Designing Embedded Systems using Micro Python

Class 1: Designing Products with MicroPython

June 10, 2019
Jacob Beningo

Course Overview

Topics:

- **Designing Products with MicroPython**

- Getting Started with the Pyboard D-Series

- Customizing the MicroPython Kernel for Production

- Developing Real-time Application Projects

- Testing MicroPython Projects

Presented by:

The Lecturer – Jacob Beningo

Jacob Beningo

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- **in** : JacobBeningo
- **EDN** : Embedded Basics

ARM Connected Community

Consulting

- Advising
- Coaching
- Content
- Consulting
- Training

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Jacobs CEC Courses

CEC 2013 – 2015

Fundamentals of Embedded Software (2013)

Mastering the Software Design Cycle (2014)

Python for Embedded Systems(2014)

Software Architecture Design (2014)

Baremetal C (2015)

Mastering the ARM Cortex-M Processor (2015)

Writing Portable and Robust Firmware in C (2015)

Design Patterns and the Internet (2015)

CEC 2016 - 2017

Bootloader Design for MCUs (2016)

Rapid Prototyping w/ Micro Python (2016)

Debugging (2016)

Professional Firmware (2016)

API's and HAL's February 2017

Baremetal to RTOS April 2017

Designing IoT Sensor Nodes July 2017

From C to C++ October 2017

CEC 2018

Connecting Edge Devices (March 2018)

Building an IoT Connected PLC (April 2018)

Securing IoT Devices using Arm TrustZone (Nov 2018)

Minimizing Defects (Dec 2018)

CEC 2019

Machine Learning for Embedded (April 2019)

Designing Embedded Systems using MicroPython

Launching a Product (Nov 2019)

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Session Overview

- Introduction

- Python

- MicroPython

- Hardware

- The REPL

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Introduction

TIOBE Programming Community Index

Source: www.tiobe.com

Legend:
- Java
- C
- C++
- Python
- Visual Basic .NET
- C#
- JavaScript
- SQL
- PHP
- Assembly language

Python Popularity

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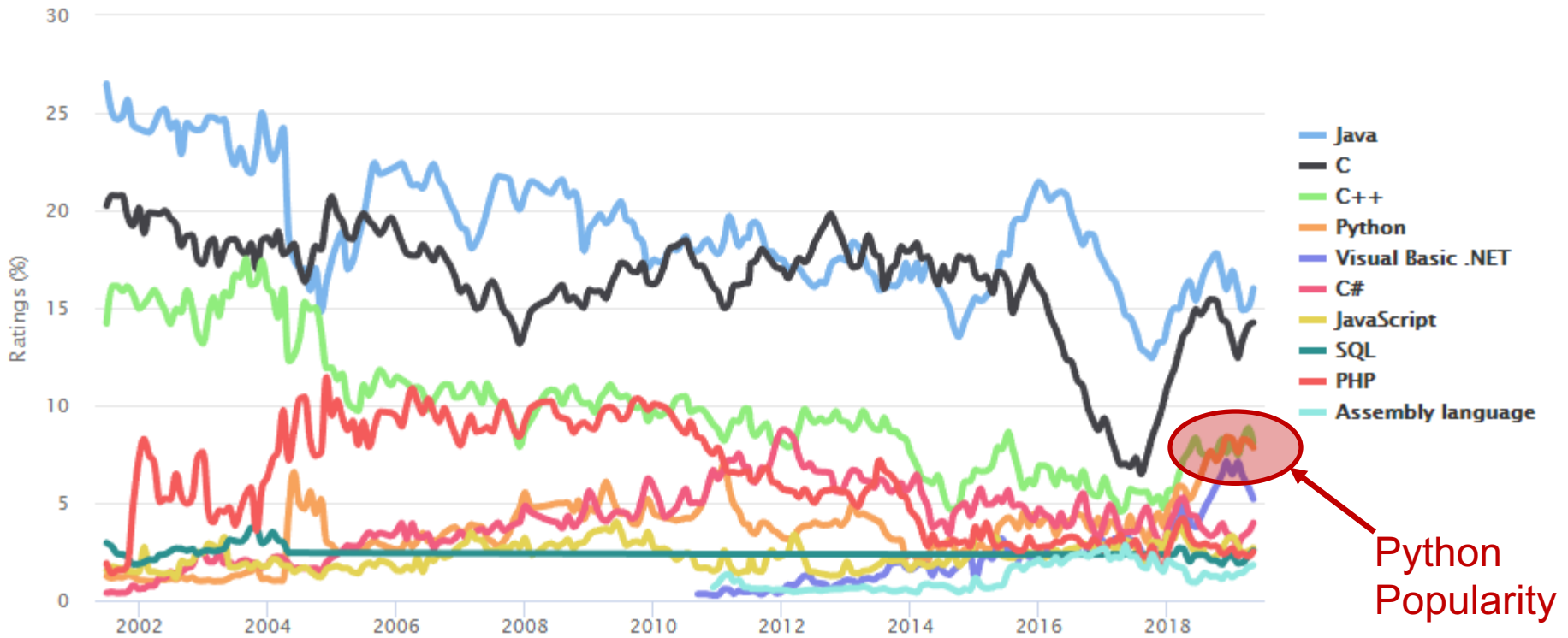
Python

- What is Python?
  - Interpreted language
  - Interactive
  - Object Oriented
- Why use Python?
  - Entry level language that is easy to learn
  - Is portable
  - Supports a large set of libraries

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MicroPython

Definition: "MicroPython is a lean and efficient implementation of the [Python 3](#) programming language that includes a small subset of the Python standard library and is optimised to run on microcontrollers and in constrained environments." (Source: micropython.org)

MicroPython Development

- MicroPython Compatible Hardware

- MicroPython Kernel

- Terminal Application

- A good text editor

  – Sublime Text

- Break-out boards

- Misc. sensors, actuators and LED's

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Libraries

- pyb
  - Pyboard specific peripheral libraries
- micropython
- math
- sys
- uhashlib
- ujson
- _thread

Pyboard v1.1 (STM32F405RG)

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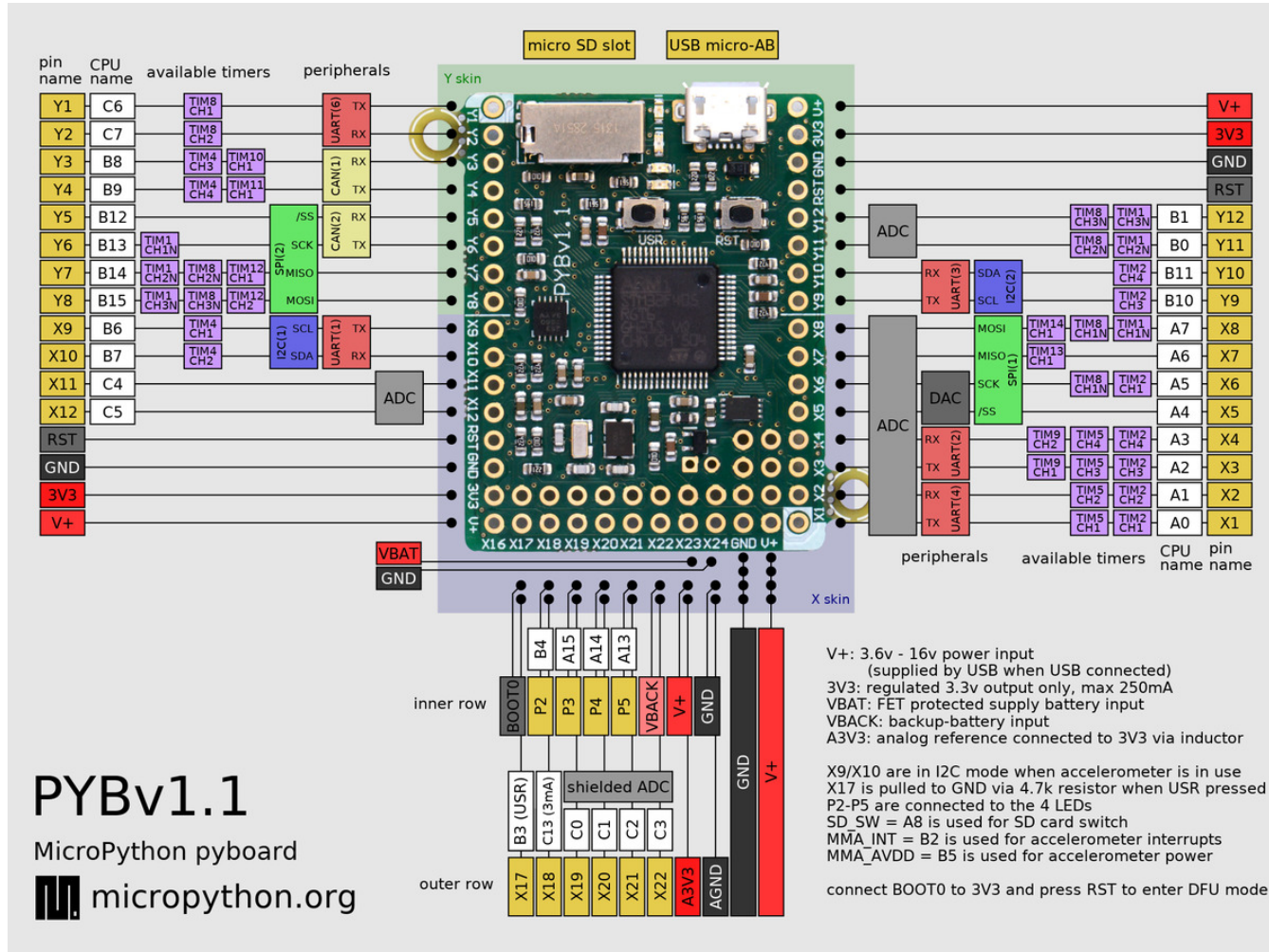
Pyboard D-Series (STM32F722)
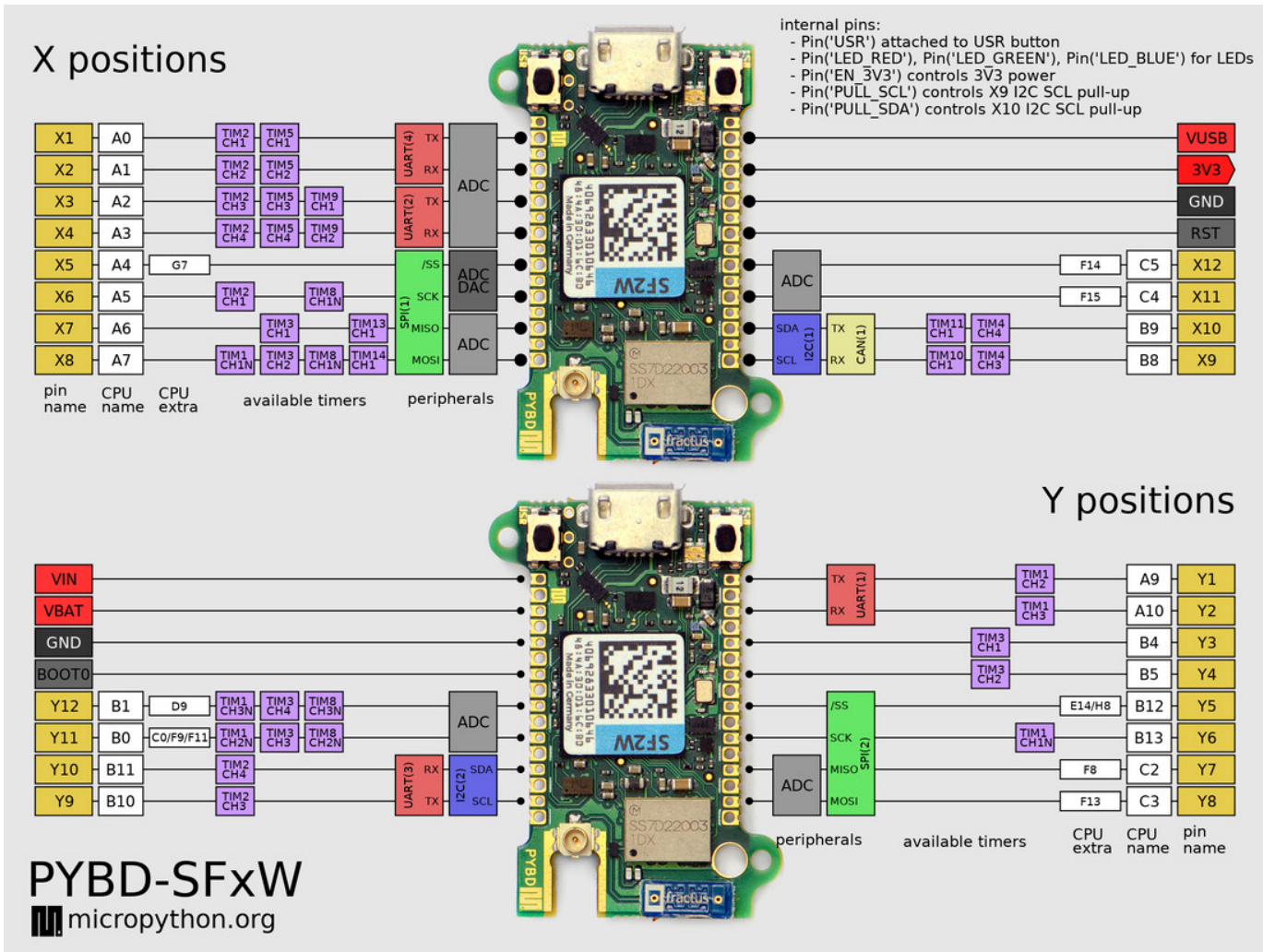
Pyboard D-Series (STM32F723)
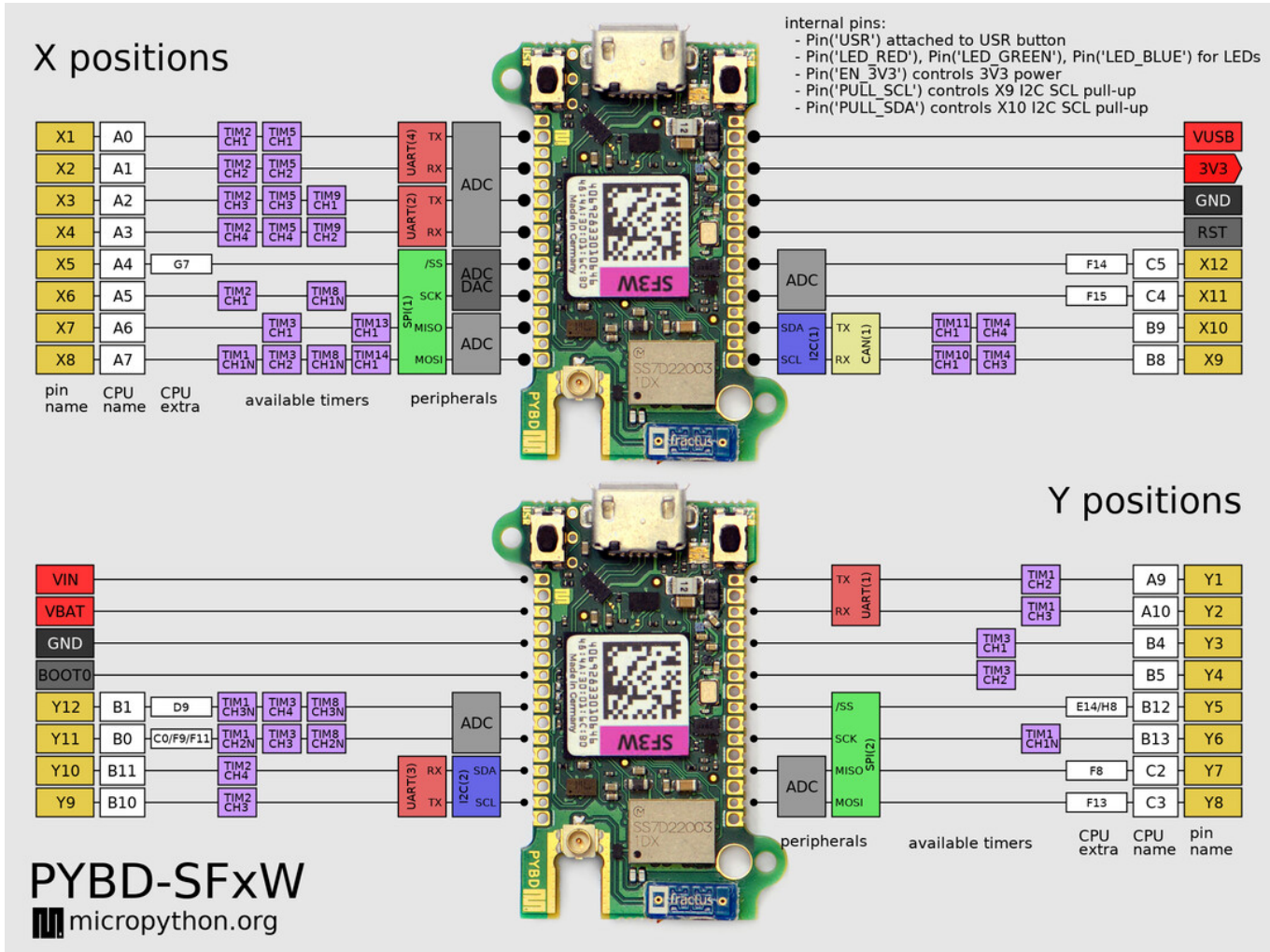
Pyboard D-Series (STM32F767)

Presented by:
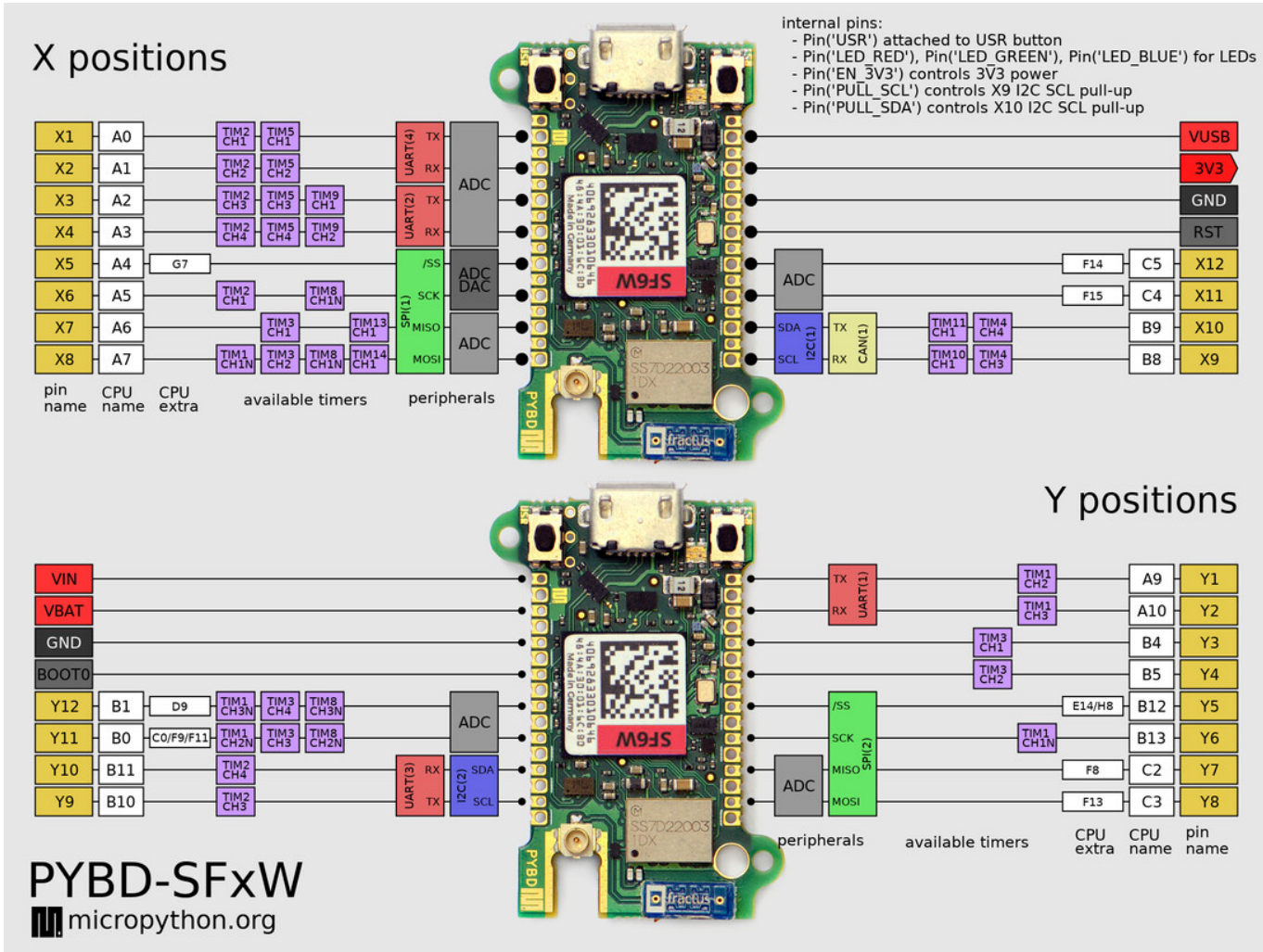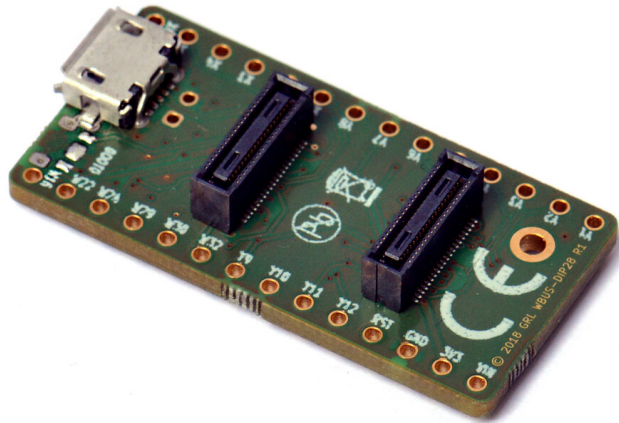
Adapter Boards

Adapter Board
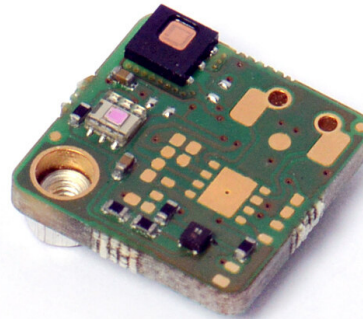- MicroPython Module
- USB power adapter
- Header Break-outs
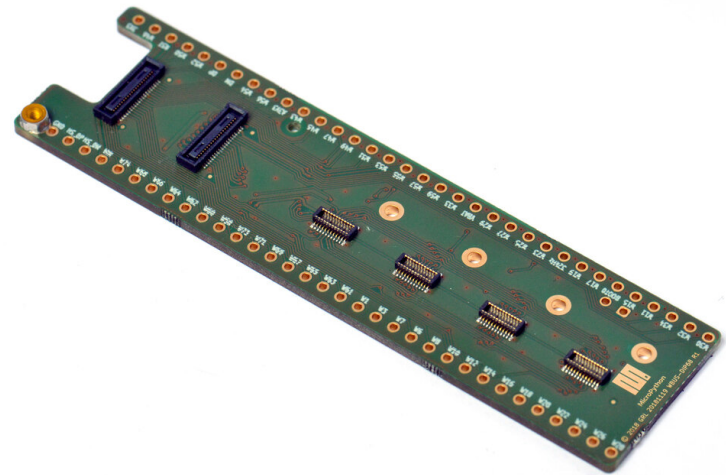
WBUS DIP68
- MicroPython Module
- Sensor Module break-outs
- Header Break-outs

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Memory and Sensor Boards
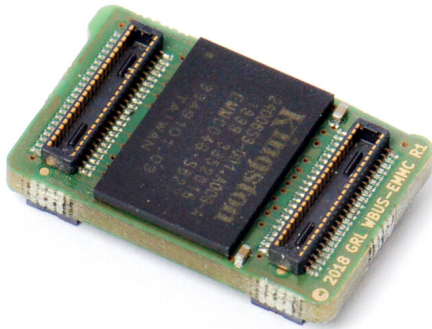
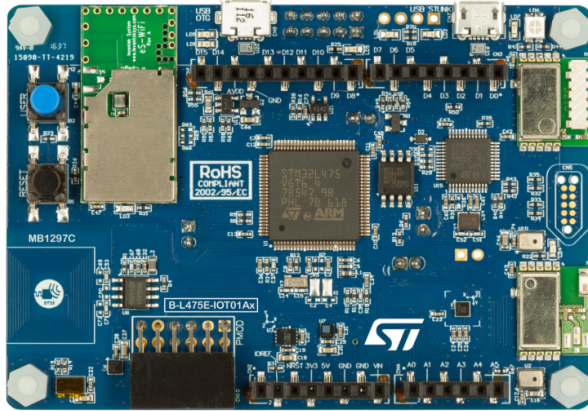**WBUS eMMC**
- 4 GB eMMC

TILE Sensor
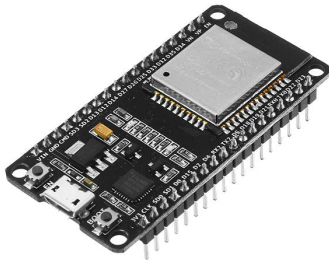- Temperature
- Humidity
- Light
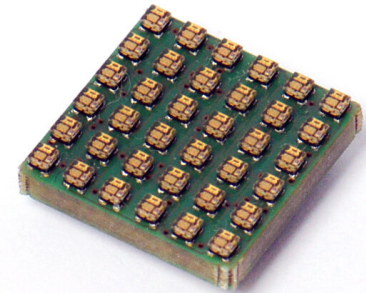
TILE LED
- 6x6 RGB LED Array

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Alternative Hardare
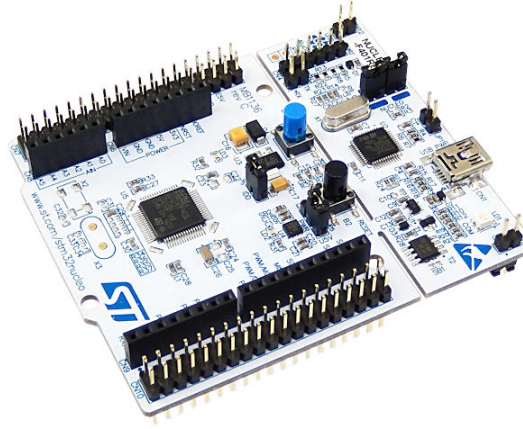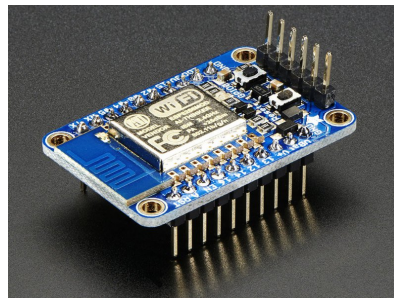
B-L475E-IOT01A

Nucleo Board
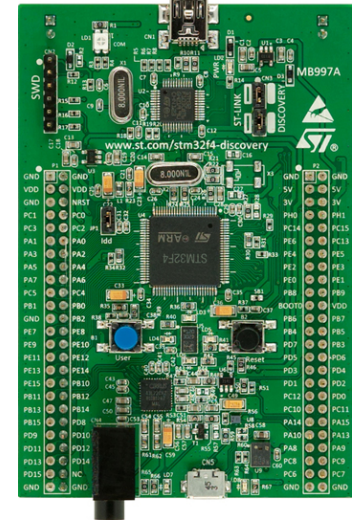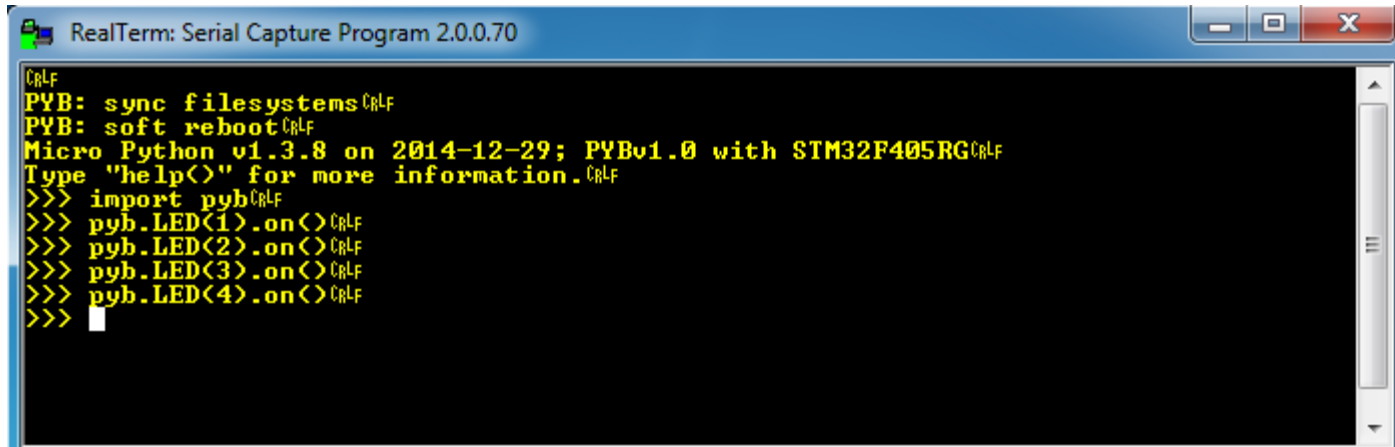
Discovery Board

ESP32

HUZZAH ESP8266

The REPL Interface

Controls	Function
CTRL-A	Enter raw REPL mode
CTRL-B	Enter normal REPL mode
CTRL-C	Interrupt a running program
CTRL-D	Soft reset
help()	Displays information on pyb library

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Getting Support

- Tutorials
  - https://docs.micropython.org/en/latest/pyboard/tutorial/index.html

- Library reference
  - https://docs.micropython.org/en/latest/library/index.html

- Forum
  - https://forum.micropython.org/

- Kernel Repository

- https://github.com/micropython/micropython

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Additional Resources

- Download Course Material for
  - http://bit.ly/MicroPythonProjects
  - Blog
  - YouTube Videos
- Embedded Bytes Newsletter
  - http://bit.ly/1BAHYXm

From www.beningo.com under

- Blog > CEC – Designing Embedded Systems using MicroPython