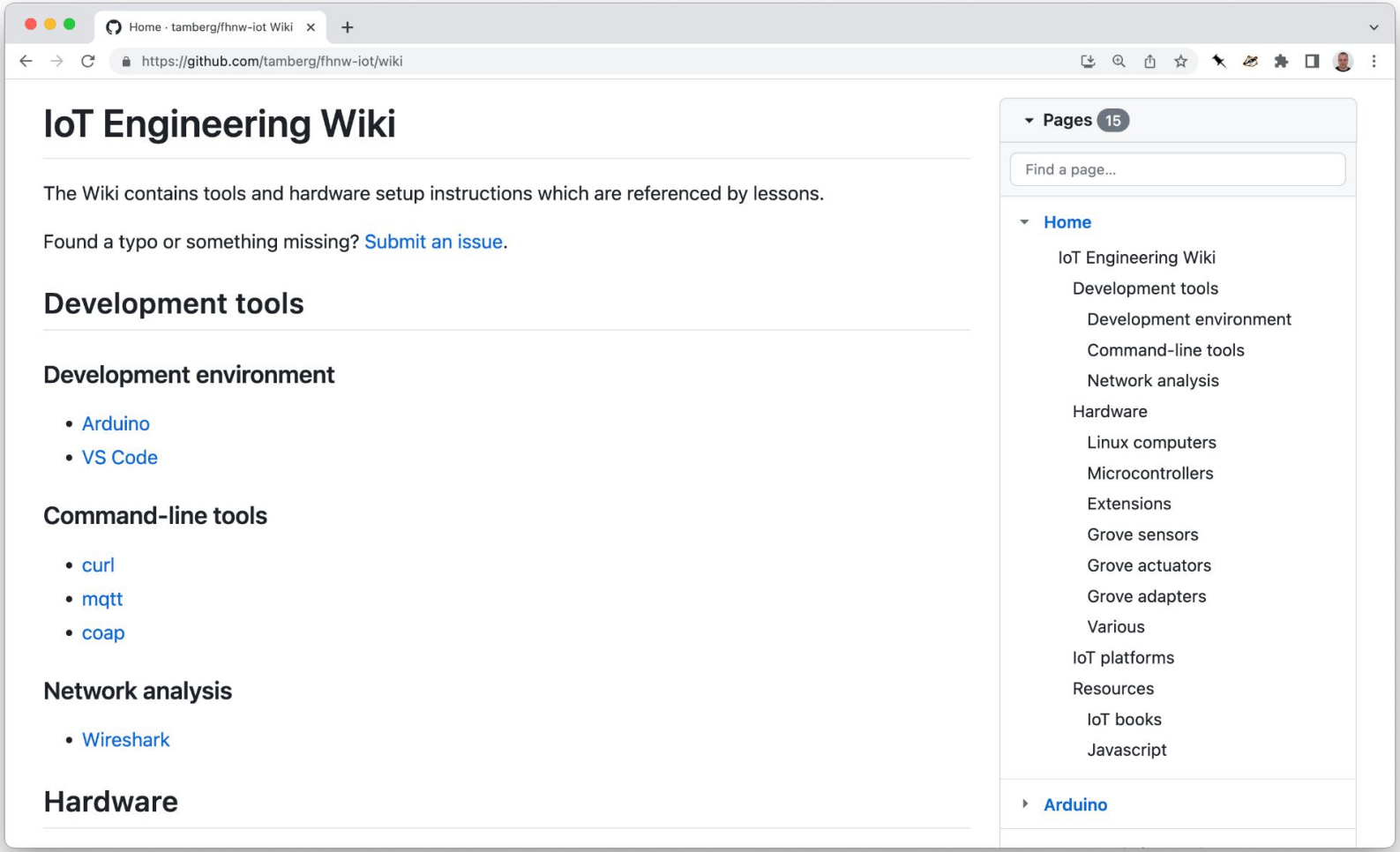
[1] http://www.tamberg.org/iotmark/2018/ConnectedProductReferenceModel.pdf

Learning objectives

The course *IoT Engineering* [0] introduces bachelor students to IoT, covering the following topics:

- Architecture of IoT systems and Internet-connected products
- Prototyping with beginner hardware, sensors and actuators
- Connectivity options for short and long-distance data transmission

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https://github.com/tamberg/fhnw-iot/wiki
IoT Engineering Wiki
The Wiki contains tools and hardware setup instructions which are referenced by lessons.
Found a typo or something missing? Submit an issue.
Development tools
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VS Code
Command-line tools
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mqtt
coap
Network analysis
Wireshark
Hardware
Pages 15
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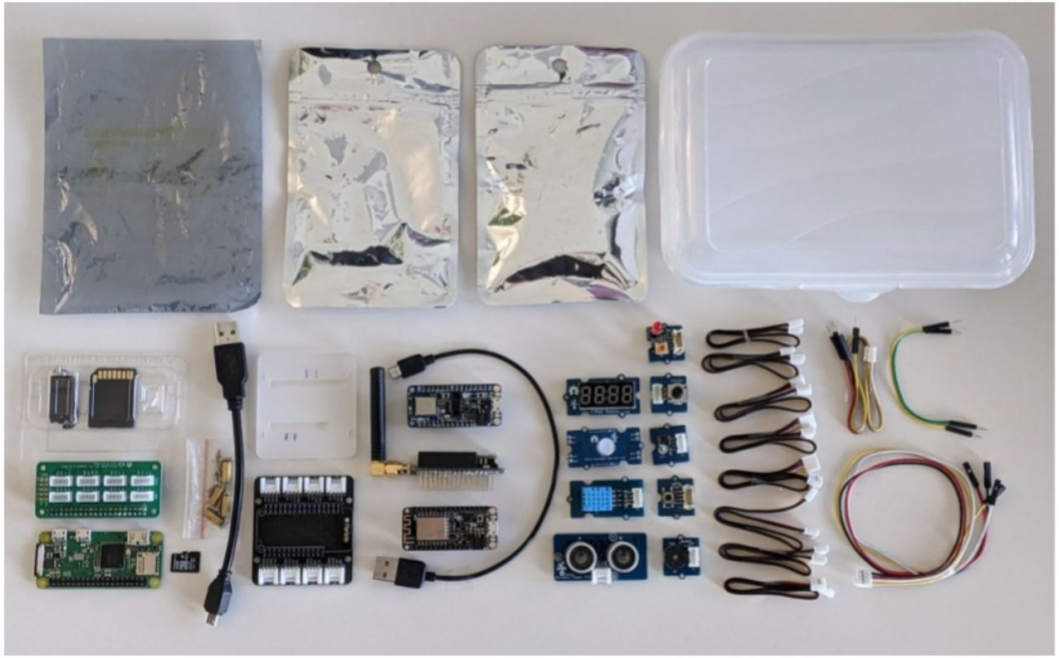
Grove actuators
Grove adapters
Various
IoT platforms
Resources
IoT books
Javascript
Arduino

Home · tamberg/fhnw-iot Wiki

https://github.com/tamberg/fhnw-iot/wiki#grove-sensors

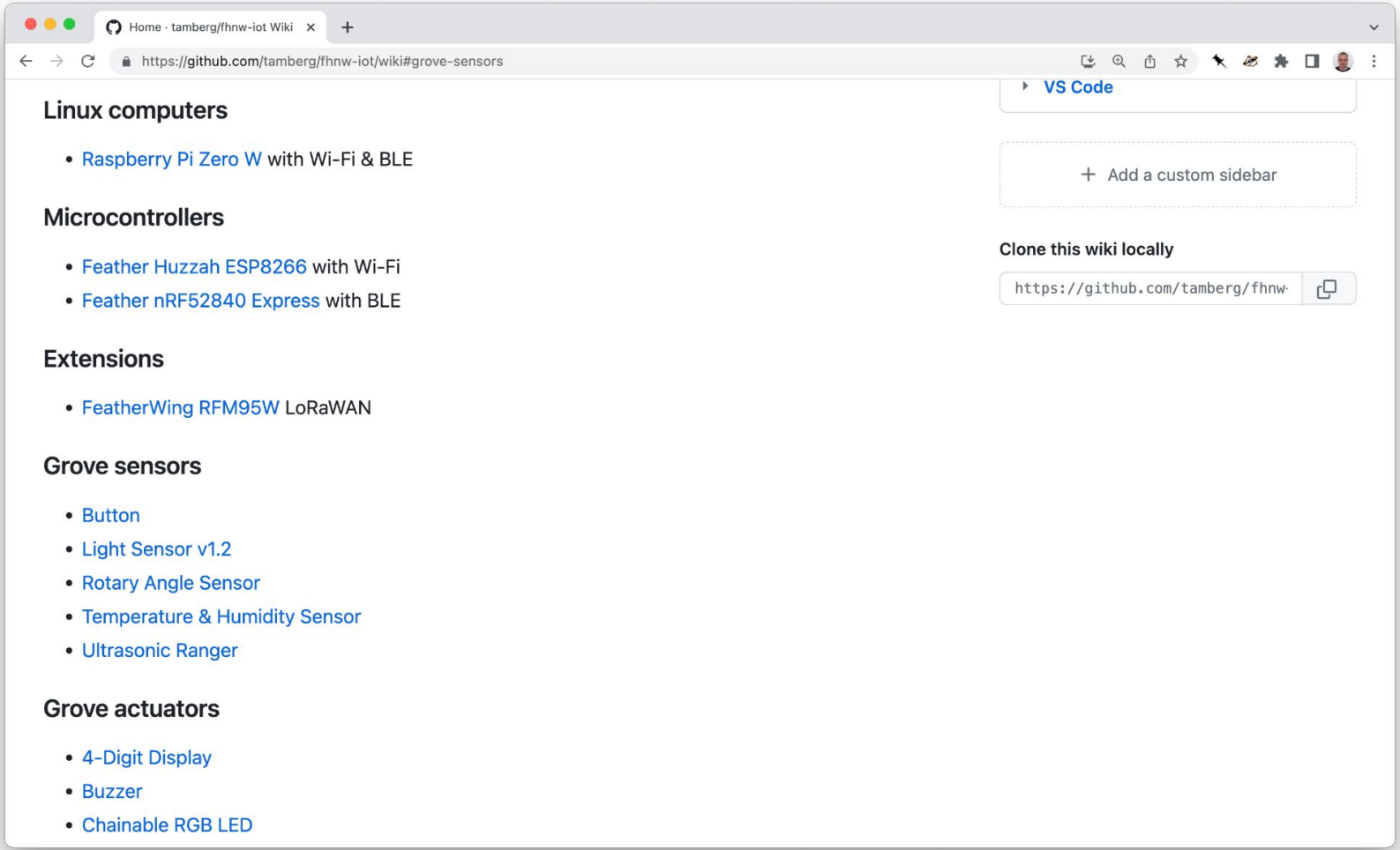
Hardware



Linux computers

- Raspberry Pi Zero W with Wi-Fi & BLE

+ Add a custom sidebar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https://github.com/tamberg/fhnw-iot/wiki#grove-sensors
Linux computers
Raspberry Pi Zero W with Wi-Fi & BLE
Microcontrollers
Feather Huzzah ESP8266 with Wi-Fi
Feather nRF52840 Express with BLE
Extensions
FeatherWing RFM95W LoRaWAN
Grove sensors
Button
Light Sensor v1.2
Rotary Angle Sensor
Temperature & Humidity Sensor
Ultrasonic Ranger
Grove actuators
4-Digit Display
Buzzer
Chainable RGB LED
VS Code
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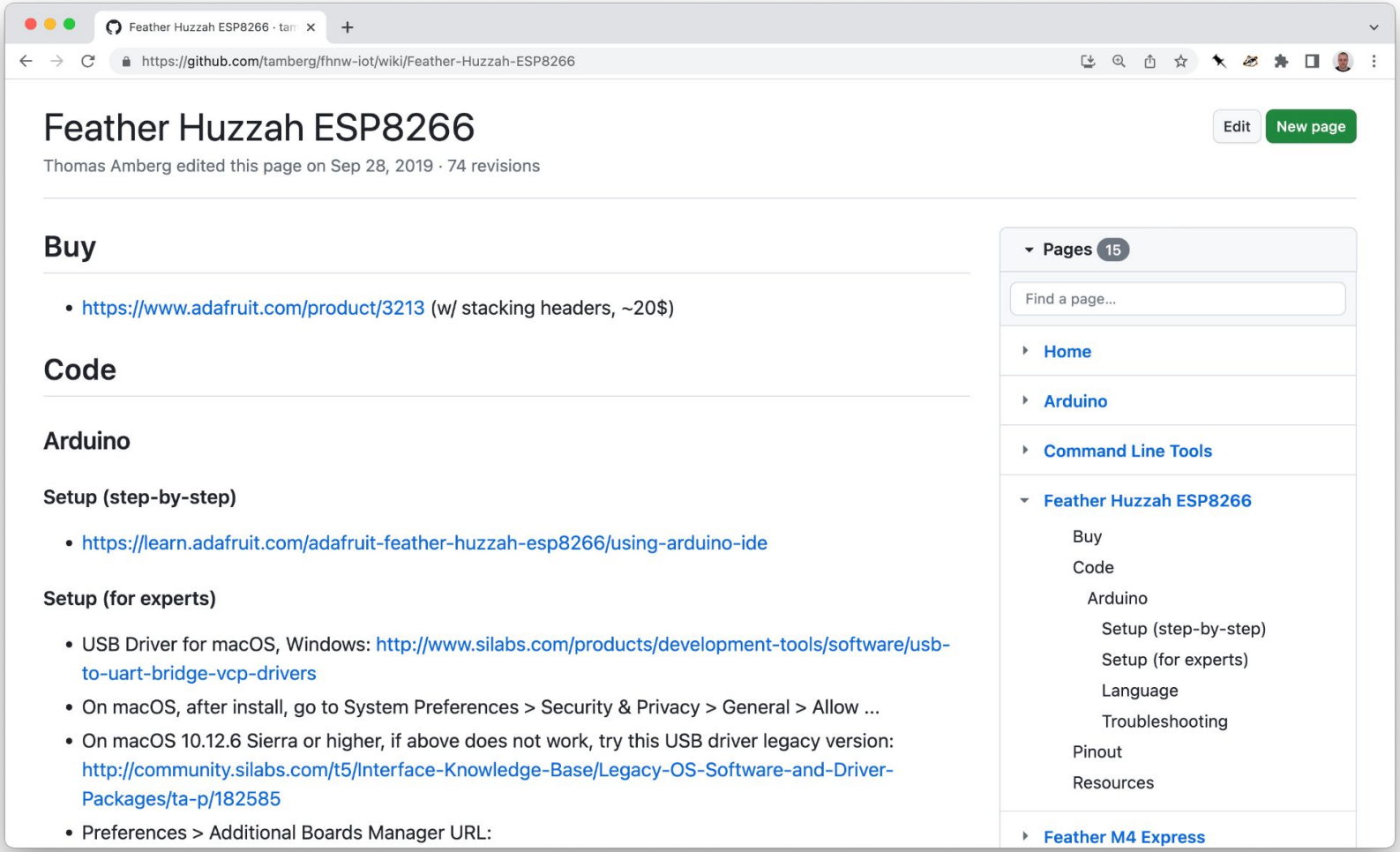
https://github.com/tamberg/fhnw


Feather Huzzah ESP8266 · tam
https://github.com/tamberg/fhnw-iot/wiki/Feather-Huzzah-ESP8266
Feather Huzzah ESP8266
Thomas Amberg edited this page on Sep 28, 2019 · 74 revisions
Edit
New page
Buy
https://www.adafruit.com/product/3213 (w/ stacking headers, ~20$)
Code
Arduino
Setup (step-by-step)
https://learn.adafruit.com/adafruit-feather-huzzah-esp8266/using-arduino-ide
Setup (for experts)
USB Driver for macOS, Windows: http://www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcp-drivers
On macOS, after install, go to System Preferences > Security & Privacy > General > Allow ...
On macOS 10.12.6 Sierra or higher, if above does not work, try this USB driver legacy version: http://community.silabs.com/t5/Interface-Knowledge-Base/Legacy-OS-Software-and-Driver-Packages/ta-p/182585
Preferences > Additional Boards Manager URL:
Pages 15
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Code
Arduino
Setup (step-by-step)
Setup (for experts)
Language
Troubleshooting
Pinout
Resources
Feather M4 Express

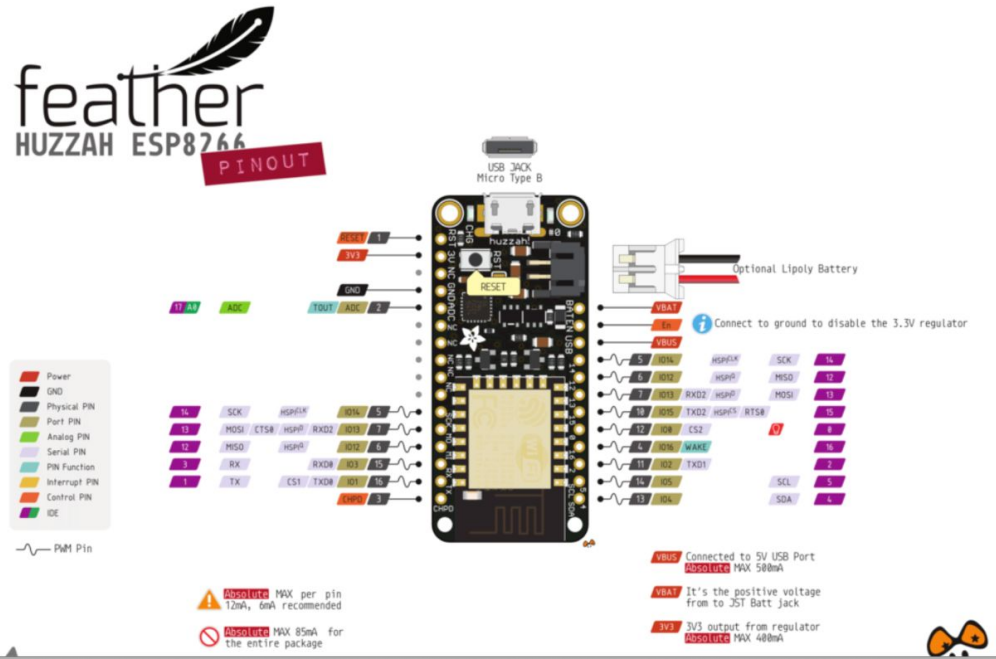
Feather Huzzah ESP8266 · tam

https://github.com/tamberg/fhnw-iot/wiki/Feather-Huzzah-ESP8266

Pinout

> Note: the Particle Grove adapter needs this fix and this fix to work with the ESP8266.

- https://learn.adafruit.com/adafruit-feather-huzzah-esp8266/pinouts/ (.pdf)



VS Code

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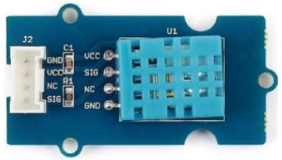
Clone this wiki locally

https://github.com/tamberg/fhnw-

Grove Sensors · tamberg/fhnw

https://github.com/tamberg/fhnw-iot/wiki/Grove-Sensors#temperature--humidity-sensor-dht11

Temperature & Humidity Sensor (DHT11)



Buy

- https://www.seeedstudio.com/Grove-Temperature-Humidity-Sensor-DHT1-p-745.html (~6$)

Pinout

Connect to Grove D<XY>

Color	Signal
Black	GND
Red	VCC (3.3V)
White	NC
Yellow	SIG (Digital)

Grove Sensors · tamberg/fhnw

https://github.com/tamberg/fhnw-iot/wiki/Grove-Sensors#temperature--humidity-sensor-dht11

Code

Arduino

ESP8266

- Library: Sketch > Include Library > Manage Libraries... > **DHTesp** > Install
- Example: File > Examples > DHT sensor library for ESPx > DHT_ESP8266
  - In the example code, make sure to use DHT11

```
//dht.setup(..., DHTesp::DHT22);
dht.setup(..., DHTesp::DHT11);
```

nRF52840

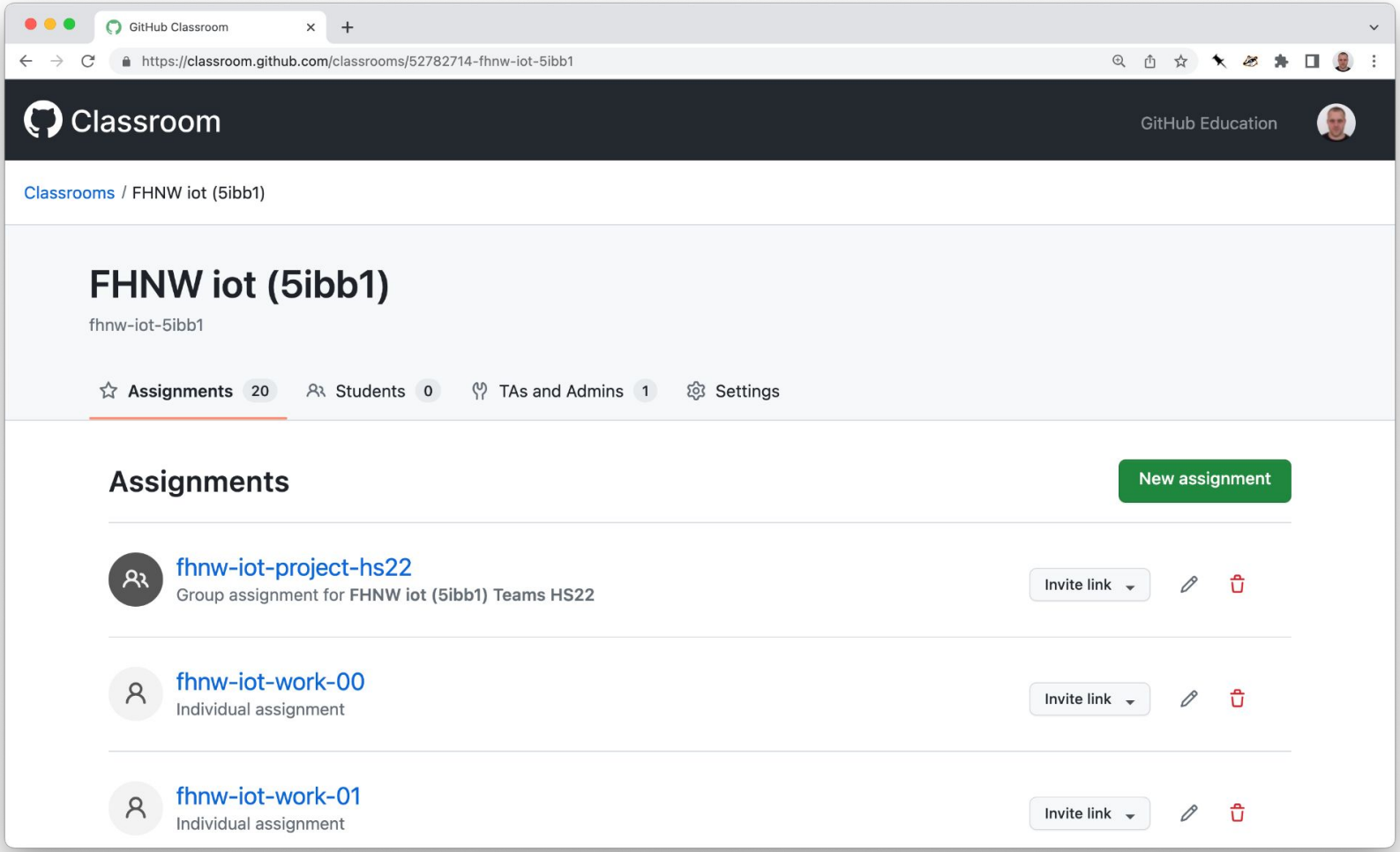
- Library: Sketch > Include Library > Manage Libraries... > **Grove DHT11** > Install
- Example: File > Examples > Grove Temperature and Humidity Sensor > DHTtester
  - In the example code, make sure to use DHT11

```
//#define DHTTYPE DHT22
#define DHTTYPE DHT11
```

Python on Raspberry Pi

- Library: https://github.com/Seeed-Studio/grove.py

Resources


GitHub Classroom
https://classroom.github.com/classrooms/52782714-fhnw-iot-5ibb1
Classroom
GitHub Education
Classrooms / FHNW iot (5ibb1)
FHNW iot (5ibb1)
fhnw-iot-5ibb1
Assignments 20
Students 0
TAs and Admins 1
Settings
Assignments
New assignment
fhnw-iot-project-hs22
Group assignment for FHNW iot (5ibb1) Teams HS22
Invite link
fhnw-iot-work-00
Individual assignment
Invite link
fhnw-iot-work-01
Individual assignment
Invite link

Feather Huzzah ESP8266 does

https://github.com/tamberg/fhnw-iot/issues/1#issuecomment-512249694

Closed

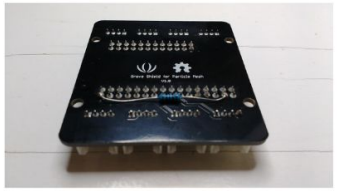
Feather Huzzah ESP8266 doesn't work w/ Grove adapter #1

tamberg opened this issue on Feb 19, 2019 · 7 comments

tamberg commented on Jul 17, 2019 • edited

Owner Author

Here's a better fix, using a 100 kΩ resistor:

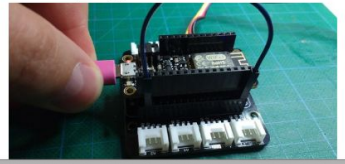


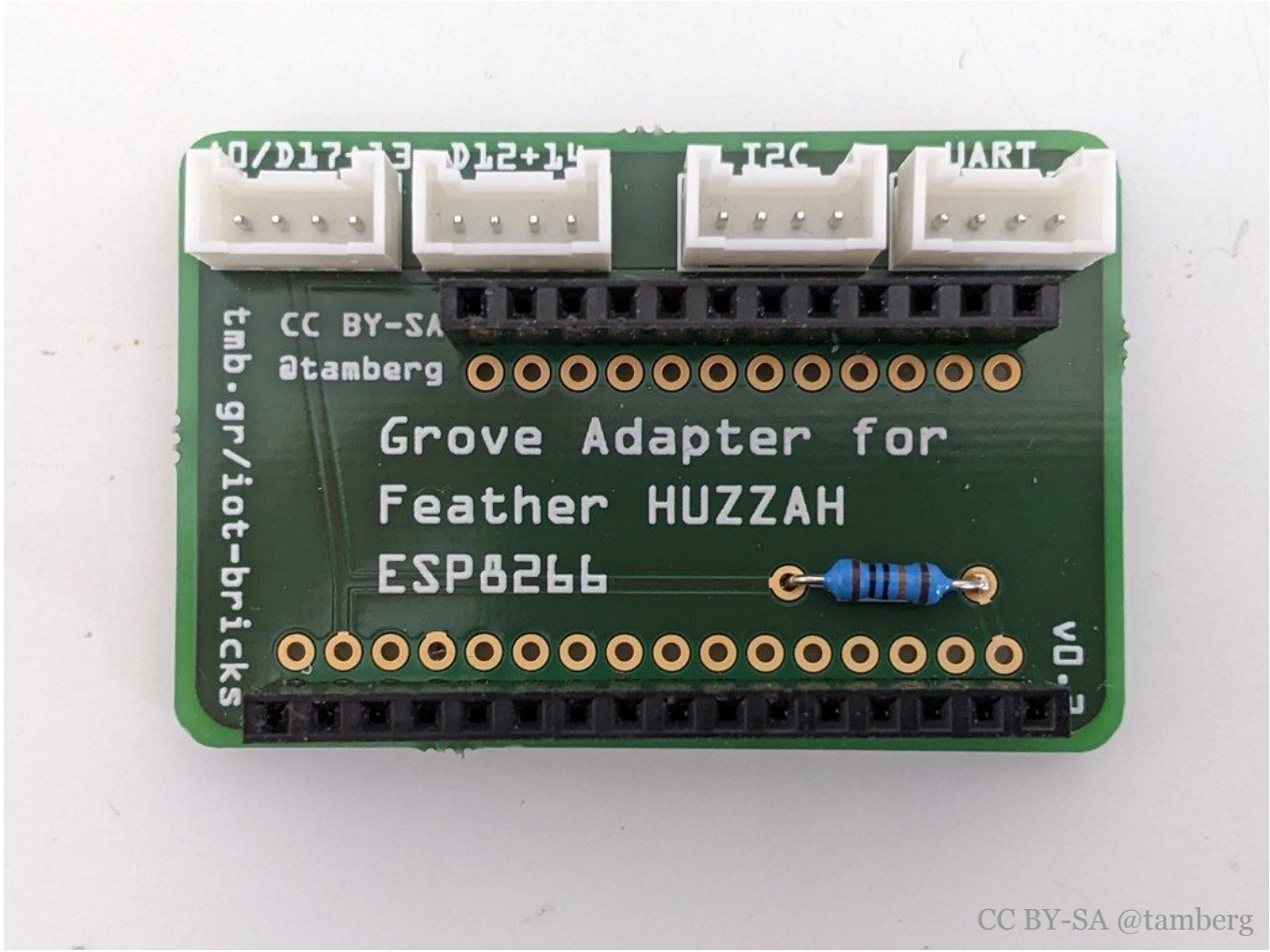
❤️ 1

tamberg commented on Jul 17, 2019

Owner Author

And a pragmatic fix, which consumes a bit more energy, using a jumper cable:





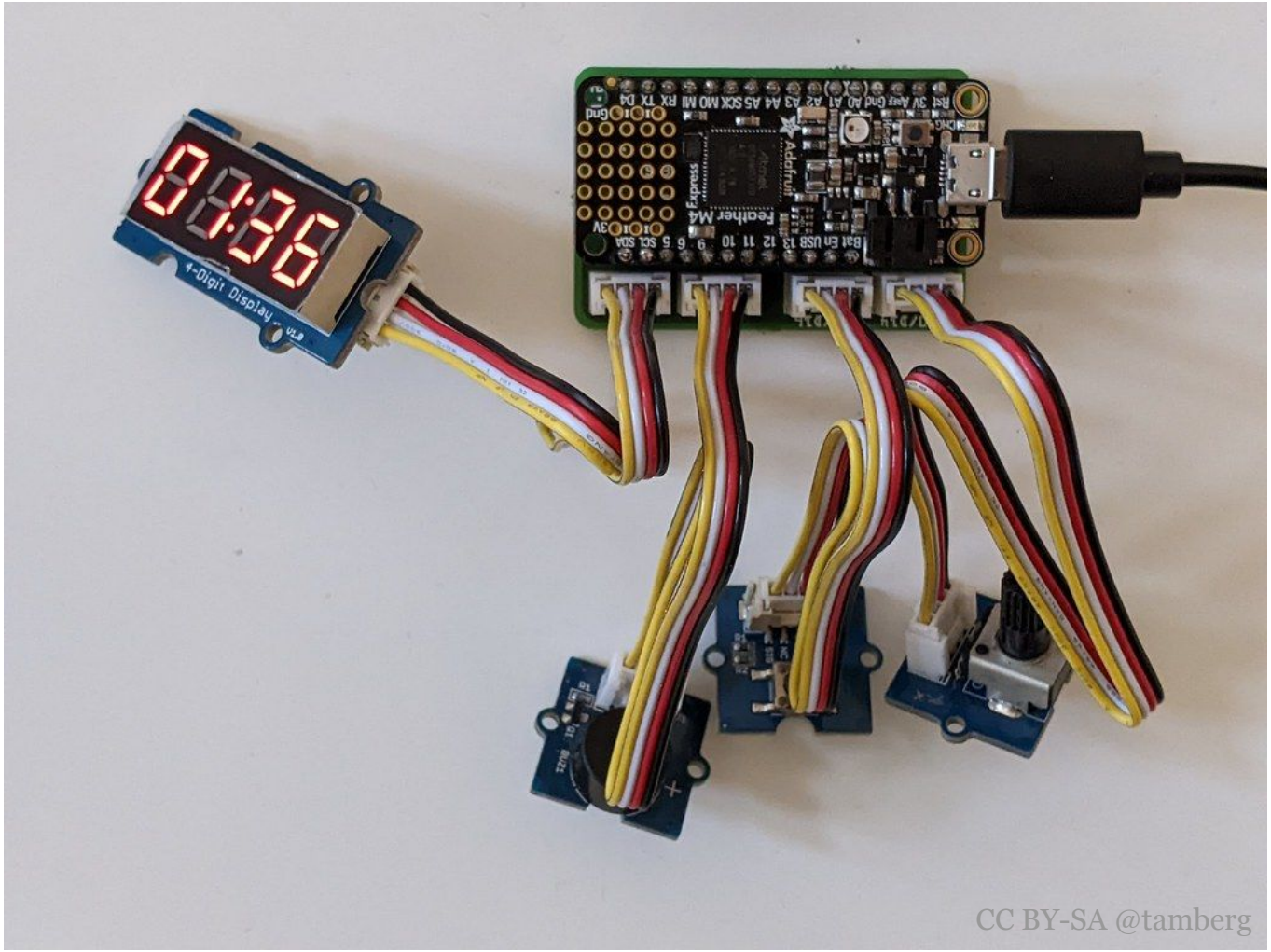
Take pictures

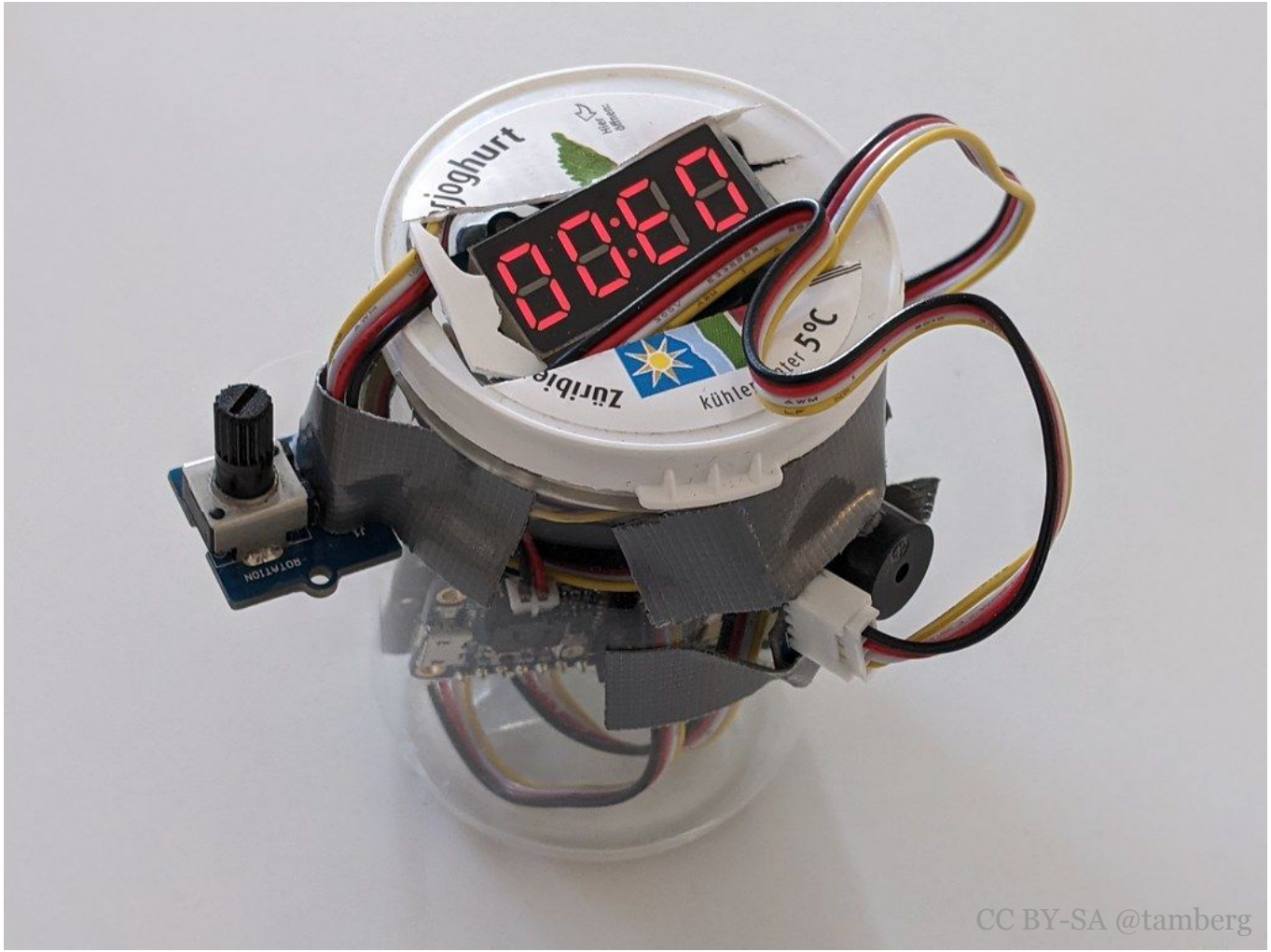
Reduce clutter.

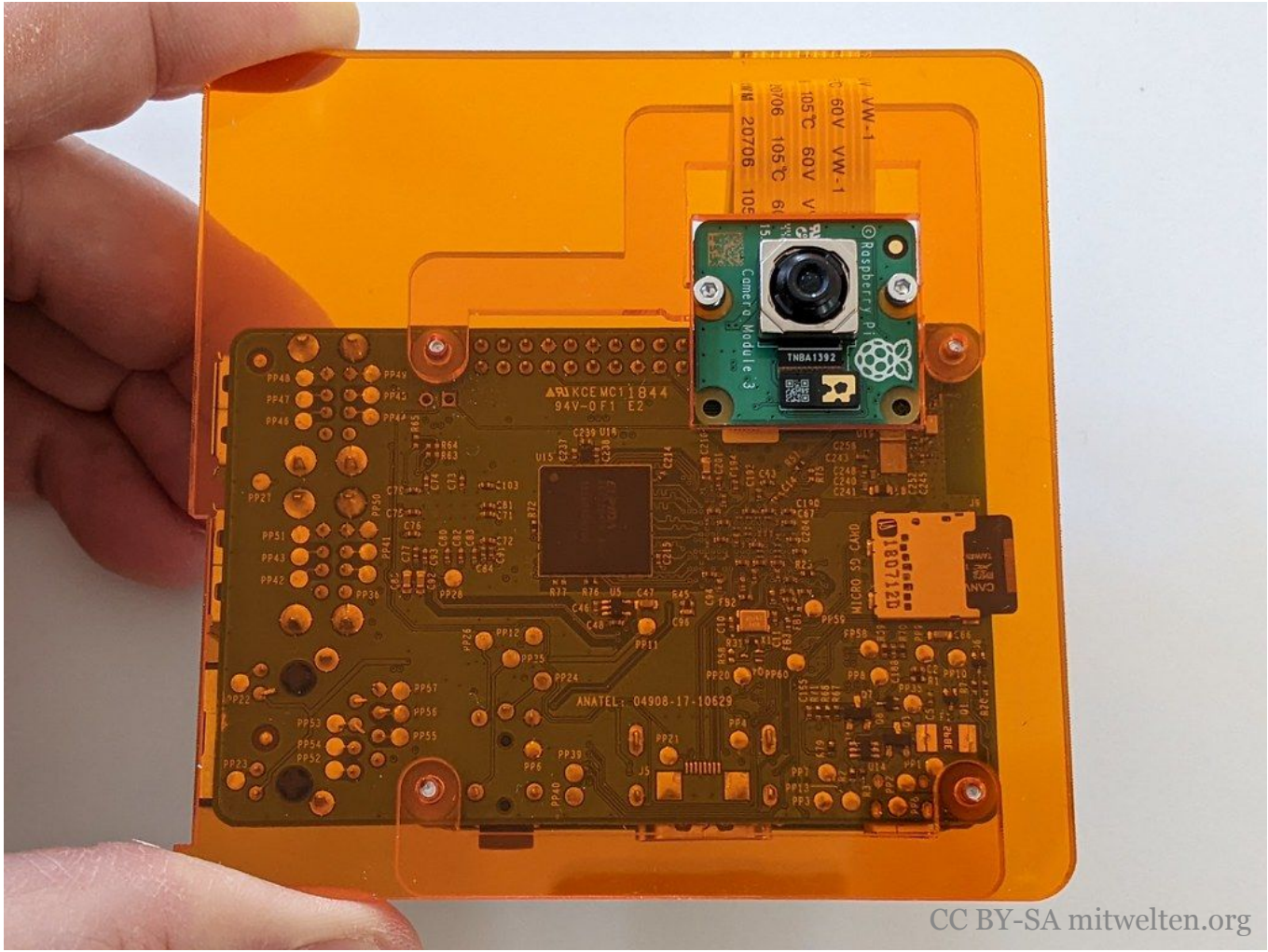
Use good lighting.

Show how it works.

Always take one more.







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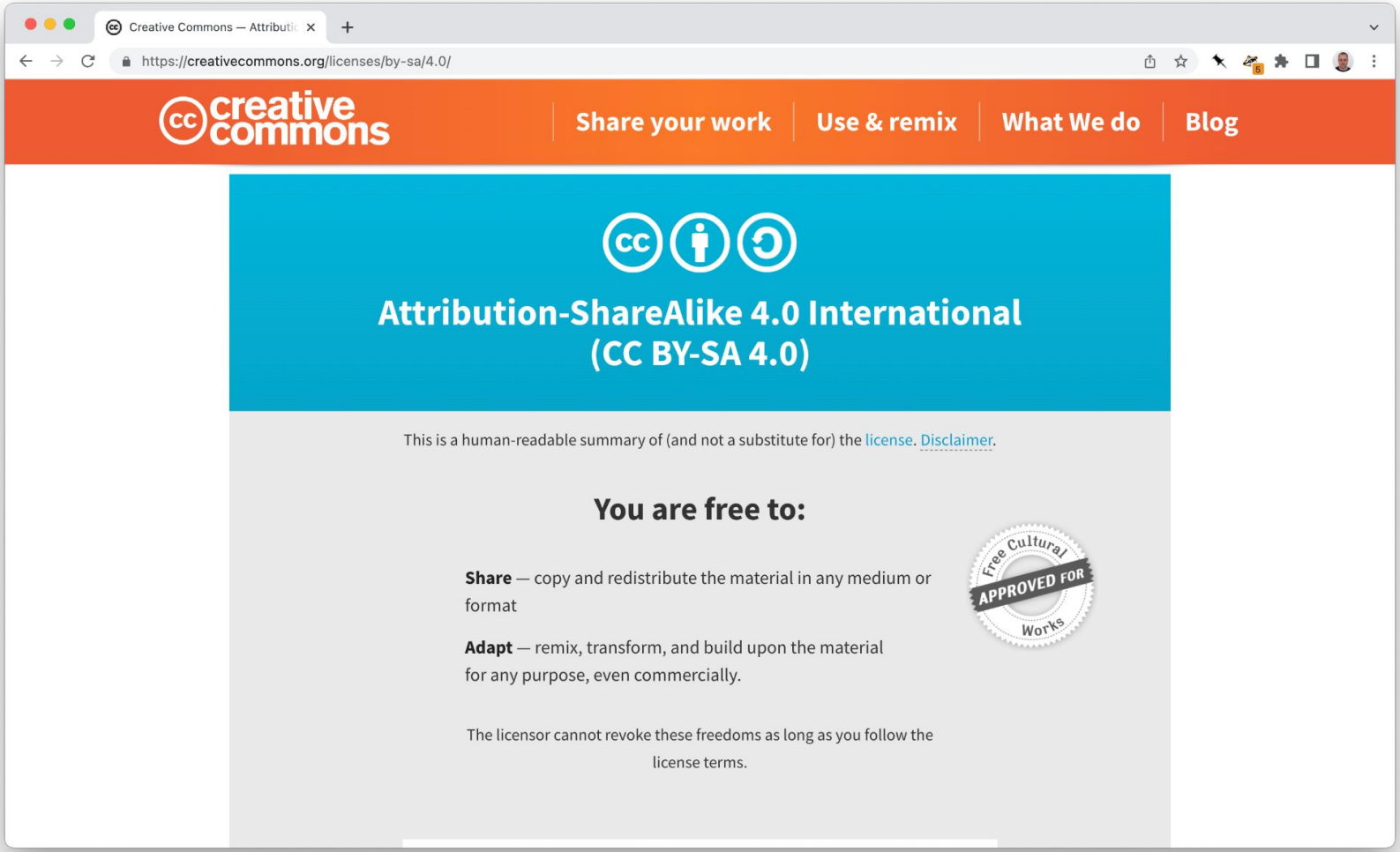
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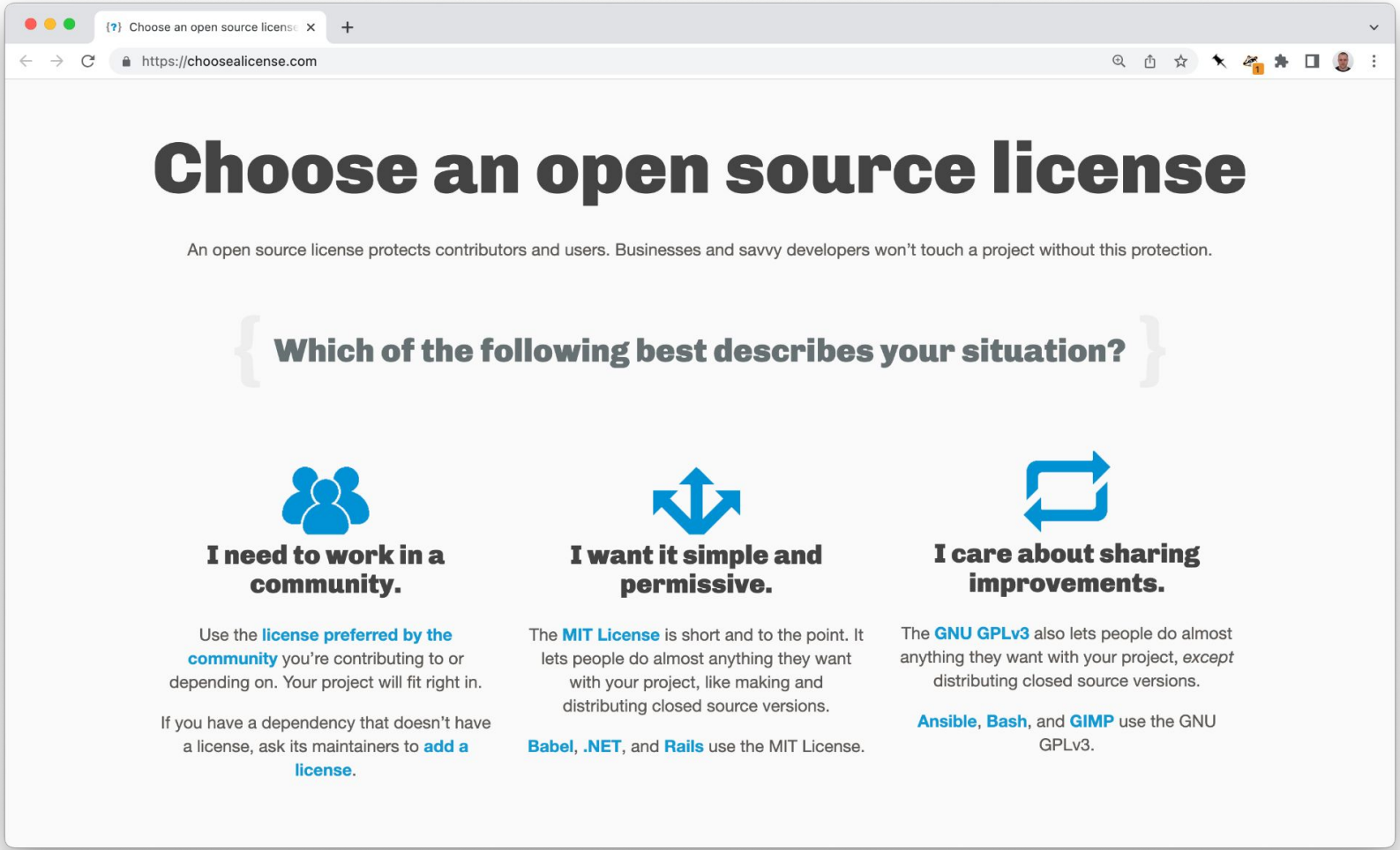
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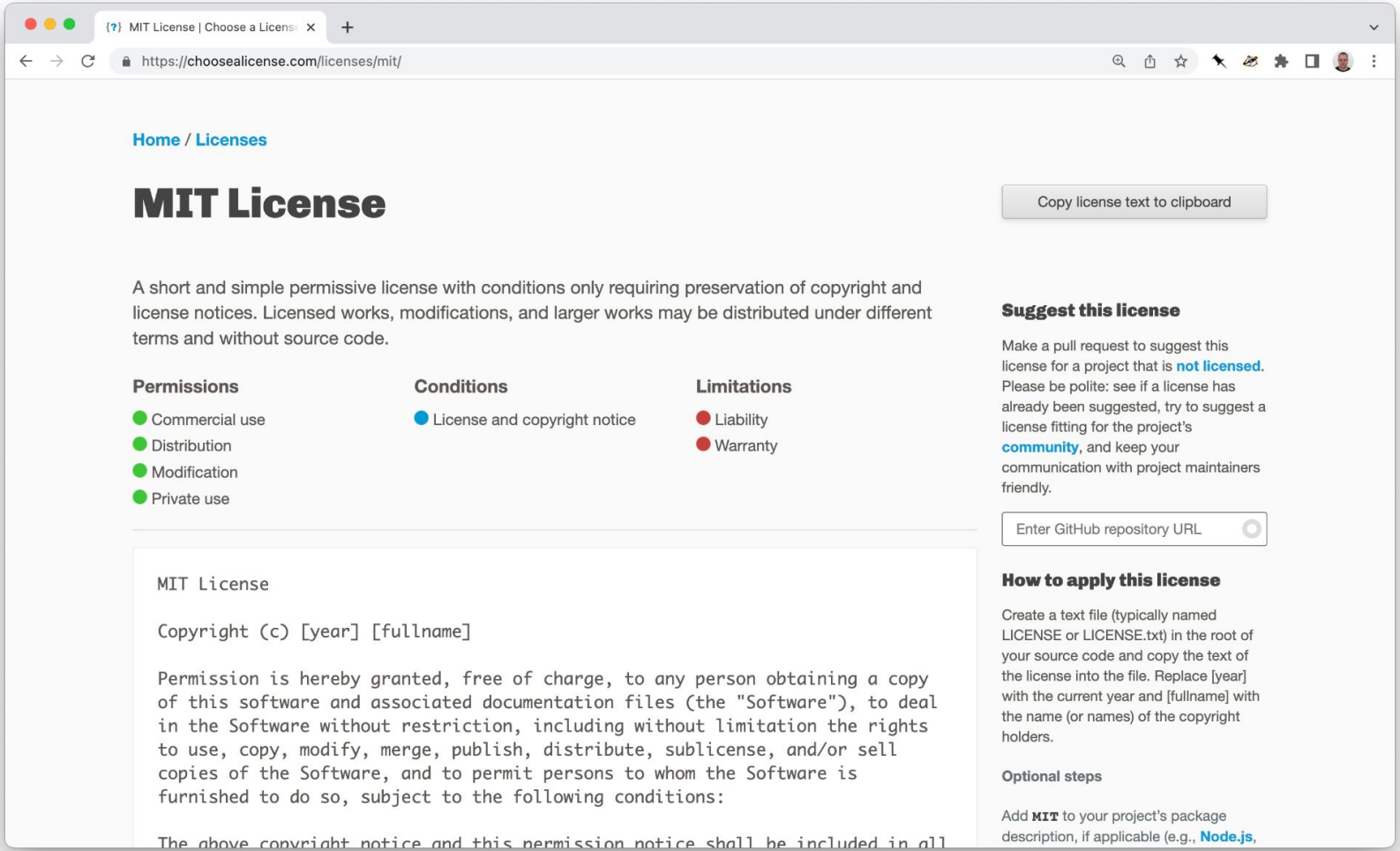
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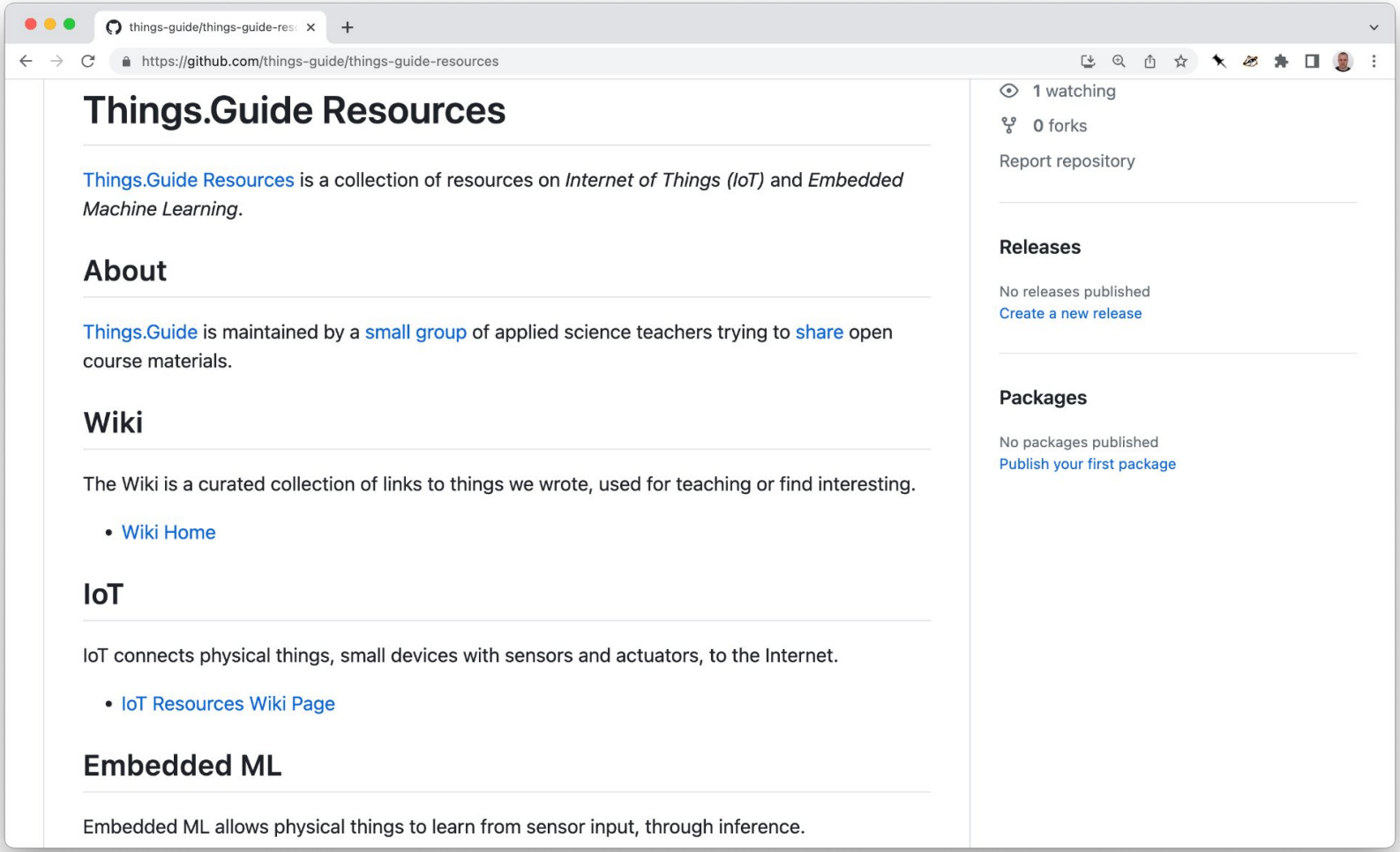
Create a text file (typically named LICENSE or LICENSE.txt) in the root of your source code and copy the text of the license into the file. Replace [year] with the current year and [fullname] with the name (or names) of the copyright holders.
Optional steps
Add MIT to your project's package description, if applicable (e.g., Node.js,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https://github.com/things-guide/things-guide-resources
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IoT Resources Wiki Page
Embedded ML
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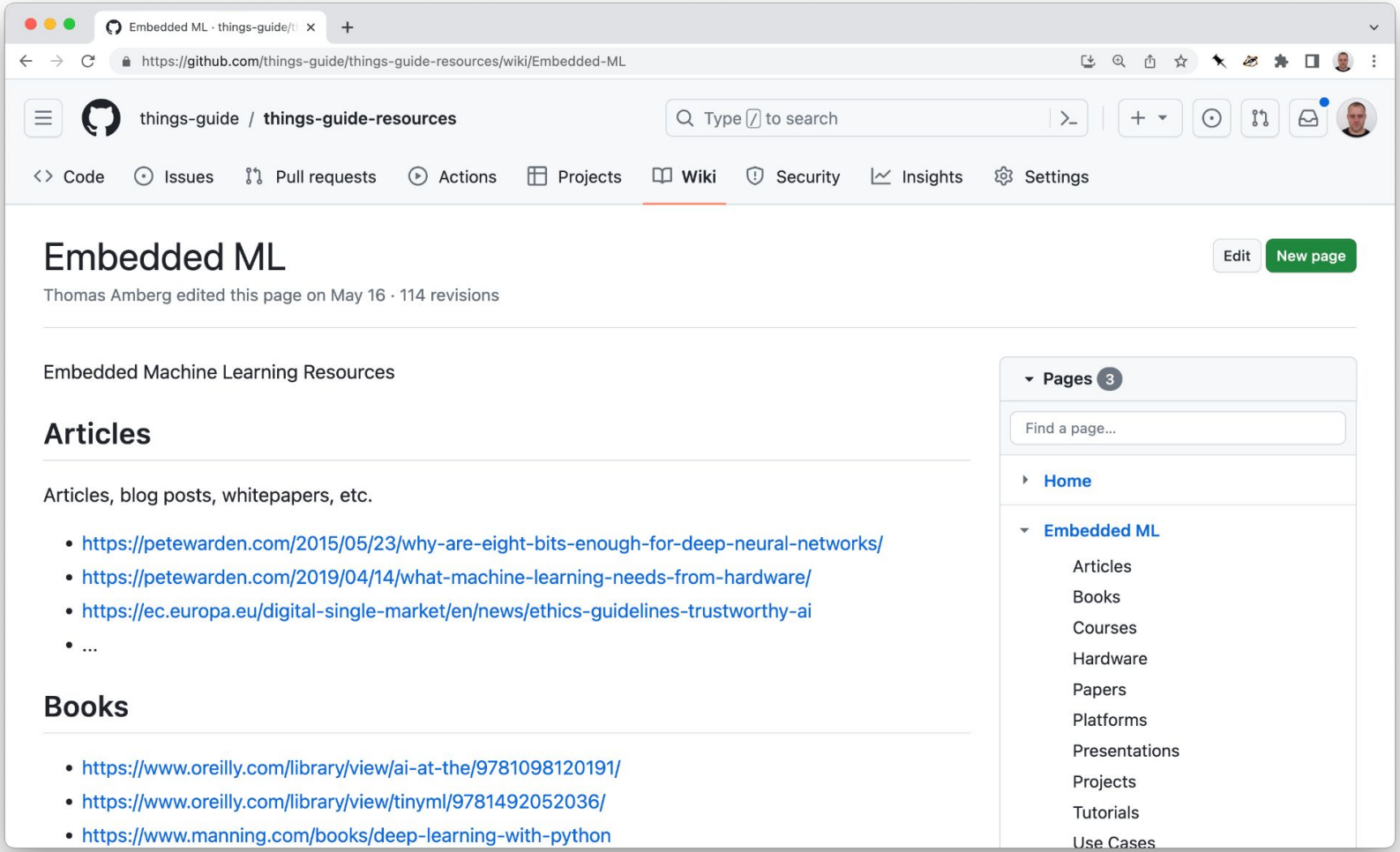
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