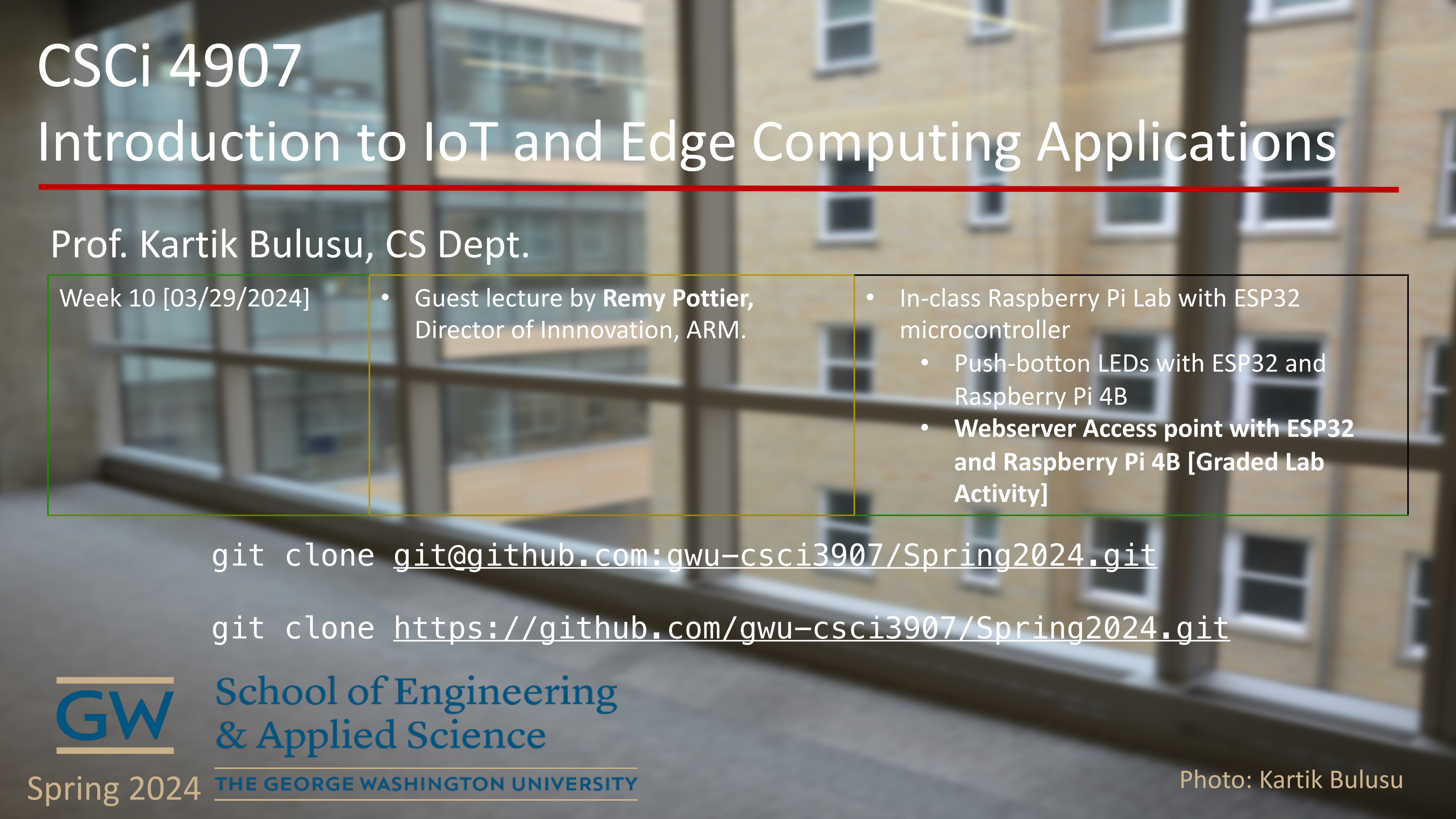


CSCi 4907

Introduction to IoT and Edge Computing Applications

Prof. Kartik Bulusu, CS Dept.

Week 10 [03/29/2024]

- Guest lecture by **Remy Pottier,** Director of Innnovation, ARM.

- In-class Raspberry Pi Lab with ESP32 microcontroller
  - Push-botton LEDs with ESP32 and Raspberry Pi 4B
  - **Webserver Access point with ESP32 and Raspberry Pi 4B [Graded Lab Activity]**

```
git clone git@github.com:gwu-csci3907/Spring2024.git

git clone https://github.com/gwu-csci3907/Spring2024.git
```

GW School of Engineering & Applied Science

THE GEORGE WASHINGTON UNIVERSITY

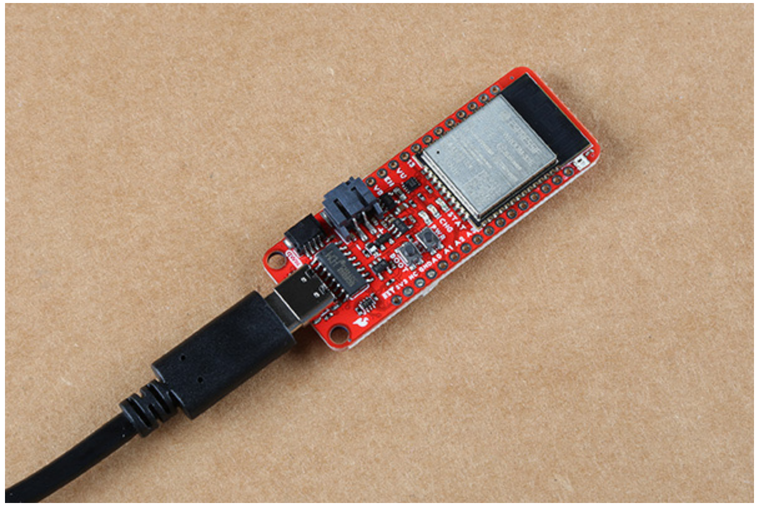
Spring 2024

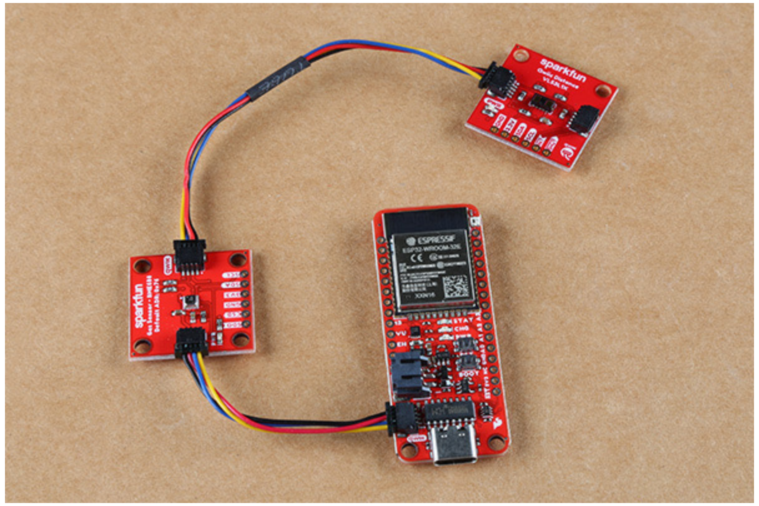
Photo: Kartik Bulusu

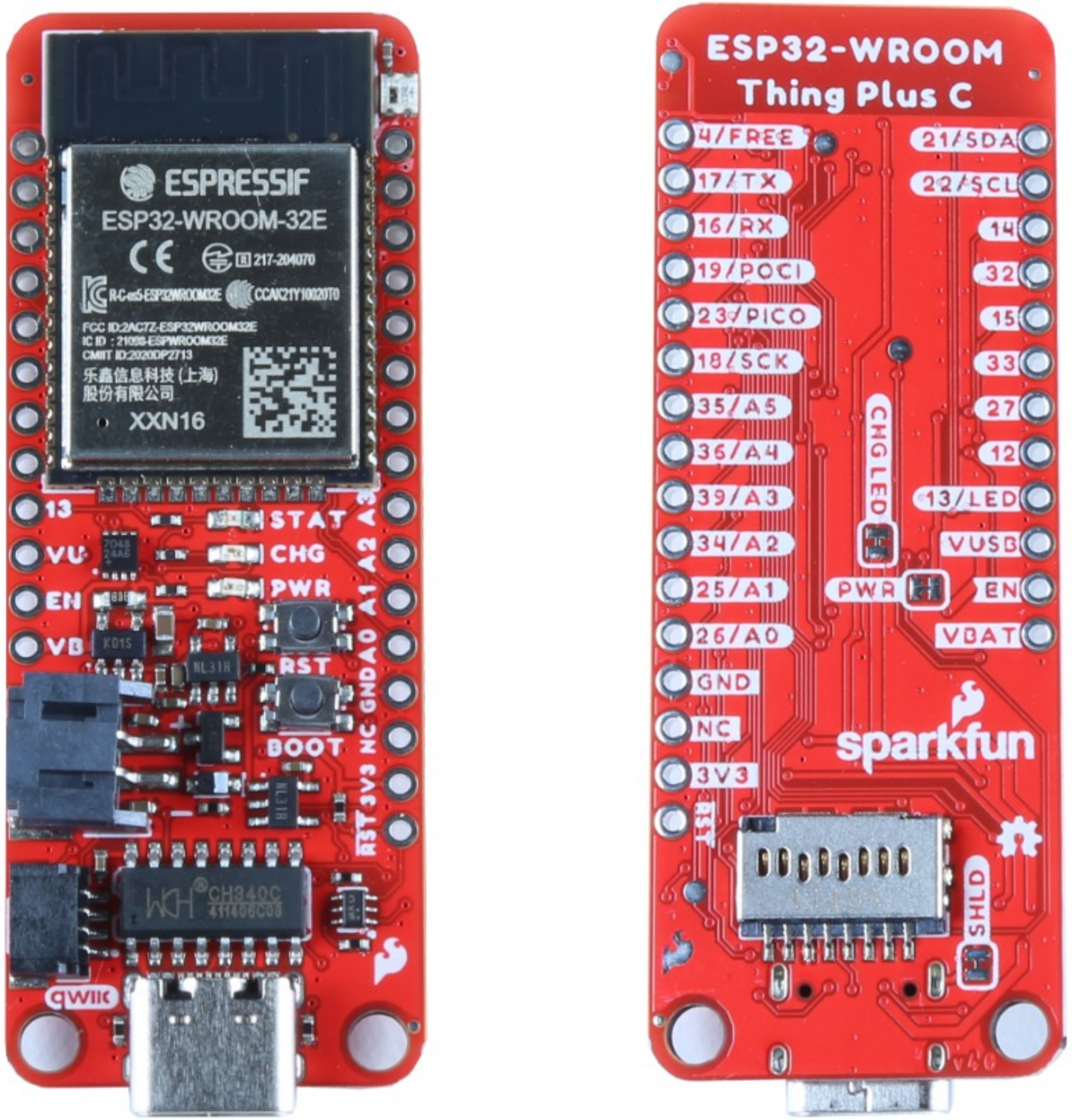
Setting up the ESP32 microcontroller with the Raspberry Pi 4B

Source:
https://learn.sparkfun.com/tutorials/esp32-thing-plus-usb-c-hookup-guide/introduction

ESP32 Microcontroller – A first look



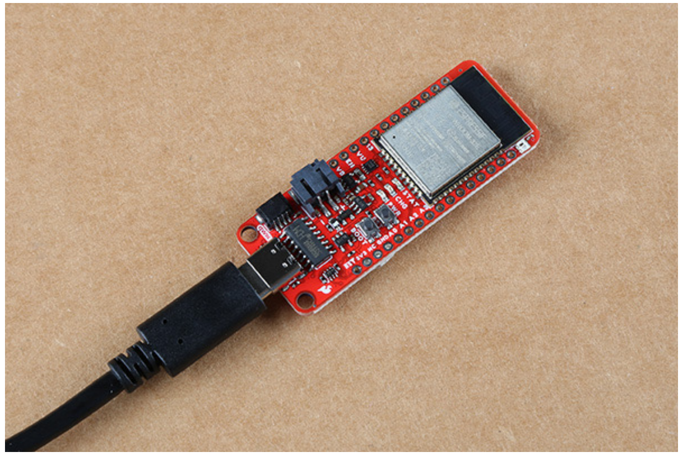


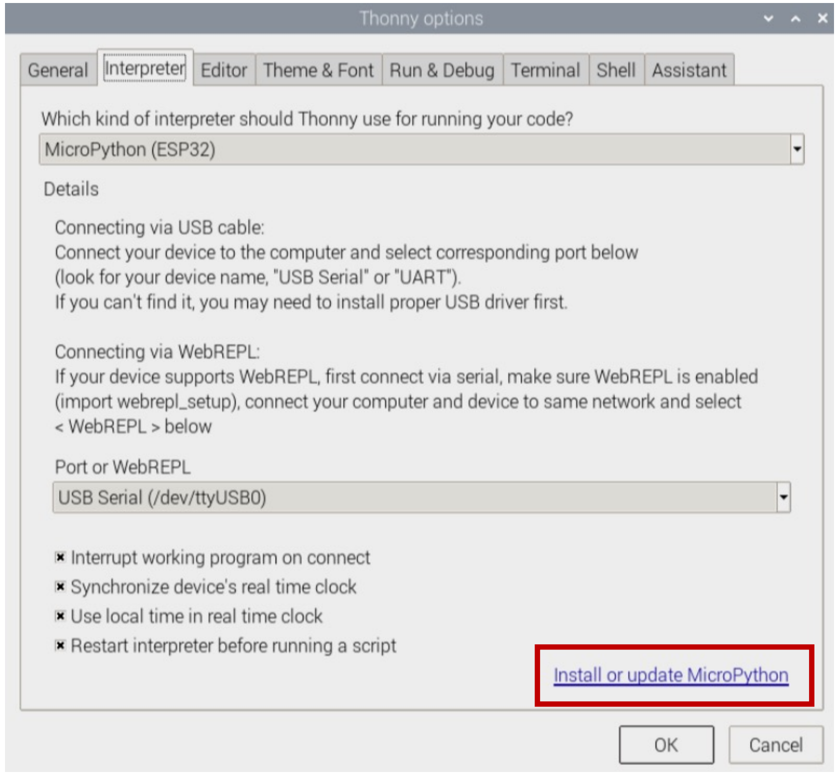


Source:
https://learn.sparkfun.com/tutorials/esp32-thing-plus-usb-c-hookup-guide/introduction

Flashing ESP32 using Thonny IDE:

1. Connect the ESP32 microcontroller using the USB cable provided and "erase the flash"
2. Flash the driver for ESP32





Thonny options

Which kind of interpreter should Thonny use for running your code?

MicroPython (ESP32)

Details

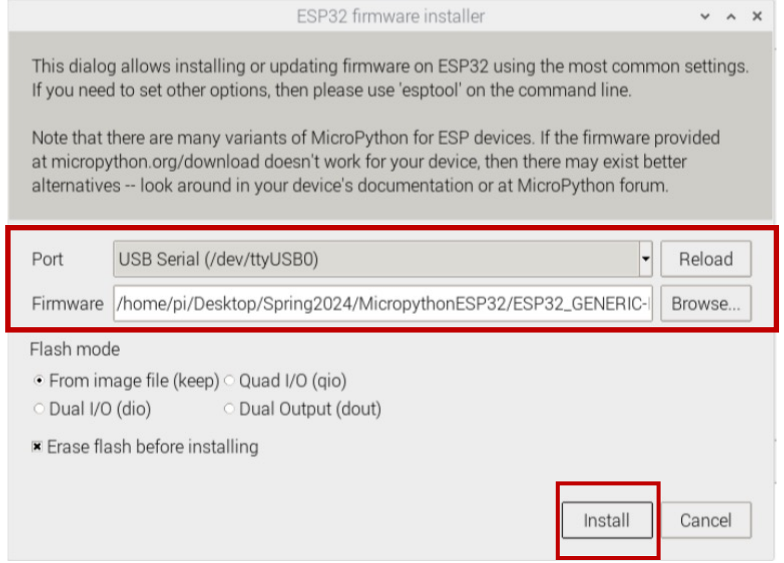
Connecting via USB cable:
Connect your device to the computer and select corresponding port below
(look for your device name, "USB Serial" or "UART").
If you can't find it, you may need to install proper USB driver first.

Connecting via WebREPL:
If your device supports WebREPL, first connect via serial, make sure WebREPL is enabled
(import webrepl_setup), connect your computer and device to same network and select
< WebREPL > below

Port or WebREPL

USB Serial (/dev/ttyUSB0)

☒ Interrupt working program on connect
☒ Synchronize device's real time clock
☒ Use local time in real time clock
☒ Restart interpreter before running a script



ESP32 firmware installer

This dialog allows installing or updating firmware on ESP32 using the most common settings.
If you need to set other options, then please use 'esptool' on the command line.

Note that there are many variants of MicroPython for ESP devices. If the firmware provided
at micropython.org/download doesn't work for your device, then there may exist better
alternatives -- look around in your device's documentation or at MicroPython forum.

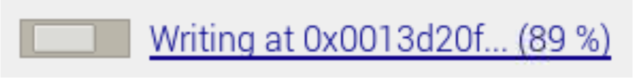
Port: USB Serial (/dev/ttyUSB0)

Firmware: /home/pi/Desktop/Spring2024/MicropythonESP32/ESP32_GENERIC-

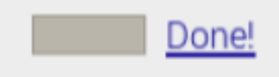
Flash mode

● From image file (keep) ○ Quad I/O (qio)
○ Dual I/O (dio) ○ Dual Output (dout)

☒ Erase flash before installing



Writing at 0x0013d20f... (89 %)



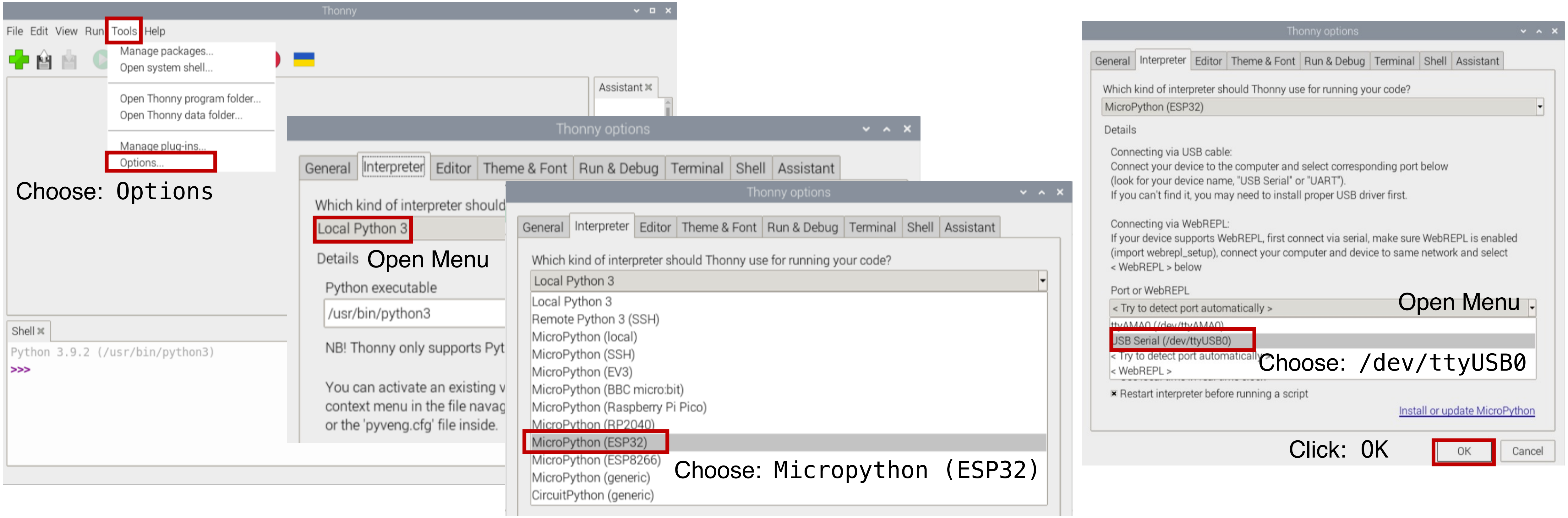
Done!

Start MicroPython interpreter on Thonny ID

Sources:
https://micropython.org
https://en.wikipedia.org/wiki/MicroPython
https://upload.wikimedia.org/wikipedia/commons/4/4e/Micropython-logo.svg

MicroPython is a software implementation of a programming language largely compatible with Python 3, written in C, that is optimized to run on a microcontroller.

Click: `Tools`



Thonny
File Edit View Run Tools Help
Manage packages...
Open system shell...
Open Thonny program folder...
Open Thonny data folder...
Manage plug-ins...
Options...
Assistant
Shell
Thonny options
General Interpreter Editor Theme & Font Run & Debug Terminal Shell Assistant
OK
Cancel

Choose: `Options`

Which kind of interpreter should

Local Python 3

Details Open Menu

Python executable

/usr/bin/python3

NB! Thonny only supports Pyt

You can activate an existing v
context menu in the file navag
or the 'pyveng.cfg' file inside.

```
Python 3.9.2 (/usr/bin/python3)
>>>
```

Which kind of interpreter should Thonny use for running your code?

Local Python 3

- Local Python 3
- Remote Python 3 (SSH)
- MicroPython (local)
- MicroPython (SSH)
- MicroPython (EV3)
- MicroPython (BBC micro:bit)
- MicroPython (Raspberry Pi Pico)
- MicroPython (RP2040)
- MicroPython (ESP32)
- MicroPython (ESP8266)
- MicroPython (generic)
- CircuitPython (generic)

Choose: `Micropython (ESP32)`

Which kind of interpreter should Thonny use for running your code?

MicroPython (ESP32)

Details

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(import webrepl_setup), connect your computer and device to same network and select
< WebREPL > below

Port or WebREPL

< Try to detect port automatically > Open Menu

- ttyAMA0 (/dev/ttyAMA0)
- USB Serial (/dev/ttyUSB0)
- < Try to detect port automatically >
- < WebREPL >

Choose: `/dev/ttyUSB0`

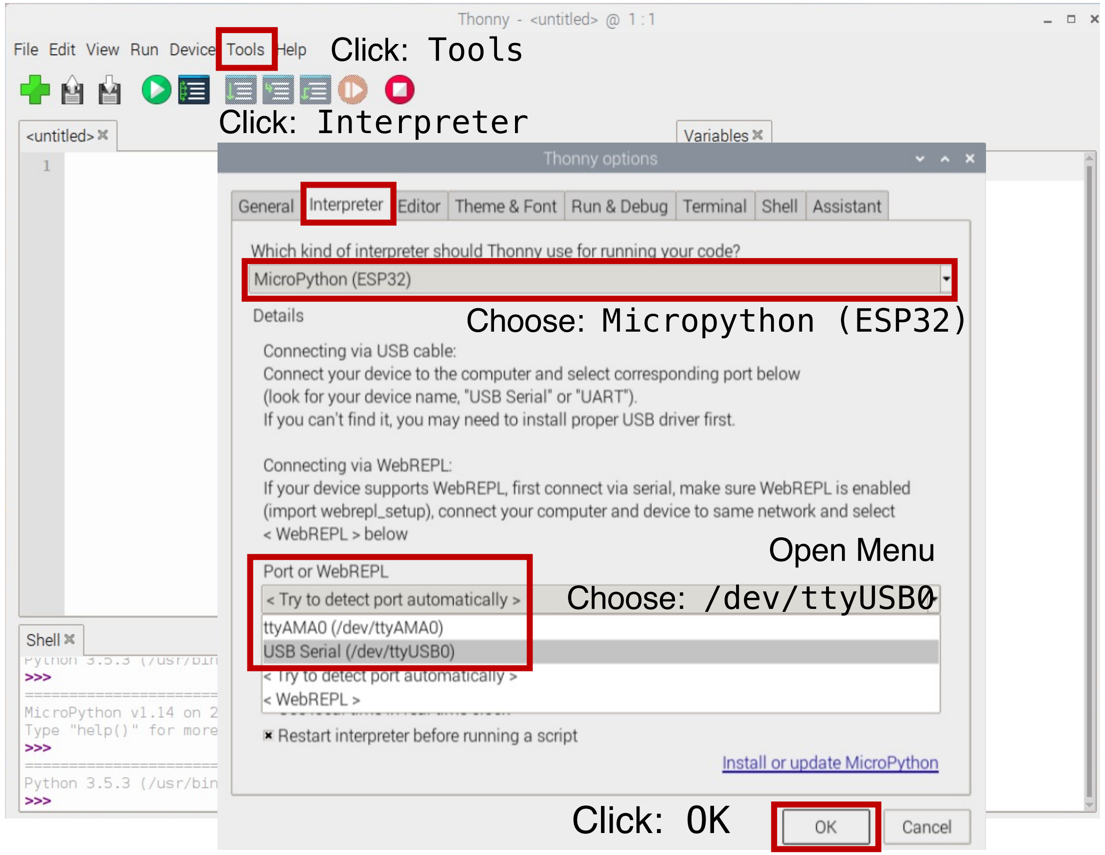
☒ Restart interpreter before running a script

Install or update MicroPython

Click: OK

Practice step: Repeat previous step to set up MicroPython interpreter on Thonny IDE

Sources:
https://micropython.org
https://en.wikipedia.org/wiki/MicroPython
https://upload.wikimedia.org/wikipedia/commons/4/4e/Micropython-logo.svg



Thonny - <untitled> @ 1 : 1
File Edit View Run Device Tools Help
<untitled>
Variables
Shell
Thonny options
General Interpreter Editor Theme & Font Run & Debug Terminal Shell Assistant
OK
Cancel

Click: Tools

Click: Interpreter

Which kind of interpreter should Thonny use for running your code?

MicroPython (ESP32)

Choose: Micropython (ESP32)

Details

Connecting via USB cable:
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(import webrepl_setup), connect your computer and device to same network and select
< WebREPL > below

Port or WebREPL

< Try to detect port automatically >

Open Menu

- ttyAMA0 (/dev/ttyAMA0)
- USB Serial (/dev/ttyUSB0)
- < Try to detect port automatically >
- < WebREPL >

Choose: /dev/ttyUSB0

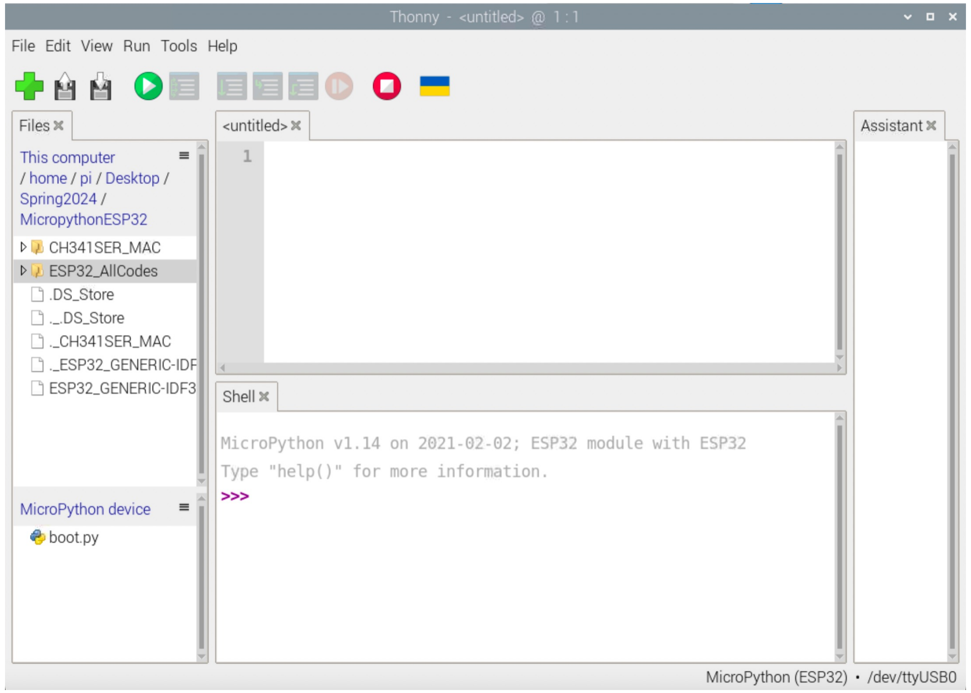
☒ Restart interpreter before running a script

Install or update MicroPython

Click: OK

```
Python 3.5.3 (/usr/bin
>>>
======================
MicroPython v1.14 on 2
Type "help()" for more
>>>
======================
Python 3.5.3 (/usr/bin
>>>
```

Thonny is set to use the MicroPython interpreter



```
MicroPython v1.14 on 2021-02-02; ESP32 module with ESP32
Type "help()" for more information.
>>>
```

MicroPython (ESP32) • /dev/ttyUSB0

Setting up the ESP32 Webserver and Access Point

- You will need to execute Python codes using the Micropython interpreter on Thonny
- Git-clone codes provided to you
- You will need two codes that should be flashed to the ESP32 from the Raspberry Pi 4B
    - boot.py
    - main.py
- You can work in groups if you like to complete the graded in-class exercise [10 points]