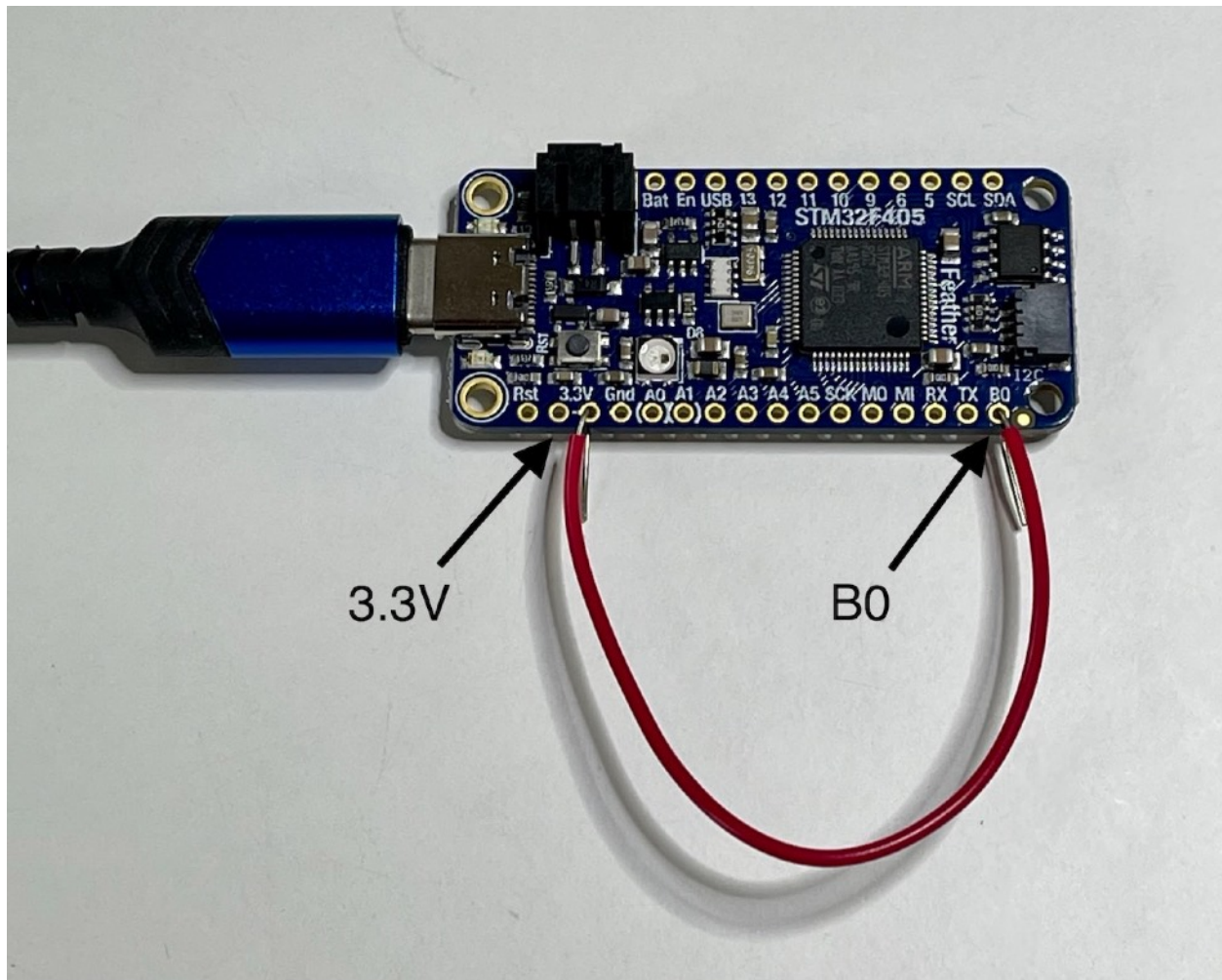


Hello and welcome to STELLA!

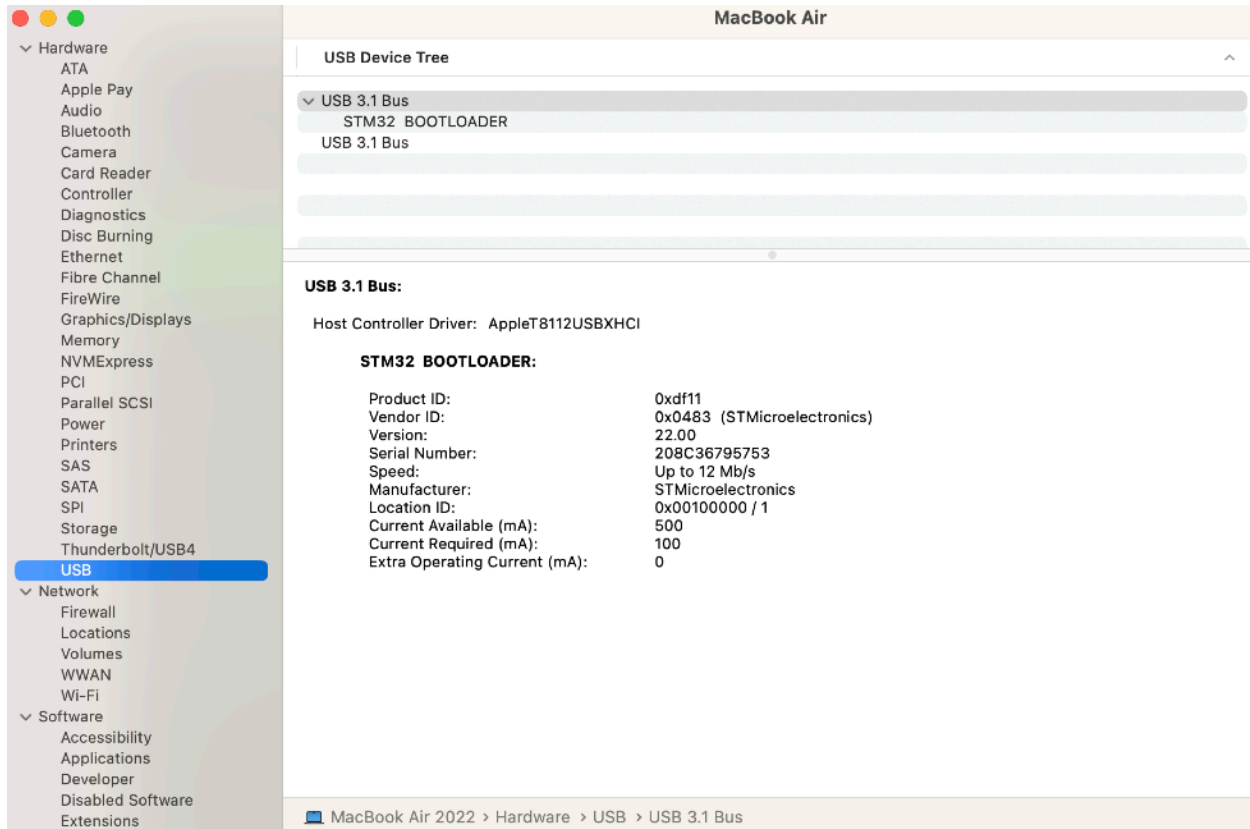
Let's program your STELLA-AQ:

First thing, let's put the CircuitPython operating system onto the microcontroller. The microcontroller is an Adafruit Industries Feather STM32F405. We're following the instructions on this webpage: <https://learn.adafruit.com/adafruit-stm32f405-feather-express/dfu-bootloader-details>

With the microcontroller disconnected from the computer, use a piece of wire to temporarily connect the B0 via to the 3.3V via. When plugged in, the microcontroller powers up into bootloader mode.



Once it's powered up, check that the bootloader appears in the device listing:  
Click on the Apple icon on the upper left of the screen.  
Choose: About this Mac  
Choose: More Info  
Choose: General, scroll down to choose System Report  
Choose: USB  
Confirm that the STM32 BOOTLOADER shows in the USB device tree.



Check that you have HomeBrew installed:  
Applications, Utilities, Terminal

% brew -v

if you have brew, the response will be something similar to this:  
Homebrew 3.6.etc

if you don't, the response will be that no brew is found.

If brew is not found, install it:

To install Homebrew, we will use the command:

```
% /bin/bash -c "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/HEAD/install.sh)"
```

which we find at the Homebrew source webpage: <https://brew.sh>

The system will ask for your password, since you need Super User access to install Brew. ("sudo")

==> This script will install:

/opt/homebrew/bin/brew

/opt/homebrew/share/doc/homebrew

STELLA-AQ programming:  
Load CircuitPython, Apple Mac.

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Paul Mirel

```
/opt/homebrew/share/man/man1/brew.1  
/opt/homebrew/share/zsh/site-functions/_brew  
/opt/homebrew/etc/bash_completion.d/brew  
/opt/homebrew  
Press enter to accept this installation.
```

We need one more preparatory step before we can install CircuitPython. Install the DFU utility with the following command:  
% brew install dfu-util

Now that we have Brew and DFU installed, we can install the binary file ("BIN") that puts CircuitPython on the microcontroller.

Get the CircuitPython file from this webpage: [https://circuitpython.org/board/feather\\_stm32f405\\_express/](https://circuitpython.org/board/feather_stm32f405_express/)  
Download the latest BIN file.

Move that file from Downloads into the directory you are running terminal in.  
Run this command in terminal, replacing the "firmware.bin" with the full filename of the CircuitPython file you just downloaded.  
% dfu-util -a 0 --dfuse-address 0x08000000 -D firmware.bin

The command looks like this.  
% dfu-util -a 0 --dfuse-address 0x08000000 -D adafruit-circuitpython-feather\_stm32f405\_express-en\_US-etc.bin

You'll see this:  
Downloading element to address = 0x08000000, size = 550496  
Erase [=====] 100% 550496 bytes  
Erase done.  
Download [=====] 100% 550496 bytes  
Download done.  
File downloaded successfully

Phew! Now remove the wire from between B0 and 3.3V, and unplug the microcontroller from the computer, and then plug it in again.

The microcontroller will flash a yellow light, and the CIRCUITPY drive for this device will appear in your Finder tree, under Locations. If you don't see it, click on the flippy triangle for Locations, to expand that list, and CIRCUITPY should show up.

Programming the STELLA-AQ is the easy part. Copy the contents of the STELLA-AQ\_code\_and\_libraries folder onto the CIRCUITPY drive. When it asks if you want to replace the ones that are already there, say yes. That's it. Now STELLA-AQ should boot normally.