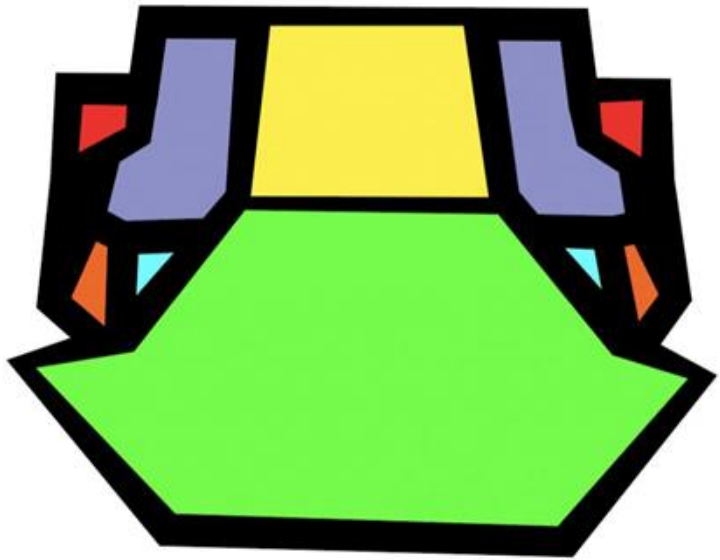


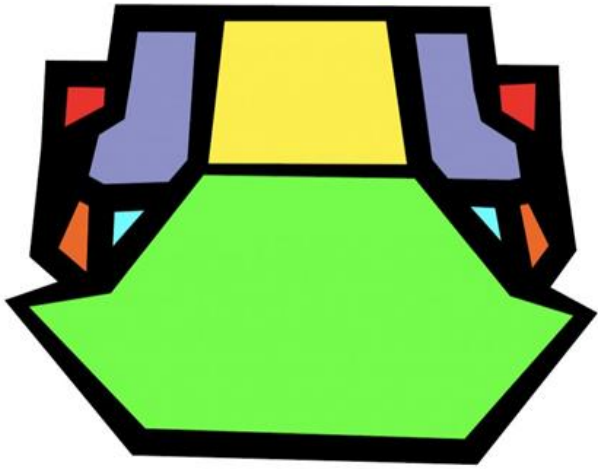
TURNABOT



create compete connect

SLIPPER ASSEMBLY INSTRUCTIONS

Version - Anvil

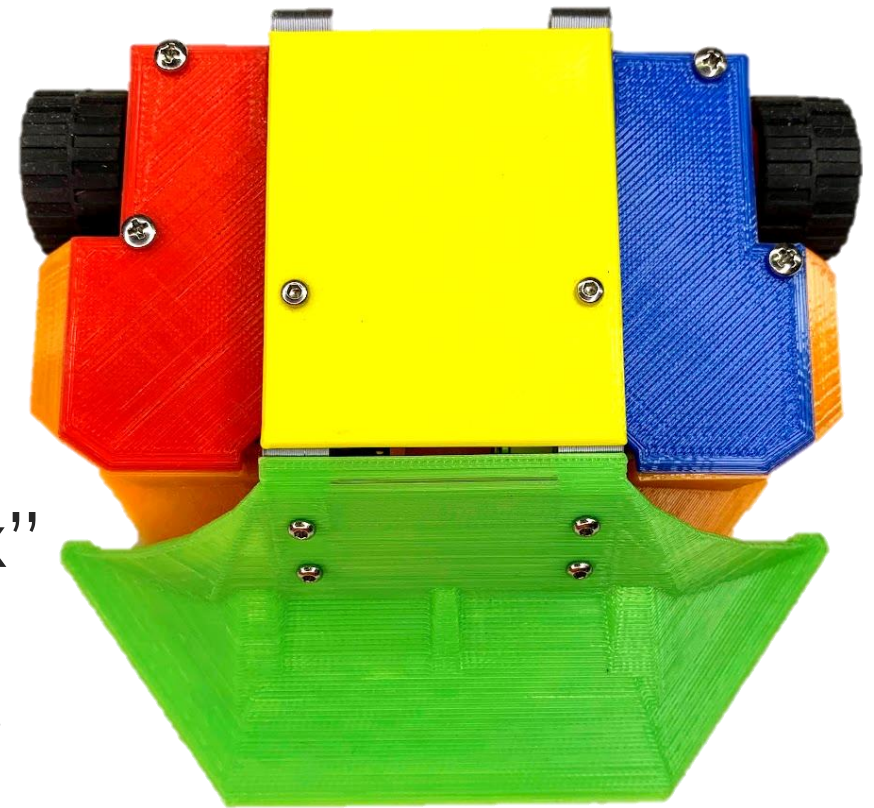


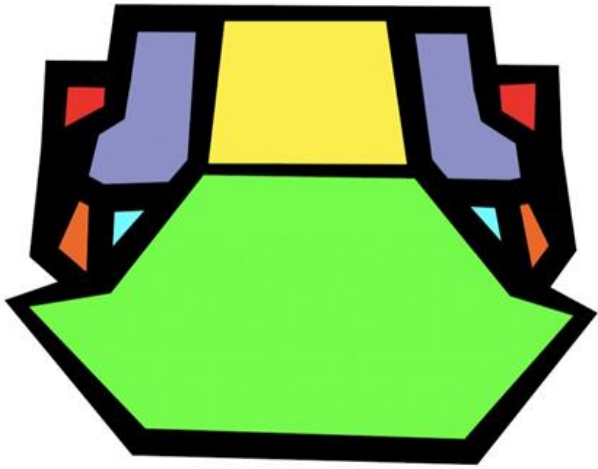
Thank you for purchasing **Slipper**, a non-destructive 150g combat robot.

Slipper is designed to be **easy** to assemble, battle, maintain, and customize if desired.

150g combat robots are known as “Fairyweight” in the US and “Antweight” throughout the rest of the world.

Slipper is quite competitive “out of the box” and can be upgraded to be a serious contender in almost all 150g competitions.





! Safety ! First and Always !

Turnabots are among the safest combat robot kits available.

HOWEVER There are still several things to be aware of:



Lipo batteries can be VERY dangerous. Charging should ONLY be done in a Lipo bag or FAR from anything flammable.

Do NOT cut both wires of a battery at the same time. If you need to change connectors, cut one wire, install it in the new connector, then cut the other wire.

If a Lipo has sustained any damage or has “puffed” do NOT charge it. DISCARD it (safely and properly).



Assume that ALL electronic joints and components have exposed **lead**.

Do not lick any electronics. Do not allow children or pets to lick any electronics.

After anyone touches any electronics, faces must not be touched and hands must be washed with soap, particularly before eating.

***As with most instructions it is HIGHLY recommended to read ALL THE WAY through the instructions multiple times before starting. Often a later step clarifies earlier steps.**

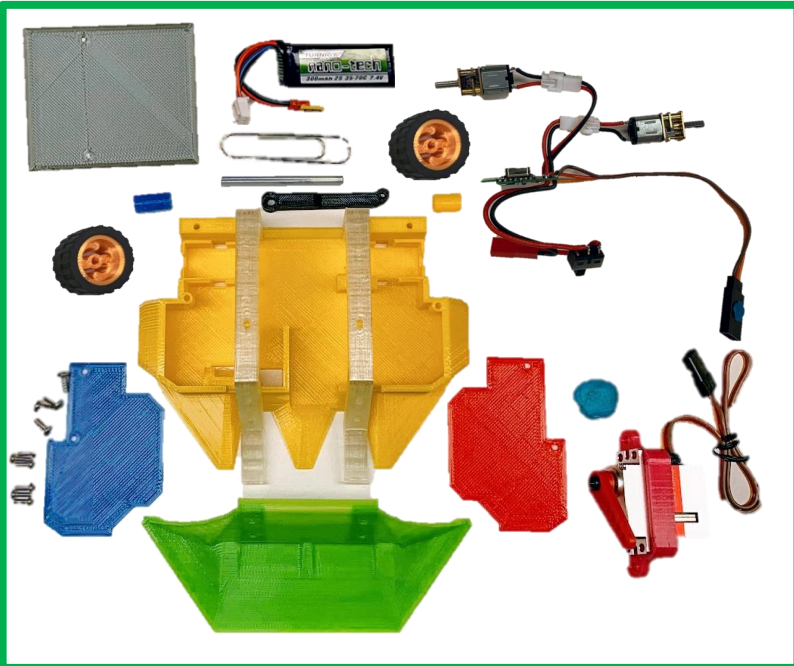
These instructions will cover every single step in properly assembling your Slipper Kit.

There are 3 sections to these instructions; each page is bordered by the below colors

Pre-Soldered Kit
Assembly
Instructions (pages 7-13)

Standard Kit
Assembly
Instructions (pages 14-38)

Setup / Radio /
Programming
Instructions (pages 38-41)



Tools – Required and Useful

Pre-Soldered Kit

Required:

1. Small Phillips Screwdriver
2. 1.5mm hex (allen) driver (key)

Useful

1. Super-glue / cyanoacrylate (tires, wheels, repairs, etc. Using “accelerator / activator” is recommended)
2. Needle-Nose Pliers (often helpful for placing servo screws among other uses)
3. Thin Acetate (flexible plastic for the front edges of wedges. Often applied with thin “carpet tape” or glue)
4. File(s) – useful for removing sharp edges

Standard Kit

Required:

1. Soldering Iron / Station – at the very least you’ll want something with adjustable temperature and a small tip
2. Solder – if using leaded solder BE AWARE OF LEAD POISONING. Lead-free solder can be used successfully
3. Flux – paste or pen, incredibly helpful
4. Flush-Cutters (aka side-cutters)
5. Wire Strippers – decent “auto-strippers” are now available for under \$12 on Amazon and are worth it
6. Needle-Nose Pliers (often helpful for holding wires while soldering, placing servo screws, etc)
7. Small Phillips Screwdriver
8. 1.5mm hex (allen) driver (key)

Useful

1. File(s) – useful for removing sharp edges

Assembly is very straightforward (you can do it)

Every single step will be covered in these instructions.

If you have the **Pre-Soldered Kit**, start by laying out the parts.

(If you have a **Standard Kit**, go to page 12)

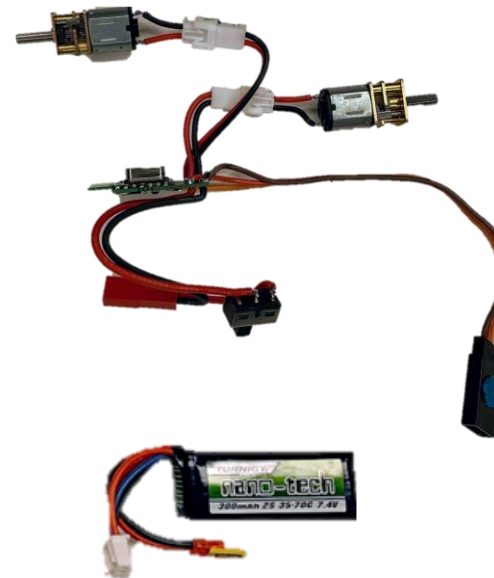
Yours may be different colors than the below images, but you'll have the same shape parts.

1. Top Armor
2. **Micro Servo Adapter**
3. **Long Spacer**
4. **Link**
5. **Short Spacer**
6. **Right Wheel**
7. **Chassis**
8. Right Arm
9. Left Arm
10. **Left Wheel**
11. **Right Armor**
12. **Plow**
13. **Left armor**

Plastics
And Tires



Electronics Assembly
and Battery



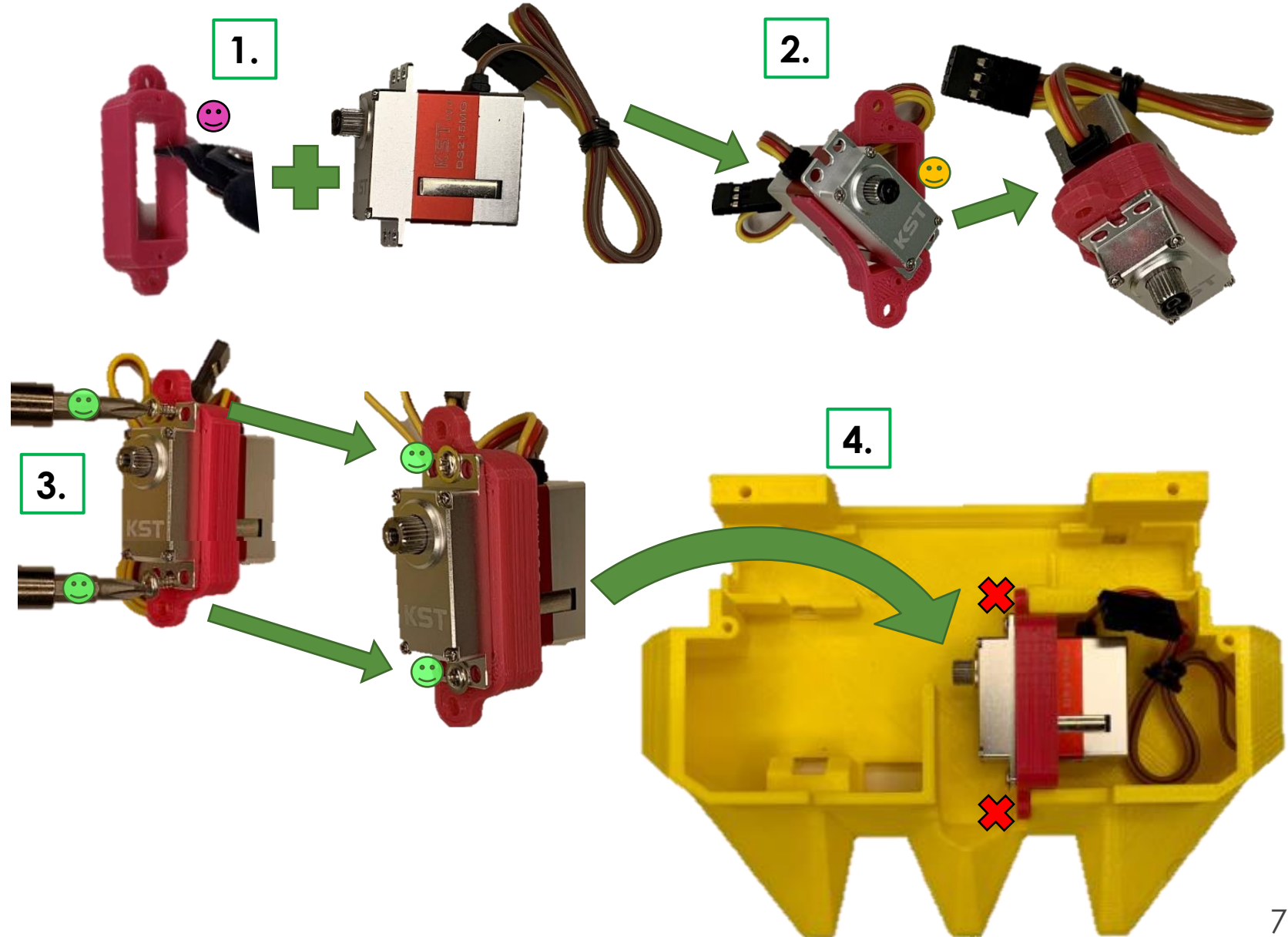
Servo, Rod,
Paperclip,
Screws & Zip Ties



Pre-Soldered Slipper Assembly Page 1/7

Micro Servo Adapter installation:

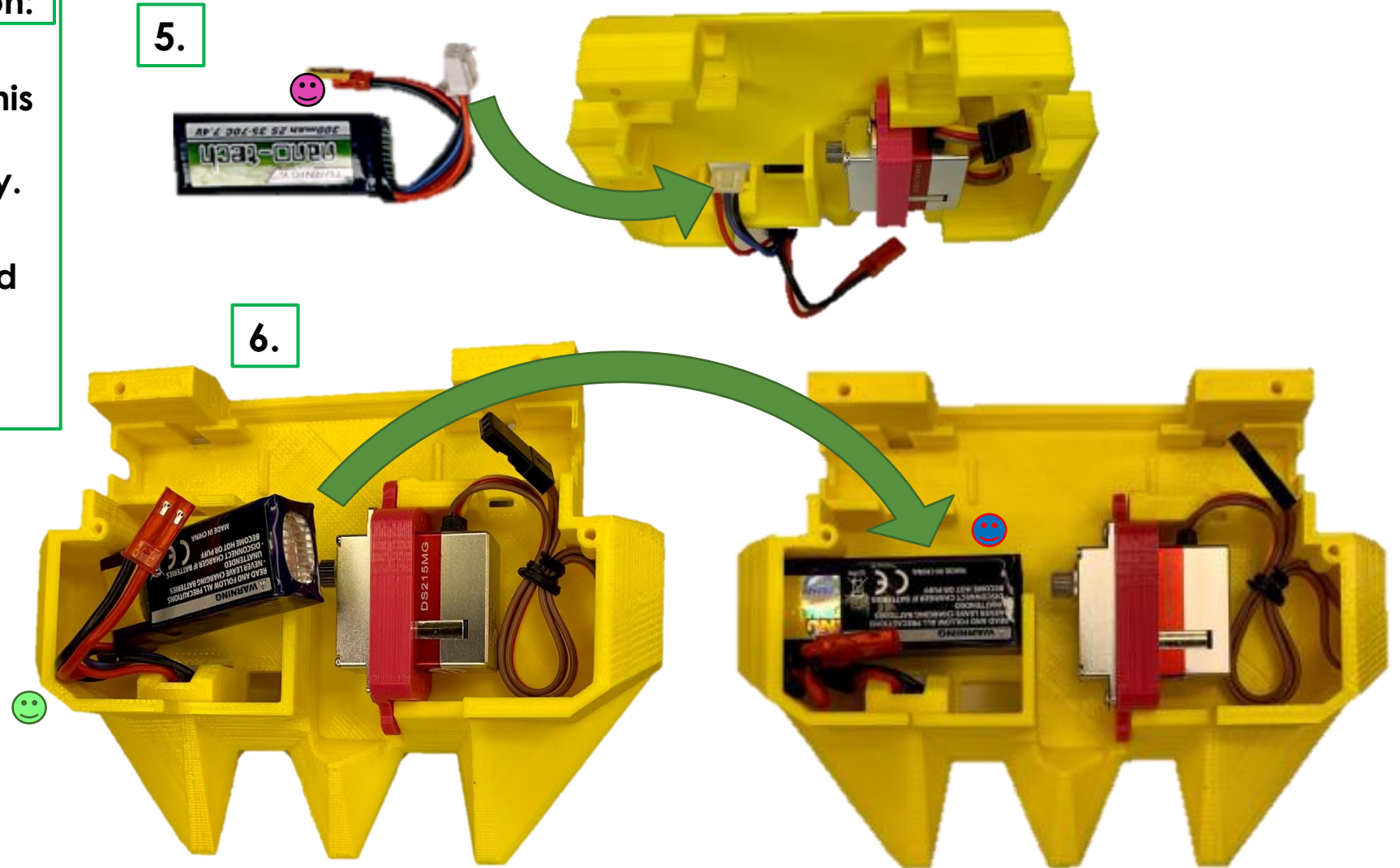
1. If the **Micro Servo Adapter** 😊 does not have a split at the bottom you may want to snip it at the indicated location.
2. Place the Micro Servo into the the 😊 **Micro Servo Adapter** noting the orientation of the servo shaft, the adapter ears, and the adapter side that fits into the chassis mounts.
3. Install the **2 servo mounting** 😊 **screws**, you do want these relatively tight)
4. Place the Servo into the Chassis but **do not install the** ❌ **screws from the adapter to the chassis yet.**



Pre-Soldered Slipper Assembly Page 2/7

Charging Port/Battery Installation:

5. Insert the battery charging connector (😊) into the mount. This can be a bit tricky, but it's worth making charging easy.
6. Place the Battery into the Chassis with the wires tucked into the front corner. The battery should fit snugly into the pocket (😬).






Pre-Soldered Slipper Assembly Page 3/7



Electronics Assembly Installation:

6. Place the Electronics Assembly  into the Chassis.

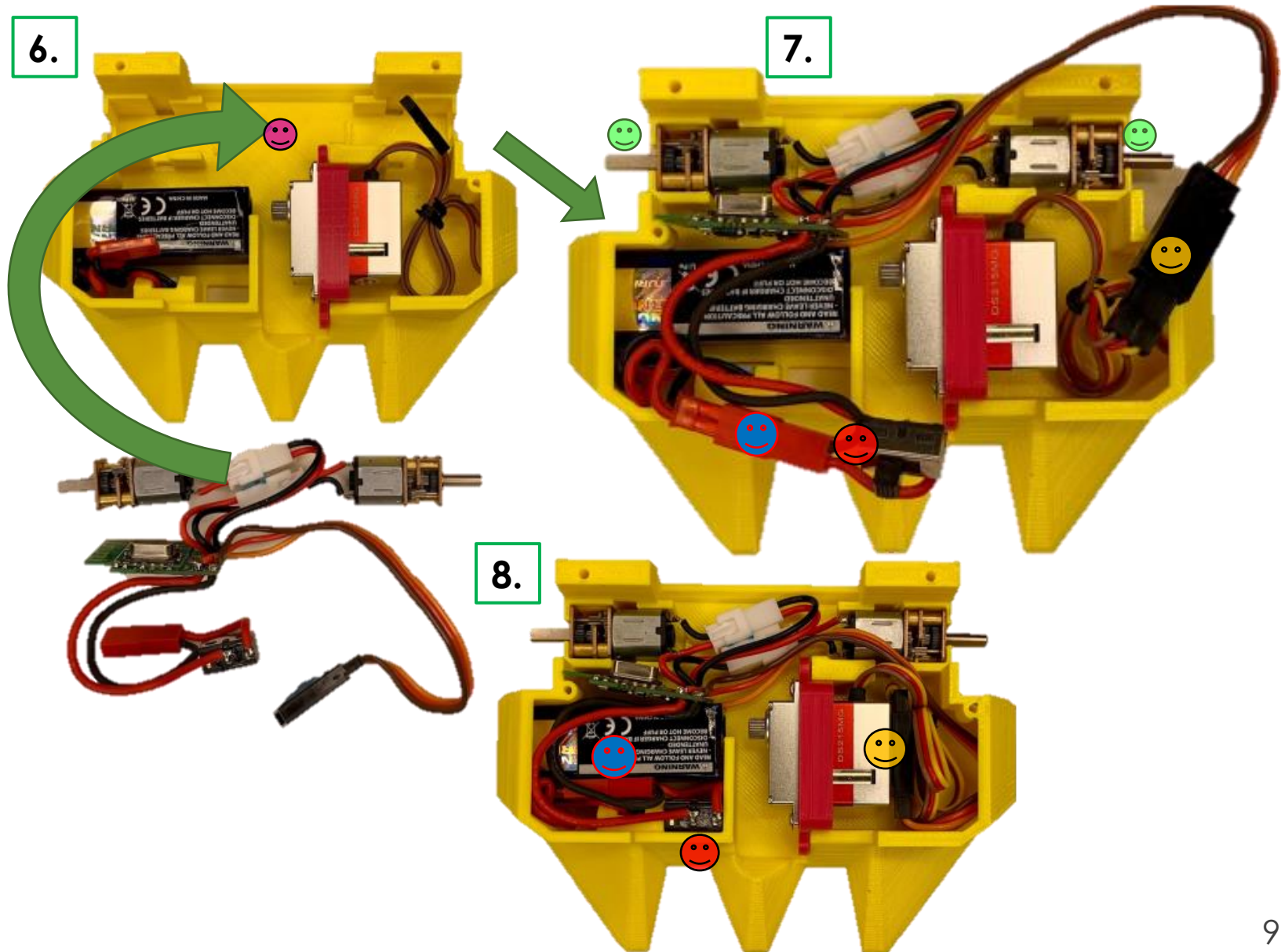
7. Make sure the gearboxes seat  securely into the pockets.

 Ensuring that the switch is in the OFF position (on the side with the missing leg, Left in this  image) connect the Battery  and the servo cable.

8. Tuck the switch into its slot.

 The switch can be stuck or glued into position. The lower it is, the easier it is to reach, which is “nice” but increases the chances of it getting hit in battle. Tuck the  battery connector between the battery and the mount.



 Tuck the servo wires into the corner.



Pre-Soldered Slipper Assembly Page 4/7

Radio / Servo setup:

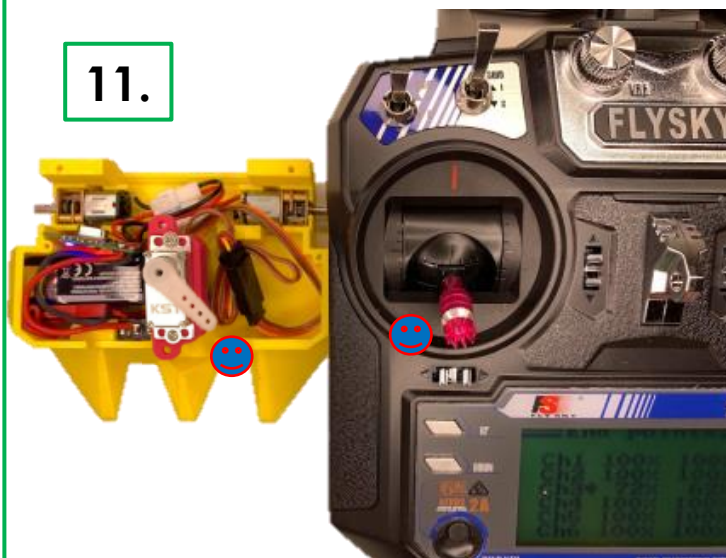
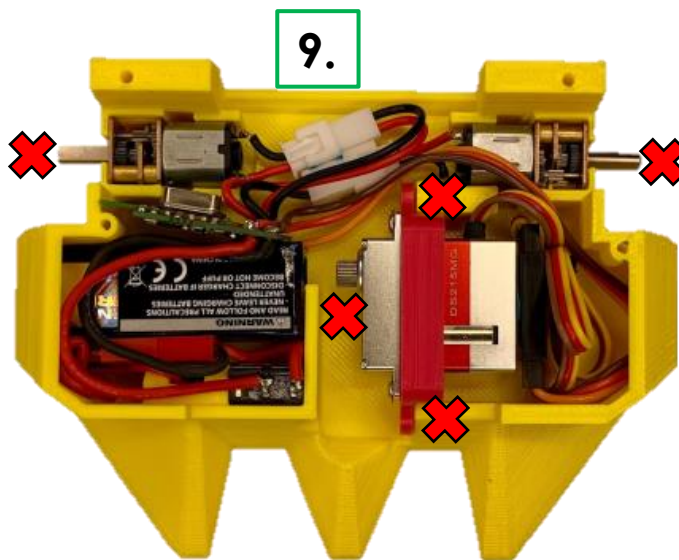
9. At this point in the assembly of any bot, **✗ BEFORE** installing the wheels and servo horn and hard-mounting the servo, it's a good idea to make sure that the bot won't run away or put the servo horn hard into the chassis. You can now turn on the bot. On the Malenki the **Red LED** will light up and the **Blue LED** will begin flashing rapidly.

10. To bind a FlySky FS-i6, hold the Bind  button while switching it on. To bind a  Turnigy Evolution, hold the power button to turn it on, click the wrench, scroll down and touch RX bind. The blue LED will go solid.

11. With the stick down the servo should be  near 45° the servo body.

12. With the stick up the servo should be  slightly toward the rear of the bot.

If you're unfamiliar, please see **Section 3** for additional instructions on radio setup.



Pre-Soldered Slipper Assembly Page 5/7

Motor (optionally **Wheels**) installation:

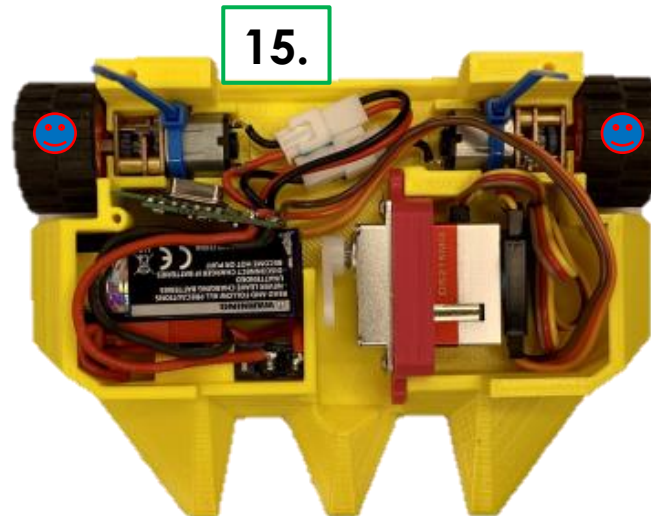
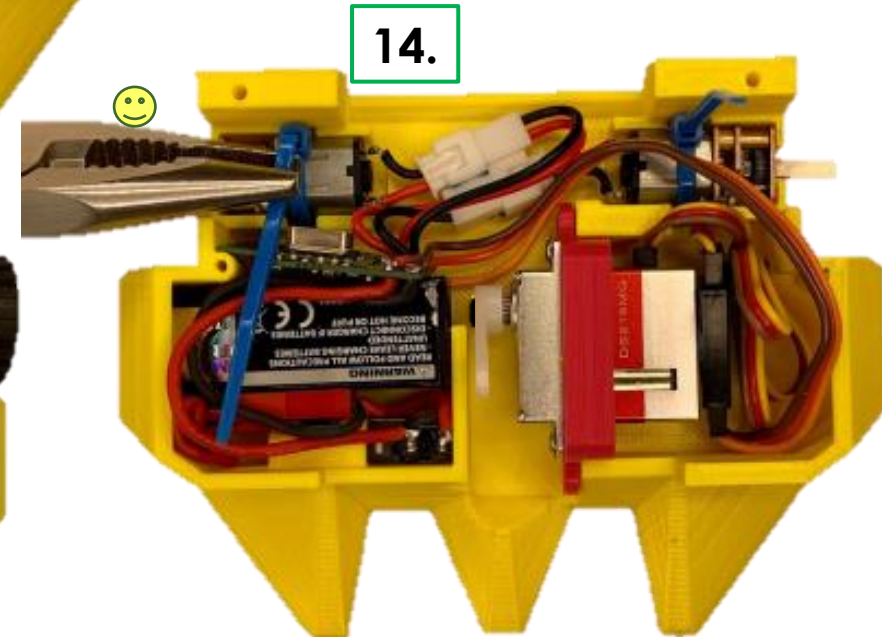
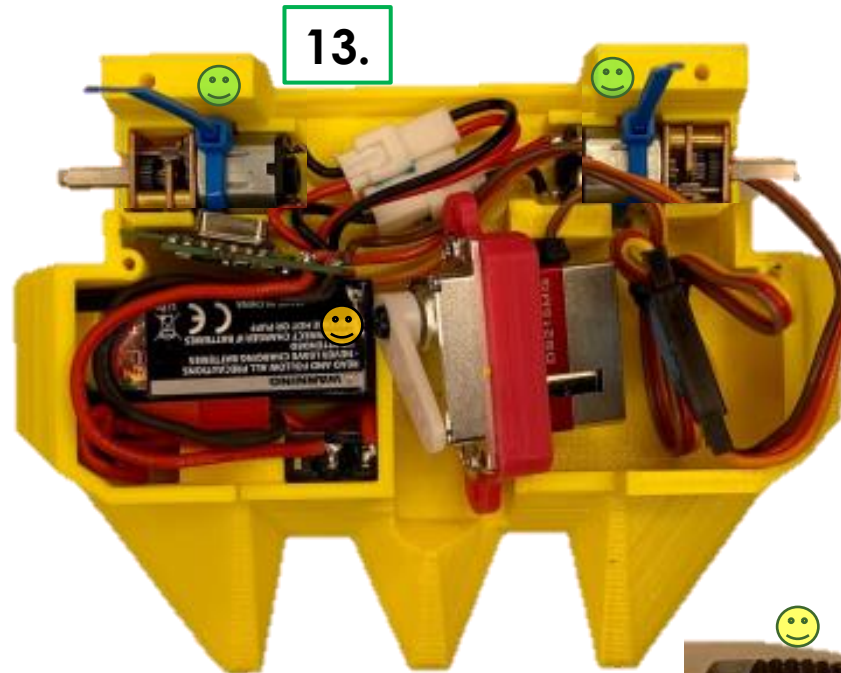
13. With the Servo Horn properly installed and the End Points set to ensure a safe servo range, install the Servo horn Screw. Install the Zip Ties to the motors. 😊

14. You may want to use pliers and “roll” them to get the Zip Ties as snug as you can without breaking them. 😊

15. Optional – You can continue building, but if you’d like, you can temporarily install the **Wheels (without glue)** because.... 😊

Congratulations! YOU HAVE A ROBOT!!!

At this point you can drive it around and actuate the flipper servo.



Pre-Soldered Slipper Assembly Page 6/7

Flipper Assembly and installation:

16. Assemble the flipper. The arms are printed to have **Left** and **Right Arms**, the side that was on the printer bed has a slightly smaller hole which helps retain the aluminum rod.

😊 Install the rod into the left arm.

17. Install the Rod and **Left Arm** to the **Plow**

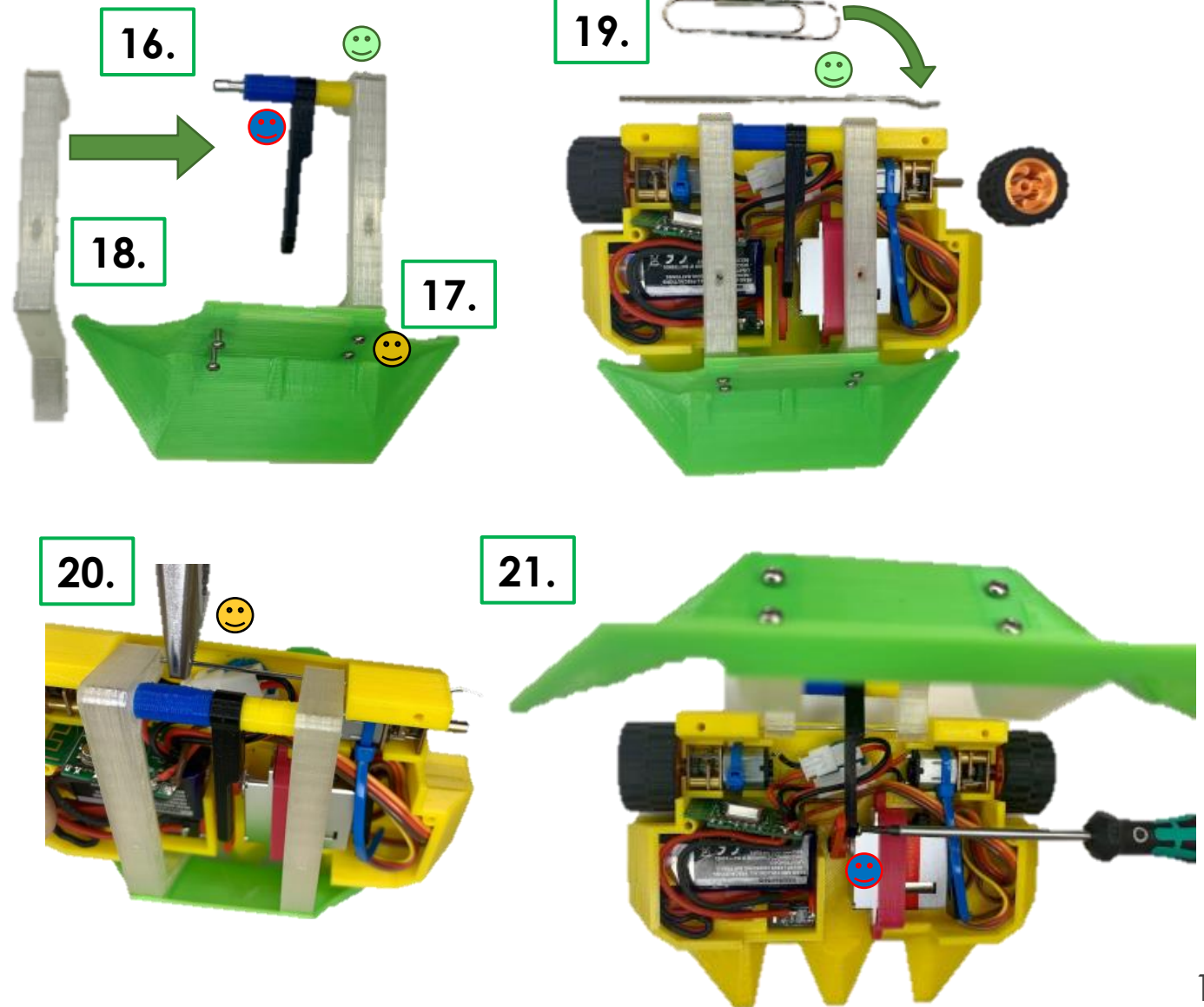
😊 using 2 of the **M2 x 6mm** button-head screws and install the **Short Spacer**, **Link**, and **Long Spacer**.

18. Install the **Right Arm**.

19. Straighten out the Paper Clip. Cut it to the 😊 length of the **Chassis Rear Uprights** (between the **Wheels**) and put a "V" bend in one end.

20. If you installed it, remove the **Left Wheel**, 😊 install the Paper Clip through the rear uprights and the **Arms**. Use pliers near the **Right Arm** to pull the "V" into the upright.

21. Reinstall the **Left Wheel** and screw the **Link** 😞 to the servo horn.



Pre-Soldered Slipper Assembly Page 7/7

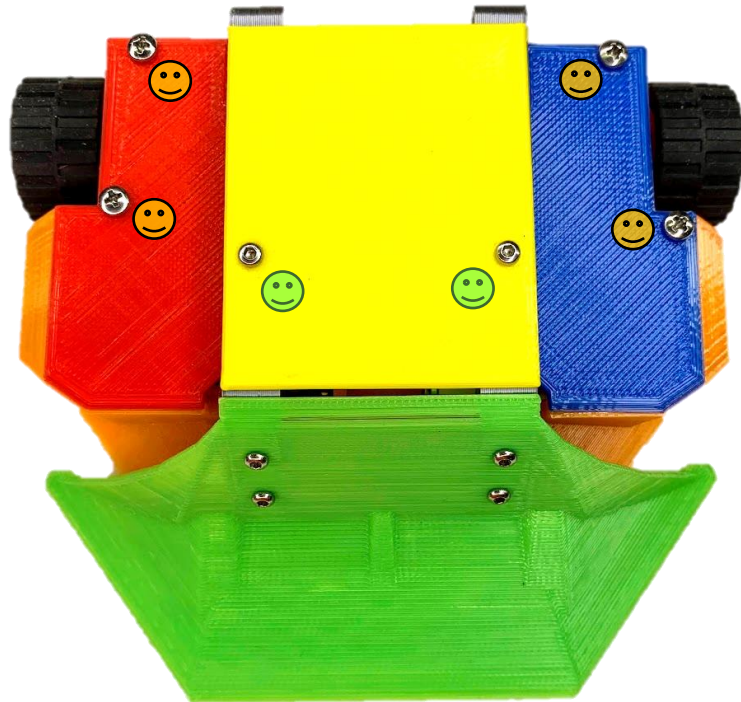
Armor Installation:

22. The Turnabot should look like this.

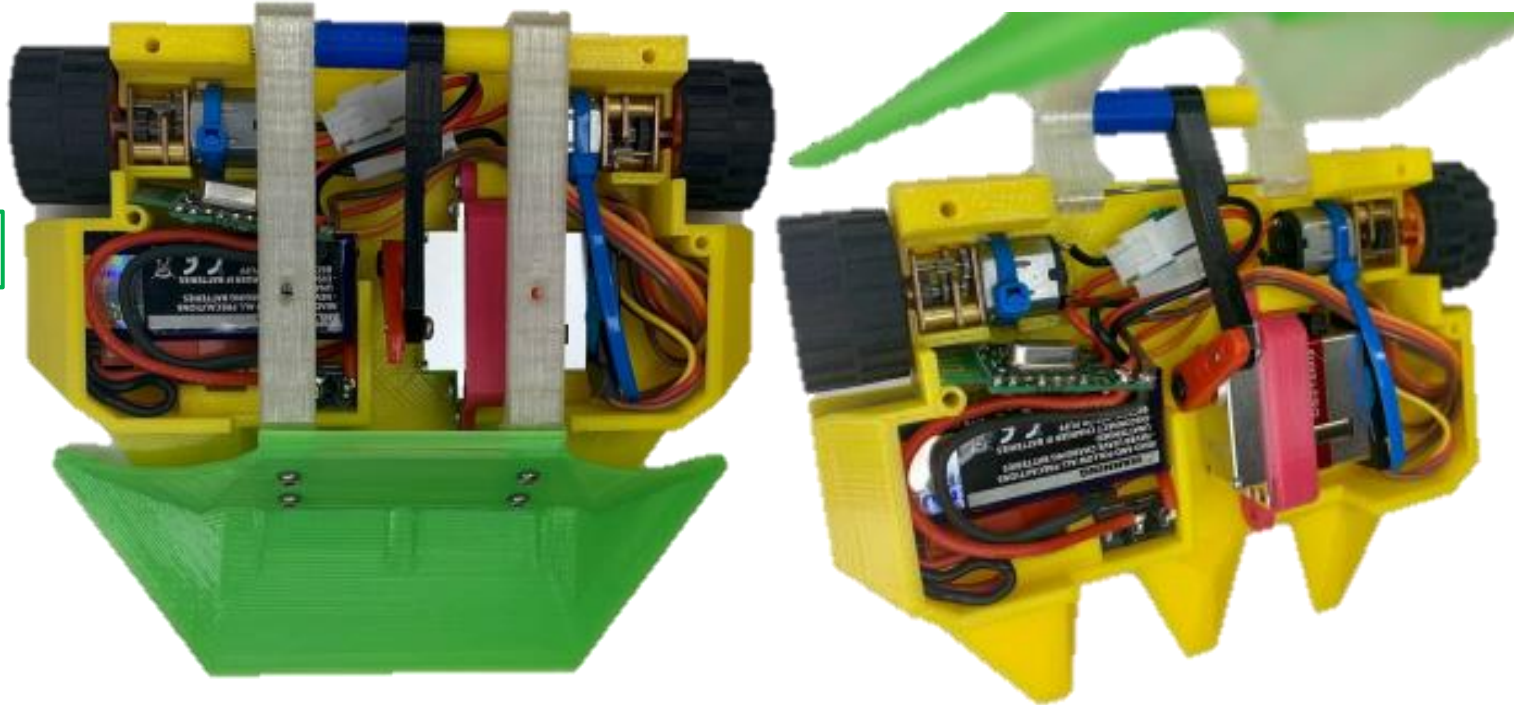
23. Install the Top Armor, with the last
😊 2 M2x6 screws and the Right
😊 Armor and Left armor with the 4
Phillips screws.

24. BATTLE!!! 😡

23.



22.



24.



Assembly is very straightforward (you can do it)

Every single step will be covered in these instructions.

With the **Standard Kit**, start by laying out the parts.

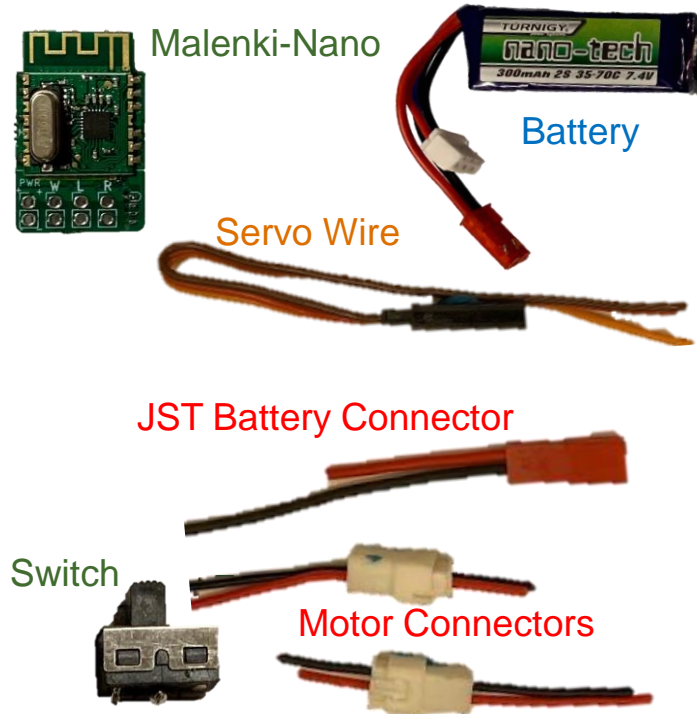
Yours may be different colors than the below images, but you'll have the same shape parts.

1. Top Armor
2. Micro Servo Adapter
3. Long Spacer
4. Link
5. Short Spacer
6. Right Wheel
7. Chassis
8. Right Arm
9. Left Arm
10. Left Wheel
11. Right Armor
12. Plow
13. Left armor

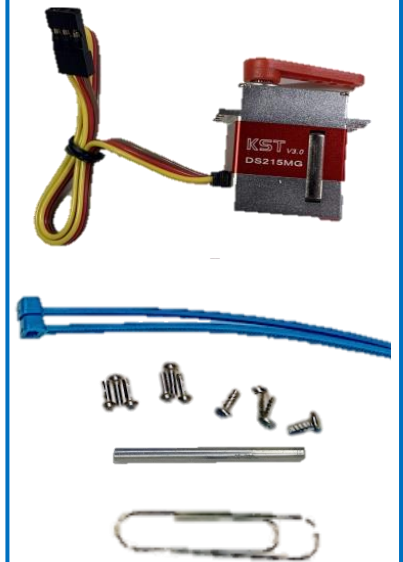
Plastics
And Tires



Electronics



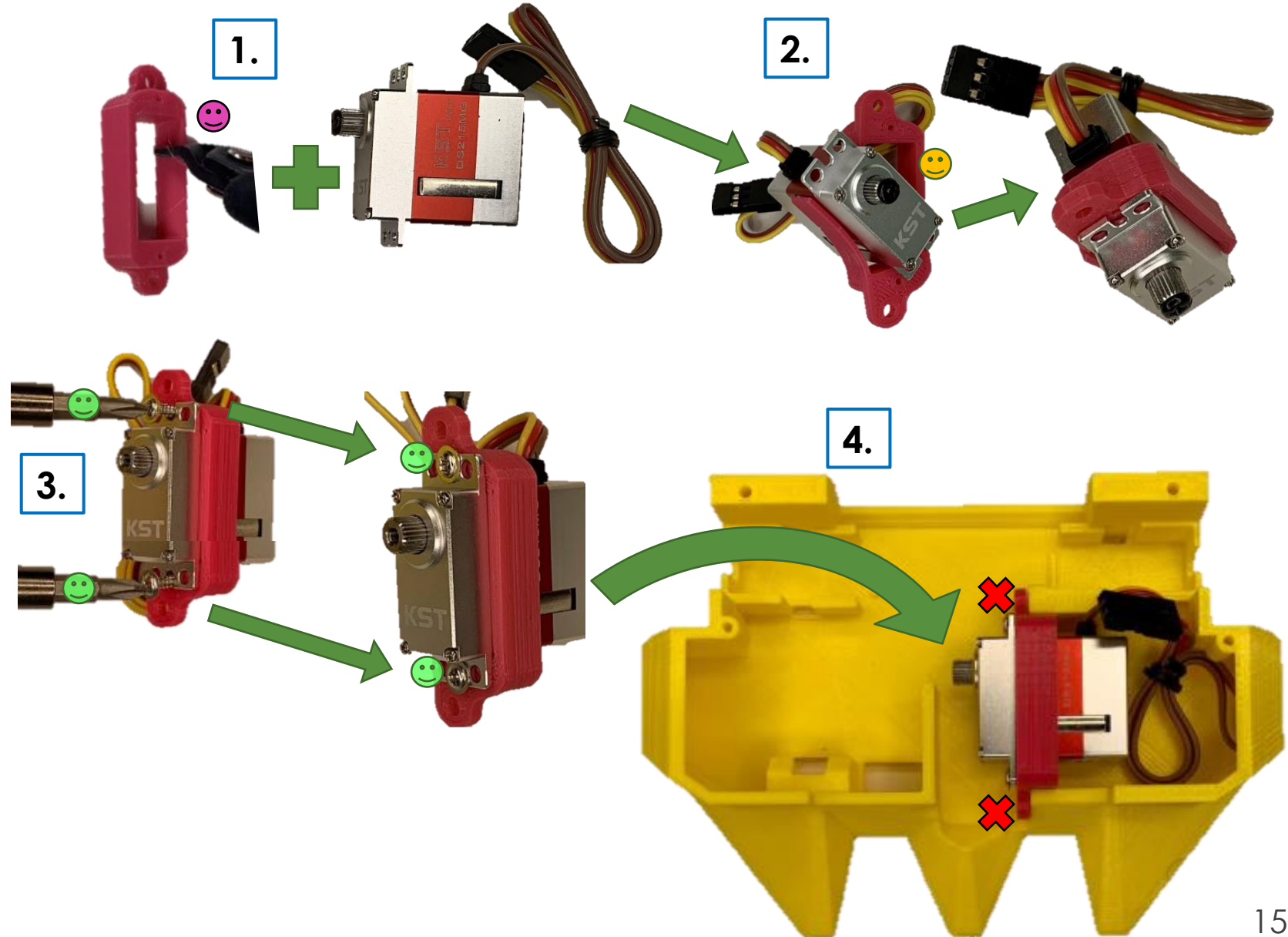
Servo, Zip Ties,
Screws, Rod,
and Paperclip



Standard Slipper Assembly Page 1/23




Micro Servo Adapter installation:

1. If the **Micro Servo Adapter** 😞 does not have a split at the bottom you may want to snip it at the indicated location.
2. Place the Micro Servo into the 😊 **Micro Servo Adapter** noting the orientation of the servo shaft, the adapter ears, and the adapter side that fits into the chassis mounts.
3. Install the **2 servo mounting** 😊 **screws**, you do want these relatively tight)
4. Place the Servo into the Chassis but **do not install the** ❌ **screws from the adapter to the chassis yet.**

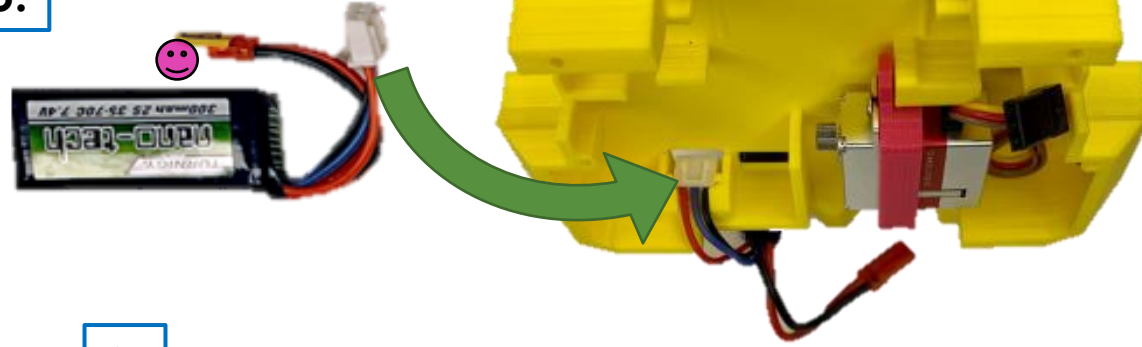


Standard Slipper Assembly Page 2/23

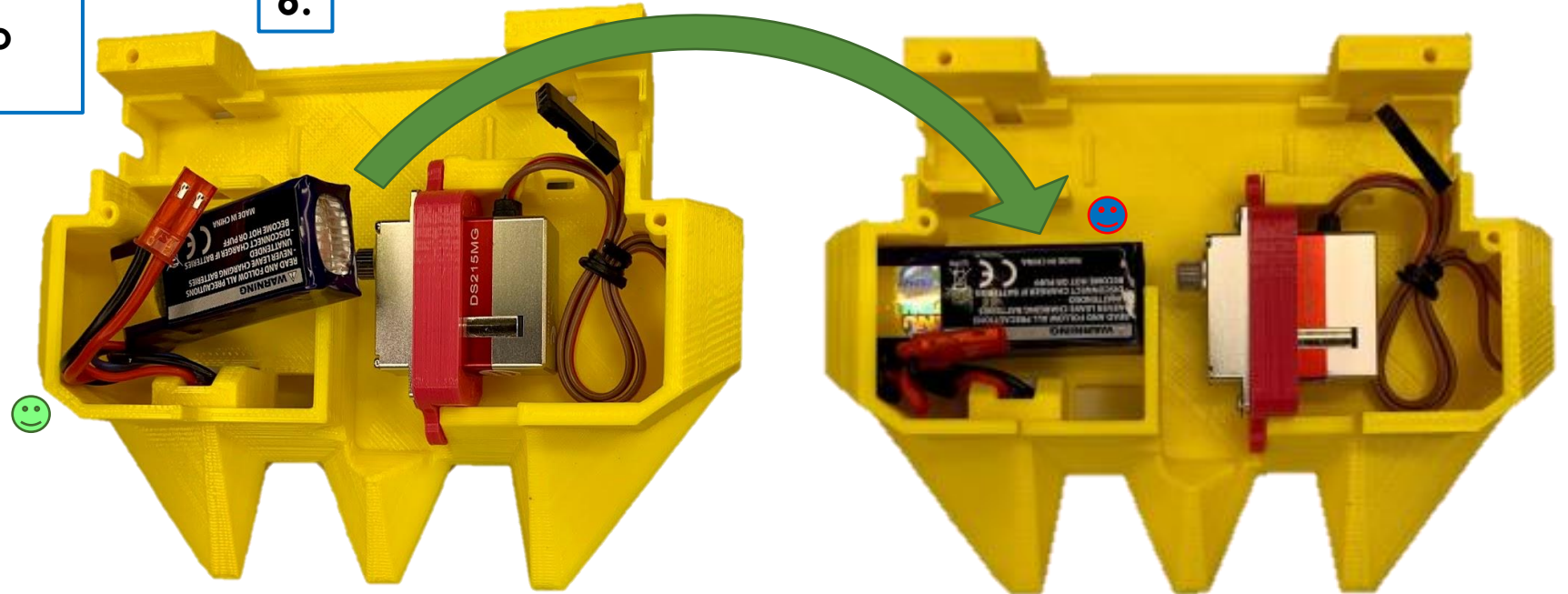
Charging Port/Battery Installation:

5. Insert the battery charging  connector into the mount. This can be a bit tricky, but it's worth making charging easy.
6. Place the Battery into the  Chassis with the wires tucked into the front corner. The battery should fit snugly into the pocket.  the pocket.

5.



6.



Standard Slipper Assembly Page 3/23

Placing components 1/2:

5. Place the components to prepare for wire trimming. First Insert the motors.

😊 We make a general practice of having “Plusses Up” to make it easier to see when installed. It helps know where the wires go. This is helpful with troubleshooting, particularly in pit sessions between battles.

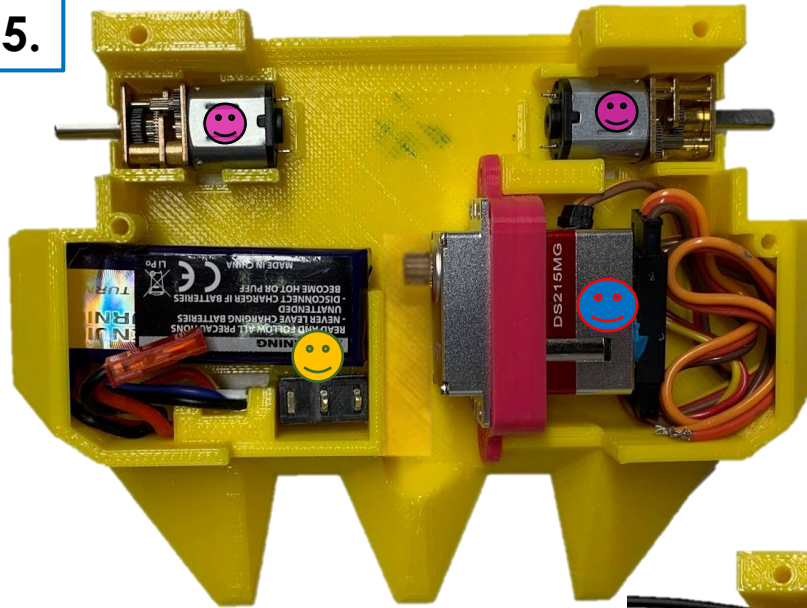
😊 **Place the Switch.** Wiring is easier with the two long legs toward the middle of the bot.

😞 **Connect the Servo Extension to the Servo wire and tuck into the corner.**

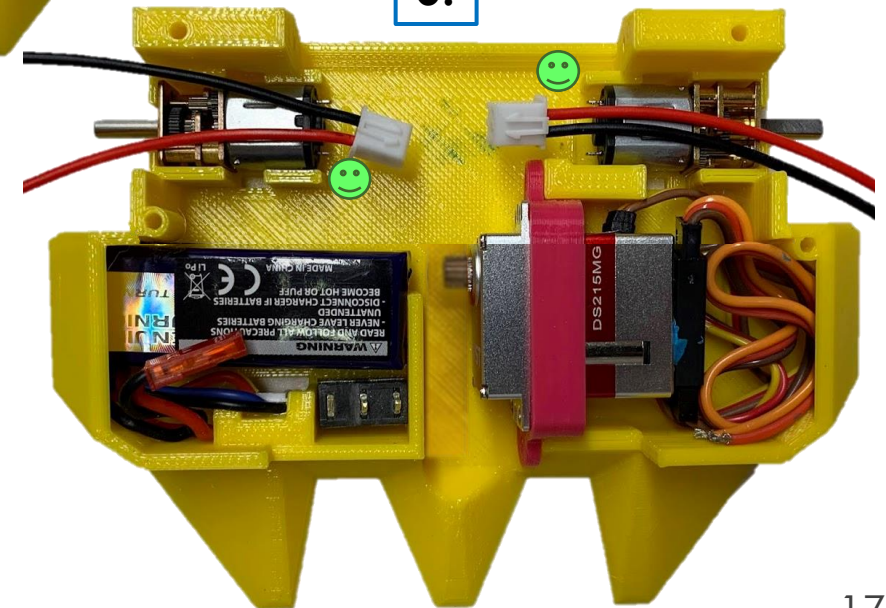
6. “Plusses Up” on Turnabot motors

😊 generally result in the **Red Wire** to the front on the Right side of the bot and to the back on the Left side. The male side of the motor connector goes to the motor.

5.







6.

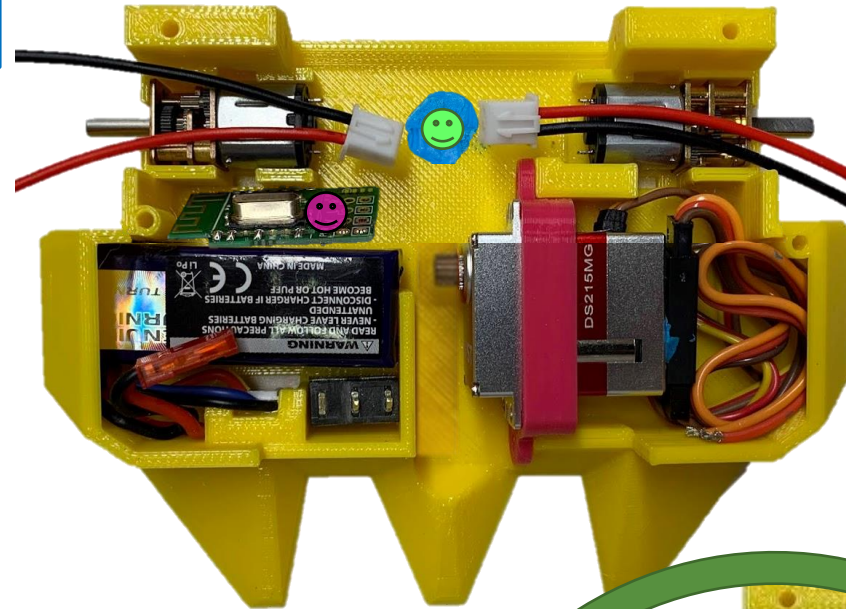


Standard Slipper Assembly Page 4/23

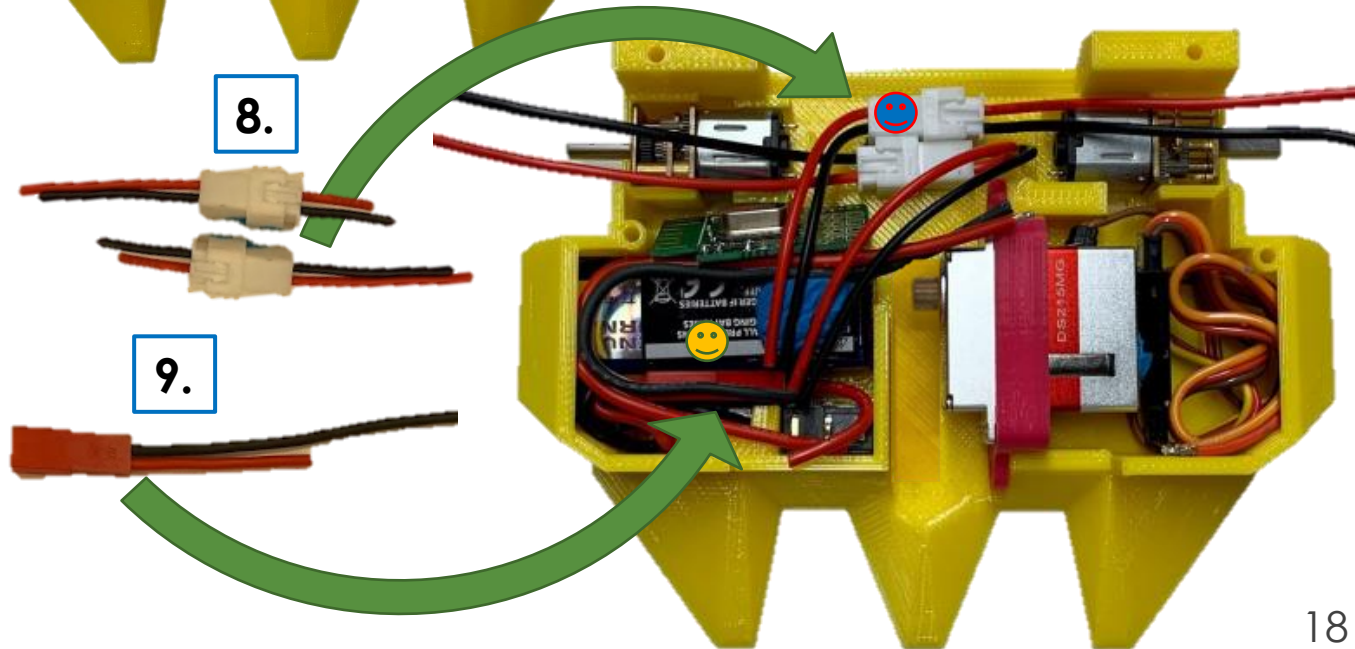
Placing components 2/2:

7. A dot of Blu-Tak under the motor connectors is very helpful for wiring.  Place the Malenki-Nano between the right motor and the battery as shown. 
8. Connect the male and female ends  of the two motor connector wires. They nest next to each other and are secured to the dot of Blu-Tak. Left motor connector toward the back of the bot improves the routing.
9. Insert the JST Battery Connector  between the battery and the charge port mount. To ease battery swaps the Black Wire is routed along the corner of the bot, then to the Malenki. The **Red Wire** is cut at the further leg of the switch. The cut portion of **Red Wire** is routed along the corner and then to the Malenki.

7.



8.



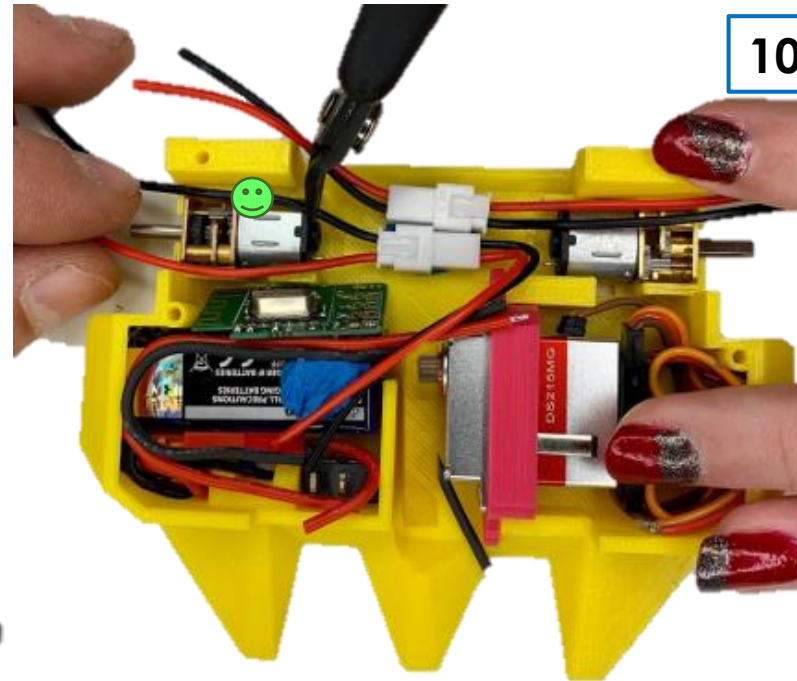
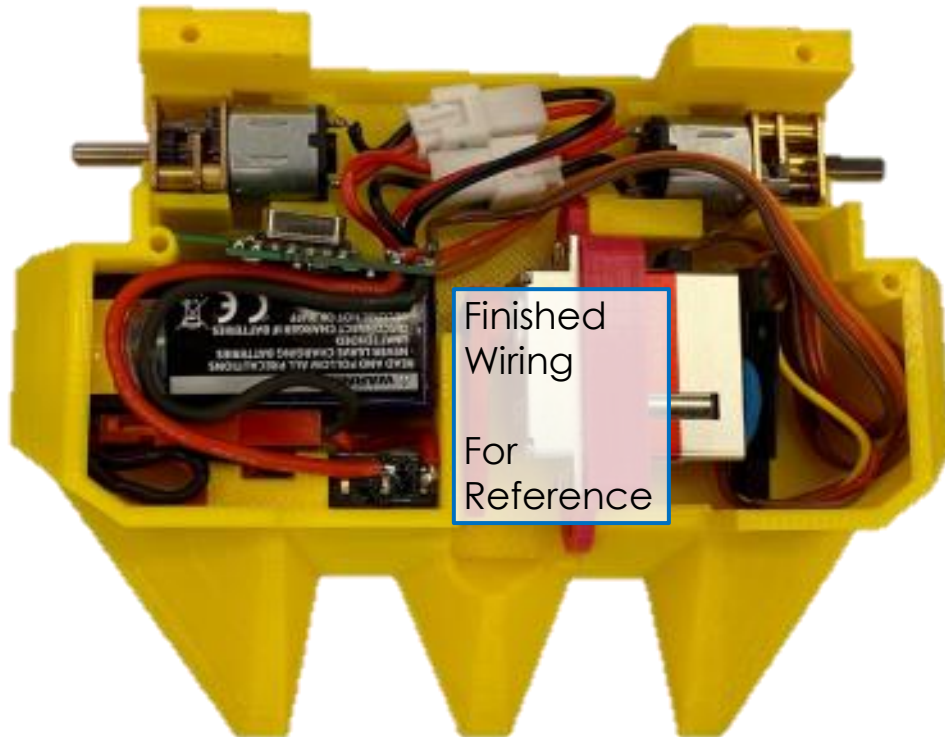
9.



Standard Slipper Assembly Page 5/23

Trimming Motor Connector Wires 1/2:

10. Trim the four motor connector wires ☺ flush to the motor caps. This will allow you to solder the wires to the sides of the motor terminals, making as strong of a connection as possible.

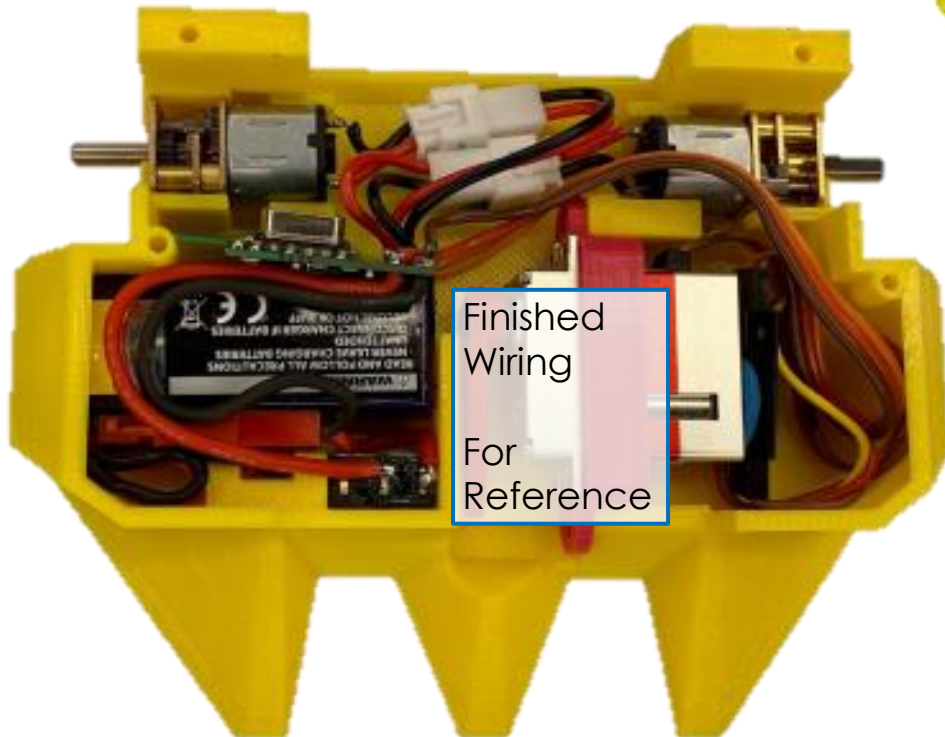
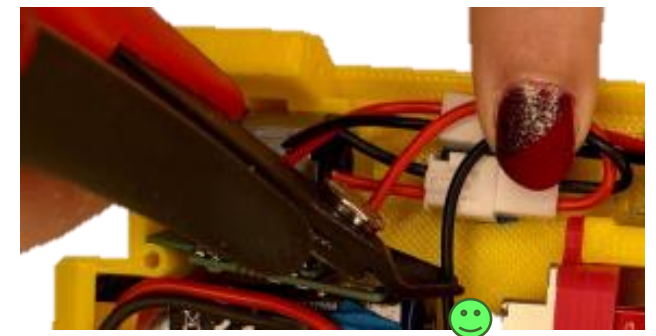
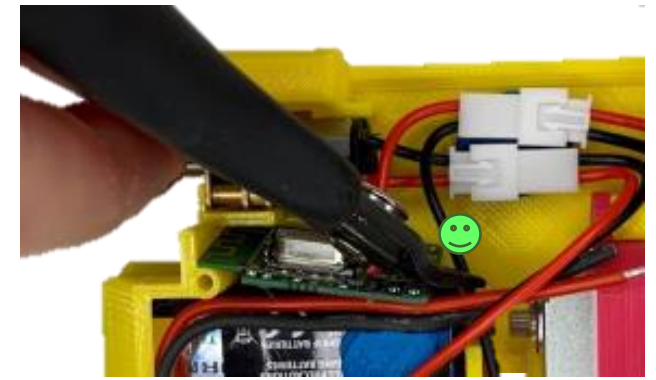
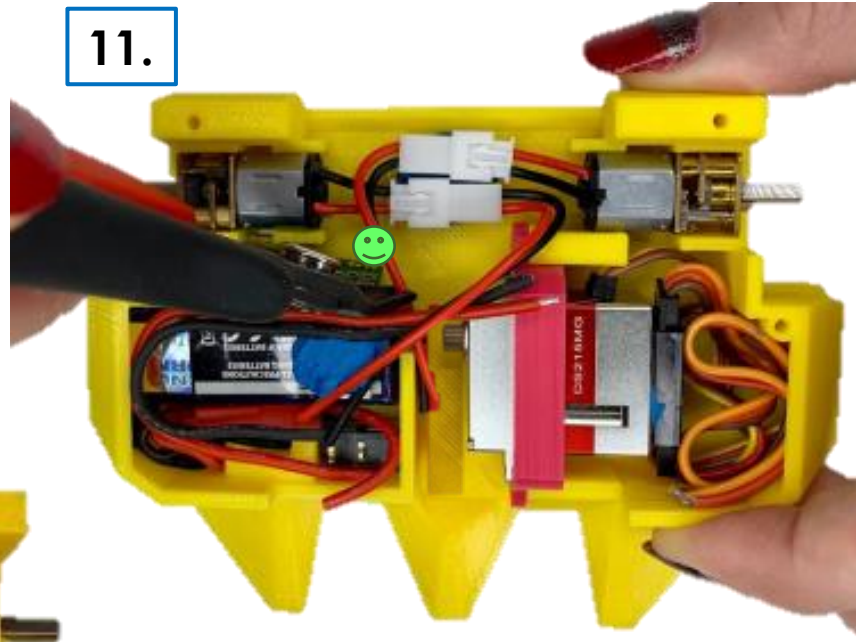


Standard Slipper Assembly Page 6/23

Trimming Motor Connector Wires 2/2:

11. Trim the motor connector wires to 😊 the FAR side of the appropriate solder rings on the Malenki. Leave enough wire to go through each solder ring. You can always trim extra later.

11.



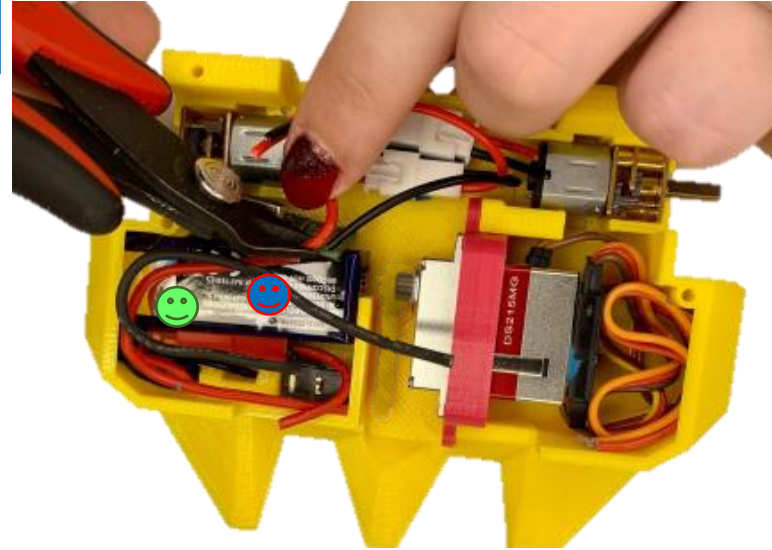
Finished
Wiring
For
Reference

Standard Slipper Assembly Page 7/23

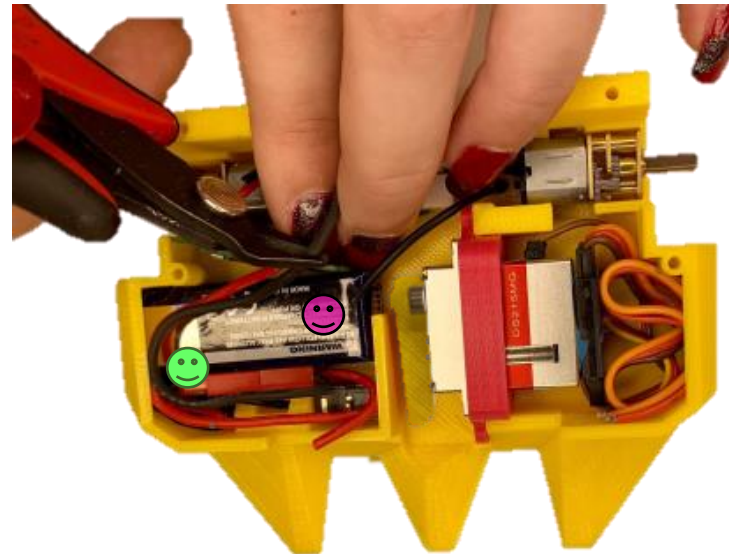
Trimming Battery / Switch Wires:

12. To ease battery swaps the wires from ☺ the battery and switch are routed along the corner of the bot, then to the Malenki. The cut portion of **Red Wire** is routed along the corner and then to the B+ solder ring. Trim the ☹ **Red Wire** on the “far” side of the Malenki to leave room to go through the solder ring.
13. The **Black Wire** is routed along the ☺ corner of the bot, then to the B- solder ring on the Malenki. Trim the ☹ **Black Wire** on the “far” side of the Malenki to leave room to go through the solder ring.

12.



13.



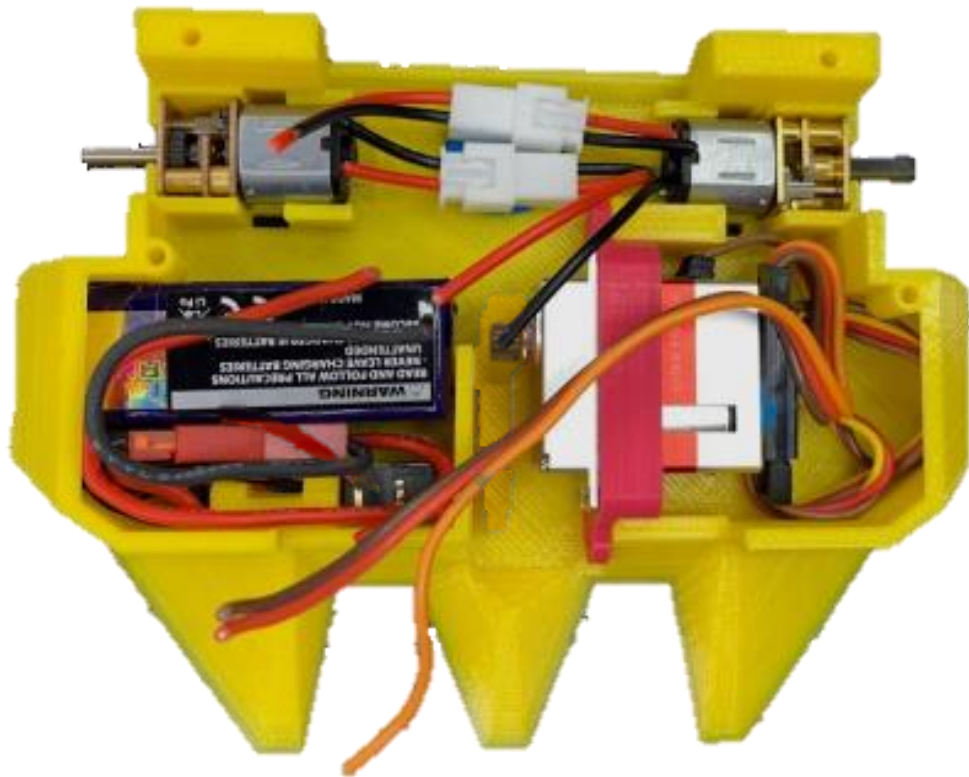
Standard Slipper Assembly Page 8/23

Trimming Servo Connector Wires 1/2:

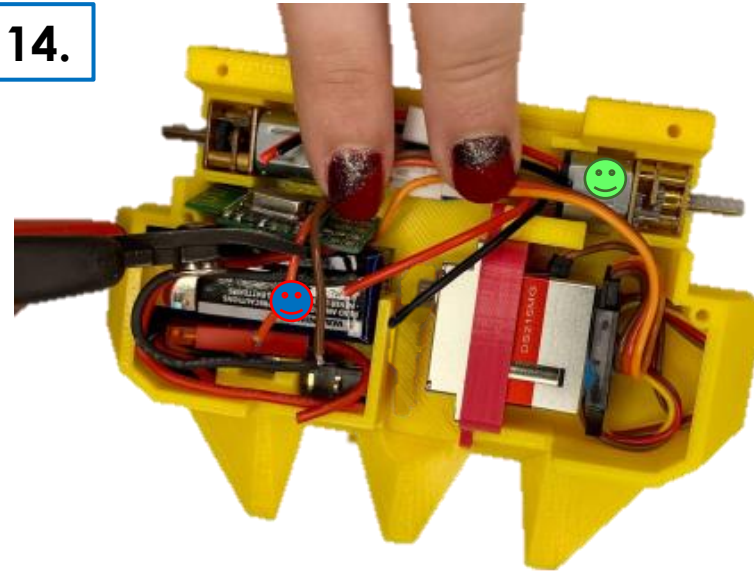
14. Route the Servo Connector Wire across the back of the bot. Trim the **Red Wire** flush with the B+ 😊 solder ring on the Malenki.

15. Trim the **Brown Wire** (or Black) flush with the solder 😊 ring on the Malenki.

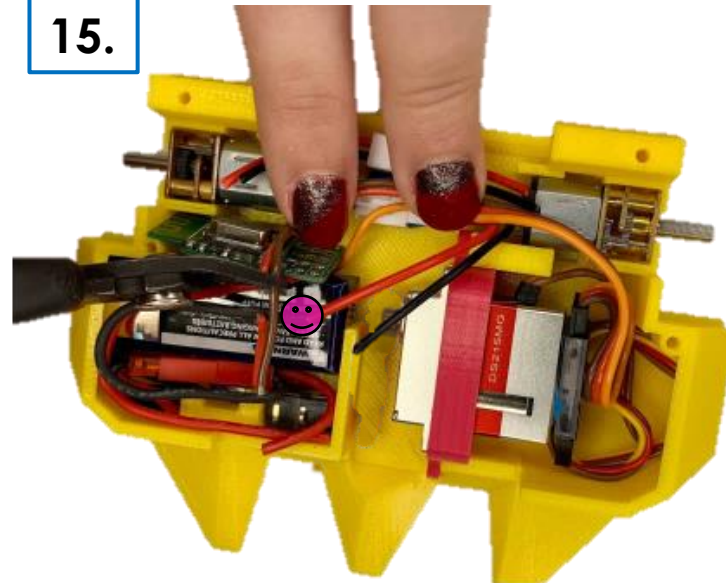
The below image is the final harness for reference.



14.



15.

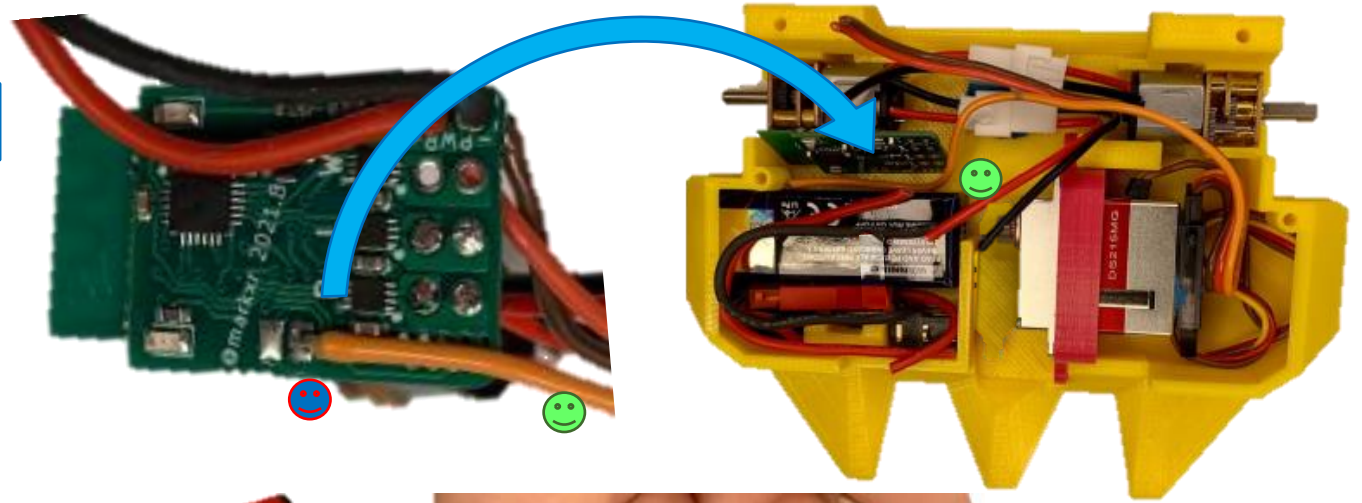


Standard Slipper Assembly Page 8/23

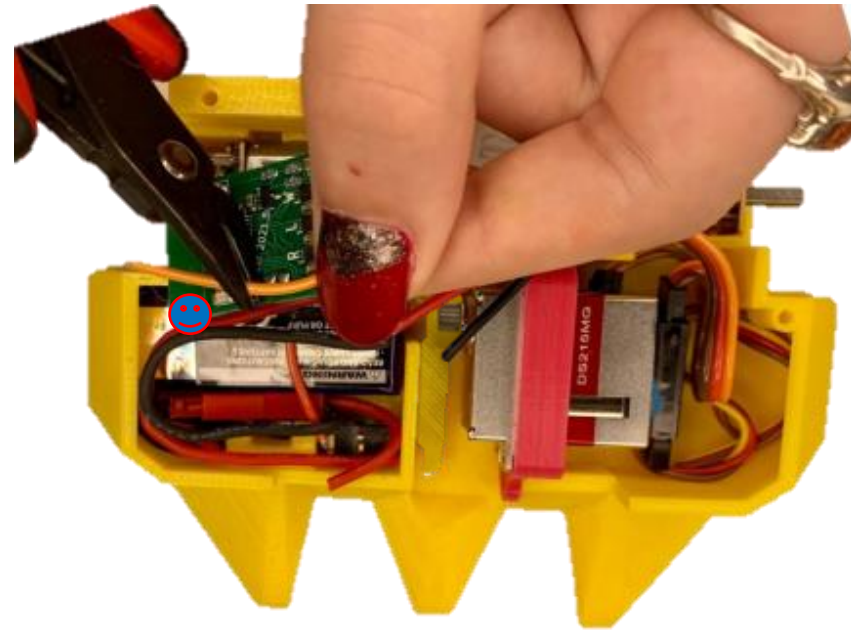
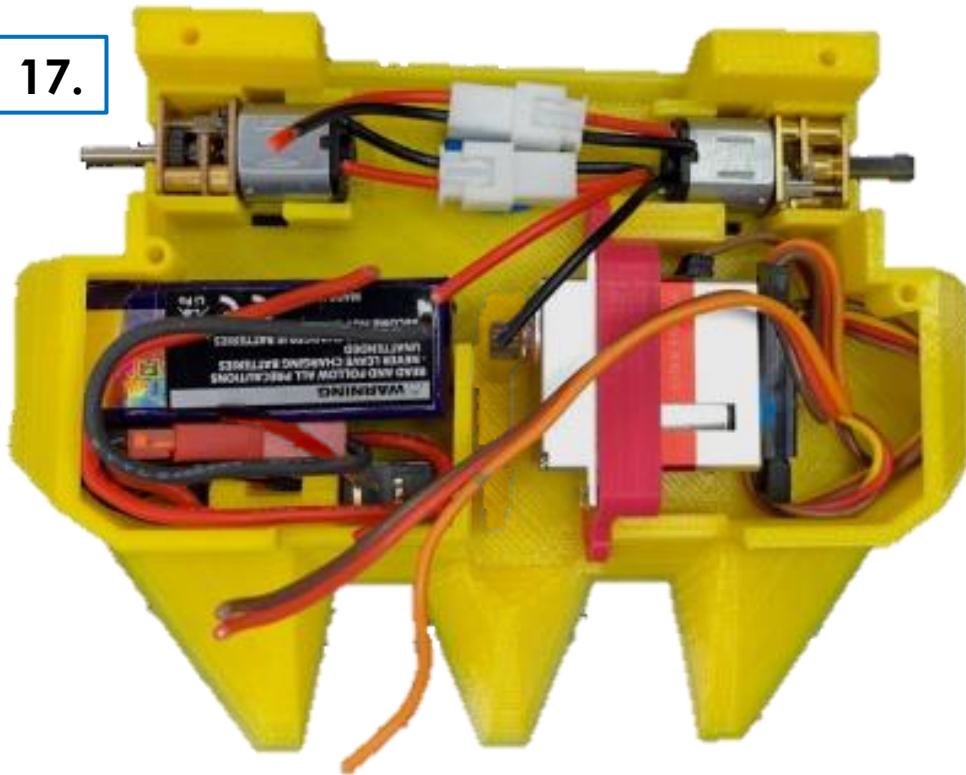
Trimming Servo Connector Wires 2/2:

16. Trim the **Orange Wire** (signal wire)
 - 😊 flush with the far side of the solder
 - ☹️ pad closest to the solder rings.
17. The trimmed harness in the bot should look like the below image.

16.



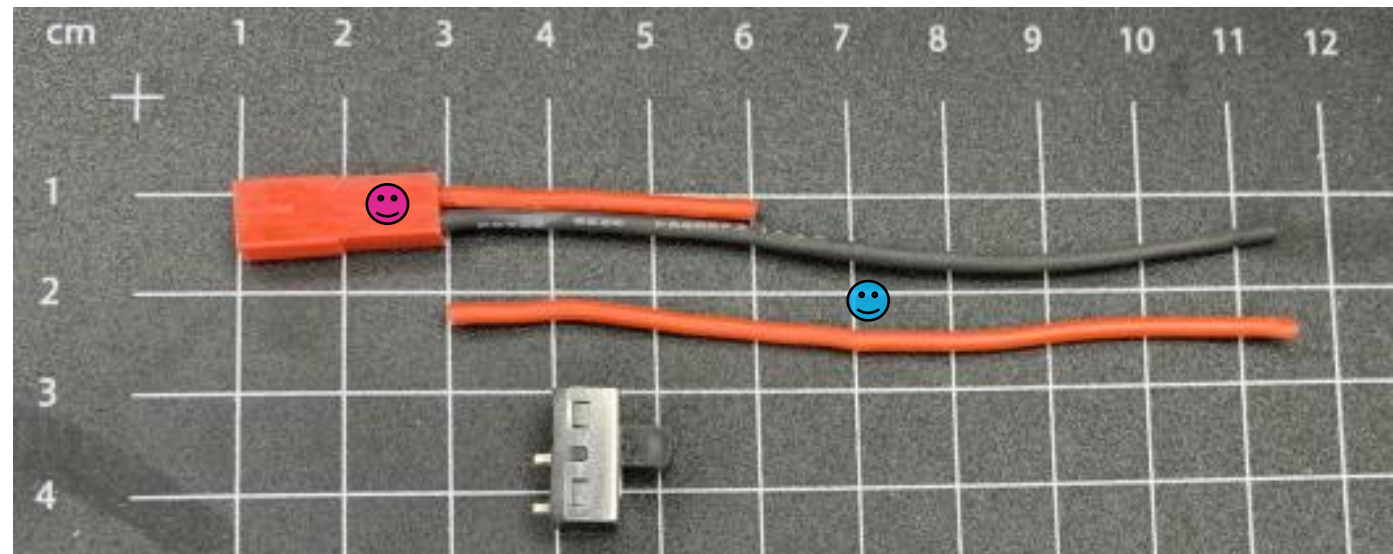
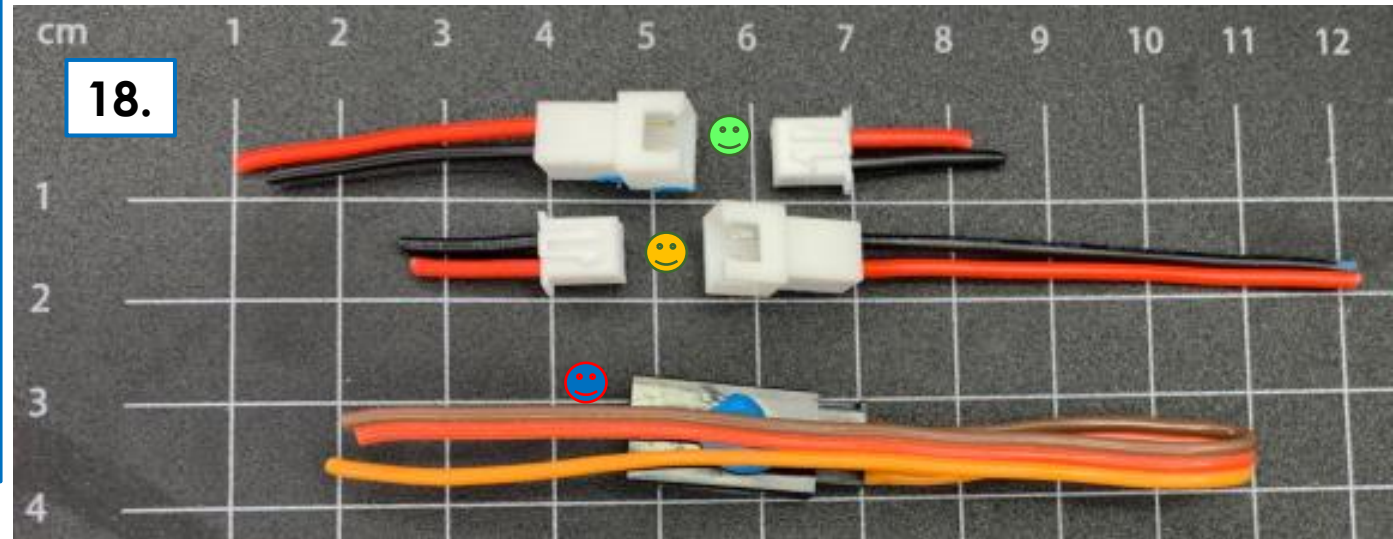
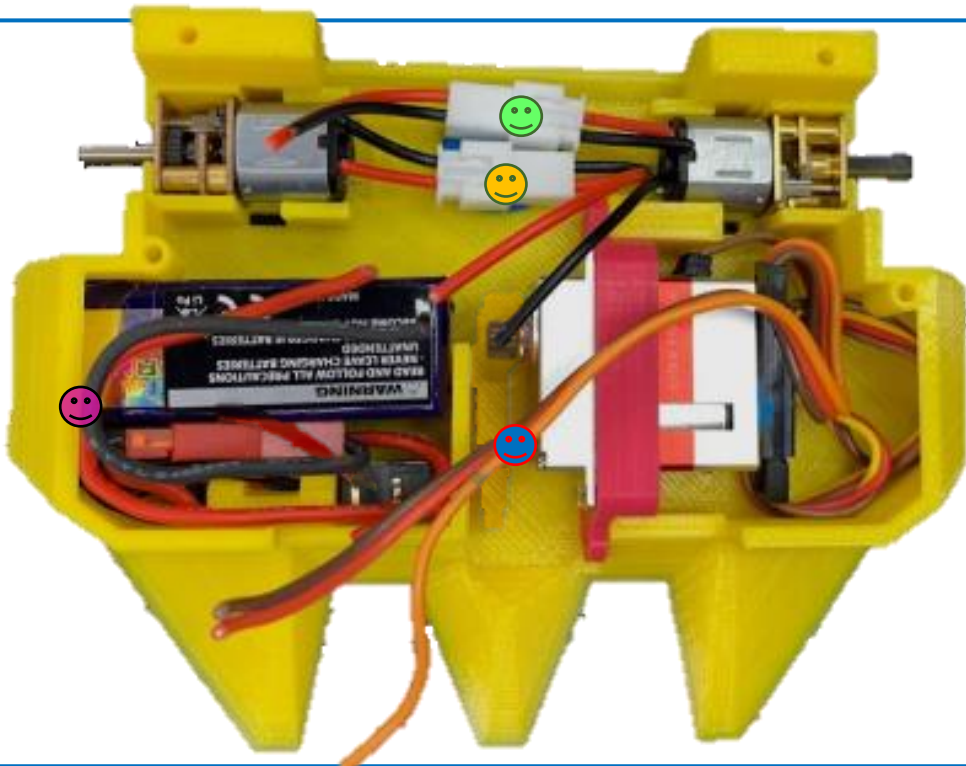
17.



Standard Slipper Assembly Page 9/23

Wire Lengths:

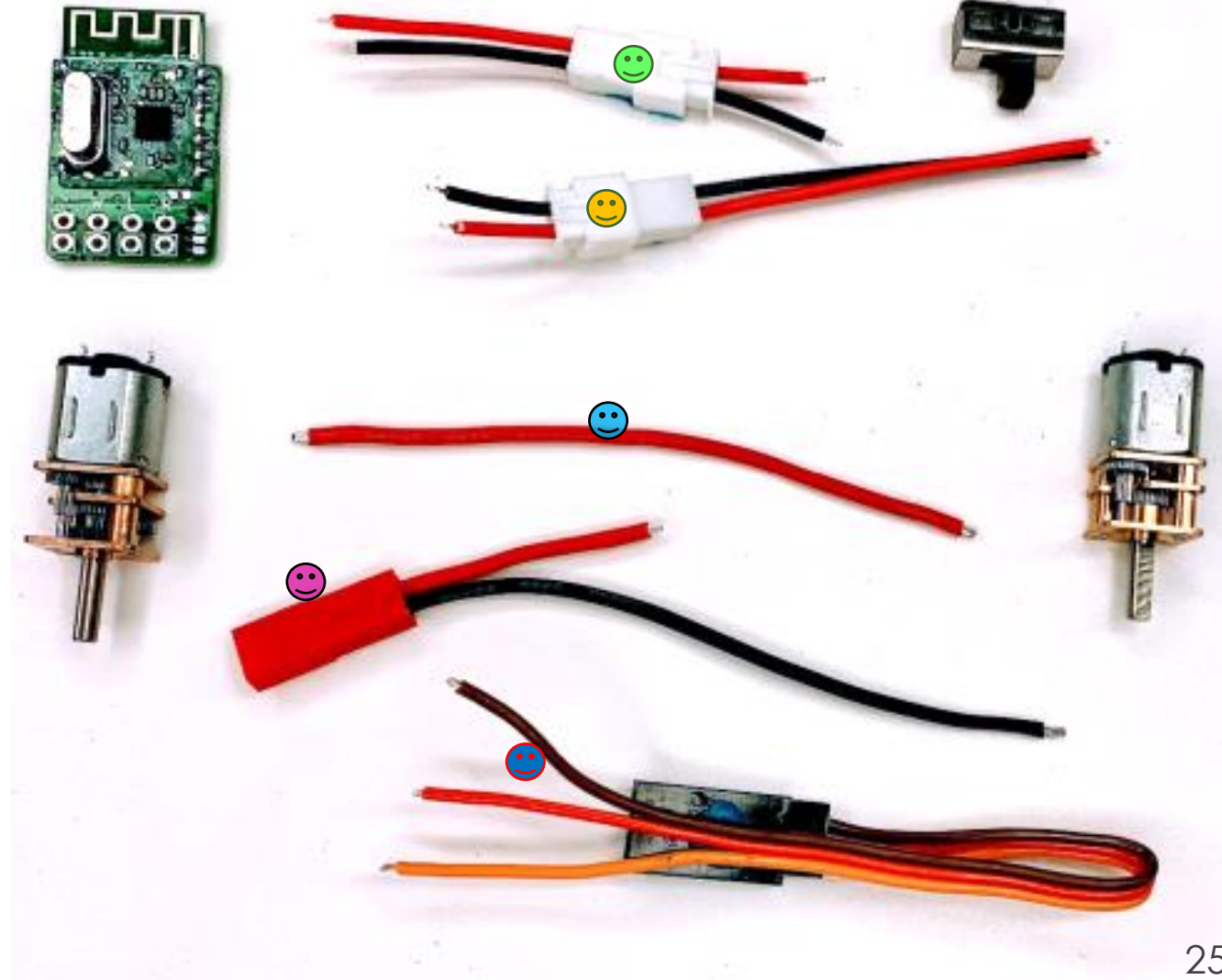
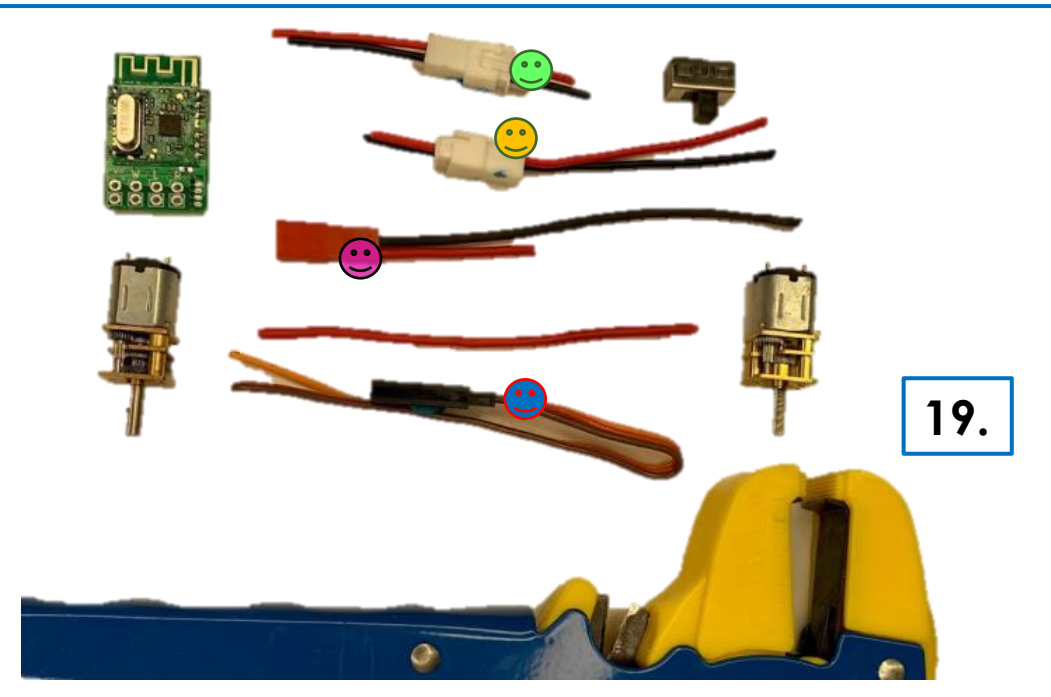
18. If you would prefer, you can cut your wires to the lengths visible in the images on the right. (You are reading this before starting, right?) You can see the lengths of the Left Motor 😊 Connector, the Right Motor 😊 Connector, the Servo 😞 Connector, JST Battery 😊 Connector and the Red 😊 Wire from Switch to Malenki.



Standard Slipper Assembly Page 10/23

Strip all the wires:

19. Strip all exposed wire ends 1-2mm. Including
😊 the Left Motor Connector, the Right Motor
😊 Connector, the Servo 😞 Connector, the JST
😊 Battery Connector and the **Cut Red Wire** from
Switch to Malenki. 😞



Standard Slipper Assembly Page 11/23

Tinning (Do NOT tin the Malenki):

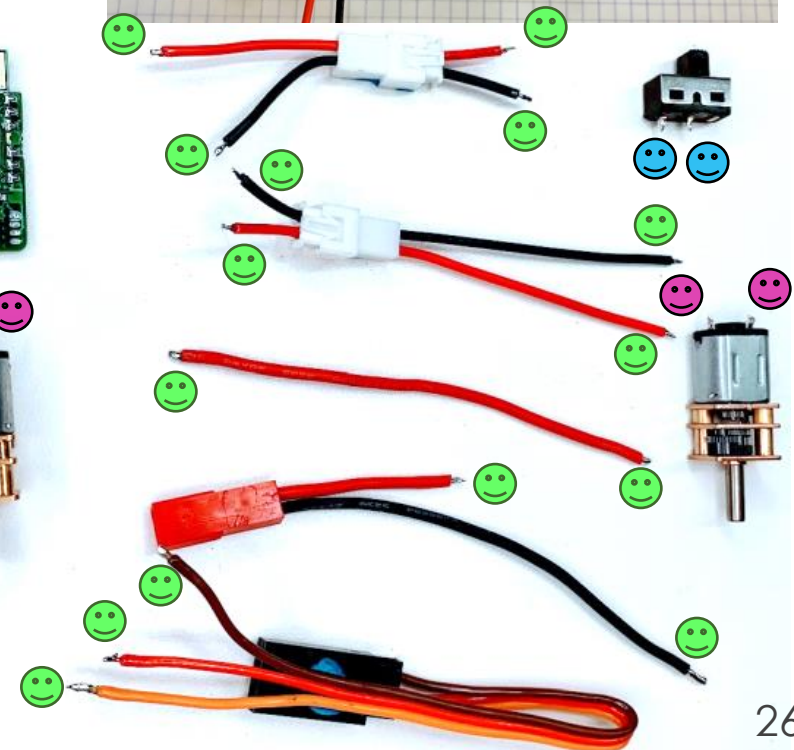
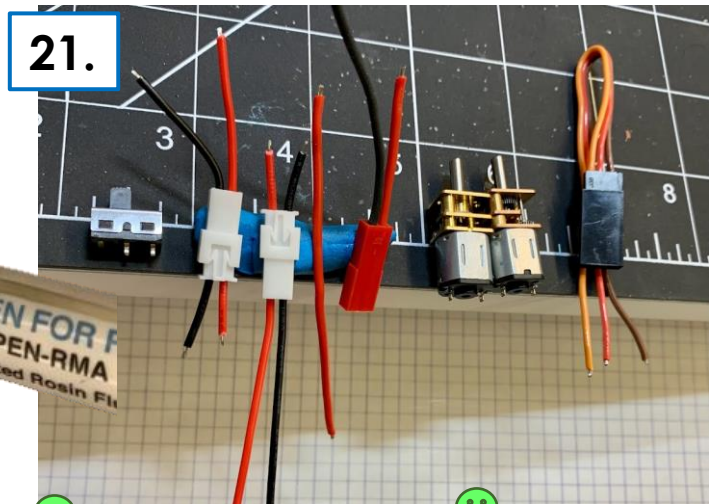
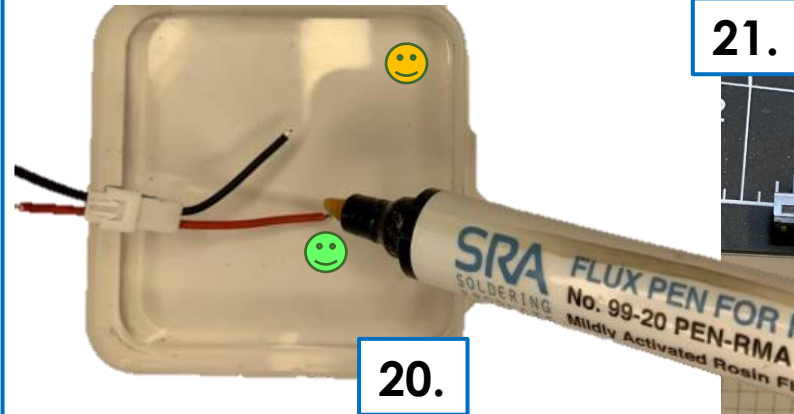
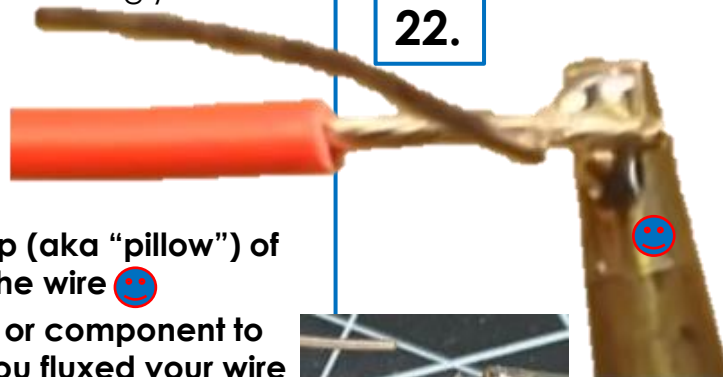
20. Start by putting flux on ALL 15 of the wire 😊 ends, the 2 Switch 😊 Terminals, and all 4 of the 😊 Motor Terminals. (Flux is very sticky, take care not to get it on anything you don't want it on. We use a small tray to contain it. It is well worth using flux it gets the solder to flow where you want it with significantly less heating of parts.)

21. Set everything up so that you can tin all the wires and terminals. (Tinning is getting a bulb of solder onto all the components that you will be soldering.)

Do not tin the Malenki

22. Tinning basics:

- Heat the iron
- Clean your iron tip
- Touch the solder to the iron to put a drop (aka "pillow") of solder on it to improve heat transfer to the wire 😊
- Touch the iron to the "back" of the wire or component to support it as you heat it. Particularly if you fluxed your wire or component, after a moment you will see the solder from the iron wick into the wire or component.
- You can then feed solder into the "front" of the wire or component. You'll want to get enough solder into / onto the wire or component that many joints have enough solder already on the mating parts that they don't require additional solder. That said, with combat robots you'll often add solder to make the joints as strong as possible.



Standard Slipper Assembly Page 12/23

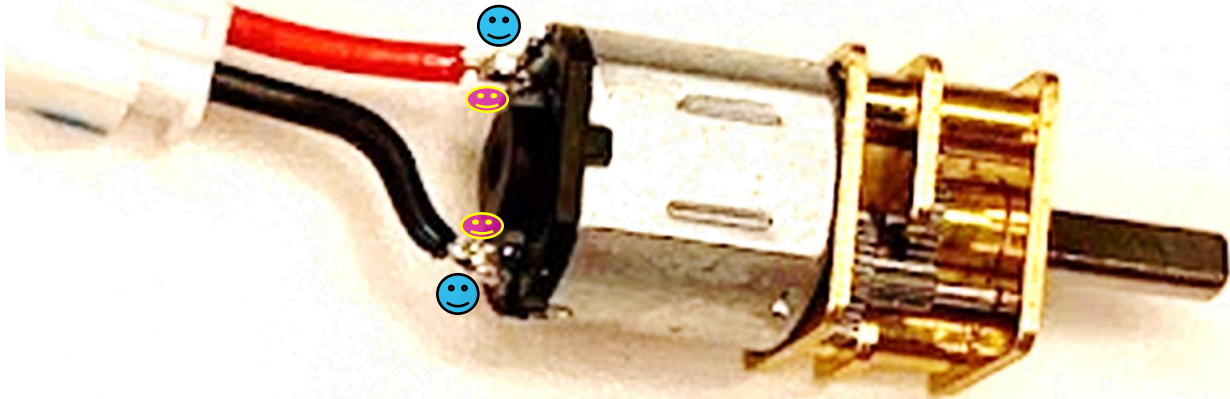
Solder the wires to the components:

23. Solder the Motor Connectors to the Motors, The Left is

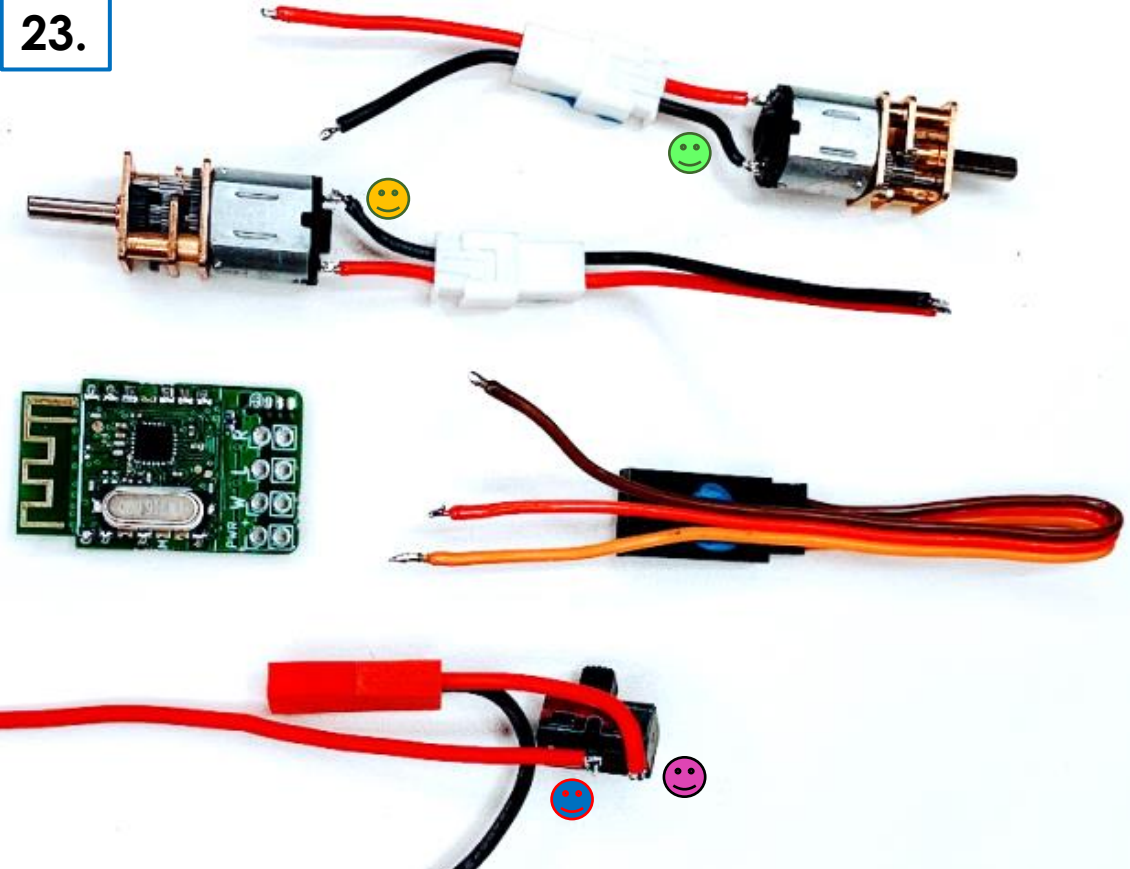
- 😊 offset toward the back of the bot, the Right is offset
- 😬 toward the front of the bot. There are details on the
- 😬 next slide for soldering the **Red Wire** on the JST Battery Connector to the far switch leg and the **Cut**
- 😬 **portion of the Red Wire** from to the near switch leg.

It is important to have as strong of a joint as possible between the motor terminals 😬 and the motor connector wires. The failure of these joints are among the most common causes of losing drive, which often results in losing battles.

For soldering these critical joints, the best technique we have found is to have well-tinned wires along the outside of well-tinned motor terminals and touching the iron 😬 to the inner side of the terminals, ensuring that the solder flows from the wires through the terminals.



23.



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Solder the Switch:

24. The switch is near the front of the bot, meaning it can take a lot of impact. You'll want to heavily tin the 😊 terminals to create a strong joint.
25. With well-tinned terminals and wires, hold them to give maximum contact areas.
26. Heat the far terminal until the solder flows from the 😊 Battery Connector wire to the terminal.
27. Holding the **Cut Red Wire** to give maximum contact with the close terminal, heat the terminal until you get a solid solder joint.

24.



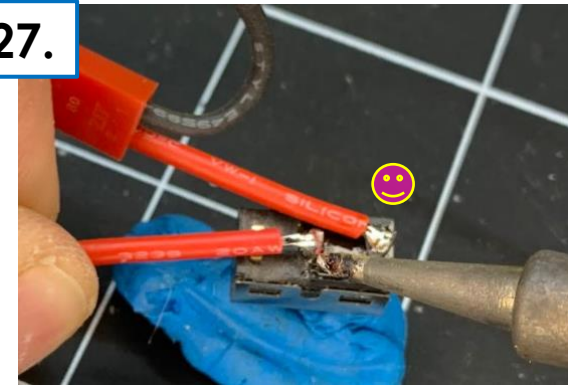
25.



26.



27.



Standard Slipper Assembly Page 14/23 (overview, details on 15)

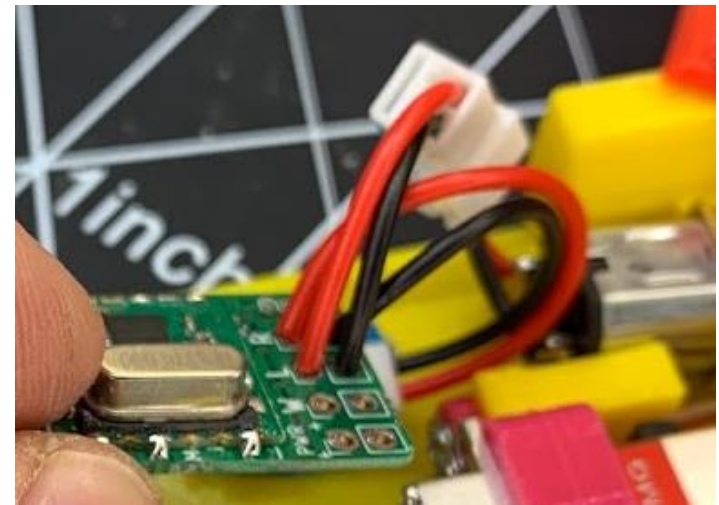
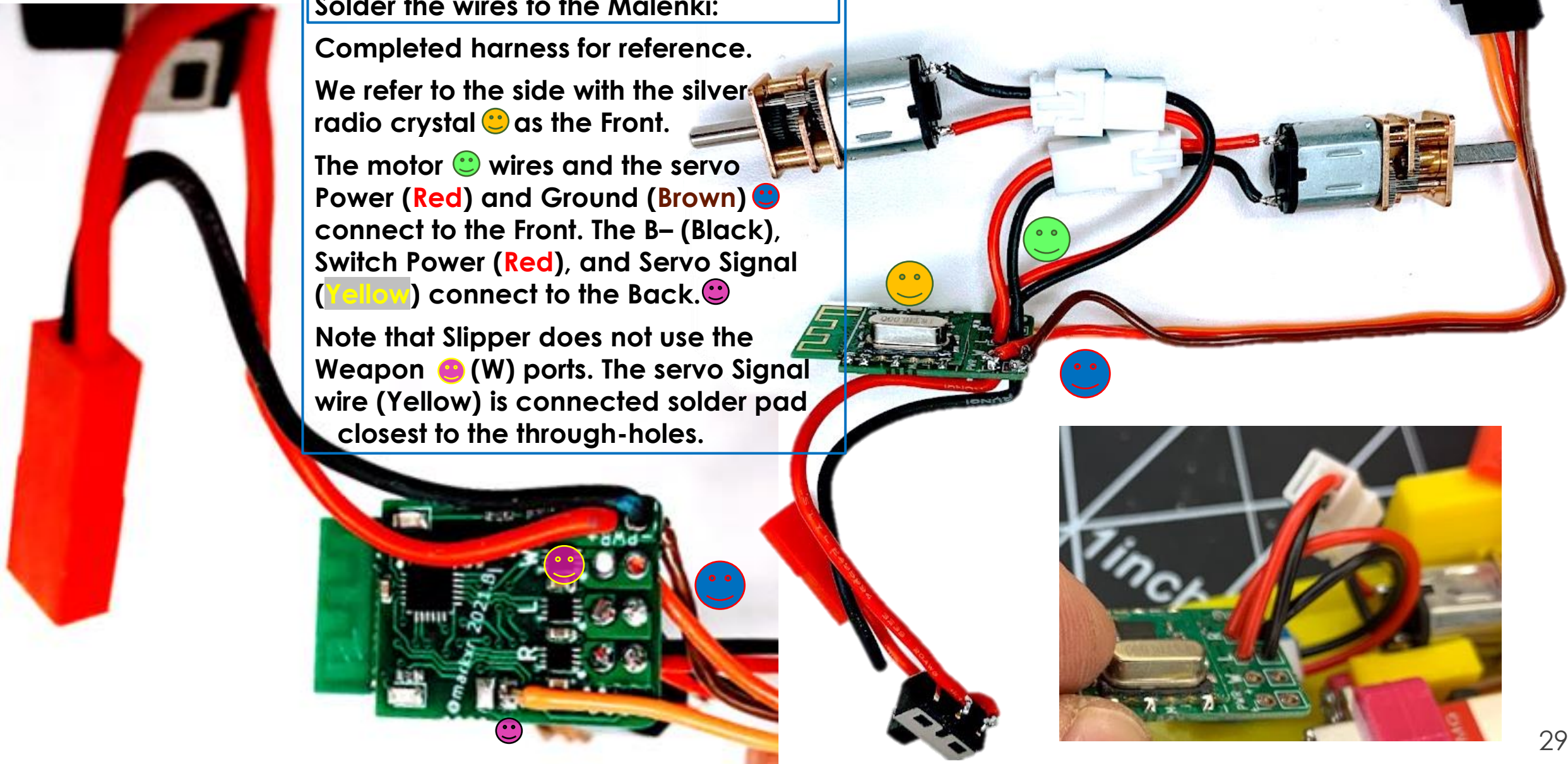
Solder the wires to the Malenki:

Completed harness for reference.

We refer to the side with the silver radio crystal 😊 as the Front.

The motor 😊 wires and the servo Power (Red) and Ground (Brown) 😊 connect to the Front. The B- (Black), Switch Power (Red), and Servo Signal (Yellow) connect to the Back. 😊

Note that Slipper does not use the Weapon 😊 (W) ports. The servo Signal wire (Yellow) is connected solder pad closest to the through-holes.



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Solder the Right Motor Wires to the Malenki:

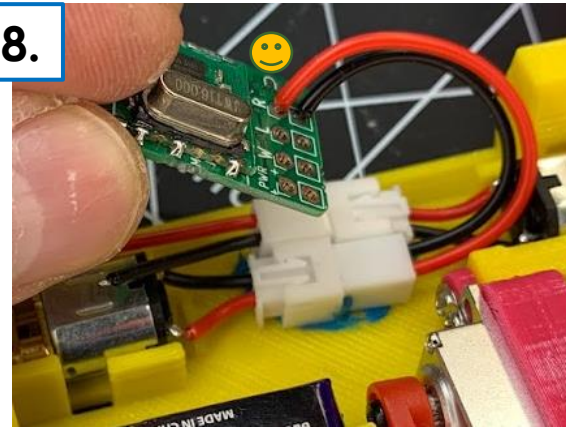
28. The Right Motor wires go through the “R” “Solder-Rings” / “through-holes” with the **Red Wire** closest to the “R” on the Malenki. 😊

29. Soldering wires into through-holes is best done by soldering the “back” of the board. As with most soldering, the “work-holding” is extremely important. All components (wires and Malenki in this case) should be held securely in place by something other than your hands, allowing you to have the iron in one hand and the solder in the other hand. Blu-tack works extremely well to hold the wires and the Malenki in a position allowing stable access to the back of the solder holes. (There are many great soldering videos on YouTube that are well worth watching if you are new to soldering. The Turnabot Soldering Videos will be released ASAP.)

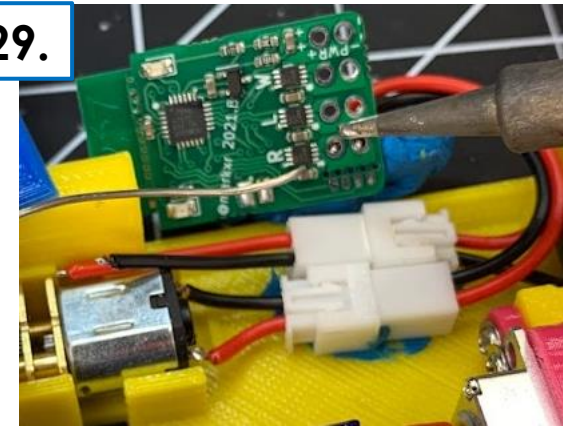
30. With well-tinned motor wires securely and safely held through the through-holes, use the iron to heat the ring for a moment before sliding it to heat the wire for another moment, before feeding the solder to the joint. 😊

31. The ideal solder joint looks like a volcano.

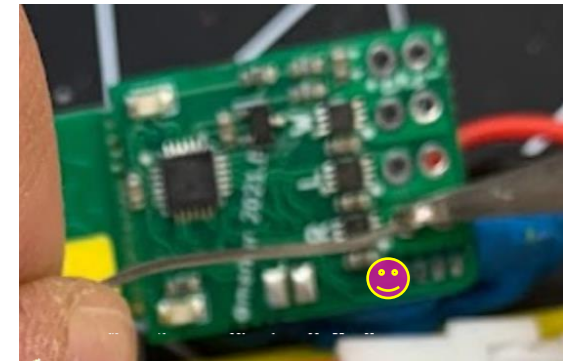
28.



29.



30.



31.

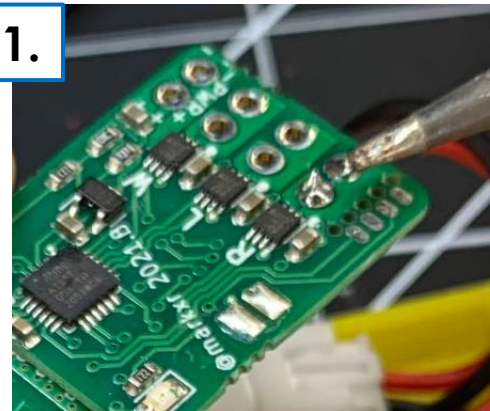


Image Courtesy Of Adafruit

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Solder the Left Motor Wires to the Malenki:

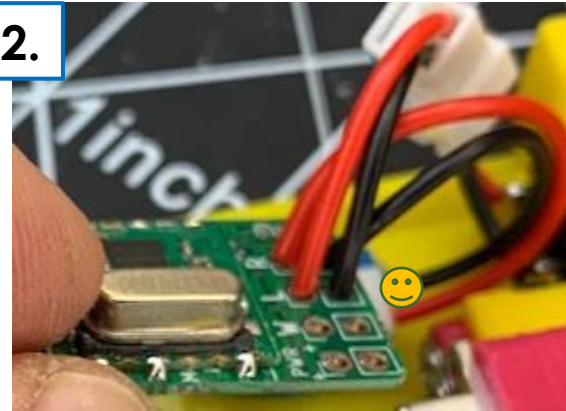
32. The Left Motor wires go through the “L” “Solder-Rings” / “through-holes” with the **Red Wire** closest to the “L” on the Malenki. 😊

33. With well-tinned motor wires securely and safely held through the through-holes, (Blu-Tack) use the iron to heat the ring for a moment before sliding it to heat the wire for another moment, before feeding the solder to the joint.

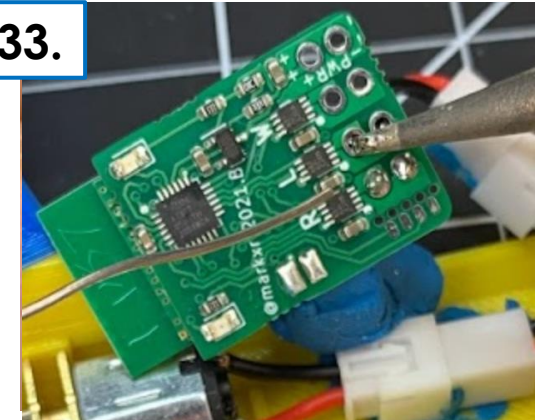
34. The ideal solder joint looks like a volcano.

35. If there is excess length on the wires you can always trim them with flush cutters. 😊

32.



33.



34.



35.

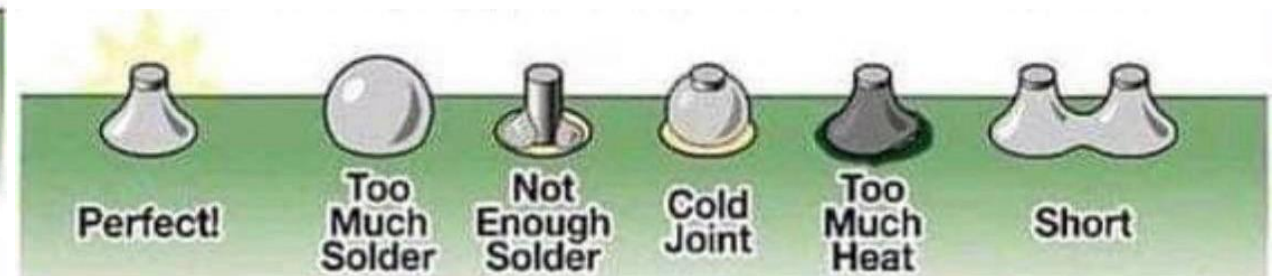
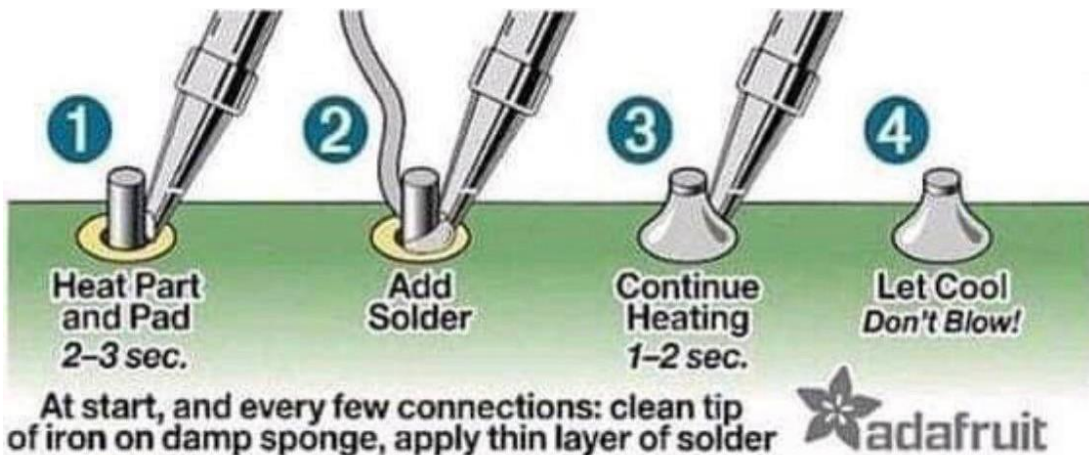


Image Courtesy Of Adafruit

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Solder the **Power** and Ground to the Malenki:

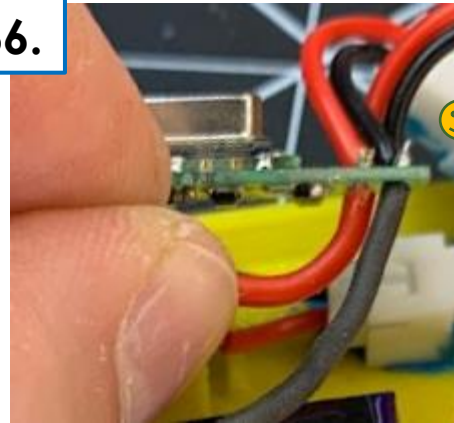
Image below: 😊 The **Cut Red Wire** and the Black wire from the JST Battery Connector (B+) route to the corner before going to the Malenki to simplify battery swaps.

36. The **Cut Red Wire** and the B+ go through the PWR+ 😊 and PWR- though-holes respectively. If they don't easily fit through you can trim the solder bulbs a bit.

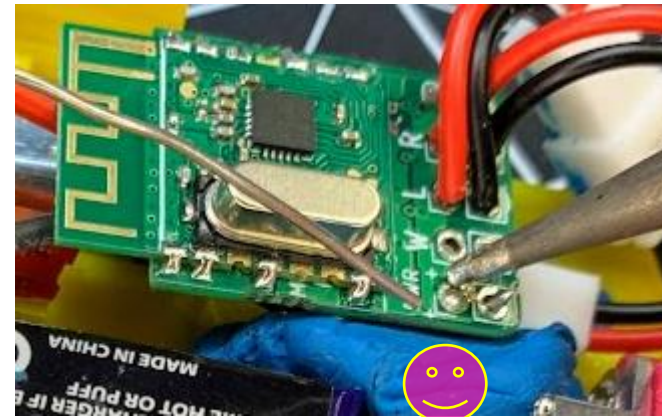
37. Again, a bit of Blu-Tak secures the wires while we solder. Again, heat the ring for a moment before 😊 sliding to the wire, when the solder on the wire melts, you can feed a touch more solder if necessary.

* **NOTE** * it's helpful to leave the Malenki on the Blu-Tak for the next step.

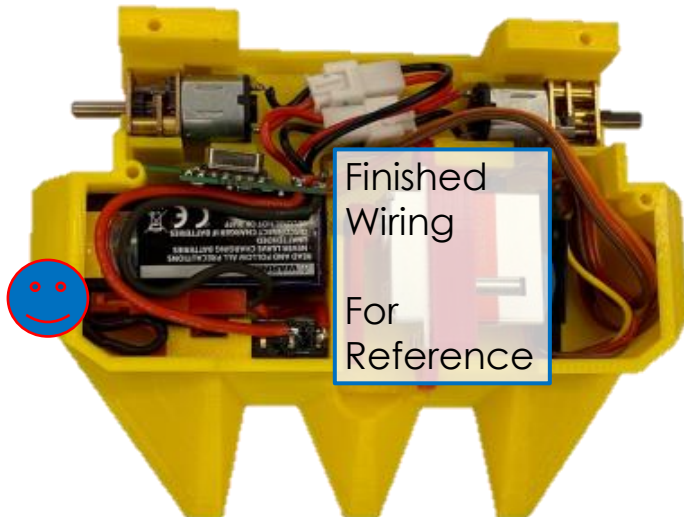
36.



37.



If your volcanoes are too large you can always trim extra from solder joints.





Finished Wiring
For Reference


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Solder the Servo wires to the Malenki:

* **Note** * it's helpful to have the Malenki on the Blu-Tak.

38. The servo **Ground Wire** (Brown in these photos)  solders to the joint of the Black Wire from the JST Battery connector through the PWR- through-hole.

39. The servo **Power Wire** (generally Red) similarly solders to the joint of the **Cut Red Wire** from the switch through the PWR+ through-hole. It can be  helpful to use needle nose to hold these wires close to the end to get a secure joint.

40. The servo **Signal Wire** (Orange in these photos) is soldered to the WEAPON2 pad (closest to the through holes / bottom of the Malenki). 

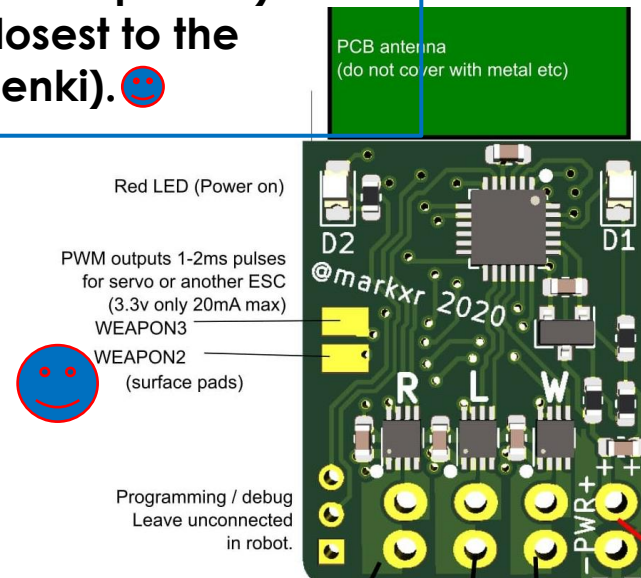
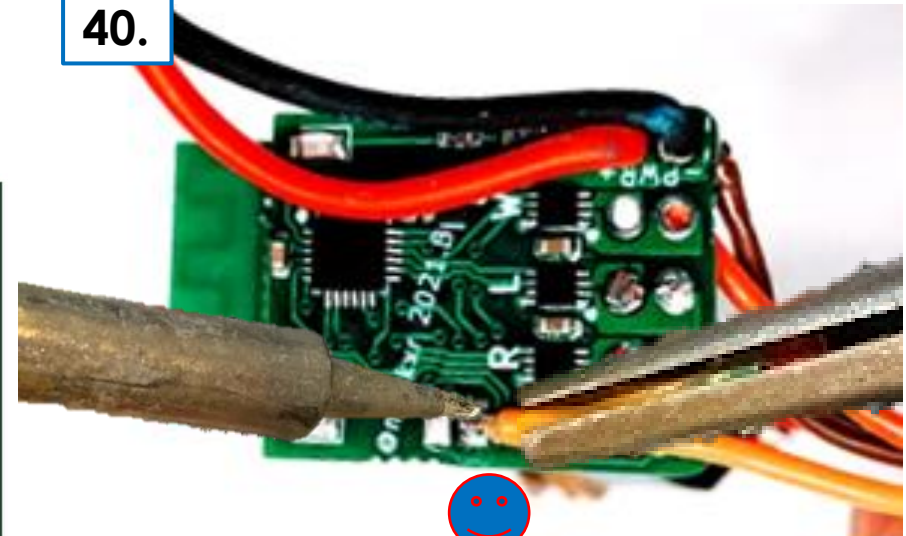
38.



39.



40.



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Solder the Servo wires to the Malenki:

* **Note** * it's helpful to have the Malenki on the Blu-Tak.

38. The servo **Ground Wire** (Brown in these photos) 😊 solders to the joint of the Black Wire from the JST Battery connector through the PWR- through-hole.

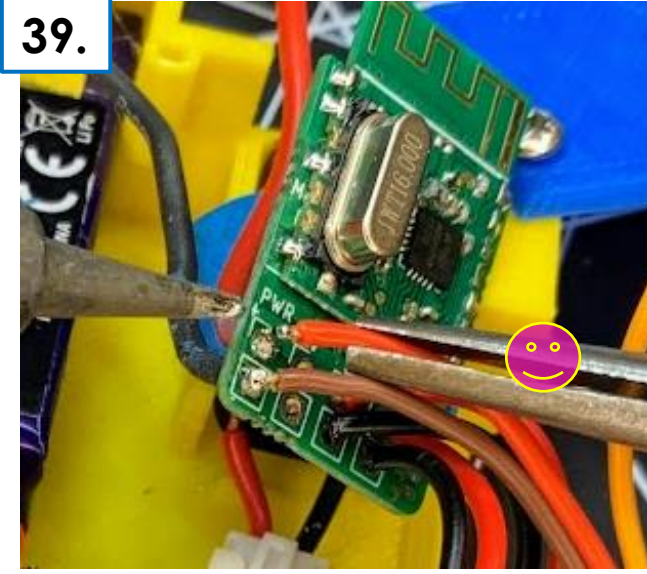
39. The servo **Power Wire** (generally Red) 😊 similarly solders to the joint of the **Cut Red Wire** from the switch through the PWR+ through-hole. It can be helpful to use needle nose to hold these wires close to the end to get a secure joint.

40. The servo **Signal Wire** (Orange in these photos) is soldered to the WEAPON2 pad (closest to the through holes / bottom of the Malenki). 😞

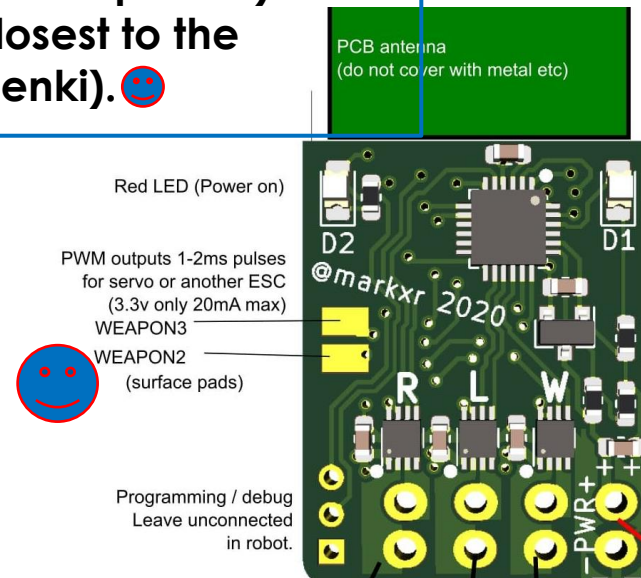
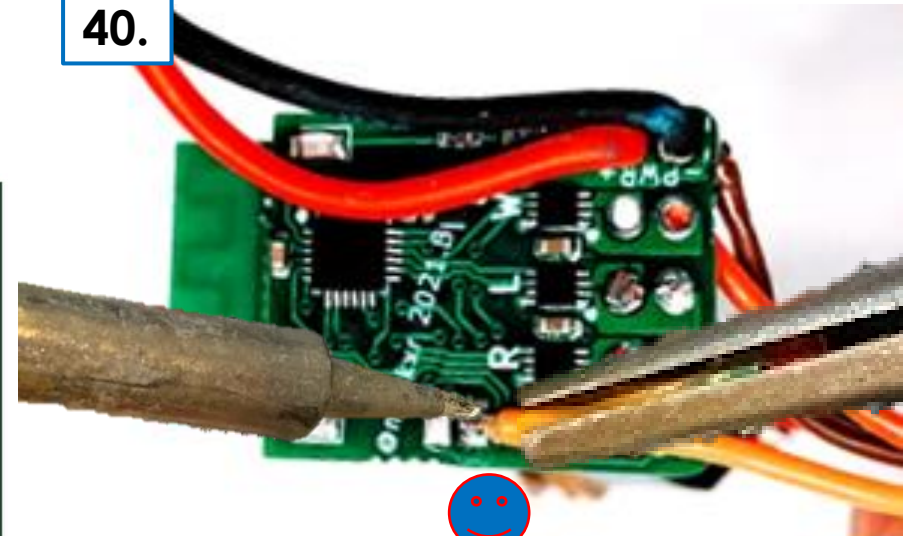
38.



39.





40.



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You're almost done! Radio / Servo setup:

41. At this point in the assembly of any bot, **✗ BEFORE** installing the wheels and servo horn and hard-mounting the servo, it's a good idea to make sure that the bot won't run away or put the servo horn hard into the chassis. You can now turn on the bot. On the Malenki the **Red LED** will light up and the **Blue LED** will begin flashing rapidly.

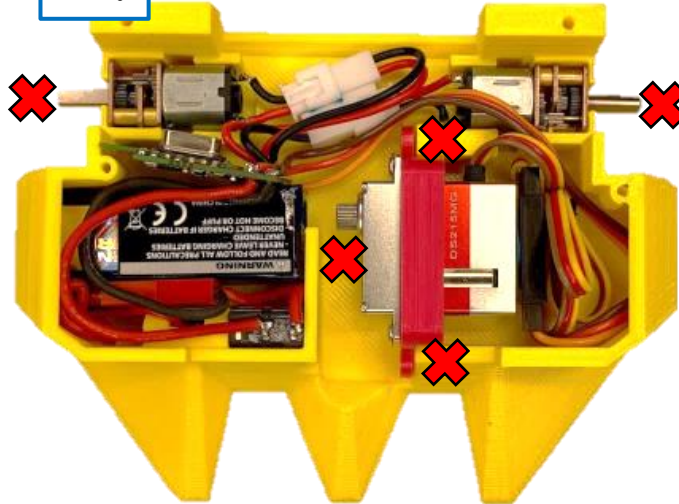
42. To bind a FlySky FS-i6, hold the Bind  button while switching it on. To bind a  Turnigy Evolution, hold the power button to turn it on, click the wrench, scroll down and touch RX bind. The blue LED will go solid.

43. With the stick down the servo should be  near 45° the servo body.

44. With the stick up the servo should be  slightly toward the rear of the bot.

If you're unfamiliar, please see **Section 3** for additional instructions on radio setup.

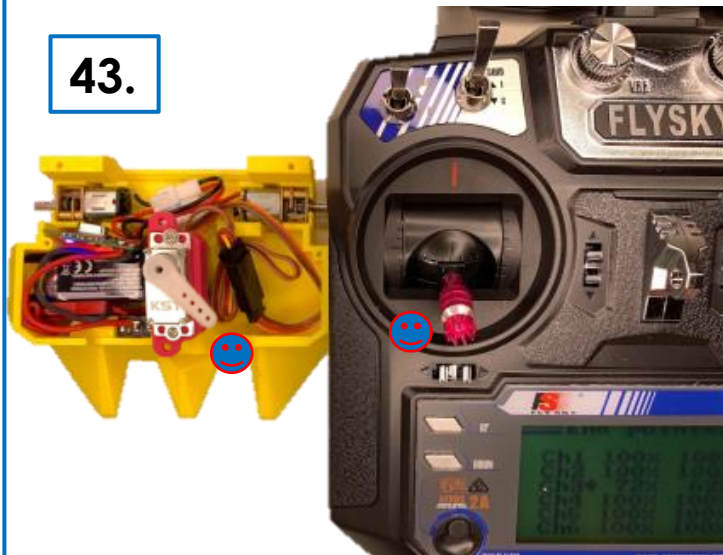
41.



42.



43.



44.



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Motor (optionally **Wheels**) installation:

45. With the Servo Horn properly installed and the End Points set to ensure a safe servo range, install the Servo horn Screw. Install the Zip Ties to the motors. 😊

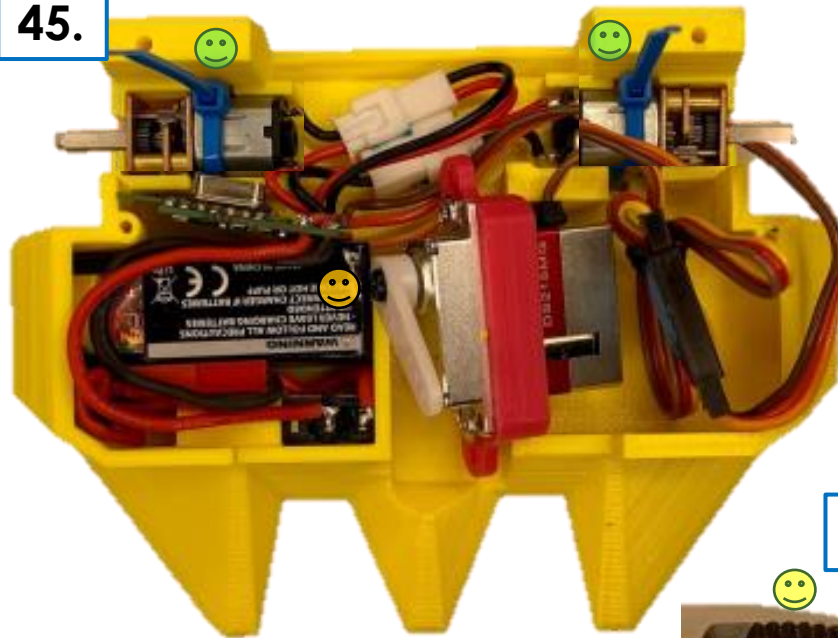
46. You may want to use pliers and “roll” them to get the Zip Ties as snug as you can without breaking them. 😊

47. Optional – You can continue building, but if you’d like, you can temporarily install the **Wheels** (without glue) because.... 😊

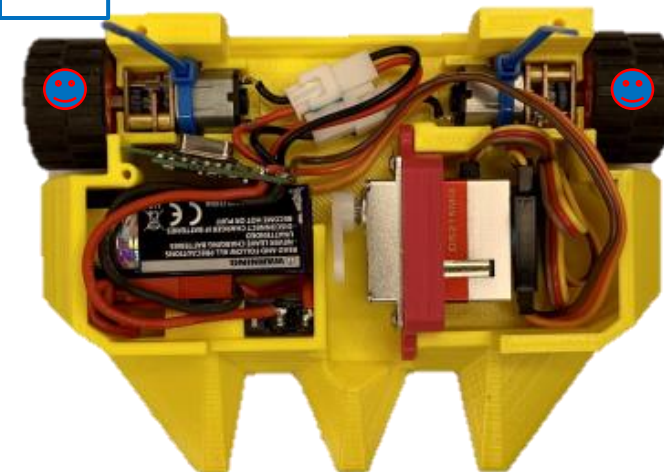
Congratulations! YOU HAVE A ROBOT!!!

At this point you can drive it around and actuate the flipper servo.

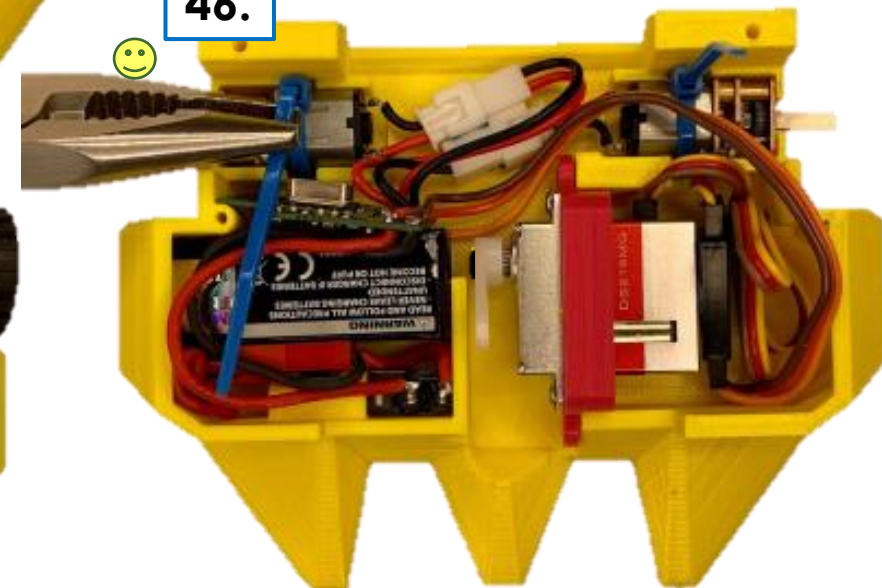
45.



47.



46.



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Flipper Assembly and installation:

48. Assemble the flipper. The arms are printed to have **Left** and **Right Arms**, the side that was on the printer bed has a slightly smaller hole which helps retain the aluminum rod.

😊 Install the rod into the left arm.

49. Install the Rod and **Left Arm** to the **Plow**

😊 using 2 of the **M2 x 6mm** button-head

☹️ screws and install the **Short Spacer**, **Link**, and **Long Spacer**.

50. Install the **Right Arm**.

51. Straighten out the Paper Clip. Cut it to the

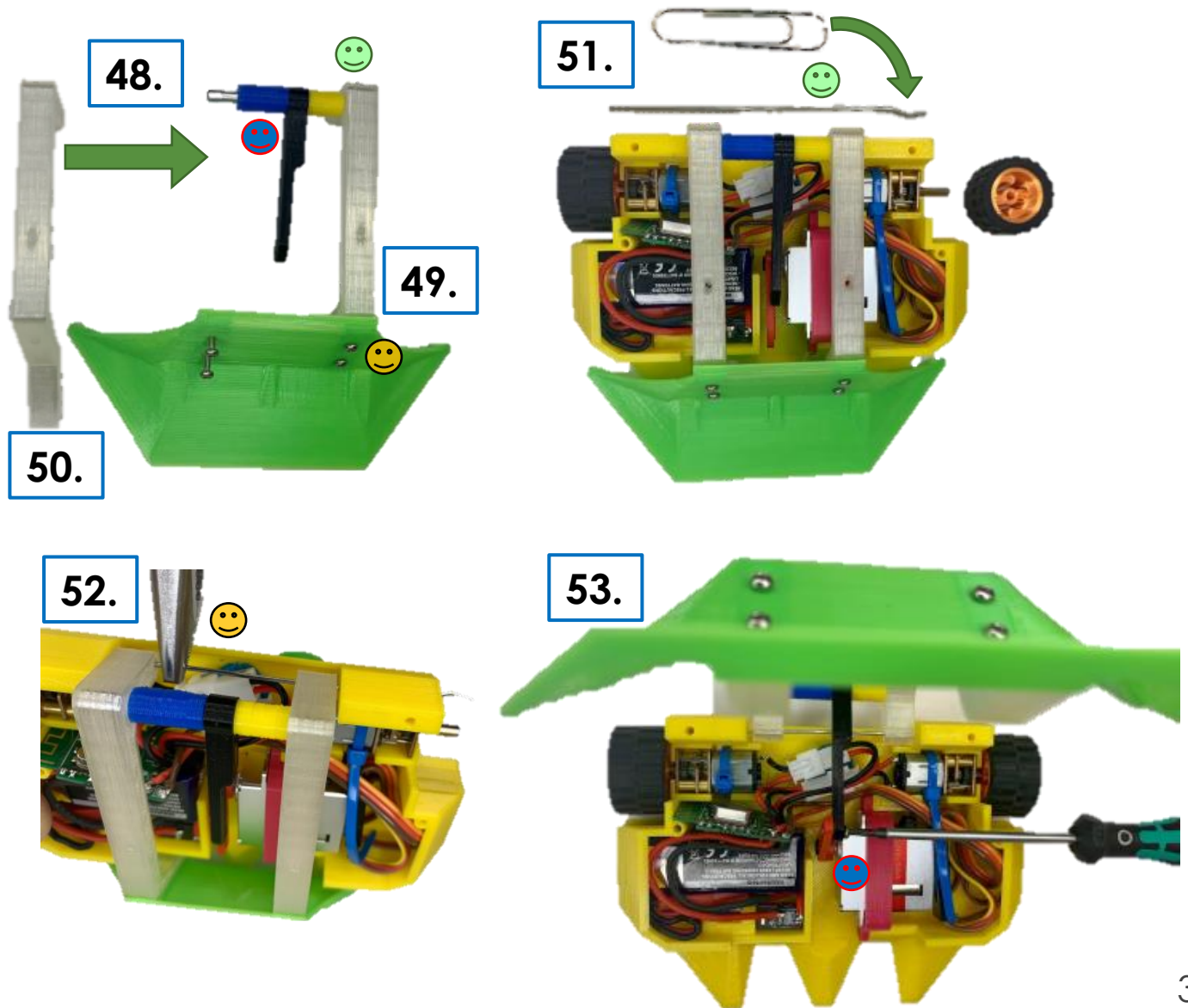
😊 length of the **Chassis Rear Uprights** (between the **Wheels**) and put a "V" bend in one end.

52. If you installed it, remove the **Left Wheel**,

😊 install the Paper Clip through the rear uprights and the **Arms**. Use pliers near the **Right Arm** to pull the "V" into the upright.

53. Reinstall the **Left Wheel** and screw the Link

☹️ to the servo horn.



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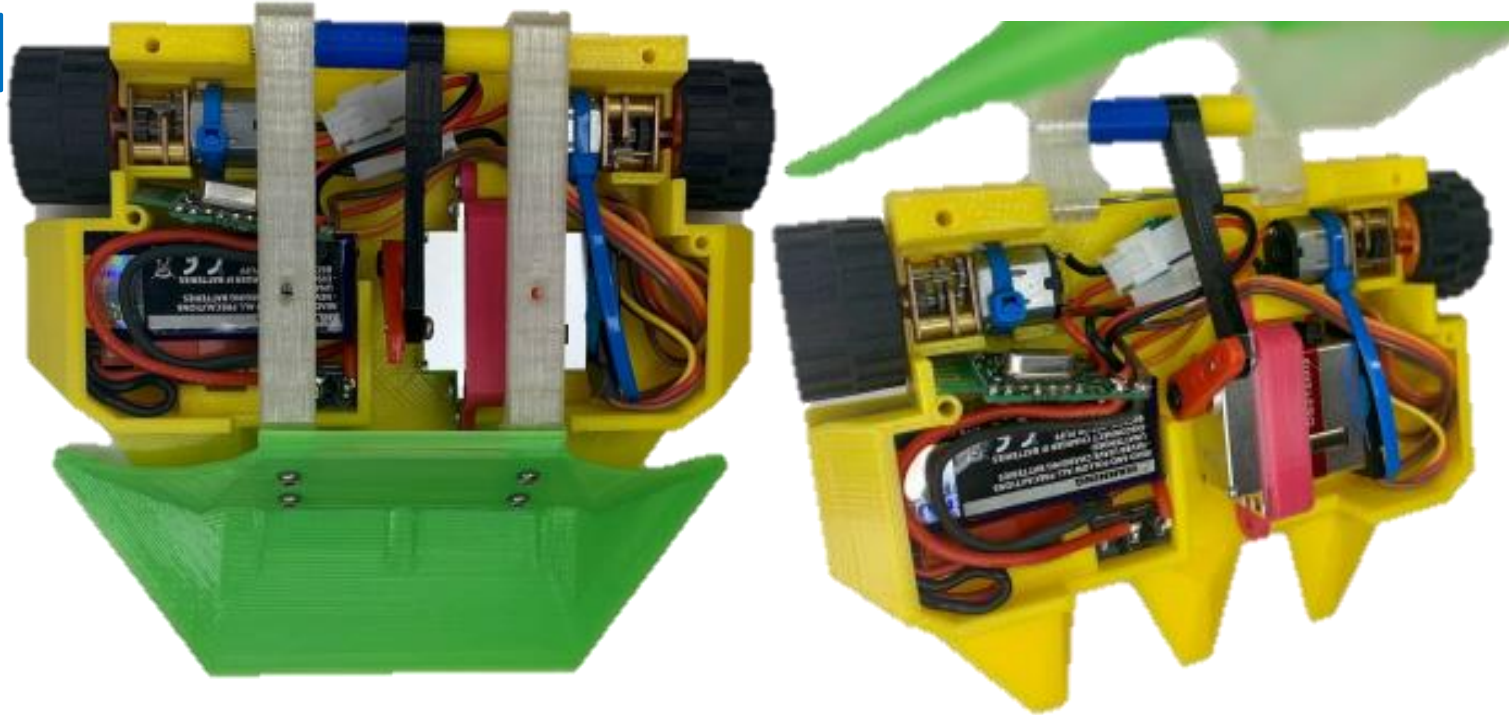
Armor Installation:

54. The Turnabot should look like this.

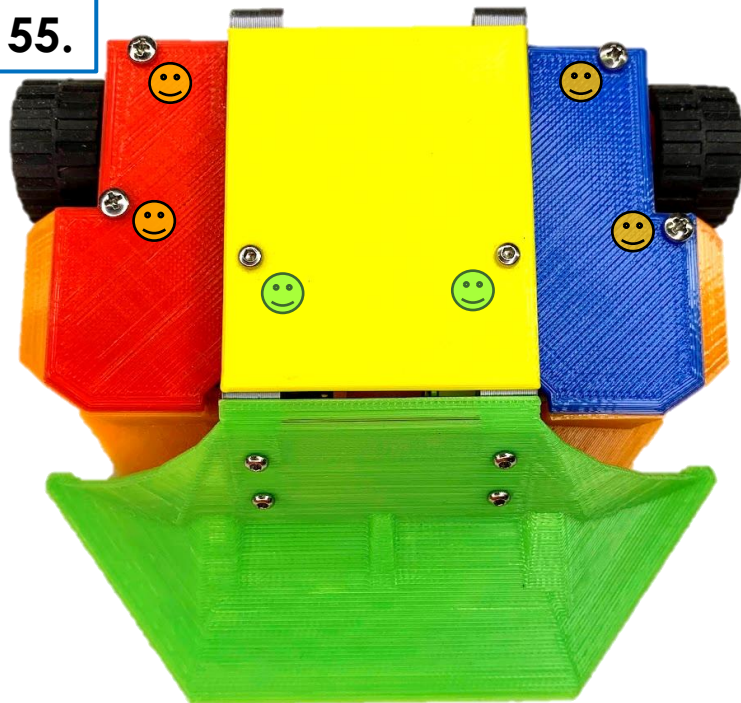
55. Install the Top Armor, with the last
😊 2 M2x6 screws and the Right
😊 Armor and Left armor with the 4
Phillips screws.

56. BATTLE!!! 😡

54.



55.



56.

