

MARS ROVER

INTRODUCTION

Hello if you are here, you probably love engineering and tech. In this file, you can find all of the STL files that I designed to build that rover. With a little bit of patience and tinkering, you can make yourself a unique vehicle that will blow your mind with its capabilities.

I will also give you the program for Arduino so you can achieve the same results. The biggest part of the project is 3D printing, although you will need some knowledge to make it alive. However don't be afraid! I will stay in touch with my costumes day and night. Let it be a challenge for you!

I am a student of the 3rd class of the Mechatronic School and all the money I might get will go for filament and other tools, to design even better and cooler projects.

Additional info: Stay in touch with me and my YouTube account.

START OF YOUR JOURNEY

I probably want to finish your rover ASAP (as soon as possible), but as everything things don't fall from the sky with the exception of rain. However I think that will be unforgettable journey across the land of mechanics and electronics. I hope you will learn a lot.

I recommend you firstly to buy all the hardware you will need, since it will take much more to come than printing the STL files. I made a list of things you need to buy to be able to make your rover alive. All the parts are standard and I think, you will be able to buy them form online stores. If you will have some problem with any part I will be glade to help you find the solution. Contact me at G-mail: kamil.kosi2000@gmail.com



Picture 1: Mars rover (photo: <https://www.rt.com>)

HARDWARE

1. Buy that part (6x): <https://www.aliexpress.com/item/WSFS-Hot-Sale-37mm-DC-Geared-Motor-Mounting-Bracket-Holder-6mm-Hex-Coupling/32719462033.html?spm=a2gos.9042311.0.0.WXiomk>
(Click Ctrl + LEFTmouseButton to open the link)

[You will only need the bronze inserts to clamp the axel of the electric motor to the wheel]

2. Buy motors (6x): <https://www.aliexpress.com/item/Robot-arm-6-DOF-manipulator-six-axis-robot-industrial-robot-model/32522242280.html?spm=a2gos.9042311.0.0.NOEjC6>

3. Buy ESC (electric speed controller)(1x): <https://www.aliexpress.com/item/1pcs-Waterproof-Brushed-ESC-320A-3S-with-Fan-5V-3A-BEC-T-Plug-For-1-10/32629024318.html?spm=a2gos.9042311.0.0.WcgxRa>

[You will need this bad boy to control the electric current for all electric motors]

4. Buy servos (6x): <https://www.aliexpress.com/item/Servos-Digital-MG996R-MG996-Servo-Metal-Gear-for-Futaba-JR-Car-RC-Model-Helicopter-Boa/32636102294.html?spm=a2gos.9042311.0.0.VExdyj>

5. Buy Arduino Uno (1x): https://www.aliexpress.com/item/Free-shipping-high-quality-UNO-R3-MEGA328P-CH340G-for-Arduino-Compatible-NO-USB-CABLE/32472332706.html?spm=2114.searcho204.3.13.46f28ec2qDI2De&s=p&ws_ab_test=searchwebo_0,searchweb201602_2_10152_10151_10065_10344_10068_10342_10343_10340_10341_10696_10084_10083_10618_10304_10307_10301_5711215_10313_10059_10534_100031_10103_10624_10623_10622_5711315_10621_10620_5722415,searchweb201603_37,ppcSwitch_7_ppcChannel&priceBeautifyAB=0

[This will be the brain of your robot]

6. Buy servo Extension cable(1x loot of 10 cables): https://www.aliexpress.com/item/10Pcs-150-200-300-500mm-Servo-Extension-Lead-Wire-Cable-For-RC-Futaba-JR-Male-to/32818865701.html?spm=2114.searcho302.3.1.2889ee14iZFblm&ws_ab_test=searchwebo_0,searchweb201602_0_10152_10151_10618_10059_10696_10534_10313_10084_100031_10083_1_0624_10304_10623_10307_10341_10065_10340_10068_10343_10342_10301_10103_10620_10344_10622_10621,searchweb201603_0,ppcSwitch_0&algo_pvid=beac2964-5e98-4aed-a489-039ac85747f5&algo_expid=beac2964-5e98-4aed-a489-039ac85747f5-0

7. That are all the parts that are specific for this project although if you want to finish it and control it with the remote, you will need also the remote and the complemental receiver of your choice. There is the example of the remote, I am using. You can buy a cheaper one if you wish. : https://www.aliexpress.com/item/1pcs-Original-Flysky-FS-T6-FS-T6-6ch-2-4g-w-LCD-Screen-Transmitter-FS-R6B/32445514343.html?spm=2114.searcho204.3.128.141e3236eHibEA&ws_ab_test=searchweb_0_0,searchweb201602_2_10152_10151_10065_10344_10068_10342_10343_10340_10341_10696_10084_10083_10618_10304_10307_10301_5711215_10313_10059_10534_100031_10103_10624_10623_10622_5711315_10621_10620_5722415,searchweb201603_37,ppcSwitch_7_ppcChann

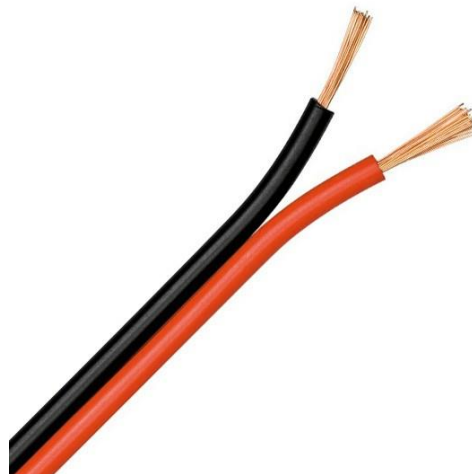
LOCAL STORE HARDWARE

Ok you are almost there. You just need to buy some parts from your local hardware store. You will need:

The name of the part	The length of the part	Number of parts needed
Bolts and nuts M ₃	>10mm	18x
Bolts and nuts M ₄	>10mm	6x
Bolts and nuts M ₅	40mm	50x
Bolts and nuts M ₅	50mm	40x
Speaker Cable 2x0.75	3000mm	
PVC pipe 25mm (outer) 21mm(iner)	3000m	

You can also use washers if you think it will be better. The link for pipes is here:

<https://www.ebay.com/itm/4-X-25CM-PVC-PIPE-INDUSTRIAL-20mm-25mm-32mm-10-16-BAR/152154549200?hash=item236d1e2bdo:m:mT-g2D3EJAltesOH2jwl3CQ>



Picture 2: Speaker Cable 2x0.75

3D PRINT TABLE:

You will need a 3d printer to do this step. The size of your printer should be at least 200x200x100 although most of the parts can be printed with smaller print as well. Use the printing setting and material of your choice, although bearings in the design should be printed with at least 0.14mm layer resolution.

There you have the table of all parts, you have to print including number of the parts that you have to print. All the STL files are in the folder named STLs.

1. Wheel (6x)
2. WheelInsidePart (6x)
3. MotorHolder (6x)
4. WheelArc (6x)
5. WheelBearingHub (6x)
6. Bearing (11x)
7. RearWheelCoupler (4x)
8. FrontWheelCoupler (2x)
9. RearSuspentionBearingCoupler (2x)
10. RearSuspentionBearingHolder (2x)
11. MainSuspentionHolder (2x)
12. SuspentionRollBarlink (2x)
13. MainBearingHolder (2x)
14. ConstructionPart2 (2x)
15. ConstructionElement (2x)
16. Chassis (1x)

ASSEMBLE THE PARTS

When you are finish printing you will have to follow these steps to make your rover alive! By now I assume that you have printed all the parts and you have all the needed hardware.

ASSEMBLING THE WHEELS

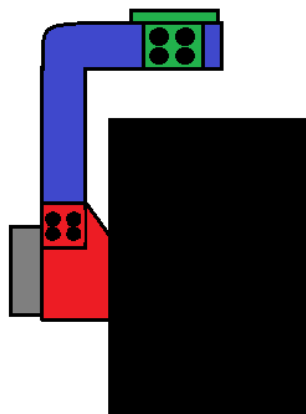
1. First grab your Coupling part that you have bought from the first link of the caption "hardware". Try to push it into the hexagon hole in the 3d printed part named "WheelInsidePart". The easiest way is to use the hammer or some sort of press.

You have to make 6 of these parts and remember. If the inserts will be at the perfect 90 angle from the base the wheels will spin smoothly.

2. Now it is a time to join the assembly, you have already built, with the outer wheel. Grab the assembly and the 3d printed part named "Wheel" and secure it with the bolts M5 40mm. You don't have to use all 6 holes, use at least 2.

3. Now you have to insert the electric motors in to the 3d printed part named "MotorHolder". Secure the motors with the M3 bolts although, you don't need to, because the parts are designed to press-fit. When it is finished attach the wheel on the shaft of the motor and secure it with the M3 bolt at the side of the bronze insert.

4. Now grab your 3D printed parts named "WheelArc" and "WheelBearingHub". Stack the parts one on the top of other as in the picture bellow and secure it with the M5 bolts. (again use any of these 4 holes but not all of them / extra holes are meant for future upgrades). Make 6 of these parts.



[Each color represents its own part]

5. Now press fit the bearings, you have printed on the "WheelBearingHub".

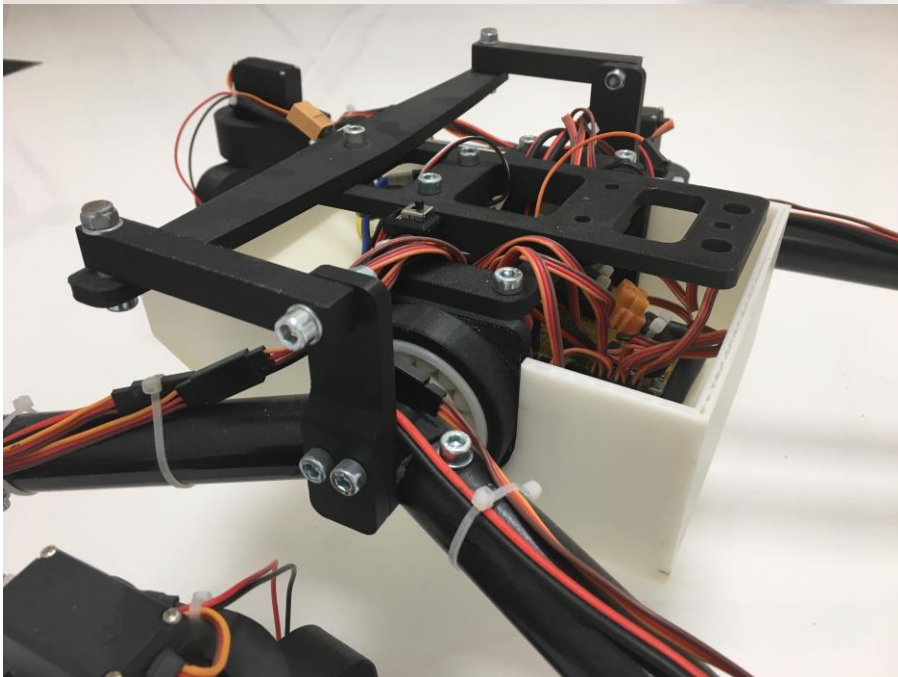
6. Now grab your 3D printed "RearWheelCoupler (4x)" and "FrontWheelCoupler". Press fit them on the base of the bearing. Grab your PVC pipe and cut it with the saw to the lengths according to table:

- (2x) 15cm
 - (2x) 18cm
 - (2x) 13cm
-

7. Now I think the easiest way to assemble the rest is by using this picture. Assemble the whole robot as shown on the picture. Secure every part by drilling the hole through the PVC pipe and insert the M5 bolt.

Make sure all the angles look right before drilling the hole through the part!



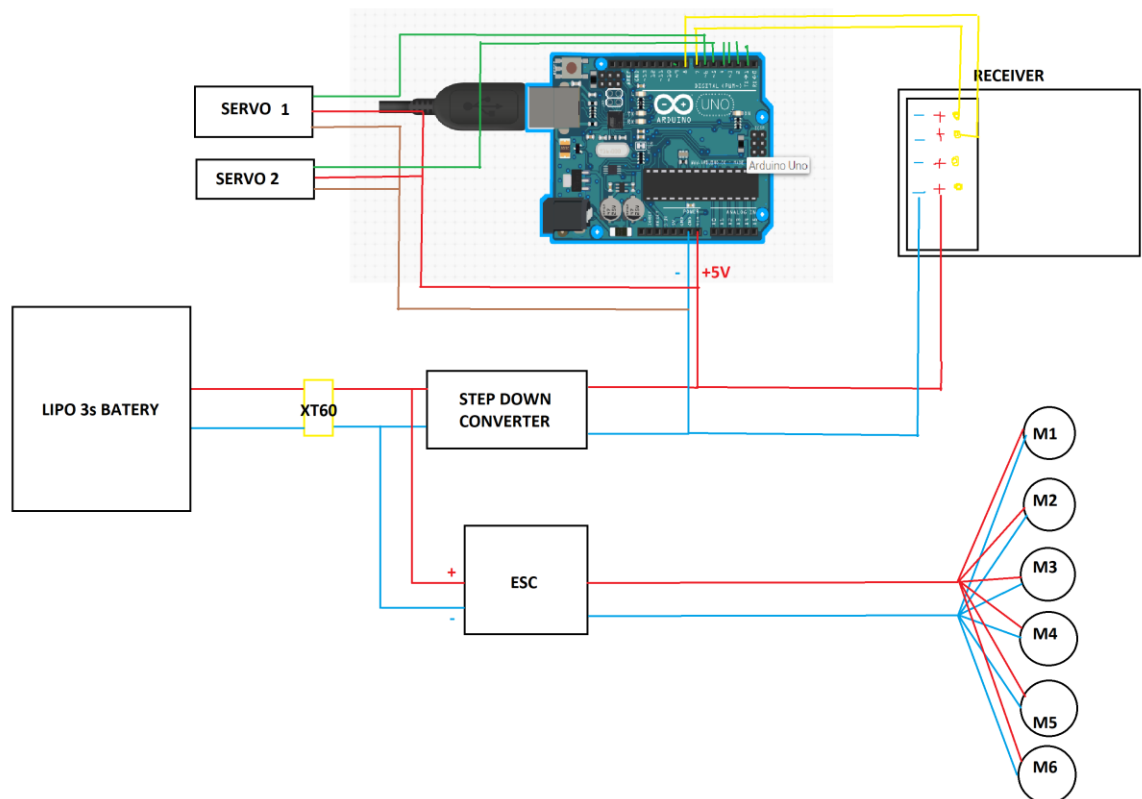


8. Now try to install the servo motors. On the pictures on the pages 6 and 7 you can see that servo motors are press fitted into the 3d printed parts and connected with extension to the base. You can secure the motors into the place with the drop of hot glue. Be careful, hot glue can melt some plastics so that's why apply just a small amount of hot glue.

9. Extend the motor wire by soldering "Speaker Cable" to its terminals. You can secure everything with heat shrink and some zip ties.

ELECTRICAL PART

By now you should have the whole mechanical body. The last thing you have to do is electrical part. There is more ways to connect cables, that's why I made an overview schematics.



I wish you a lot of luck and happy building. If you have any problems, contact me on:
kamil.kosizoo@gmail.com