General Info

The following should be taken as an overall guide on what you are going to be achieving.

PLEASE DO NOT TAKE THE SCREENSHOTS/CONFIGURATIONS ON THIS PAGE EXACTLY AS WRTTEN AS THEY MAY NOT BE COMPATIBLE WITH YOUR PARTICULAR MAINBOARD

Before doing anything it is good to have some dependencies installed. Do this by running these on your Pi:

```
sudo apt update
sudo apt upgrade
sudo apt install python3 python3-serial
```

> If you get an error along the lines of "unable to locate package python3-serial" then you may be on an older version of linux.
>
> In that case, run:
>
> `sudo apt install python3-pip`
>
> then
>
> `pip3 install pyserial`

Installing Katapult

First you need to clone the Katapult repo onto your pi. Run the following commands to clone (or update) the repo:

```
test -e ~/katapult && (cd ~/katapult && git pull) || (cd ~ && git clone https://github.com/Arksine/katapul
```

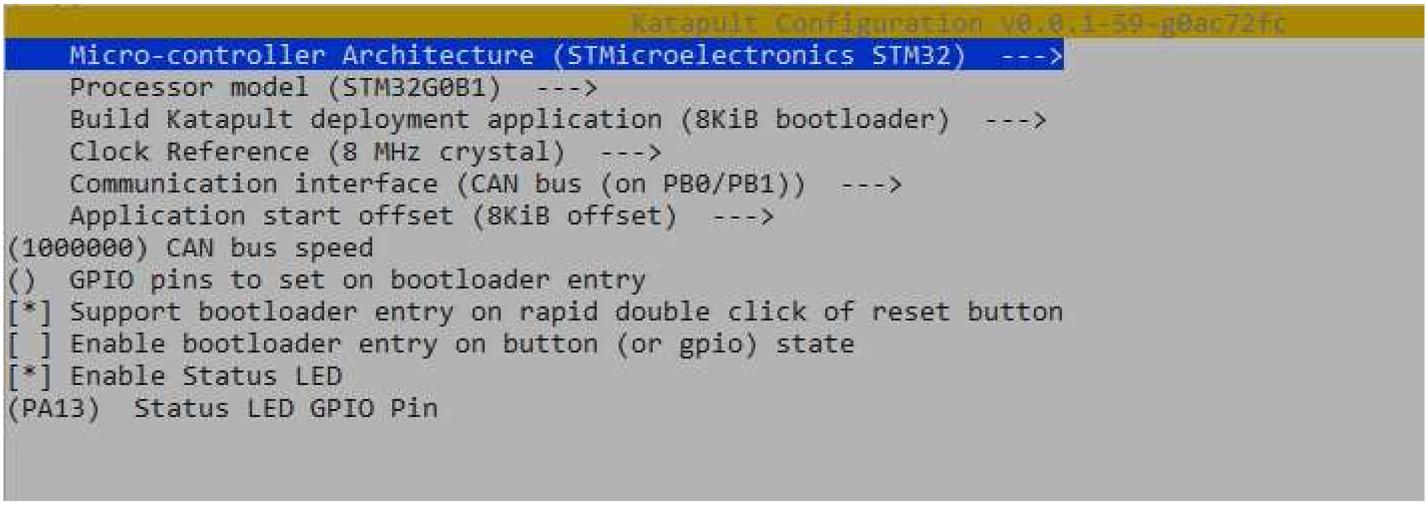
This will clone the Katapult repo into a new folder in your home directory called "katapult" if you don't already have it, or it will update your Katapult folder to the latest version if you did already have it.

To configure the Katapult firmware, run these commands to change into the katapult directory and then modify the firmware menu:

```
cd ~/katapult
make menuconfig
```

You will need to adapt the below instructions so they cover *your* board's specicific configuration. You can find screenshots of settings for common toolheads in the Common Toolhead Hardware section.

If your board doesn't exist in the common_hardware folder already, then you want the Processor, Clock Reference, and Application Start offset to be set as per whatever board you are running. You can leave the "Build Katapult deployment application" set or not set (it makes not difference at this flashing stage, it's only for updating), and make sure "Communication Interface" is set to "CAN Bus" with the correct pins for your toolhead board. Also make sure the "Support bootloader entry on rapid double click of reset button" is marked. It makes it so a double press of the reset button will force the board into Katapult mode. Makes re-flashing after a mistake a lot easier. Lastly, setting the Status LED GPIO Pin won't affect how katapult functions, but it will give a nice visual indicator (of an LED flashing on and off once a second) on the toolhead to show the board is sitting in Katapult mode.



```
                                  Katapult Configuration v0.0.1-59-g0ac72fc
    Micro-controller Architecture (STMicroelectronics STM32)  --->
    Processor model (STM32G0B1)  --->
    Build Katapult deployment application (8KiB bootloader)  --->
    Clock Reference (8 MHz crystal)  --->
    Communication interface (CAN bus (on PB0/PB1))  --->
    Application start offset (8KiB offset)  --->
(1000000) CAN bus speed
()  GPIO pins to set on bootloader entry
[*] Support bootloader entry on rapid double click of reset button
[ ] Enable bootloader entry on button (or gpio) state
[*] Enable Status LED
(PA13)  Status LED GPIO Pin
```

Compile the firmware with `make`. You will now have a katapult.bin (or katapult.uf2) in your ~/katapult/out/ directory.

```
make
```

To flash, connect your toolhead board to the Pi via USB then put the toolhead board into DFU/BOOT mode (your toolhead board user manual should have instructions on doing this).

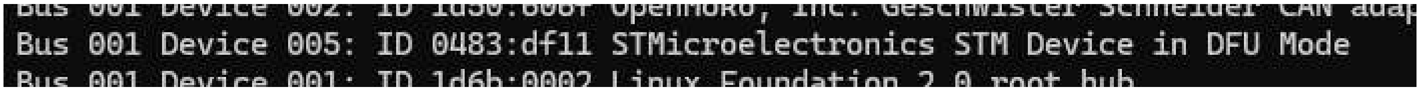
If your toolhead board uses an STM32 based MCU use these flashing steps

If your toolhead board uses an RP2040 MCU, use these flashing steps

STM32 based boards

To confirm it's in DFU mode you can run the command lsusb and look for an entry of "STMicroelectronics STM Device in DFU mode"

```
lsusb
```



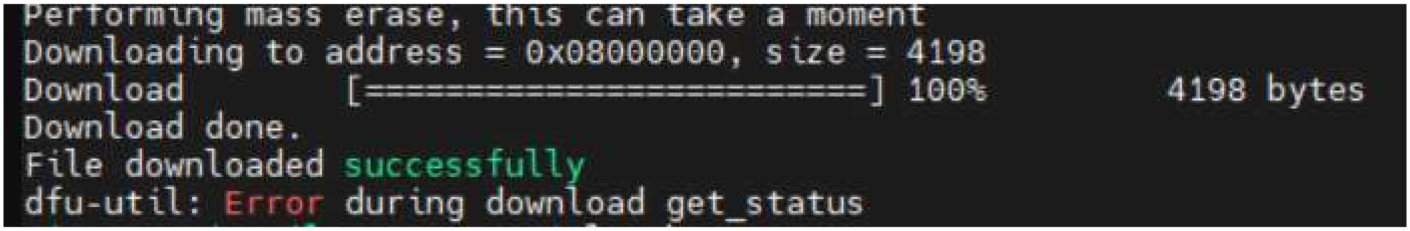
```
Bus 001 Device 002: ID 1d50:606f OpenMoko, Inc. Geschwister Schneider CAN adap
Bus 001 Device 005: ID 0483:df11 STMicroelectronics STM Device in DFU Mode
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
```

You can then flash the Katapult firmware to your toolhead board by running

```
sudo dfu-util -R -a 0 -s 0x08000000:mass-erase:force:leave -D ~/katapult/out/katapult.bin -d 0483:df11
```

If the result shows an "Error during download get_status" or something, but above it it still has "File downloaded successfully" then it still flashed OK and you can ignore that error.

> If you get a different error and do **not** see a "File downloaded successfully" then try:
>
> `sudo dfu-util -R -a 0 -s 0x08000000:leave -D ~/katapult/out/katapult.bin -d 0483:df11`



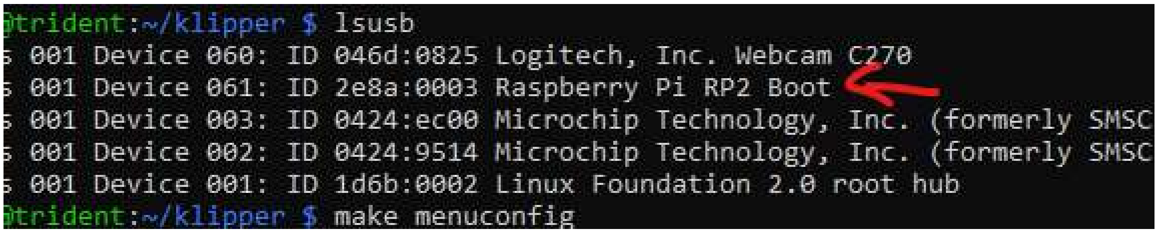
```
Performing mass erase, this can take a moment
Downloading to address = 0x08000000, size = 4198
Download        [=========================] 100%         4198 bytes
Download done.
File downloaded successfully
dfu-util: Error during download get_status
```

Katapult is now installed, click here for the next steps.

RP2040 based boards

To confirm it's in BOOT mode, run an `lsusb` command and you should see the device as a "Raspberry Pi boot" device (or similar)

```
lsusb
```



```
@trident:~/klipper $ lsusb
s 001 Device 060: ID 046d:0825 Logitech, Inc. Webcam C270
s 001 Device 061: ID 2e8a:0003 Raspberry Pi RP2 Boot
s 001 Device 003: ID 0424:ec00 Microchip Technology, Inc. (formerly SMSC
s 001 Device 002: ID 0424:9514 Microchip Technology, Inc. (formerly SMSC
s 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
@trident:~/klipper $ make menuconfig
```

> Note the address of the usb device => 2e8a:0003

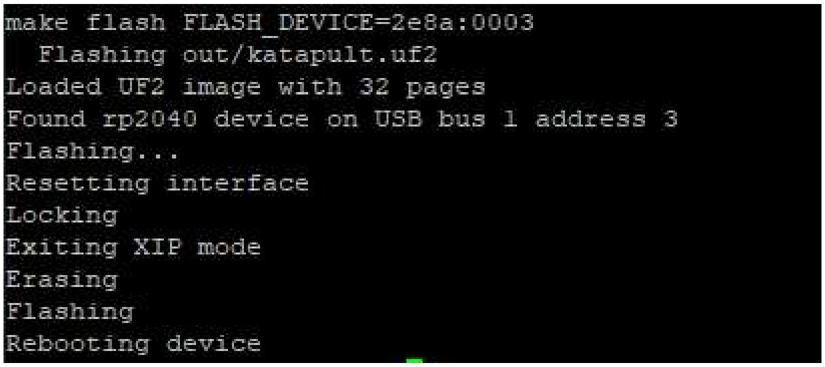
You can then flash the Katapult firmware to your toolhead board by running

```
cd ~/katapult

make flash FLASH_DEVICE=2e8a:0003
```

where the FLASH_DEVICE ID is what you noted down from the `lsusb` command.

It should look something like this if the download was successfull



```
make flash FLASH_DEVICE=2e8a:0003
  Flashing out/katapult.uf2
Loaded UF2 image with 32 pages
Found rp2040 device on USB bus 1 address 3
Flashing...
Resetting interface
Locking
Exiting XIP mode
Erasing
Flashing
Rebooting device
```

Katapult is now installed, click here for the next steps.

Katapult is now installed

Katapult should now be successfully flashed.

Shut down your Pi (`sudo shutdown now`) and then power off your entire printer.

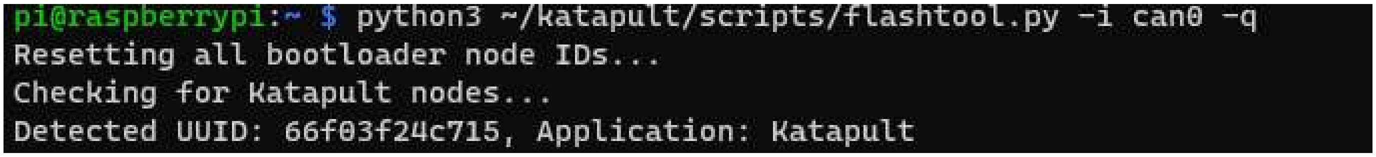
```
sudo shutdown now
```

Take out any DFU jumpers on your toolhead (if it needed them) and then wire up your toolhead power (24v and gnd) and CAN (CANH/CANL) wires, then power your printer back up.

Run the following command to see if the toolhead board is on the CAN network and waiting in Katapult mode

```
python3 ~/katapult/scripts/flashtool.py -i can0 -q
```

You should see a "Found UUID" with "Application: Katapult". If you don't see it, try double-clicking the reset button on your toolhead board to force it into katapult mode.



```
pi@raspberrypi:~ $ python3 ~/katapult/scripts/flashtool.py -i can0 -q
Resetting all bootloader node IDs...
Checking for Katapult nodes...
Detected UUID: 66f03f24c715, Application: Katapult
```

If you see the above, take note of the UUID and move on to flashing Klipper to the toolhead board.

If you do *not* see a UUID here with "Application: Katapult" (if you are using usb-can-bridge mainboard then you may see your Mainboard UUID with "application:klipper", **this is different and not what we are looking for**) then the first thing to do is to double-click the reset button on your toolhead and then check again.

If you still don't see it then go back to the Installing Katapult section and try again, making sure the Katapult `make menuconfig` settings are *absolutely* correct for your toolhead board.

If still no luck then check the no_uuid troubleshooting page for things to try.

DO NOT CONTINUE until you can see your toolhead UUID with "application:katapult" when running `python3 ~/katapult/scripts/flashtool.py -i can0 -q`

Installing Klipper

Move into the klipper directory on the Pi by running:

```
cd ~/klipper
```

Then go into the klipper configuration menu by running:

```
make menuconfig
```

Again, if your toolhead is already in Common Toolhead Hardware then you can copy the Klipper settings from there.

Otherwise, you want the Processor and Clock Reference to be set as per whatever board you are running. Set Communication interface to"CAN Bus" with the correct pins for your toolhead board. Also set the CAN bus speed to the same as the speed in your can0 file. In this guide it is set to 1000000.

Once you have the firmware configured, run a

```
make clean
```

to make sure there are no old files hanging around, then

```
make
```

to compile the firmware. It will save the firmware to ~/klipper/out/klipper.bin

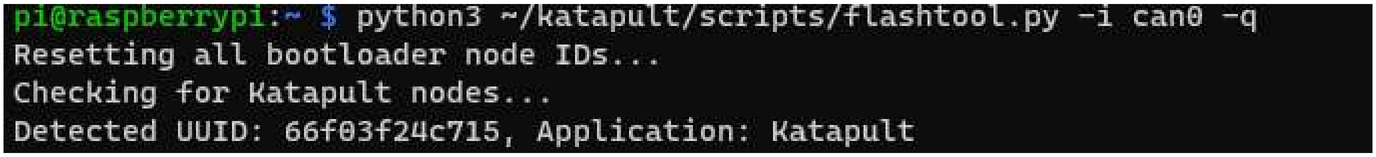
Using Katapult to flash Klipper

Stop the Klipper service on the Pi by running:

```
sudo service klipper stop
```

Run the following query command and take note of the Katapult device that it shows:

```
python3 ~/katapult/scripts/flashtool.py -i can0 -q
```



```
pi@raspberrypi:~ $ python3 ~/katapult/scripts/flashtool.py -i can0 -q
Resetting all bootloader node IDs...
Checking for Katapult nodes...
Detected UUID: 66f03f24c715, Application: Katapult
```

Then run the following command to install klipper firmware via Katapult. Use the UUID you just retrieved in the above query.

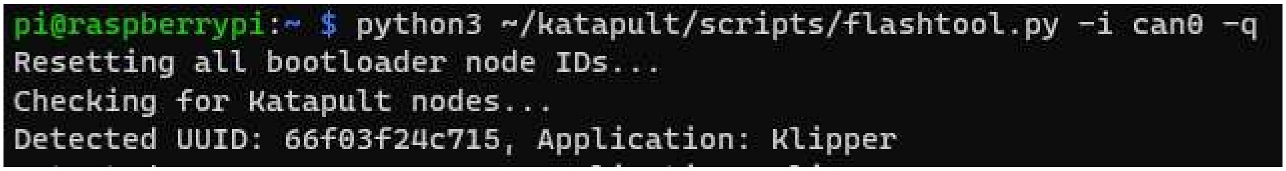
```
python3 ~/katapult/scripts/flashtool.py -i can0 -f ~/klipper/out/klipper.bin -u youruuid
```

where the "-u" ID is what you found from the "flashtool.py -i can0 -q" query.

Once the flash has been completed you can run the

```
python3 ~/katapult/scripts/flashtool.py -i can0 -q
```

command again. This time you should see the same UUID but with "Application: Klipper" instead of "Application: Katapult"



```
pi@raspberrypi:~ $ python3 ~/katapult/scripts/flashtool.py -i can0 -q
Resetting all bootloader node IDs...
Checking for Katapult nodes...
Detected UUID: 66f03f24c715, Application: Klipper
```

If you do *not* see "Application:Klipper" for the **same** UUID that was previously showing as "Application:Katapult" then the Klipper didn't flash properly or you had the wrong settings for the Klipper firmware.

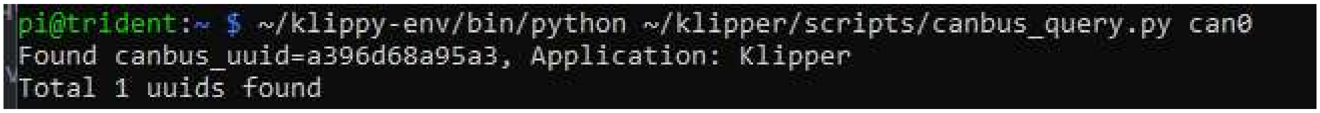
Double-click the RESET button on your toolhead to force it back into DFU mode then go back to Installing Klipper section and try again, making sure the Klipper `make menuconfig` settings are *absolutely* correct for your toolhead board.

> If your toolhead board doesn't *have* a RESET button then you'll have to go all the way back to the Installing Katapult sections and reflash Katapult via USB again, then try the Installing Klipper steps.

Klipper is now installed

You can now run the Klipper canbus query to retrieve the canbus_uuid of your toolhead board:

```
~/klippy-env/bin/python ~/klipper/scripts/canbus_query.py can0
```



```
pi@trident:~ $ ~/klippy-env/bin/python ~/klipper/scripts/canbus_query.py can0
Found canbus_uuid=a396d68a95a3, Application: Klipper
Total 1 uuids found
```

Use this UUID in the [mcu] section of your printer.cfg in order for Klipper (on Pi) to connect to the toolhead board.

Start the Klipper service on the Pi again by running:

```
sudo service klipper start
```

Next Step

Congratulations! Everything is now flashed. Time to move on to the final steps.