Pitanq assembly guide

Pitanq

Pitanq is a RaspberyPi-powered aluminium tank with a camera. It is designed as educational home bot to learn basic robotics and artificial intelligence.

Package

Chassis plate

Acrylic plate

Chassis sides

Chassis hardware pack

Chassis motors

Tracks

Raspberry PI

MicroSD card

Camera

Motor Driver

Power converter

Servo controller

Batteries

Charger

Camera stand

Camera stand motors

Wires

Screws

Screwdriver

Chassis assembly

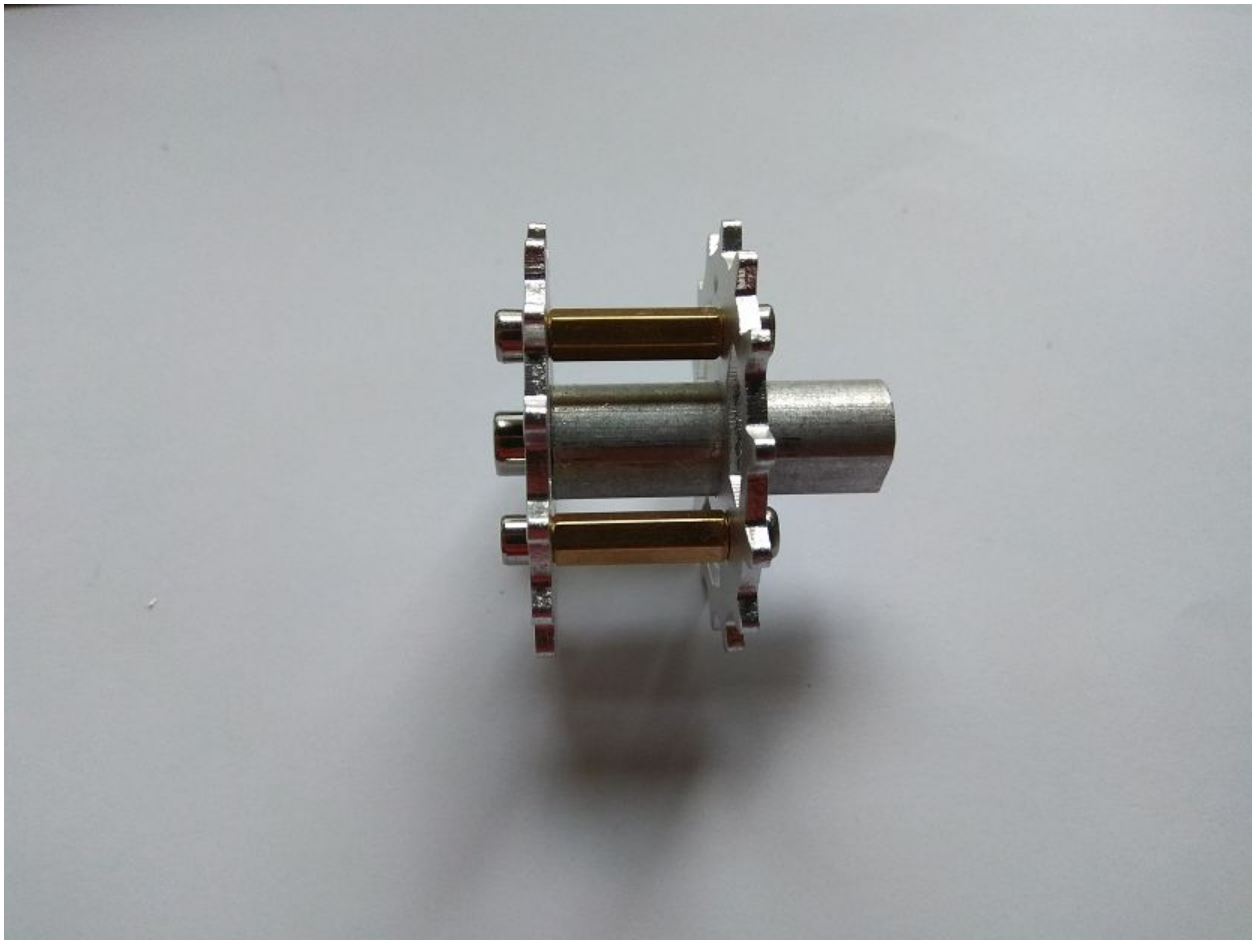
Wheel assembly

There are parts for one wheel:

1. Put the brass standoffs between the wheels and fix them together with M3 screws.
2. Put the bearings into the wheels
3. Put the coupling through the bearings
4. Fix the coupling to the bearing with M2 screw
5. The assembled wheel looks like that:

There are parts for a driving wheel:

Assembled driving wheel:



Side assembly

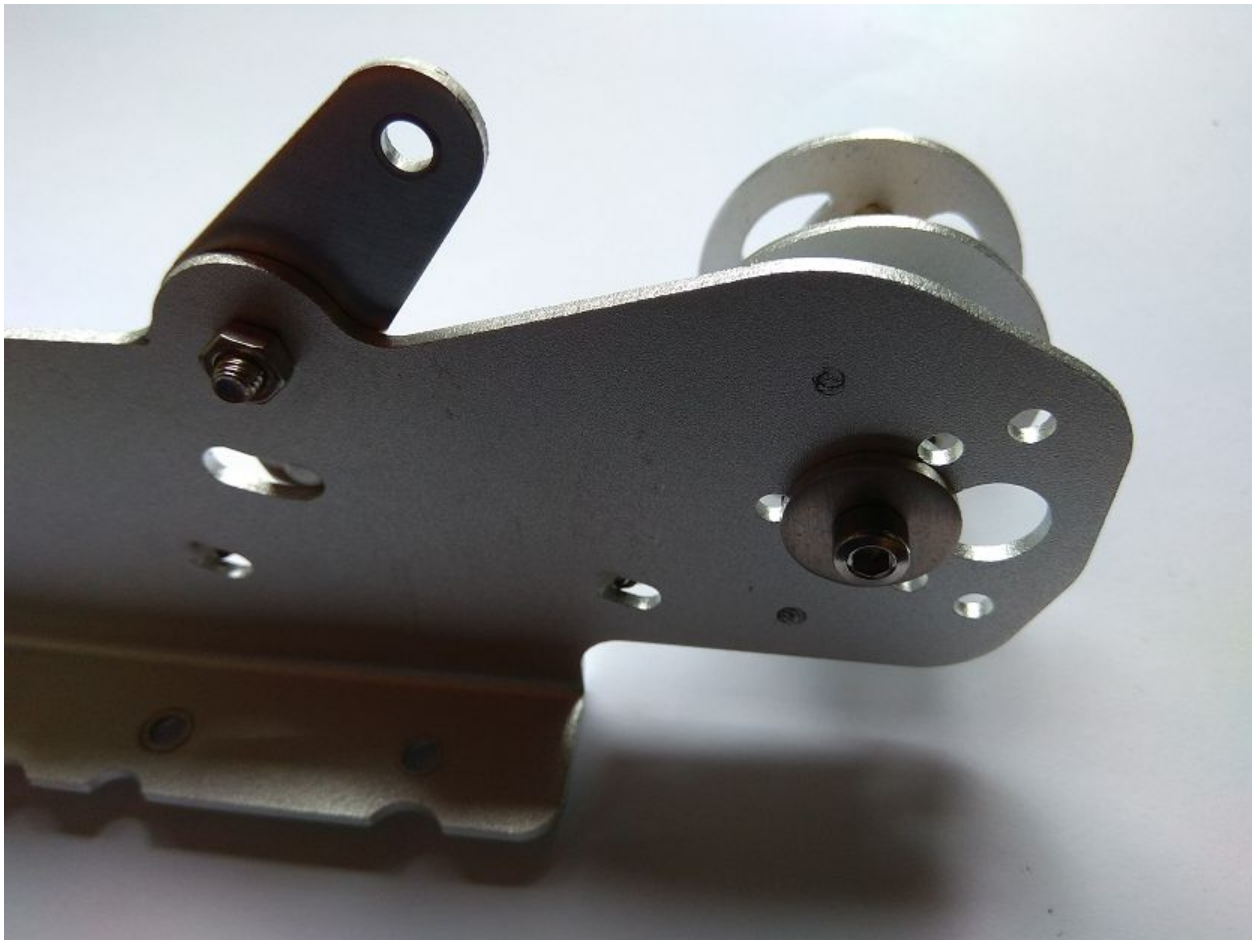
Attach shock absorbers and springs to the side.

Attach motors

Attach the motor to the side with M3 screws

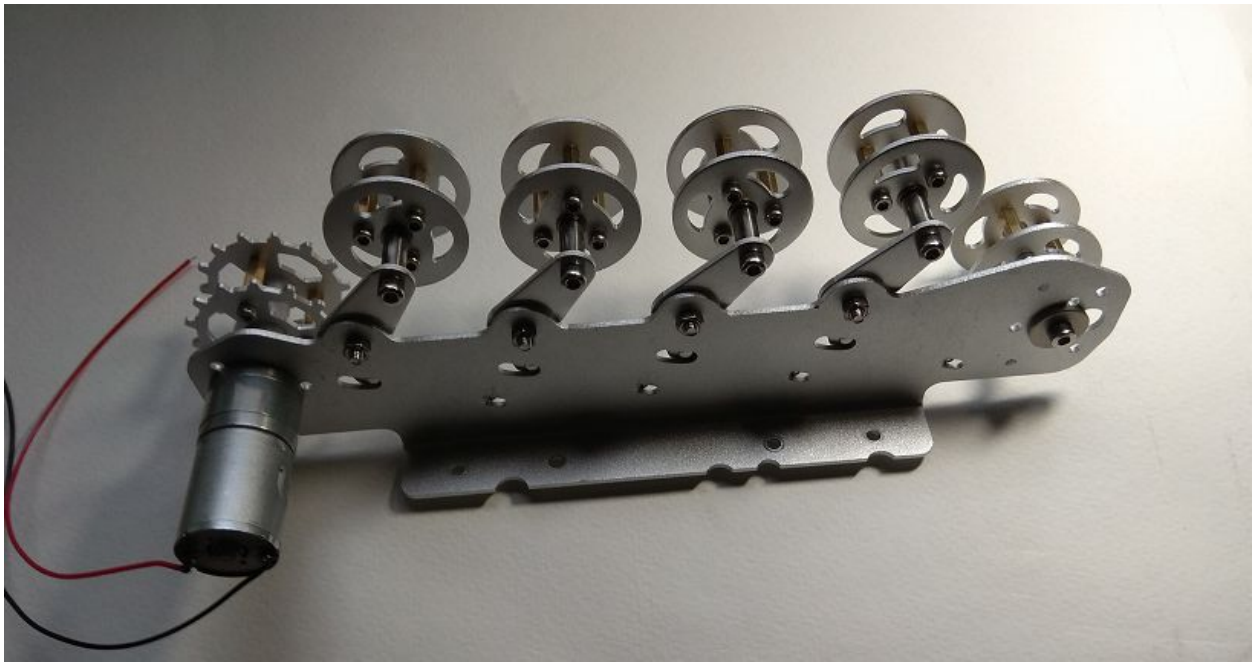
Attach wheels

Attach the driving wheel to the motor shaft:
Attach a wheel to another end of side with two washers and M4 screw:



Attach all other wheels with M4 screws.

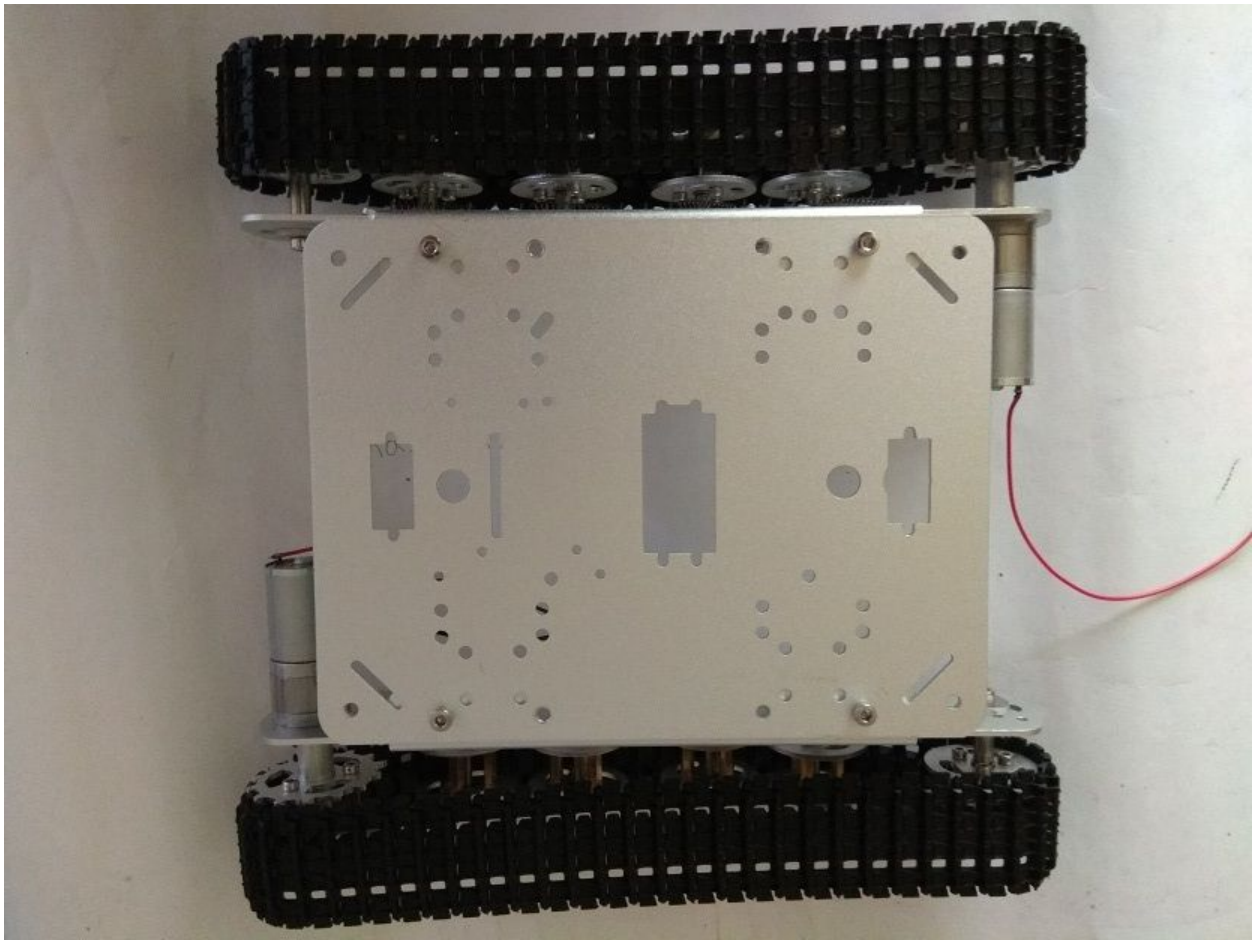
Attach tracks



Put tracks on the wheels with wheels rims between the track teeth. Adjust the tracks length and connect both side with a black needle.

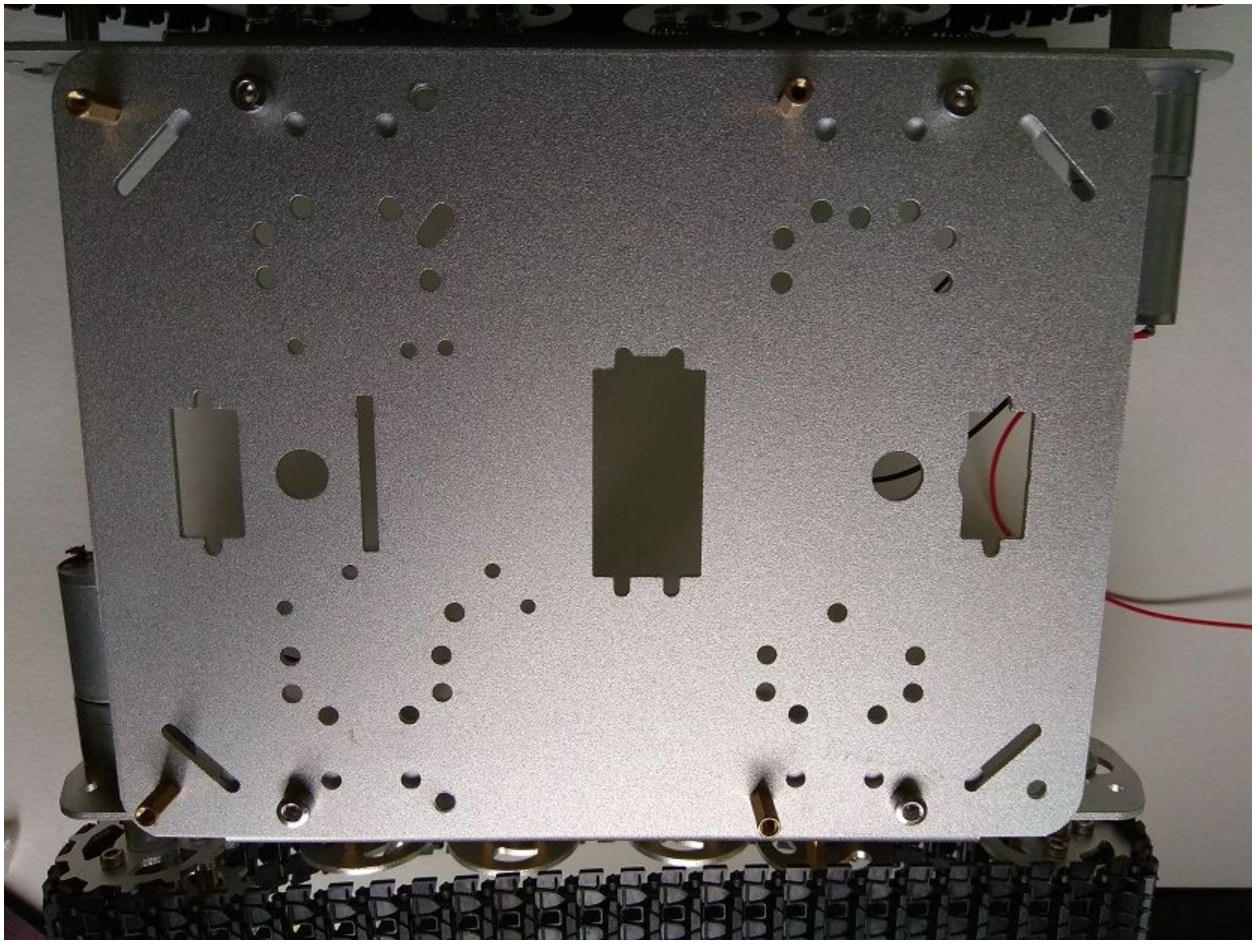
Attach sides to plate

Using M4 screws attach side to the plate.



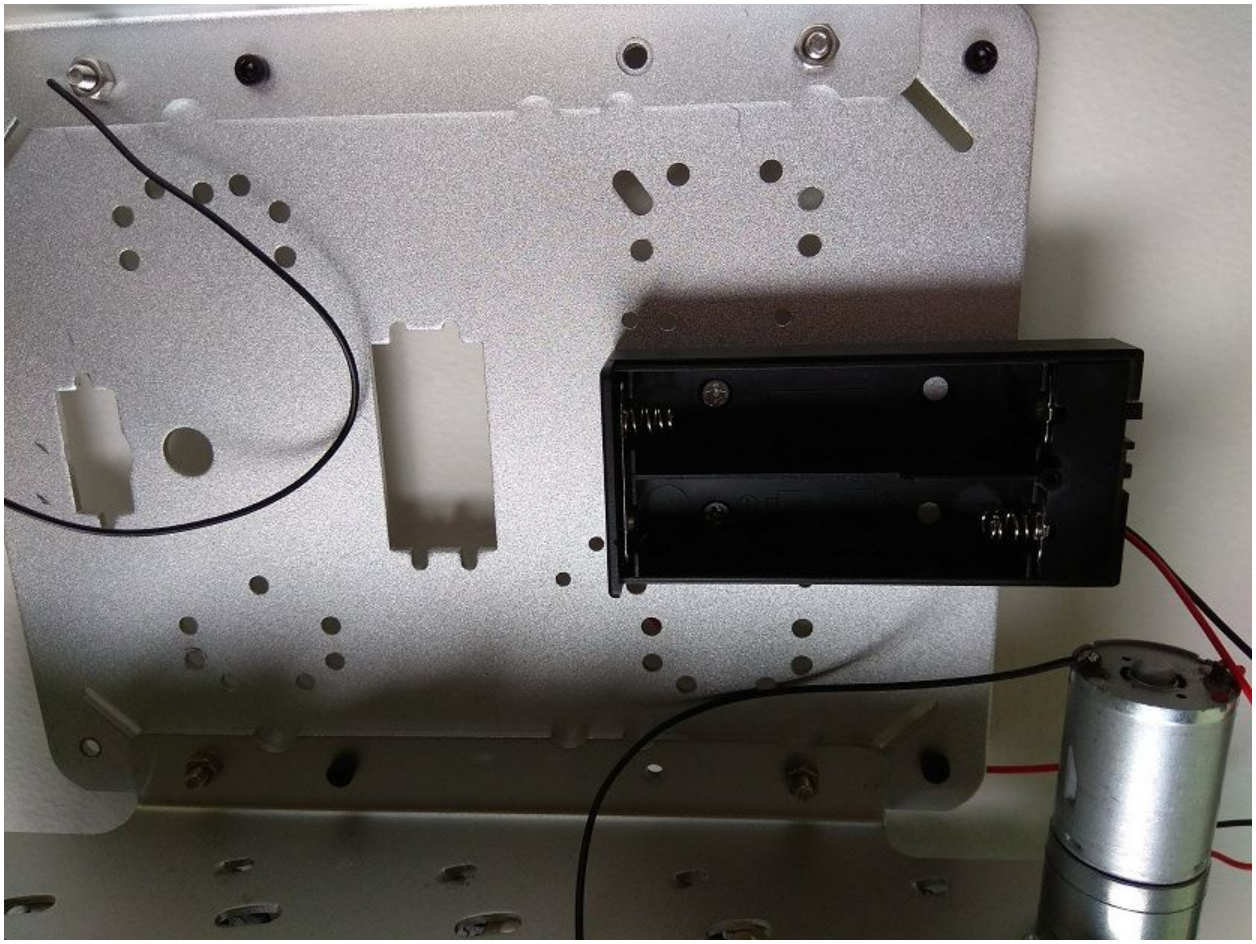
Attach standoffs to plate

Using black M3 screws attach the brass standoffs at top of the plate.



Attach battery holder to the plate

Using 2 M3 flat head screws attach the battery holder to the bottom of the plate

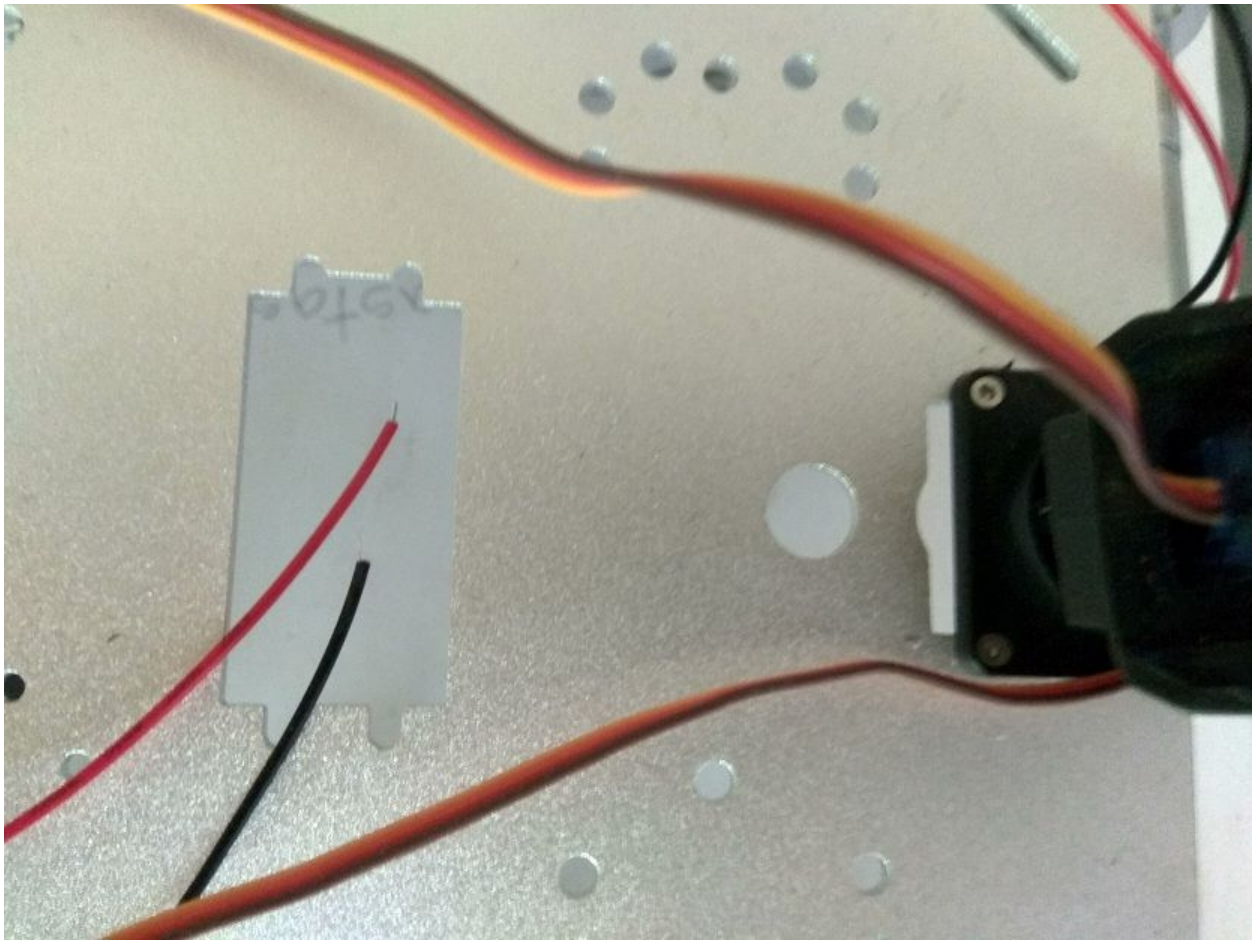


Camera assembly

Assembly camera stand

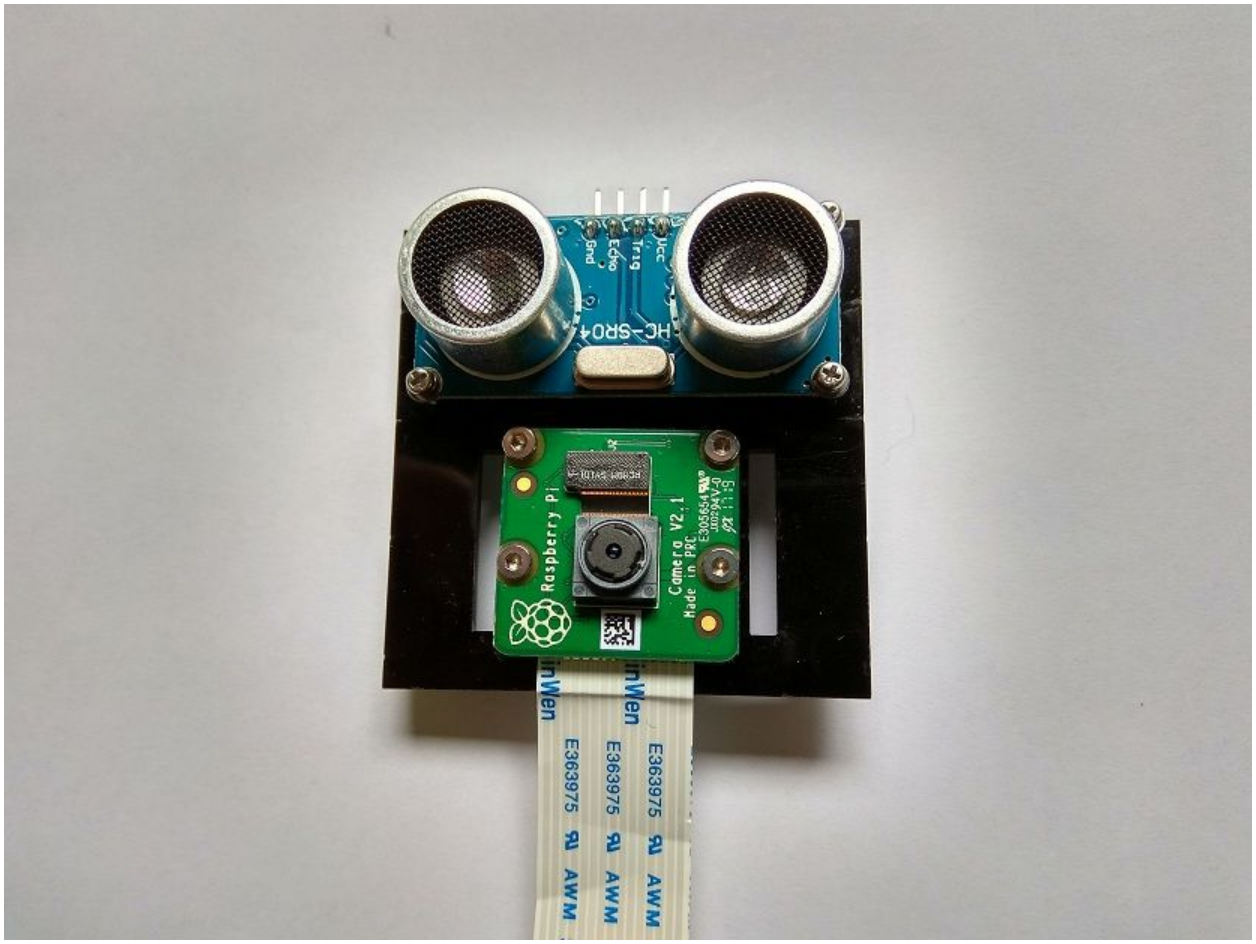
Attach camera stand to the chassis plate

Using 2 M2 screws and nuts attach the camera stand with rear holes.
Make sure the stand mount allows to tilt to right angle to the right and left.



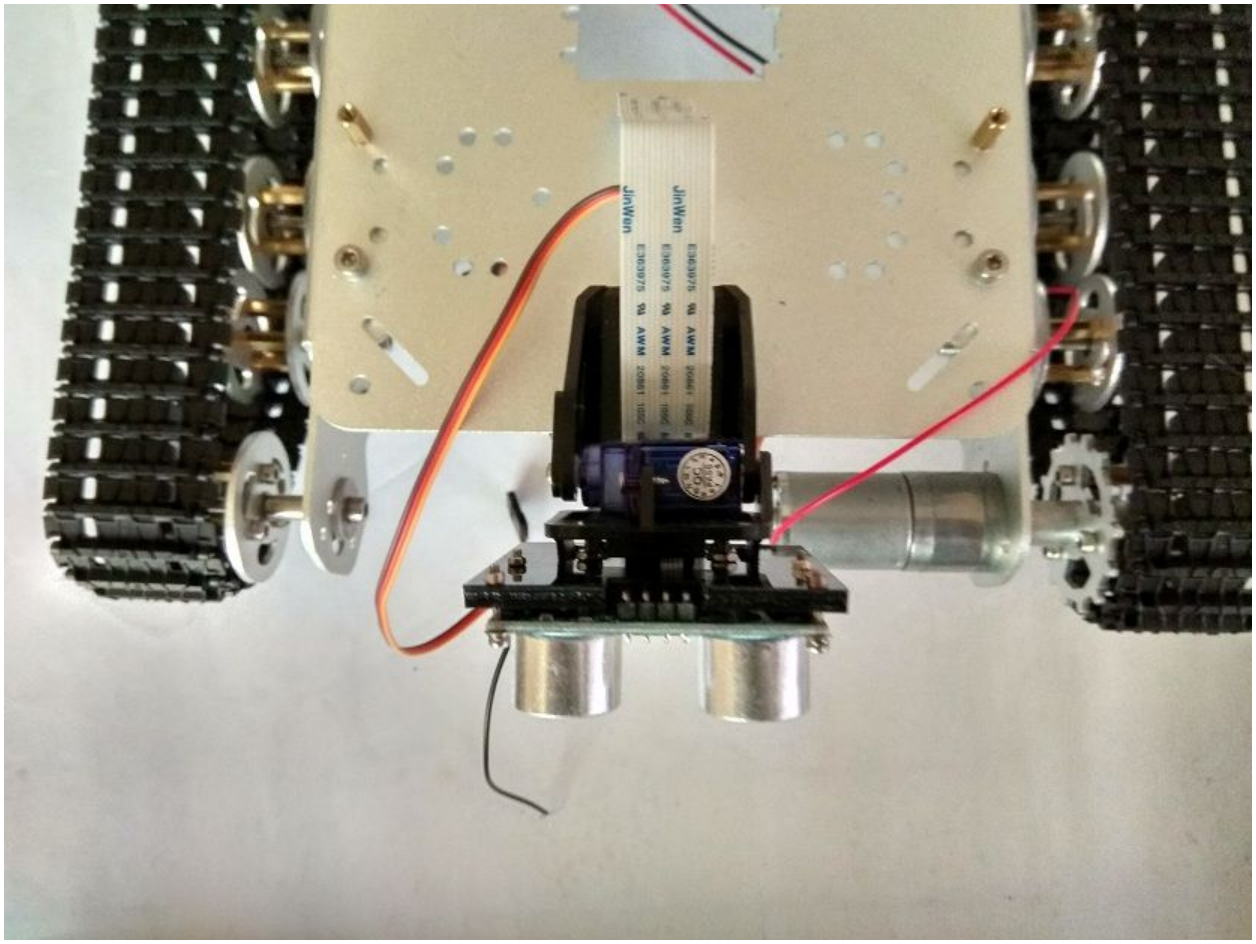
Attach Camera and ultrasonic sensor to the camera board

Remove paper from the camera board
Using 4 M2 screws and nuts attach the camera to the board
Using 4 M1.6 screws and nuts attach the ultrasonic sensor to the board



Attach camera board to stand

Using the vertical slots set the board on the stand fins.
Pull the camera cable underneath into the gap between servo-motor and lower part of the stand



Prepare SD Card

We recommend to set up SD card and insert it into Raspberry Pi before put it on the acrylic plate.

Configure Wi-Fi

- Insert SD card to the adapter
- Insert the adapter to computer
- Create a text file “wpa_supplicant.conf”
- Type or paste:

```
ctrl_interface=DIR=/var/run/wpa_supplicant GROUP=netdev
update_config=1
country=US

network={
    ssid="NAME-OF-YOUR-WIFI"
```

```
    psk="PASSWORD-TO-YOUR-WIFI"
    key_mgmt=WPA-PSK
}
```

- It is recommended to create an empty file named “ssh”. I will allow a remote access to the Raspberry Pi.
- Insert SD Card to Raspberry Pi

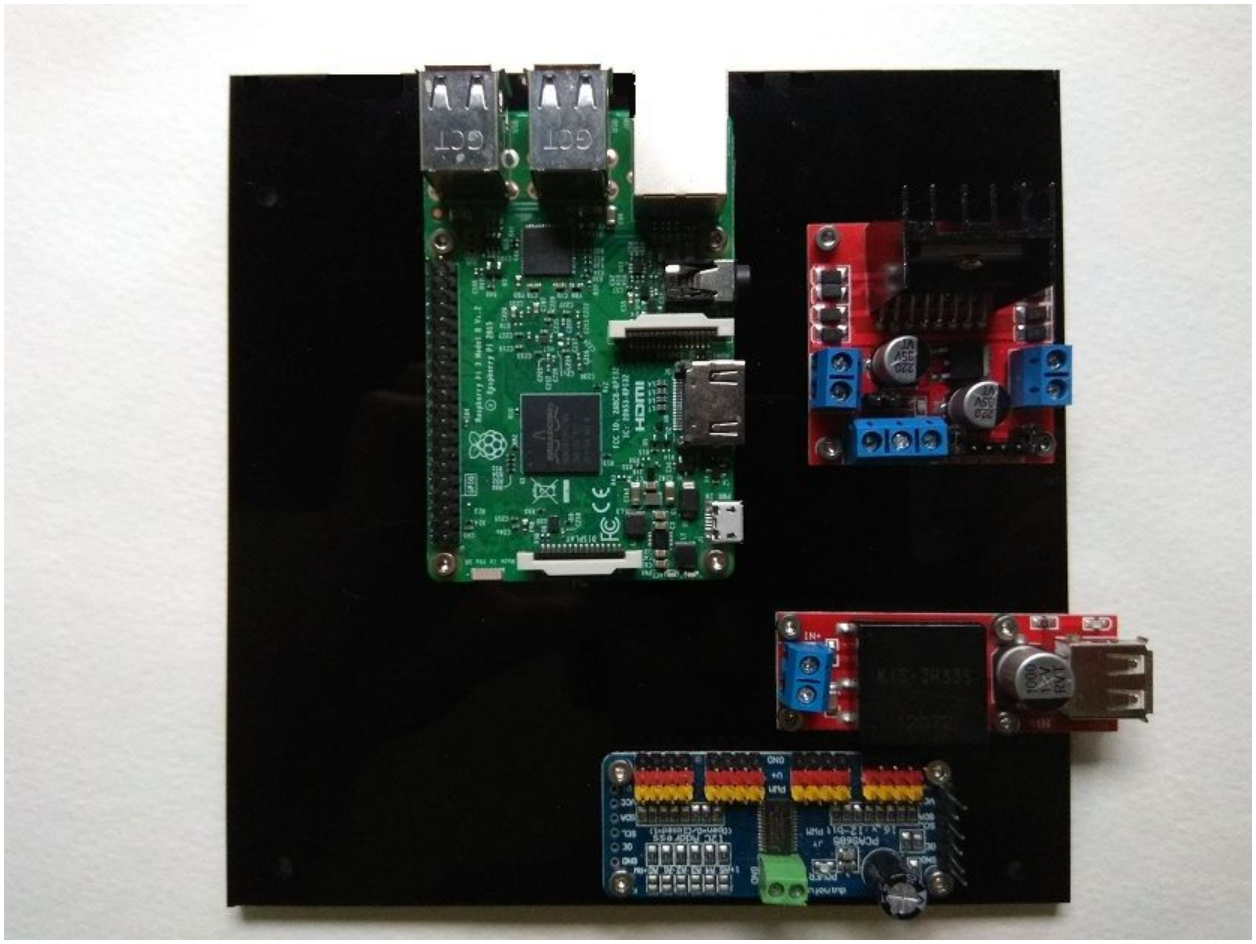
Electrical assembly

Remove paper from the acrylic plate
Put the acrylic plate such way the most holes are on the right side
Using short M3 screws attach to the plate:

- Raspberry Pi

Using long M3 screws attach to the plate:

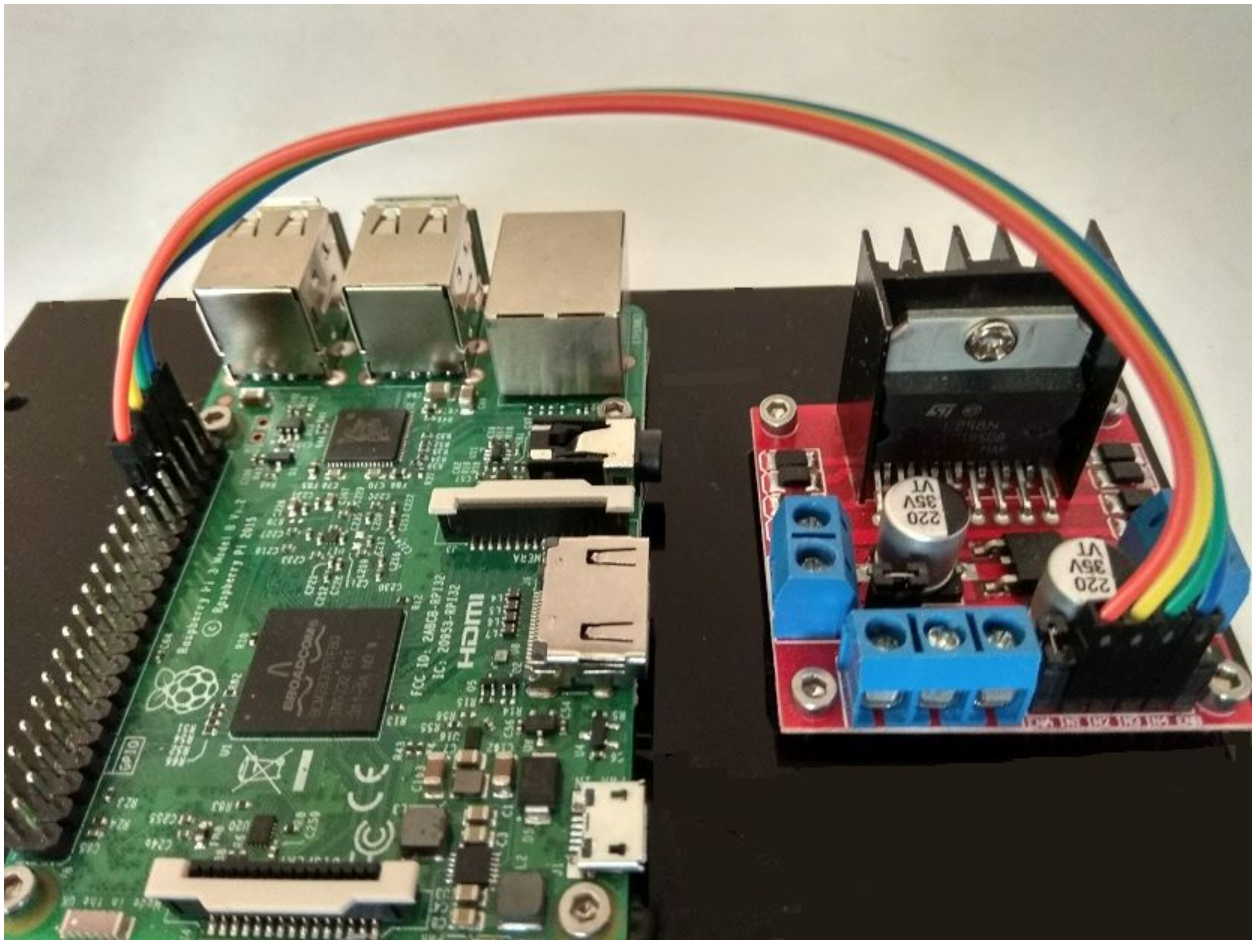
- Power Converter
- Motor Controller
- PWM Controller



Wiring

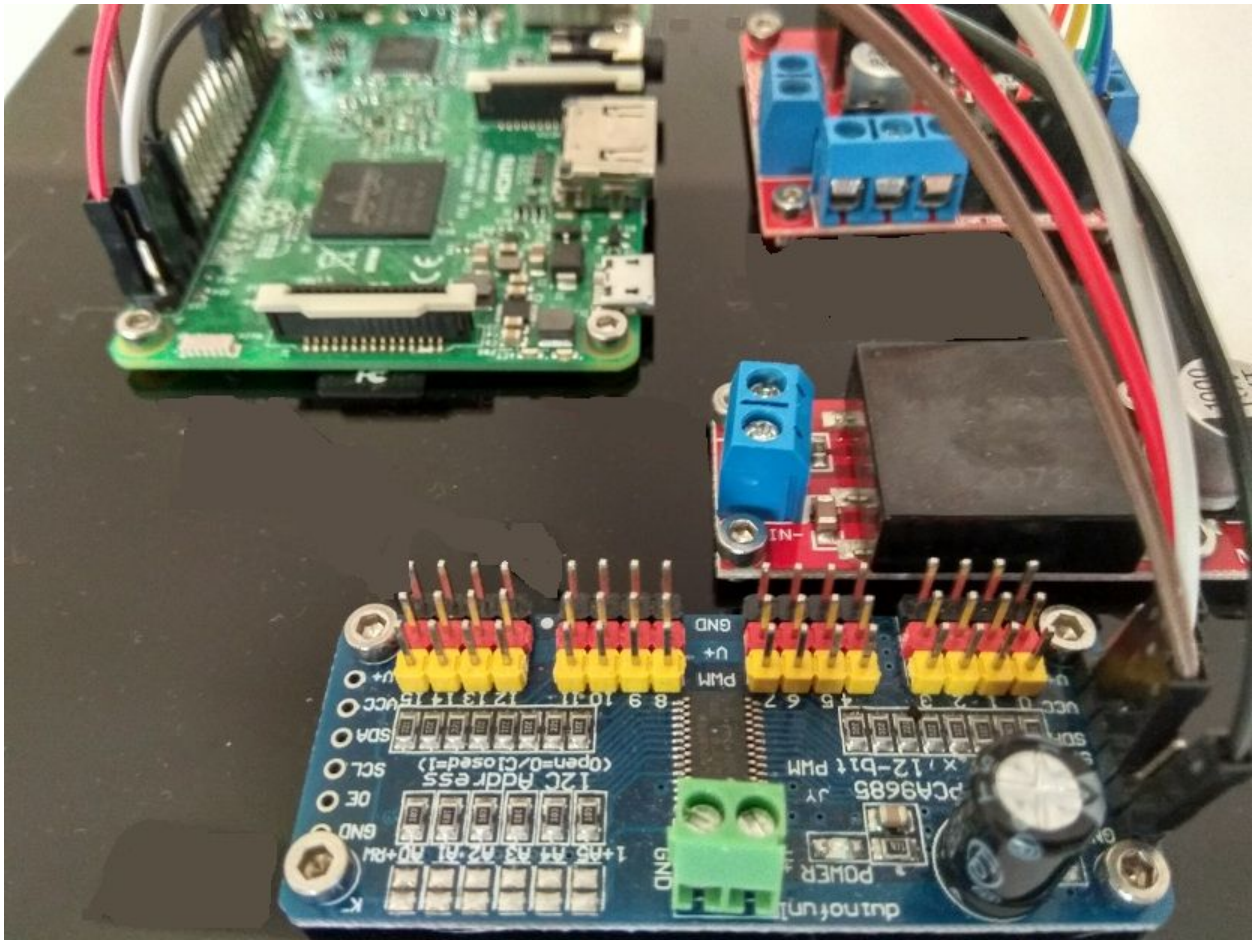
Wire Raspberry Pi and Motor Driver

Using 15cm blue wire connect Raspberry Pi #40 to Motor Driver IN4
Using 15cm green wire connect Raspberry Pi #38 to Motor Driver IN3
Using 15cm yellow wire connect Raspberry Pi #36 to Motor Driver IN2
Using 15cm orange wire connect Raspberry Pi #32 to Motor Driver IN1



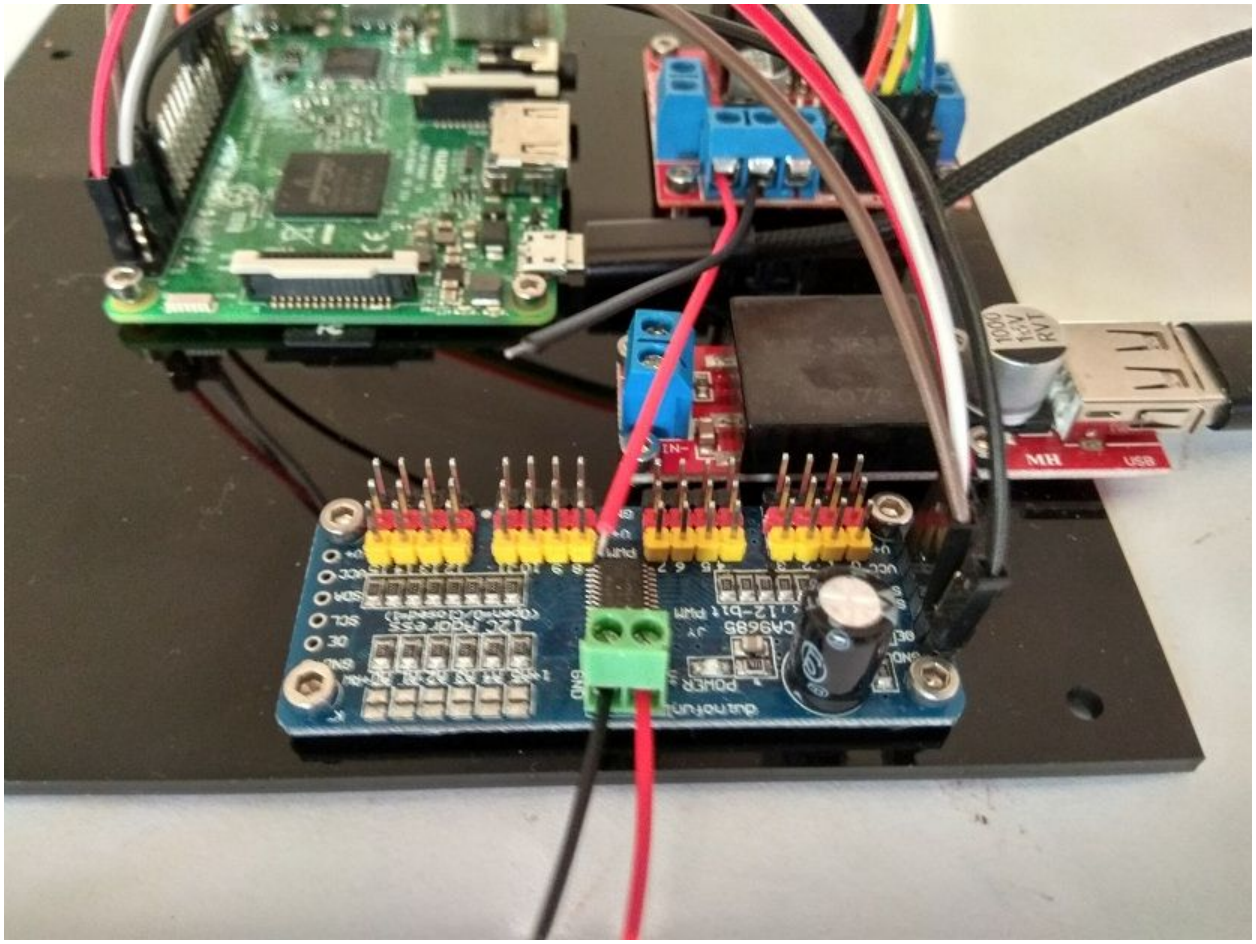
Wire Raspberry Pi and PWM Controller

Using 15cm red wire connect Raspberry Pi #2 to PWM VCC
Using 15cm black wire connect Raspberry Pi #9 to PWM GND
Using 15cm white wire connect Raspberry Pi #3 to PWM SCA
Using 15cm brown wire connect Raspberry Pi #5 to PWM SCL

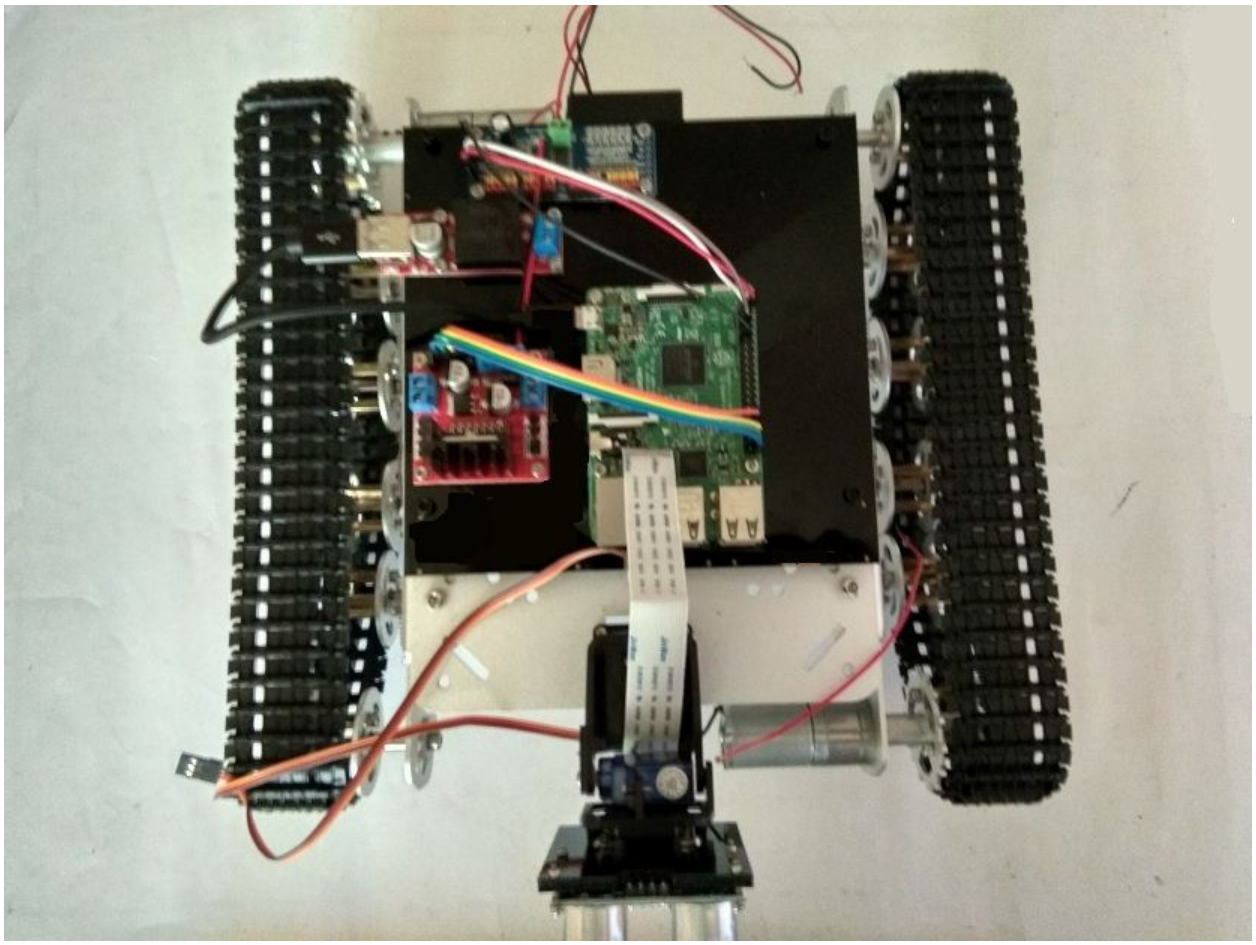


Connect Raspberry Pi and Power Converter and prepare leads

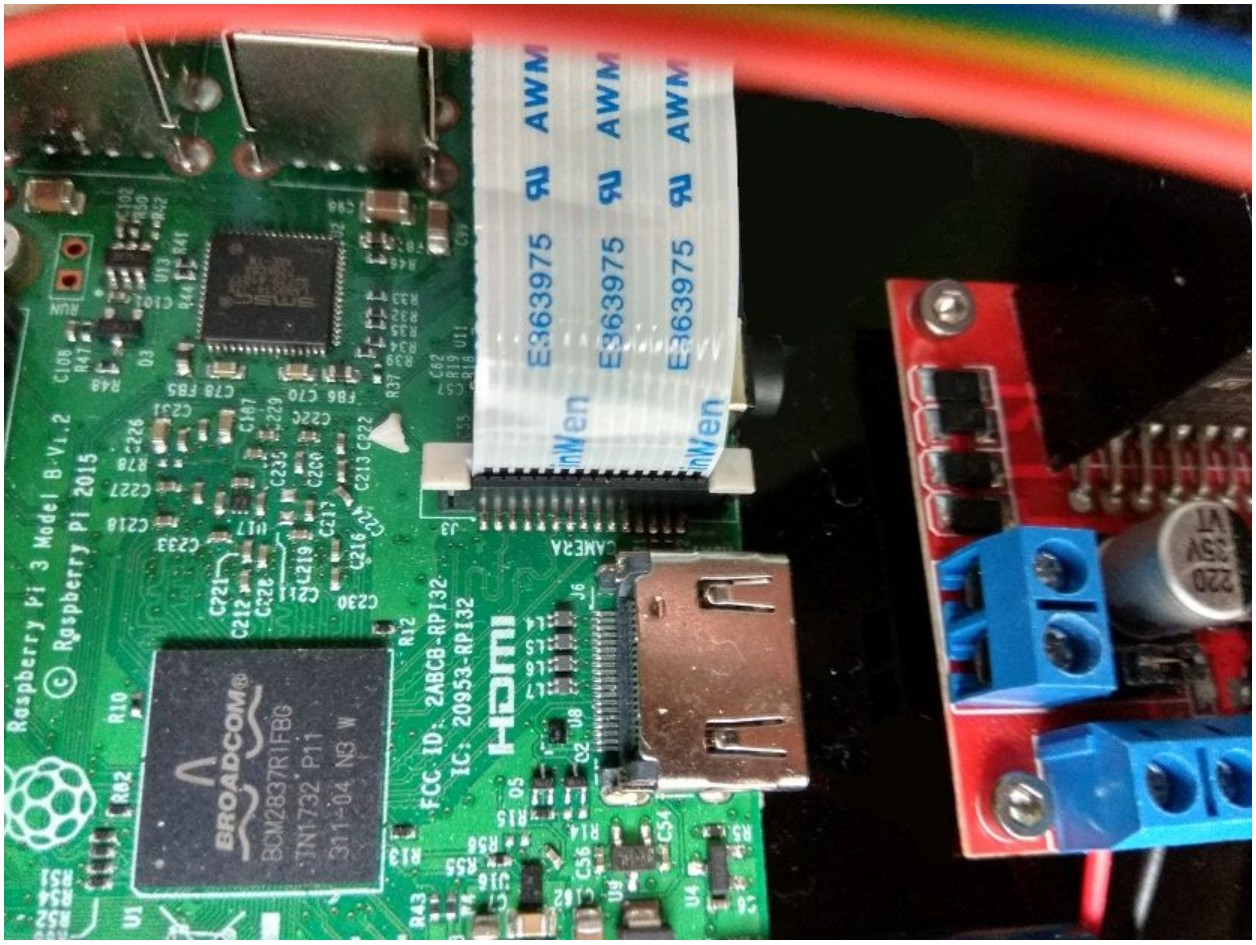
Connect Raspberry Pi mini-USB with Power converter
Attach wire leads to Motor Driver
Attach wire leads to PWM Controller



Attach the acrylic plate to the chassis standoffs with 4 black M3 screws

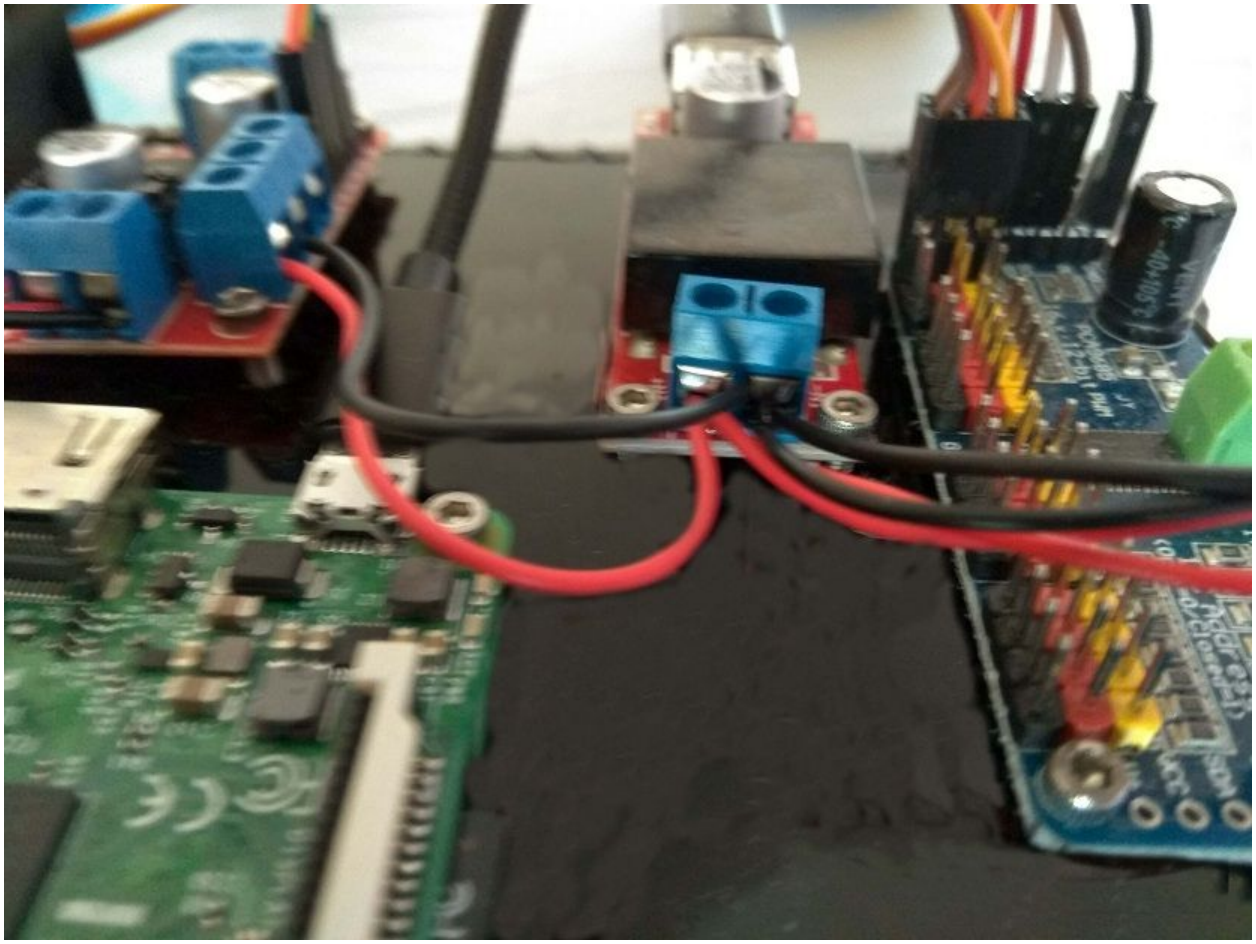


Connect camera cable to Raspberry Pi



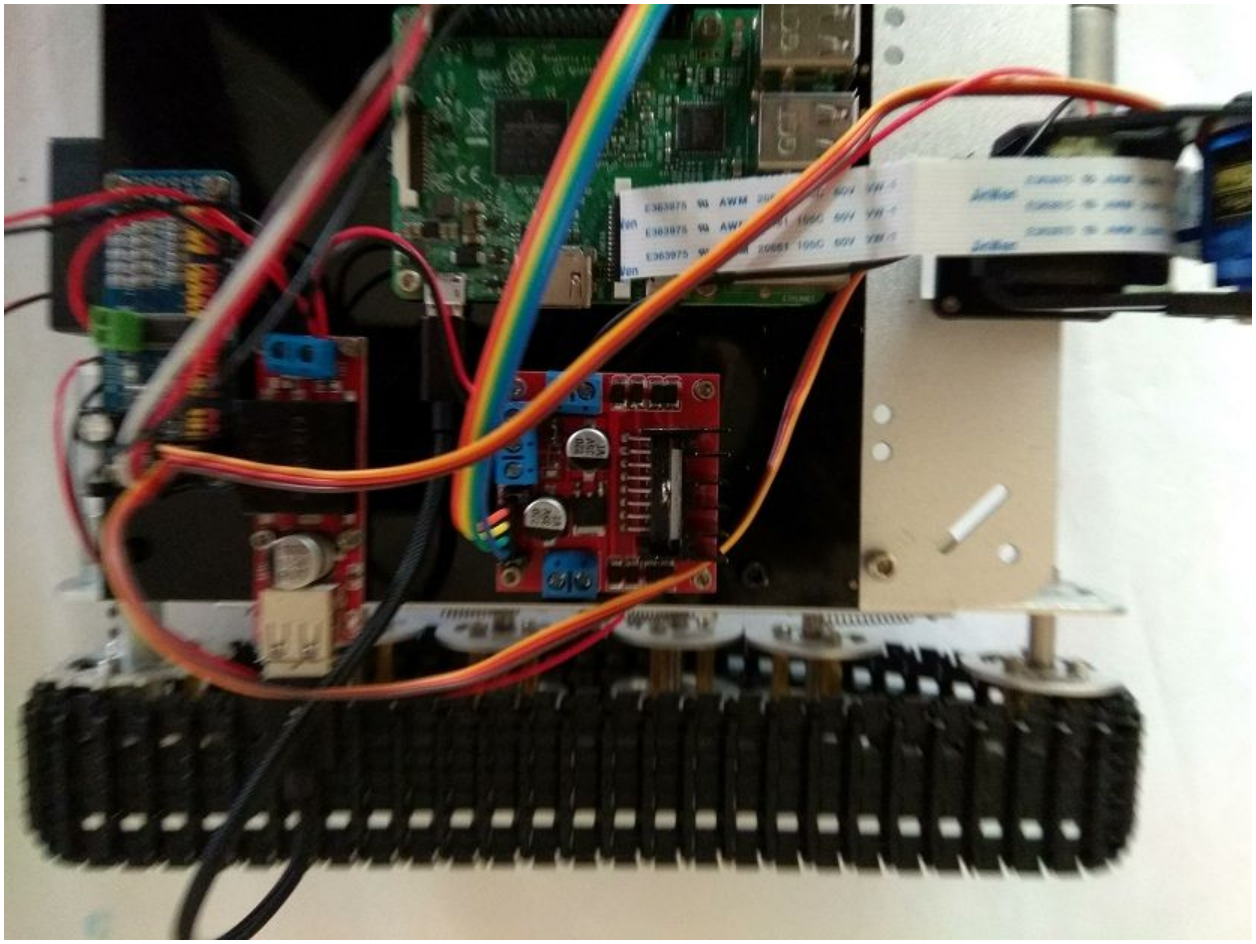
Connect Power Converter with Motor Driver, PWM Controller and Battery

Use leads from the battery holder, Motor Driver and PWM controller to connect them to terminals of Power Converter.
Red wires are going to IN+ terminal, Black wires are going to IN- terminal.



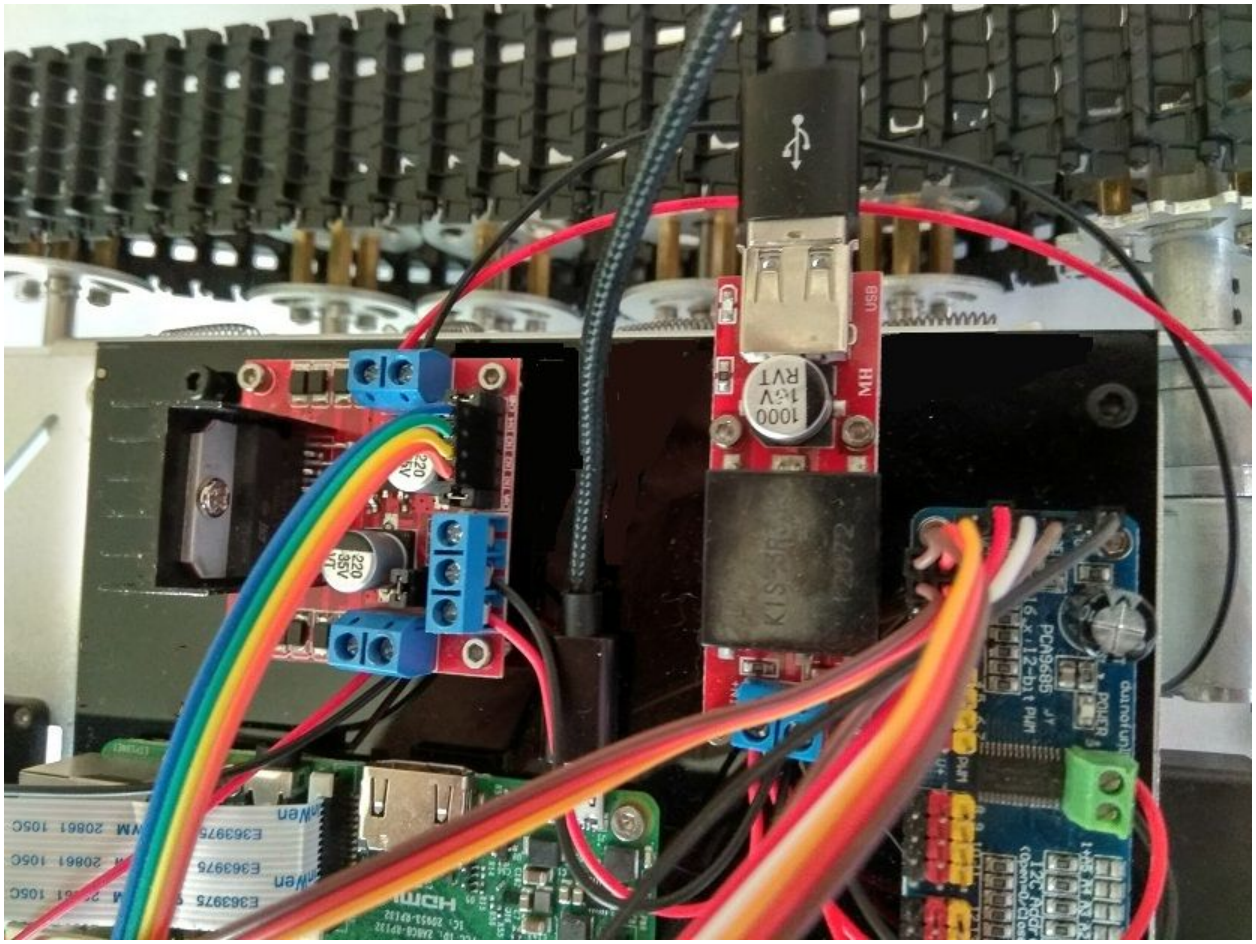
Wire Camera Stand and PWM Controller

Attach cables of stand servomotors to PWM controller.
The lower cable is going to 0 channel.
The upper cable is going to 1 channel.



Wire Motor Controller and motors

Attach motors leads to the motor controller terminals.
Right motor side leads are going to the right side of the controller.
Left motor leads are going to the left side of the controller.
Red leads are going to front terminals.



Wire Raspberry Pi and Ultrasonic sensor

Using scotch patch attach Level Shifter to the plate (on the left from Raspberry Pi, the power pins of the chip are toward the rear - look at the back side of Level Shifter to identify the power pins).
Attach 6 wires to the Level Shifter.
One side of the Level Shifter is marked 3V, another one - 5V.
Attach 5V side wires to:

- V+ pin of last (or any free) channel of PWM
- GND pin of the same channel of PWM
- Echo pin of the ultrasonic sensor

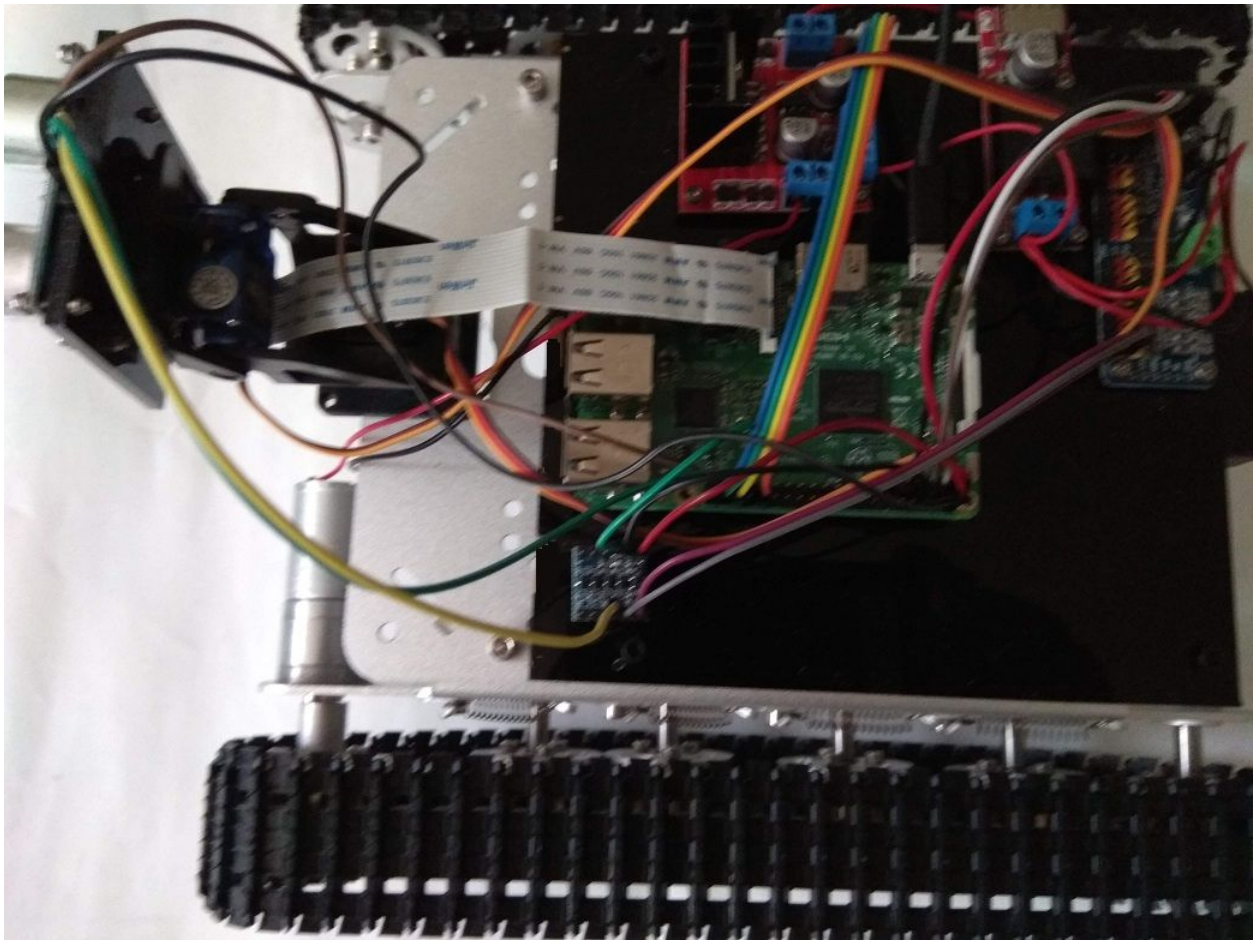
Attach 3V side wires to:

- 3V pin of Raspberry Pi (Pin #1, the first on the far inner side)
- GND pin of Raspberry Pi (Pin #6, the third on the far outer side)
- GPIO19 pin of Raspberry Pi (Pin #35, the third on the near inner side)

Then attach 3 more wire of the ultrasonic sensor:

- The longest wire goes from VCC pin of the sensor to 5V pin of Raspberry Pi (Pin #4, the second on the far outer side)

- GND pin of the sensor goes to pin #39 (the first on the near inner side)
- TRIG pin of the sensor goes to pin# 37 (the second on the near inner side)



Raspberry Pi pinout

https://learn.adafruit.com/assets/22438

Pin#	*NAME*	*Connection*		*Connection*	*NAME*	*Pin#*
01	3.3V			**5V** (Cupcade)	5V	*02*
03	GPIO 2			**5V** (Powerboost)	5V	*04*
05	GPIO 3			**GND** (Powerboost)	Ground	*06*
07	GPIO 4	**START**			GPIO 14	*08*
09	Ground	**GND** (Cupcade)			GPIO 16	*10*
11	GPIO 17	**UP**		**SELECT**	GPIO 18	*12*
13	GPIO 27	**DOWN**		**GND** (Select/Start)	Ground	*14*
15	GPIO 22	**LEFT**		**RIGHT**	GPIO 23	*16*
17	3.3V			**A**	GPIO 24	*18*
19	GPIO 10	**B**		**GND** (ABXYR)	Ground	*20*
21	GPIO 09	**X**		**Y**	GPIO 25	*22*
23	GPIO 11	**L Shoulder**		**R Shoulder**	GPIO 08	*24*
25	Ground	**GND** (L)			GPIO 07	*26*
27	ID_SD				ID_SC	*28*
29	GPIO 05				Ground	*30*
31	GPIO 06				GPIO 12	*32*
33	GPIO 13				Ground	*34*
35	GPIO 19				GPIO 16	*36*
37	GPIO 26				GPIO 20	*38*
39	Ground				GPIO 21	*40*

Software setup

Download an application for Android

https://play.google.com/store/apps/details?id=tprlab.com.pitanq

Turn the tank on

Put the batteries into the holder (Charge them if necessary).
Turn on the small switch on the holder.

Control the PiTanq

1.Wait for a minute when Raspberry Pi loaded

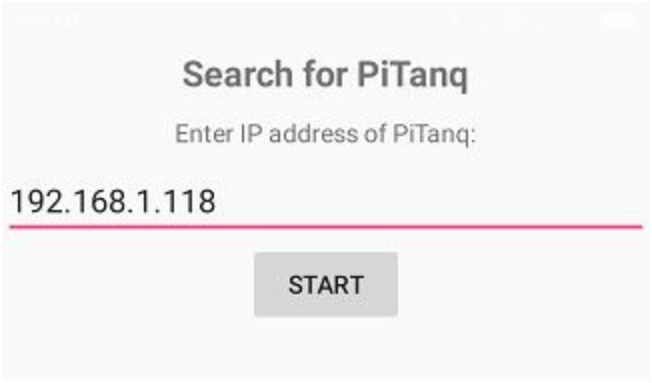
2.Find IP-address of the Raspberry.

I would recommend Fing software for that (absolutely no affiliation) or check the WI-FI router connections.

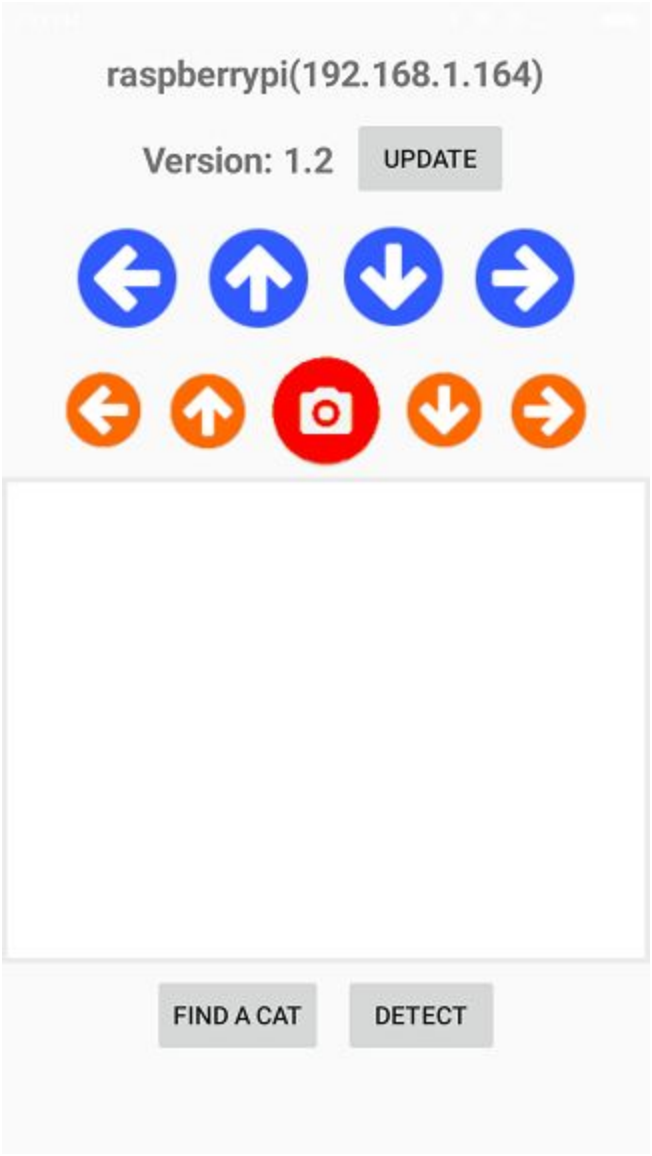
Fing on Google Play:
https://play.google.com/store/apps/details?id=com.overlook.android.fing

3. Run the PiTanq application

4. Enter the found IP address:



5. As far as everything OK, the dashboard screen should appear:



On this screen you can:

- Update a python service working on the Raspberry. (The update means the code will be update from the master branch of this repo: https://github.com/tprlab/pitanq)
- Control the tank movement (blue buttons)
- Control pan and tilt of the camera stand (orange buttons)
- Take a photo (red button)
- After a photo has been taken it is possible
    - Find a cat using OpenCV-provided Haar cascade for cat faces.
    - Detect objects using Tensoflow-powered neural network and OpenCV-DNN module.

Contacts

Visit our site: https://pitanq.com
Write us to: dev@tprlab.com