

TARINA MANUAL

Step by step build instructions for a 3D printable Raspberry Pi video camera. Now, this is still a work in progress and documentation is on its way, if you're in a hurry feel free to drop a message in #tarina:bennysmatrixchat.ddns.net



Figure 1: Filming with Tarina

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The interface

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[Building, repairing & modding]

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Introduction

The interface focuses on presenting the essentials for film making in one menu that is present and accessible all the time. You can control the interface with a keyboard or with 9 physical buttons; Enter, Up, Down, Left, Right, Record, Retake, View and Remove.



Figure 2: Tarina UI

Keys

Buttons

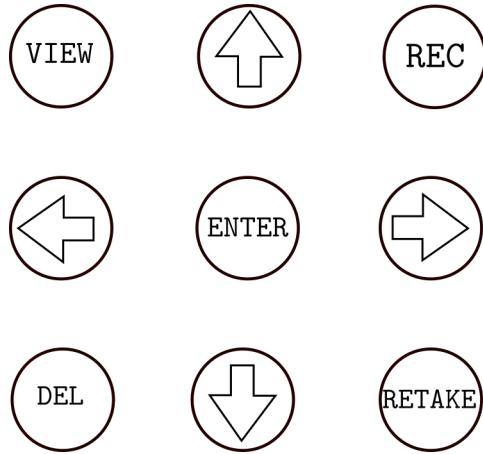


Figure 3: Buttons

Keyboard

The enter key has some special elements. (Improvement) Will write out on the last row a help for each menu.

With keys up and down you change a specific setting for example shutter speed. With keys left and right you change what settings to change. With view, you can view the last shot or if you have a specific scene highlighted the camera would automatically glue all shots together and play that scene for you, same goes for film. With remove you can remove a specific take, shot, scene or film. With the retake button you retake a bad take, this is how the camera keeps track of your good takes. As of now the last take is always chosen.



Figure 4: Buttons

Menus

A short explanation of all the settings and why they are where they are.

Film, scene, shot and take

This you don't see on other cameras because they don't care about what you're filming however this camera does and it wants to know where you are in your filmmaking process and help put it together. Of course this means that *you* have to know where you are in your filmmaking process. The idea of the workflow is: film only the essentials, check your montage on the spot and do a retake if you need to fix something. Rather than filming a bunch of things and fixing it later.

Shutter, iso, red, blue

Shutter and iso are well known basic camera concepts. With red and blue you control the colors. If you press enter while on any of these then it will go into auto mode and if you press it again it will go back to manual mode with the current auto settings. I'm using this feature to quickly find a reasonable good value before I'm locking and tuning the settings manually to my likings. Cuz you always will know better than the robots!

Bright, cont, sat

Color grade on the go with brightness, contrast and saturation. You will probably have to play with these to figure out what you want. Remember that as you're making your film ready while you're shooting it take by take, there's no color grading later on so you'll have to settle on your color grade before you film. To get that good old spaghetti western look go with the contrast at -19.

Flip, beep, lenght

If you go gonzo, flippin it is the way to go! Beep is a countdown timer from the moment you press rec or retake to when it actually starts filming. Lenght let's you put in the lenght of your take before you actually start filming. Both of these are very useful if you film action alone and can't reach for the buttons.

Mic, phones, comp and dub

Control teh level of your mic and headphones. Comp is a basic compressor to get really get your message across we need to hear ya so it's quite harsh as of the moment im writing this manual. But I like it when it goes crackling up abit like in the good old 70s cinema. Dub is a recent feature as well and it does what it says. Do an audio dubbing over your film, make some music or whatever ya like. I'll do a scene based dub sometime in the future for sure, should not be that hard to implement (I hope).

Timelapse

Do a timelapse when you need to tell about time. There's an undermenu here where you can choose the intervall of the takes, now this isn't really a traditional timelapse with pictures it will instead do a 0.1 sec video at each intervall or it can be set to your likings but 0.1 is good for a traditional timelapse effect. At the bottom of the screen is a calculation of how long the clip will be if you do the timelapse for an hour. I'd say don't over do it a 10 - 20 clip is already quite a stretch but its up to you, you're the director.

Lens

A future implementation of lens shade correction will come where you get to do your own lens corrections to get those colors right on the spot.

Dsk, shutdown, srv, wifi

Disk space, showing you how much of space left on your sd card. Shutdown when your done. Srv is a network server, if your connected to a network and put this on you should be able to go to any browser on any device and watch your movie films if you've rendered them first, just go to <http://tarina.local>. If you press enter on wifi you will be transported to a glorious program called Wicd curses, here you really need to have a keyboard to set up your connections. Hints are down on the screen what buttons to press.

Update and upload

Update the camera to the most exclusive version, this is still pretty much a-work-in-progress and as a warnign expect some bugs. But don't worry I'll be improving things but it takes time. Upload your film to the web, there is a youtube uploader mod you can install but you'll have to do some configs to make it work for you. Details in the mods directory.

Backup

It's good to always backup your stuff! Plug in your usb drive and just press enter and sit back and relax as the wonderful work of computer copying does the magic. While your at it open a beer cuz it can take quite a while if you got much stuff on there. Now, this should be working on almost all hard drives but there are some that still use a very old file system called fat, and its as lazy as its given name and doesnt store critical information we would want, because we want the copying to only copy our new takes or retakes. So please use new drives like ntfs systems or ext or whatever they all are called. You'll find all you takes even the shitty ones on your harddrive in a directory called /tarinafilms/. One more thing, there are some drives that are very powerhungry and doesnt come with it's own power source, now these drives are very bad for this particular use because the Tarina has limited amounts of power for usb use, so to be sure it's gonna work, use a powered hard drives with its own power cord.

Load and new

You can have many on going films, load em up or start as many films as you like.

Features to come

Now I've already talked about some features that'll be implemented but three very important ones that you can expect in the near future are Yank(copy), Insert and Move.

Building, repairing and modding

Get the parts



Figure 5: Tarina parts layed out

Here is a list of parts that will work, there are other parts that probably will work but this is what I recommend.

Raspberry pi 3 B

Price ~30 eur

The heart of Tarina. Why Raspberry pi you ask? There are several reasons:

- Huge support.
- The great Debian based os Raspbian (beeing a debian nerd myself).
- Low price.
- Picamera.

The 3B+ is too powerhungry for the Powerbooster 1000C thats why I went with 3B

[Links](#) Raspberry pi site [Buy](#) Aliexpress

Arducam 5 MP OV5647 camera module with CS lens

Price ~30 eur

This module and lens gives good hd video quality with the ability to manually focus and replace lenses. See tested lenses down below.

Links Arducam **Buy** ebay

Ugeek 3.5 inch 800x480 TFT Screen

Price ~35 eur

Best 3.5 inch screen that I could find. Features worth mentioning:

- 800x480 pixels
- Very responsible 11 ms.
- High contrast.
- Sunlight readable.
- I2C Master.

This is not a touchscreen but I dont think touchscreens are good for cameras anyway.

Links Raspberrypiwiki **Buy** Aliexpress

USB via vt1620a sound card

Price ~1 eur

Really cheap usb soundcard. It has been working suprisingly well. Have not tested other cards yet.

Buy Aliexpress

3.7v 7800mAh li-ion Battery

Price ~17 eur

I have tried several batteries, the adafruit 6800mAh is also fine.

Buy Aliexpress

Adafruit Powerboost 1000C

Price ~23 eur

This is the only power board that I could find with the feature to run the camera and charge it at the same time.

Links Adafruit **Buy** Ebay

8x8x5MM DIP-4 Silicone Switch Mute Silent button

Price ~2 eur/20 pcs

You can only buy a pack of 20 pcs but these buttons are good and silent! Not necessary if you want to control with keyboard like Rii mini 8+

Buy Ebay

MCP23017-E/SP DIP-28 16 bit I / O expander I2C

Price ~1 eur

This will be connected to the screen I2C port. This is not necessary if you intend to control the camera with a keyboard like the Rii mini i8+

Buy Aliexpress

2x8cm double side copper prototype pcb

Price ~0.20 eur/pcs

PCB board to solder all connections on the MCP23017-E/SP

Buy Aliexpress

Piezo electronic buzzer

Price ~1 eur

Very useful for timing shots!

Buy Aliexpress

Latching push button switch mini

Price ~1 eur/10 pcs

This serves as the microphone and screen on/off button

Buy Aliexpress

Latching push button switch 10mm

Price ~5 eur/24 pcs

I use this as the powerbutton. I have tried different versions of safe shutdown buttons for the Raspberry pi but they have not worked as I wanted (they draw power even when Pi is powered off, this is not good). I have solved the problem with a menu button to safely shut down the camera.

Buy Aliexpress

Nut 1/4 -20 UNC 304 A2

Price ~2 eur/10 pcs

This is the standard camera stand nuts. If you never use a stand then you dont need this.

Buy Ebay

MAX9812 Microphone amplifier

Price ~2 eur

This makes surprisingly good sounding sound!

Buy Aliexpress

3.5mm Female stereo headset interior PCB mount

Price ~1 eur/10 pcs

Microphone input.

Buy Ebay

LR44 Batteries

Price ~2 eur/10 pcs

Microphone batteries

Buy Aliexpress

Screws M3x12mm

Price ~2 eur/25 pcs

These hold the camera together.

Buy Your local hardware store Motonet (store in Finland) Ebay

Screws M3x30mm

Price ~2 eur/30 pcs

These hold picamera-body to the body.

Buy Ebay

Screws 2.2x9.5mm

Price ~1 eur/20 pcs

These hold the camera/mic together.

Buy Your local hardware store Hobbycenter (store in Finland)

LR44 Button cell socket holder

Price ~1 eur/pcs

We only need the metal parts from these, if you have some thin metal you could cut these yourself.

Buy Aliexpress

3.5mm Jack to jack aux cable

Price ~1 eur

From microphone to mic-in.

Buy Aliexpress

Rii mini i8+ mini keyboard

Price ~17 eur

Wireless control over camera. You will also need this for wifi settings etc. (Recommended) This is one of the best mini keyboards I've tried.

Buy Aliexpress

Parts grand total ~200 eur

3d printing

While waiting for ordered parts lets 3d print the rest of the parts. I recommend printing with a solid 90% infill. Now it is pretty crucial that you have a good calibrated printer so that you don't over/under print. Some parts need to be very precise to work.

You'll find all the 3d parts in the 3d folder.

- body
- button-plate-bottom
- button-plate-upper
- hdmi-cap
- left-side
- mic-body
- mic-lid
- picamera-body
- picamera-body-lid
- picamera-bridge
- right-side
- screen-lid

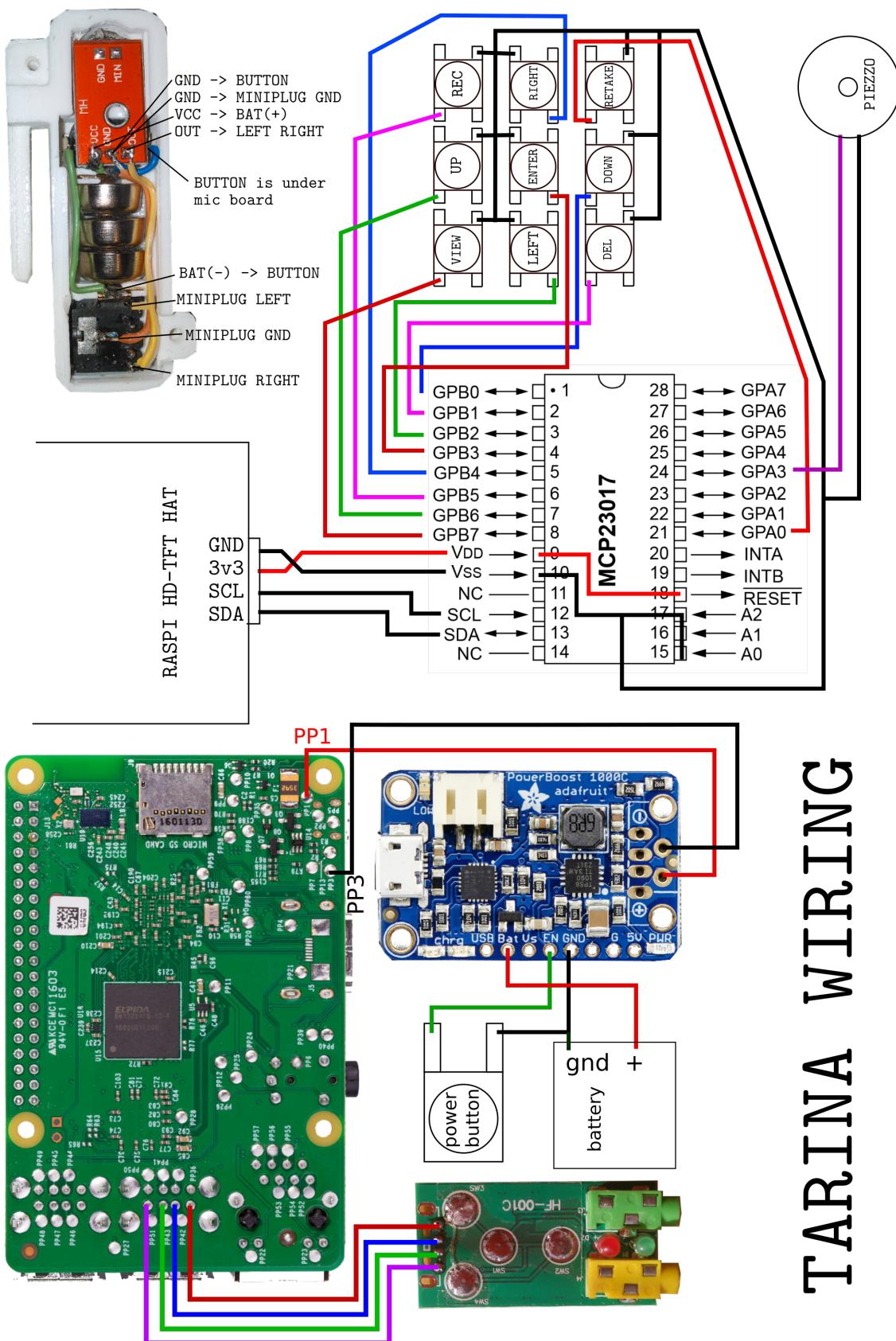
Post processing

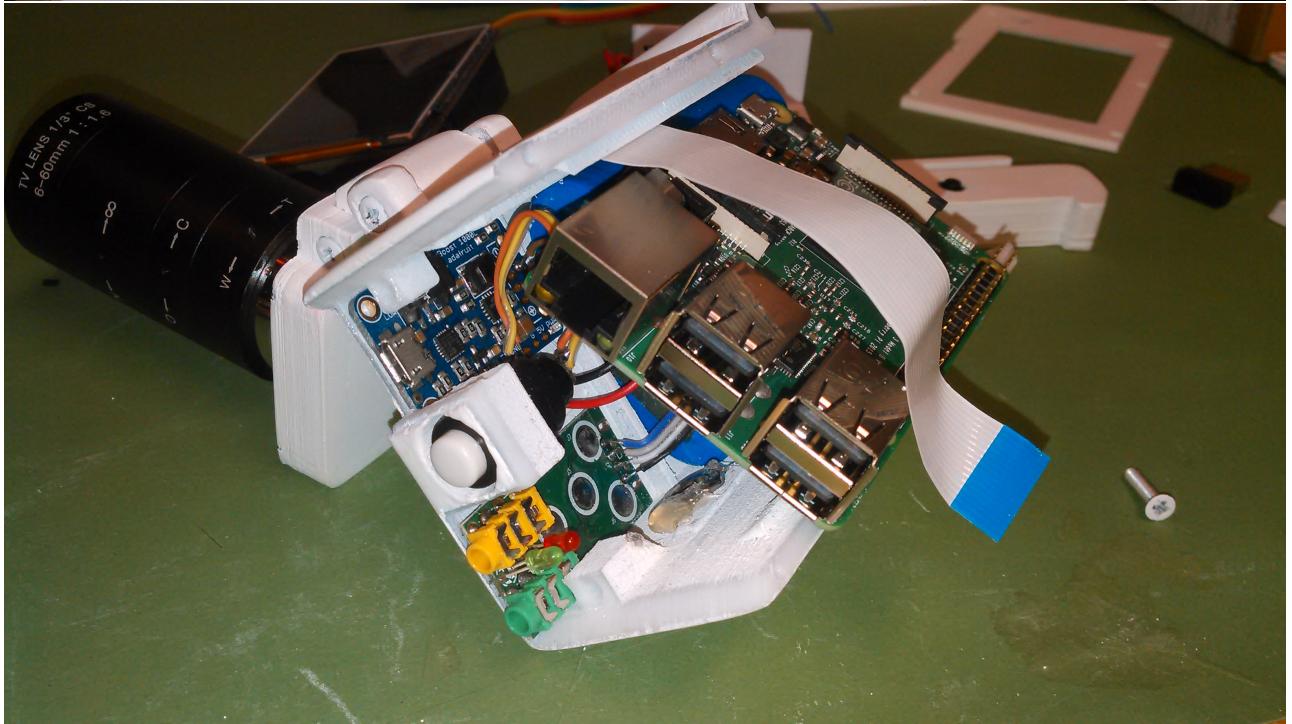
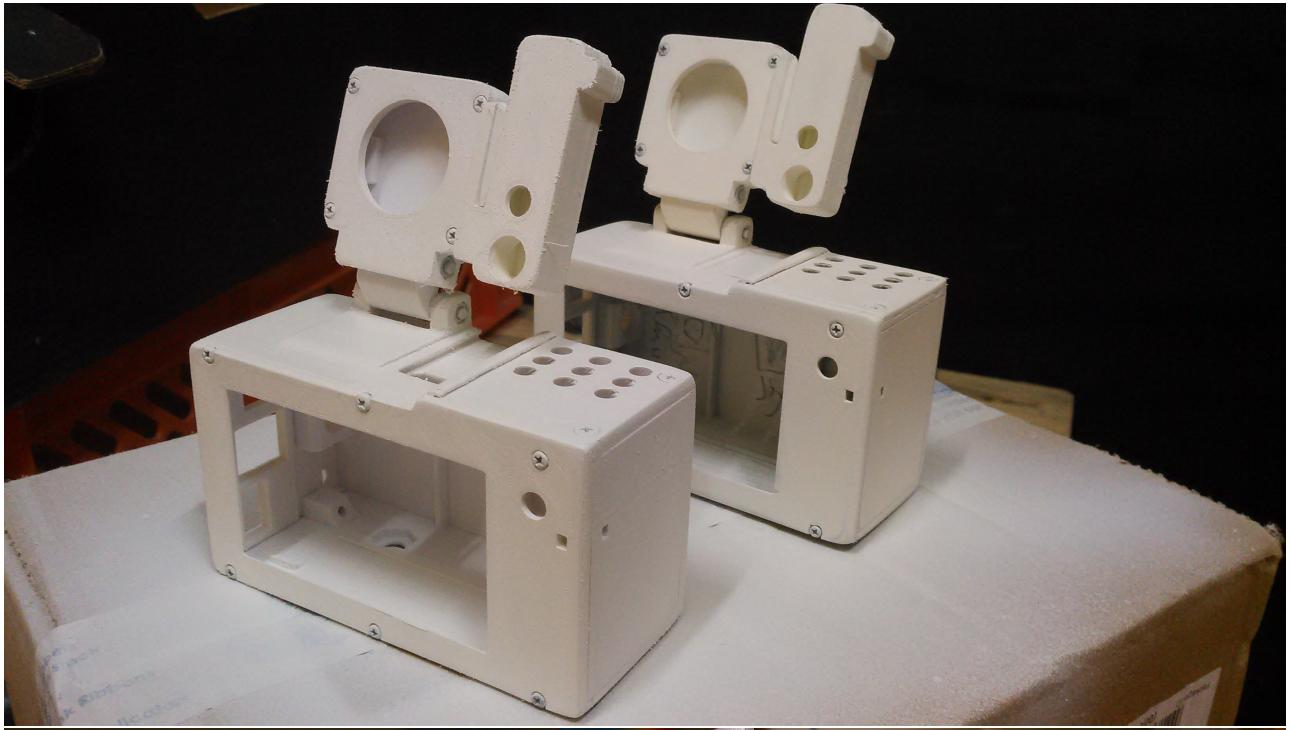
This is still a work in progress...

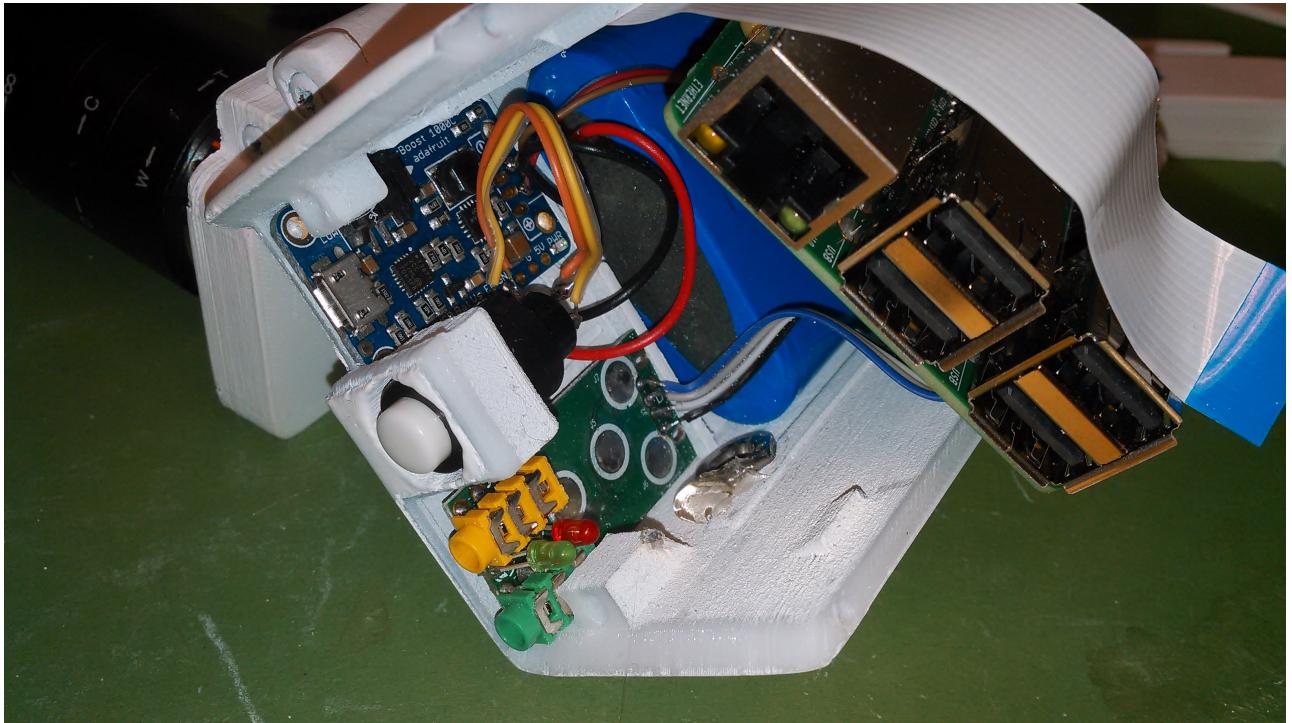
So far I've come to this conclusion:

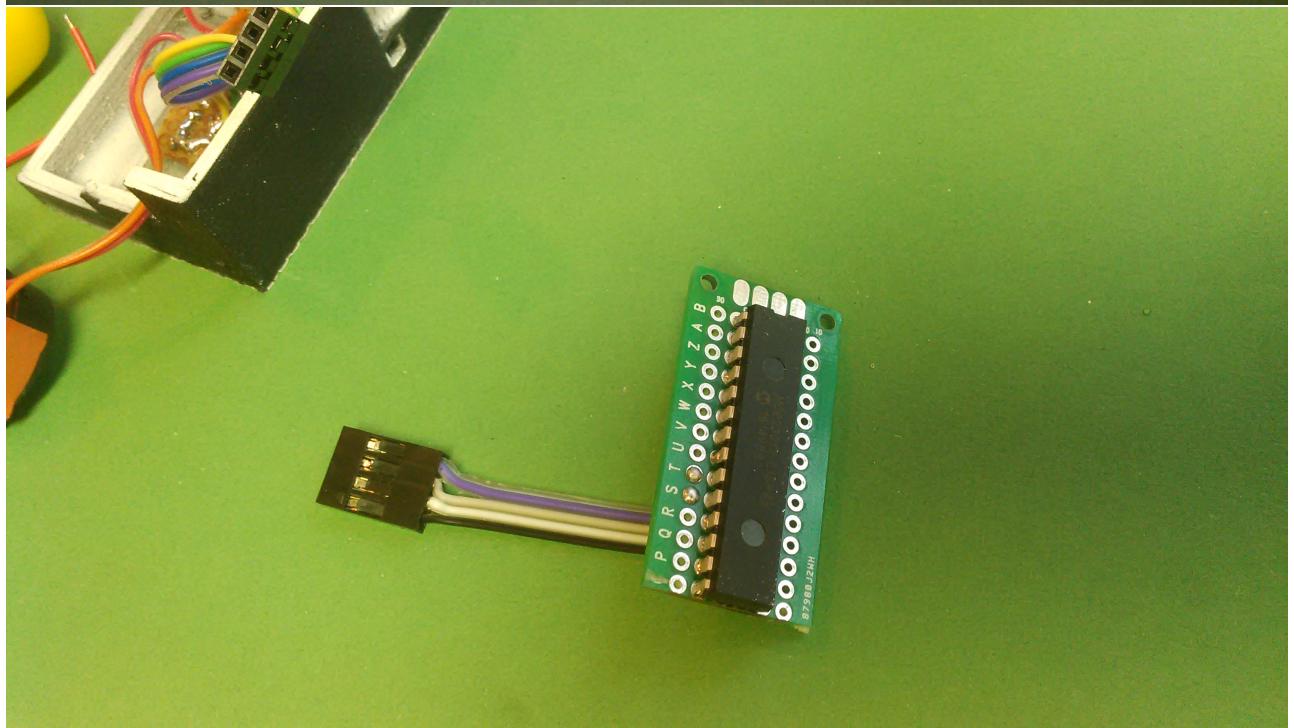
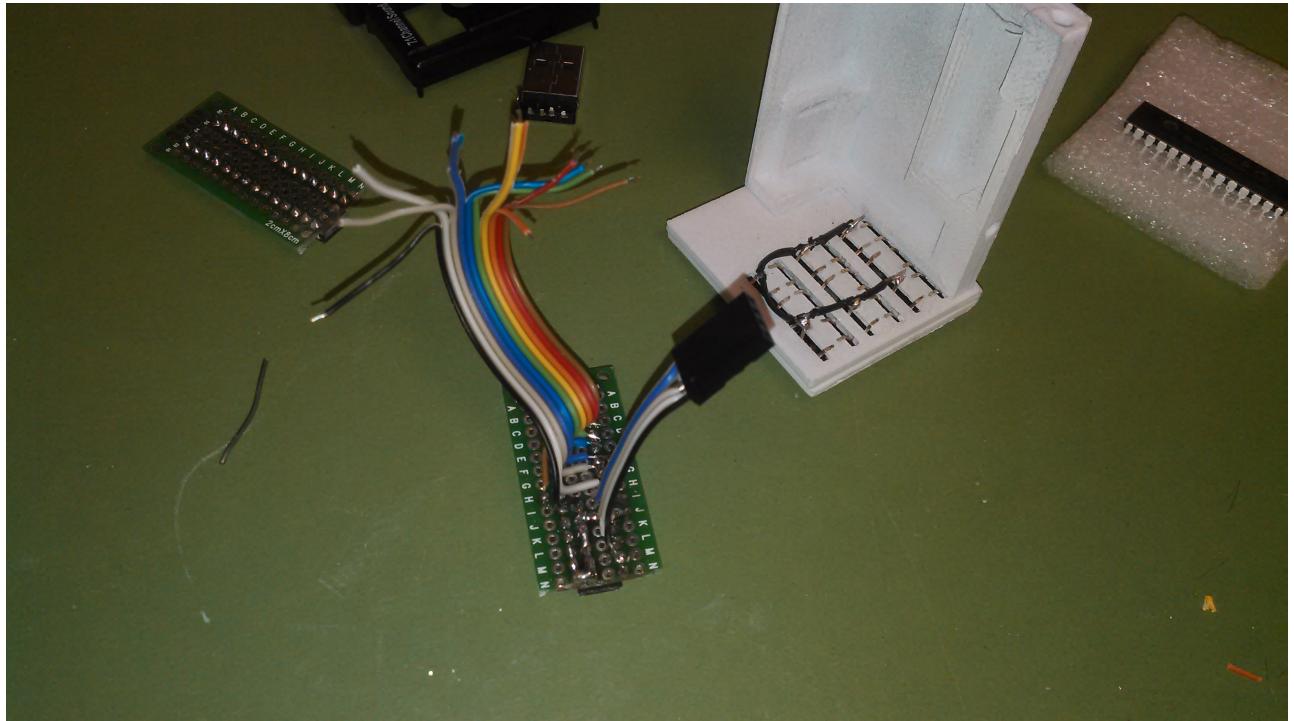
- Put 3d printed parts together with screws.
- Sand with sandpaper from rough to finest (from 120 to 400). I like to sand down all corners making them round.
- Dust off.
- Paint.
- Wait til dry.
- Paint again.
- Wait til dry. I like to wait for atleast a day to make it really dry.
- Sand again.
- Paint and wait again.
- Continue like this til you are satisfied with the feel, now I like to have a good grip so I finnish with sanding with 400 grit paper and leave it like that.

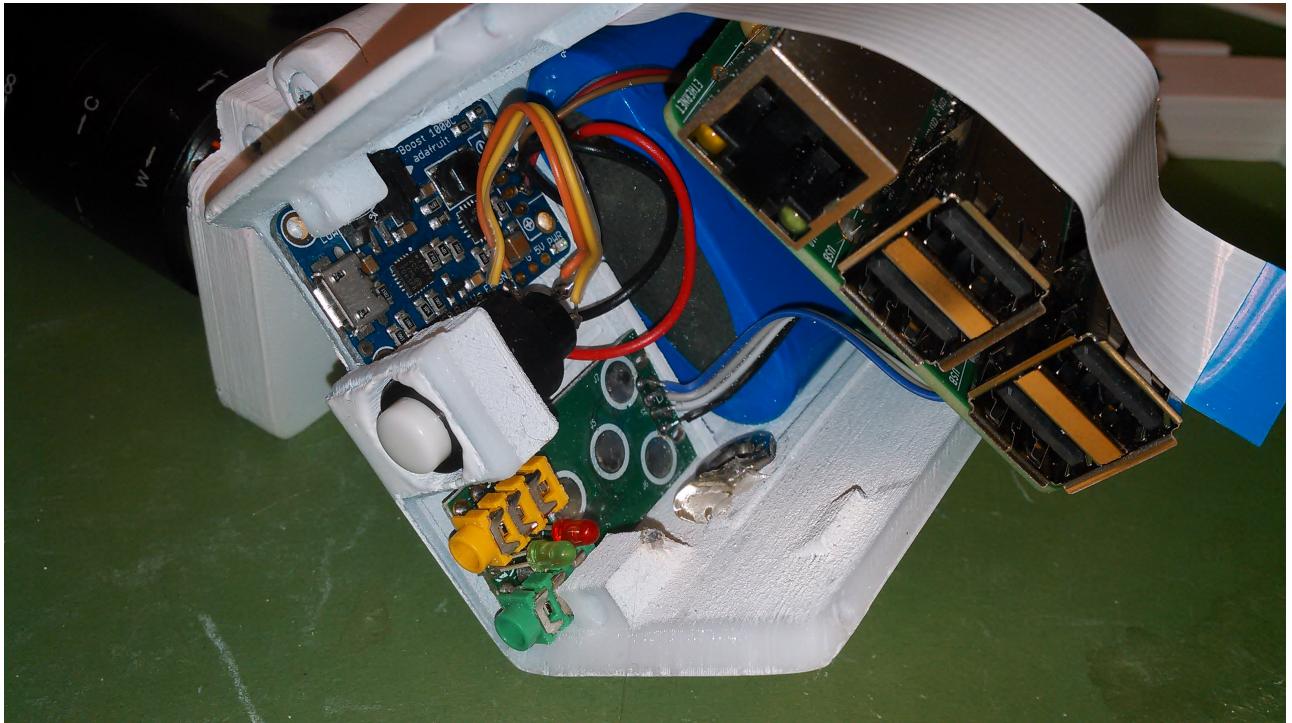
Wiring











Putting it together

Documentation on its way, if you're in a hurry feel free to drop a message in `#tarina:bennysmatrixchat.ddns.net`

Installing software

Download latest Raspbian and follow install instructions. Ssh into Raspberry Pi and run:

```
sudo raspi-config
```

Expand file system, enable camera and then reboot. Run this to install git:

```
sudo apt-get install git
```

Git clone tarina and then run install script with sudo:

```
git clone https://github.com/rbckman/tarina.git  
cd tarina  
sudo ./install.sh
```

You're ready to rumble:

```
python3 tarina.py
```

Happy filming!



Figure 6: Should be looking like this once finished

Tested lenses

Here is what I'm testing right now.

Yumiki 6-60mm 1/3" CS Lens CCTV Lens IR F1.6 Manual Zoom Manual Iris

Aliexpress

Camera Lens 2.8-12mm Varifocal

This lens is good. Will write a longer review once I have more filming hours.

Aliexpress