



**INSTALL MANUAL
SMART DPV CONTROLLER V2
DUAL-BOX RELEASE**

**Picture for
onto 2015 gear-driven Piranha**

Thank you, JIM Pruitt, for this guide.

1. Inventory items in kit.

The first step is to inventory the items in the package, and make sure you have everything you need.

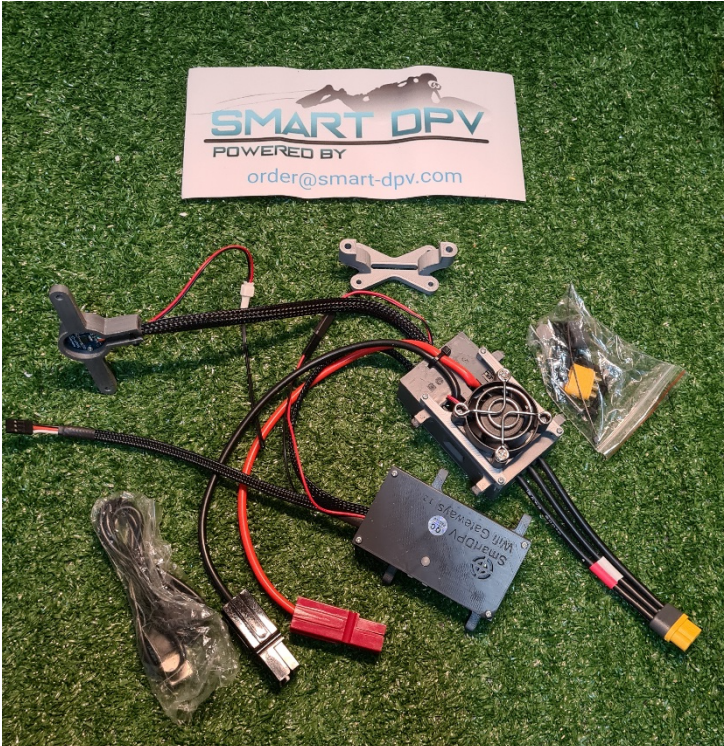


Figure 1. Contents of Piranha package

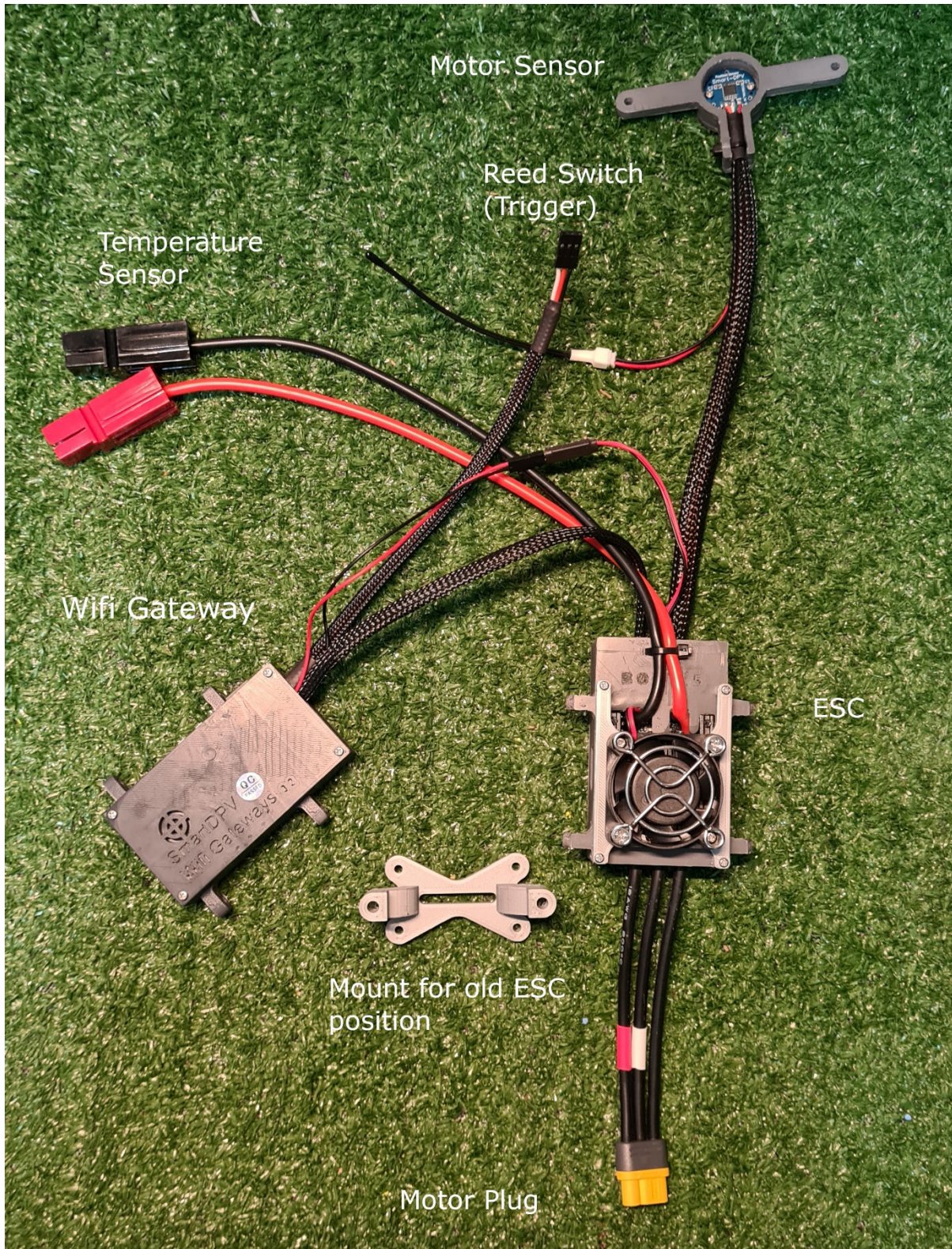


Figure 2. Major components of the Smart DPV v2 system

2. Remove old ESC and/or motor

The old ESC must be removed. For the 2015 Piranha (gear-driven), it is easiest to remove the entire motor assembly, to give more room for removal of old components and installation of new components.

The motor assembly is held in place with four 3mm Allen screws. Note that the center screw (on top of propeller shaft) is slightly shorter than the other three. Disconnect the reed switch before removing assembly.

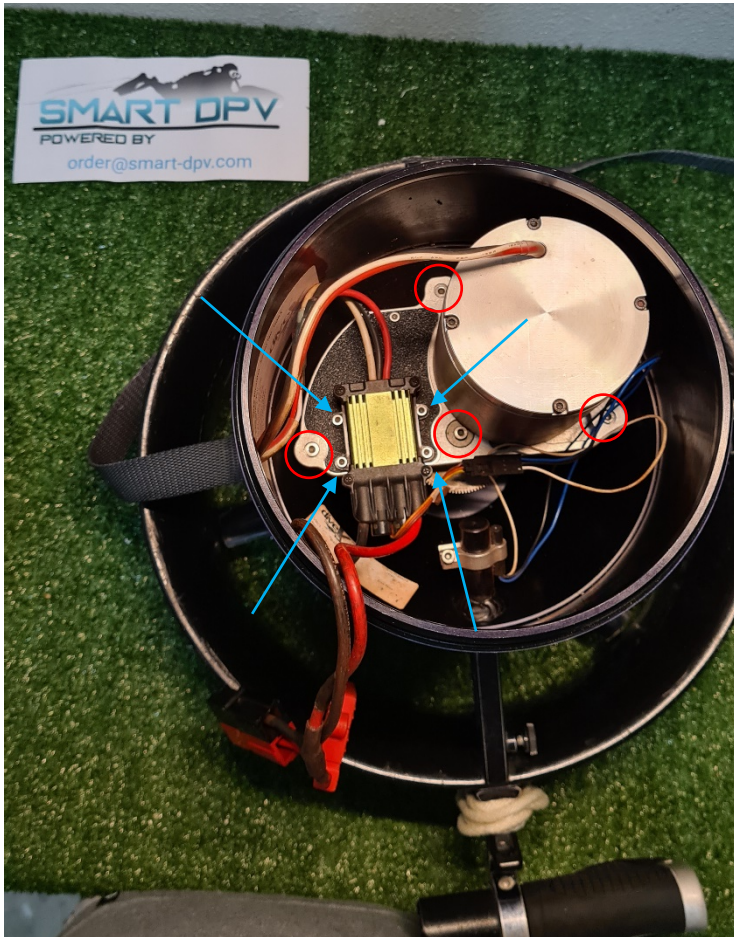


Figure 3. Overview of 2015 gear-driven Piranha. To remove entire motor assembly, remove four 3mm Allen screws (red circles). To remove ESC, remove four 2.5mm Allen screws (blue arrows)

To remove the old ESC, first remove four 2.5mm Allen screws (blue arrows in Figure 3, above). Cut the wires near the solder or butt joints.



Figure 4. Cut motor wires near solder or butt joints to old ESC.

With motor assembly removed, now may be a good time to clean the tail cone of any debris, rust, etc.

3. Remove motor cap

Now we need to remove the motor cap, to drill holes for the sensor magnet and the temperature probe. To remove the motor cap, first remove four 2.5mm Allen screws on top of cap. Then, carefully work the cap back and forth, until it is free. The top motor bearing is press-fit into the cap, and needs to be worked free. A soft prying tool, made of plastic or wood (old toothbrush handles work well) can help provide the leverage needed to free the motor cap.

4. Drill motor cap for magnet

Mark the center of the underside of the motor cap with a center punch. Then, drill a 1/2" hole in the center of the cap to make space for the sensor magnet. Make two additional holes along the edge of the motor cap to feed the temperature probe. Deburr all holes with a deburring tool, file, or sandpaper.

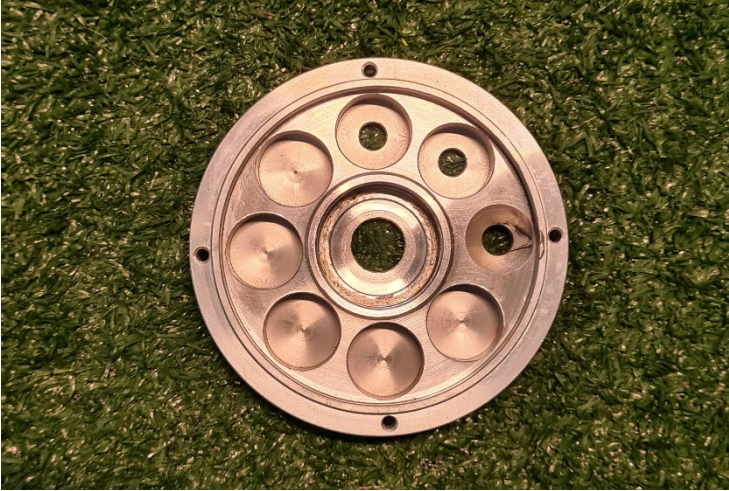


Figure 5. Motor cap drilling complete. Original motor wiring hole at 3:00 position, with 1/4" holes at 12:00 and 1:30 positions for temperature probe. Hole at center is 1/2" for sensor magnet

5. Install temperature probe, sensor magnet, and sensor

Install temperature probe along inside edge of motor housing. Wrap probe wire through two holes to ensure it does not get pulled out of motor housing, and reinstall motor cap.

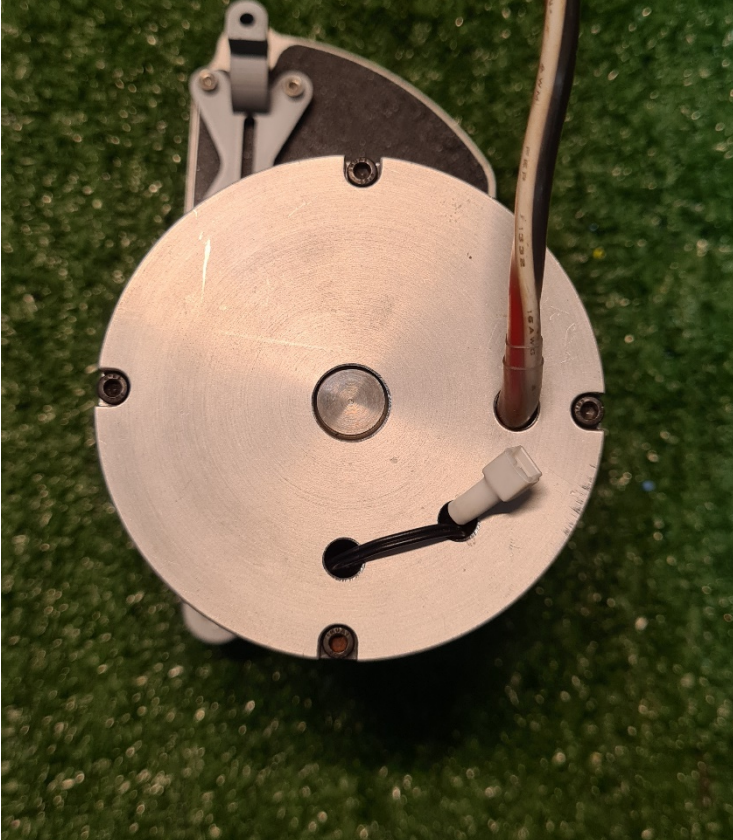


Figure 6. Temperature probe installed, wrapped through two holes to lock it in position.

Glue the sensor magnet to the center of the motor shaft, with the plastic down and magnet up. Glue with superglue (CA glue) or 2-part epoxy, ensuring that glue does not seep drip into space between motor spindle and motor cap.

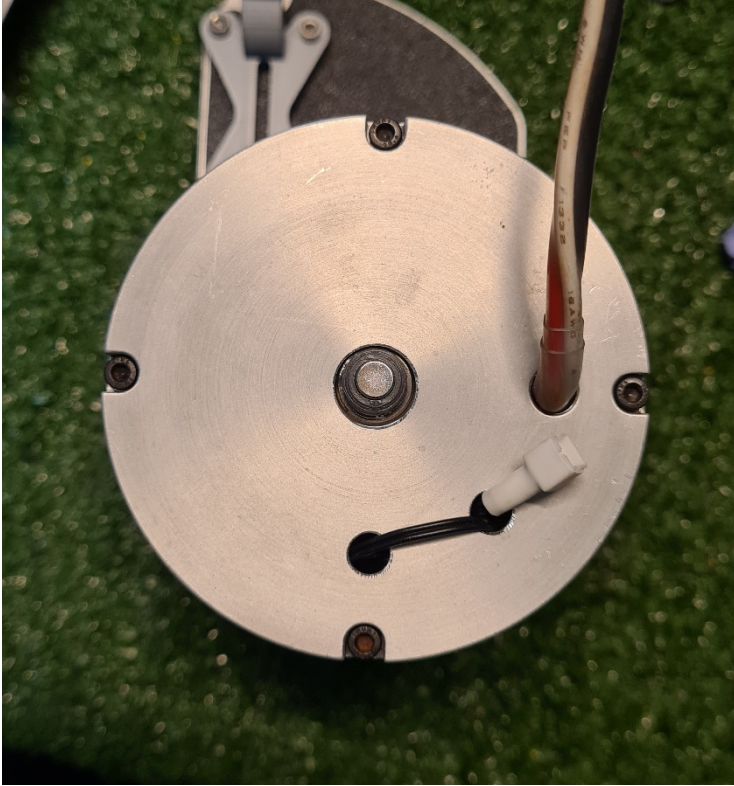


Figure 7. Sensor magnet glued to motor shaft.

Remove two opposing screws from motor cap. Using provided spacers and longer screws, install motor sensor to top of motor.

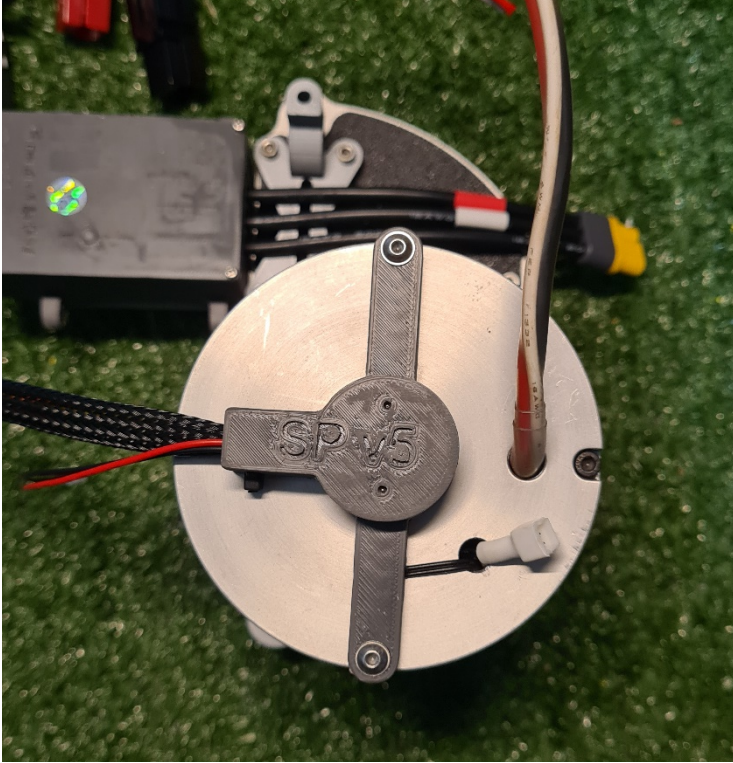


Figure 8. Motor sensor installed to top of motor.

6. Solder plug to ESC

Solder provided plug to motor wires. Note that plug is polarity-protected and will only connect in one orientation. Ensure that black, white, and red wires will connect to the same color on the ESC (white and red marked with short piece of colored shrink wrap). Feed wires through holes in gray plug back, with opening facing forward. Strip wires, and solder to the solder cup for each wire. Squeeze gray plug back together to orange plug front until they snap together.



Figure 9. Completed motor plug assembly.

7. Mount Controller

Mount the ESC to the motor plate. The Piranha kit has a 3D printed mount that aligns with mounting holes of old ESC. As this is 3D printed, the edges of the hole may need to be cleaned up from printing artifacts with a sharp knife. Once completed, the included black plastic nut should press-fit into the bottom of the mounting hole. Repeat for both sides.



Figure 10. Smart DPV ESC mount, viewed from bottom. Note that the top mounting hole already has black plastic nut installed, while bottom hole has printing artifacts that need to be removed before the nut can be pressed in.

Install the mount using the screws from the old ESC, in the same position. Smart DPV ESC can be mounted vertically, using black plastic screws to connect through the bottom mounting holes on the ESC to the mount attached to the motor plate.

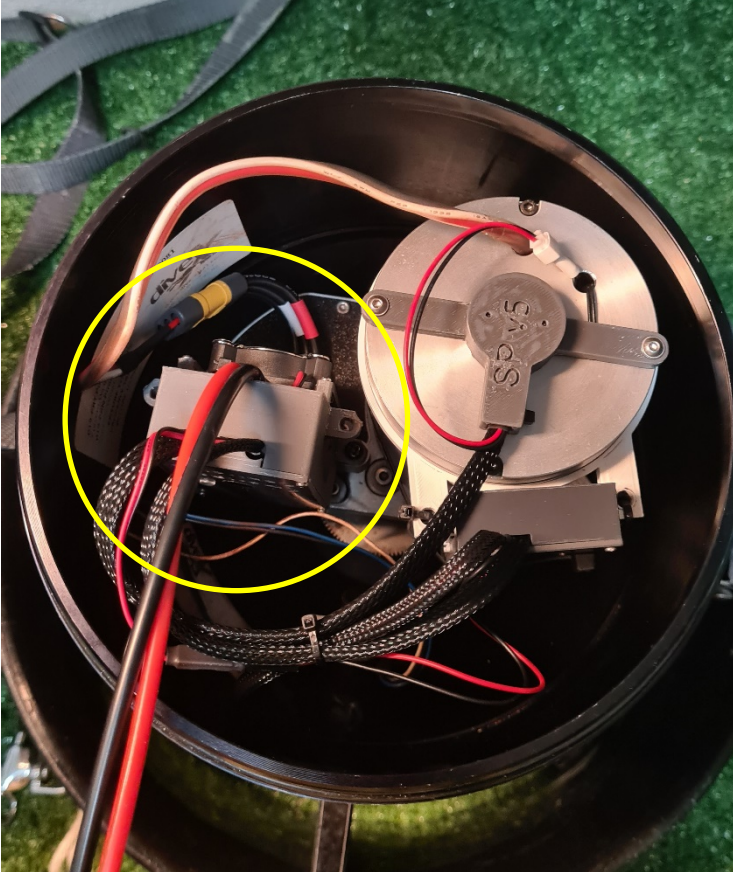


Figure 11. Smart DPV ESC mounted vertically (yellow circle), utilizing 3D printed mount installed to motor plate. Note in this instance, only the bottom two mounting holes of the Smart DPV ESC were used.

8. Replace Motor Assembly

Install the motor assembly back into the tail cone, ensuring that shorter screw goes into the propeller shaft (center).

9. Mount gateway

The wireless gateway needs to be mounted securely. There are several possible approaches. One solution is to use a mounting ring (not included) installed on the motor housing, and either small screws or zip ties to the mounting ring. A mounting ring design may be freely downloaded and 3d printed from:

<https://www.thingiverse.com/thing:5534693>.



Figure 12. Example of mounting ring designed to fit over motor housing, with holes that align with mounting holes on WiFi gateway. Note this is not included in the kit, but may be found and printed at <<https://www.thingiverse.com/thing:5534693>>

The mounting ring method is illustrated in Figure 11, above.

Other methods include double-sided tape, zip-ties directly to the motor housing, or?

10.Plug in reed switch

Plug in reed switch. Although the wire colors do not match, plugging white to white seems to work properly.

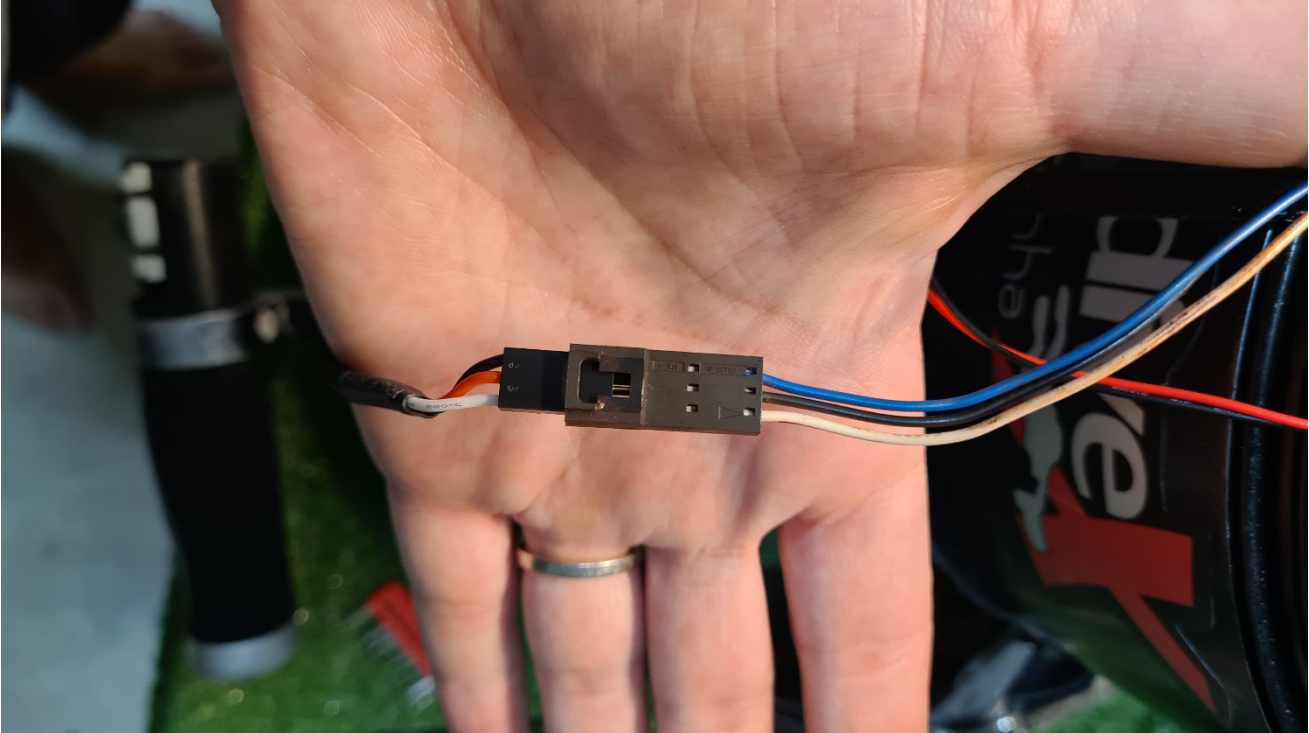


Figure 13. Reed switch plug configuration. Smart DPV controller plug on the left, reed switch on the right. This configuration worked for the author, although the colors do not match.

11. Connect to gateway

At this point, installation is complete! Note that the scooter may not work yet. Connect the scooter battery, and then connect to the WiFi gateway with a computer, tablet, or phone. To connect to the gateway, first search for a WiFi connection named "SmartDPV".

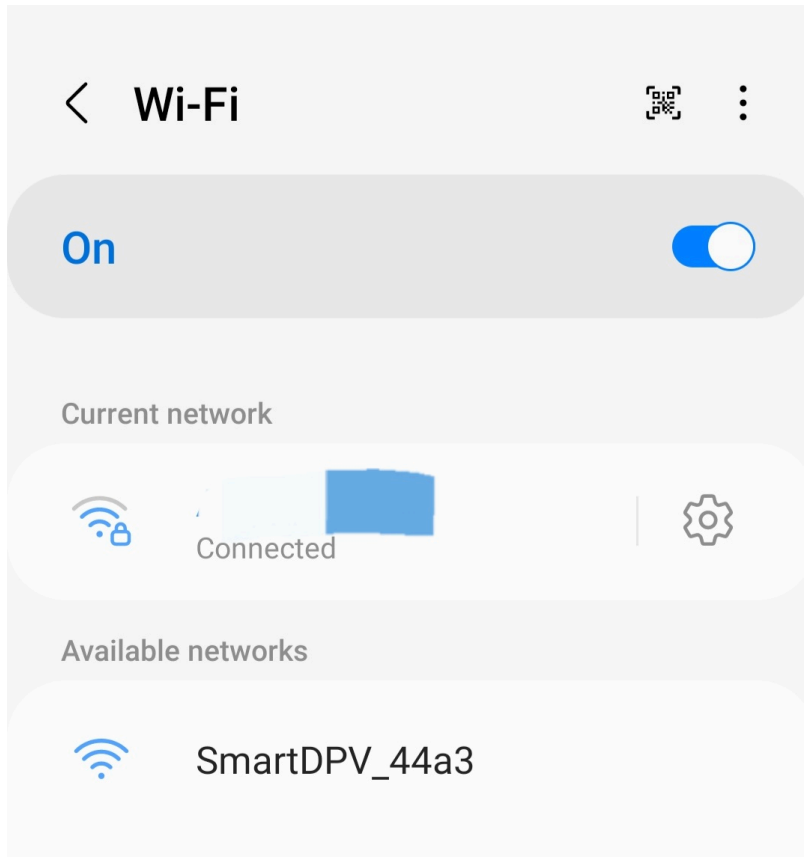


Figure 14. Example of Smart DPV wireless gateway access point.

After connecting to the Smart DPV access point, open a web browser and go to: 192.168.4.1

12. Calibrate motor

There may be an error message that the motor is not calibrated.

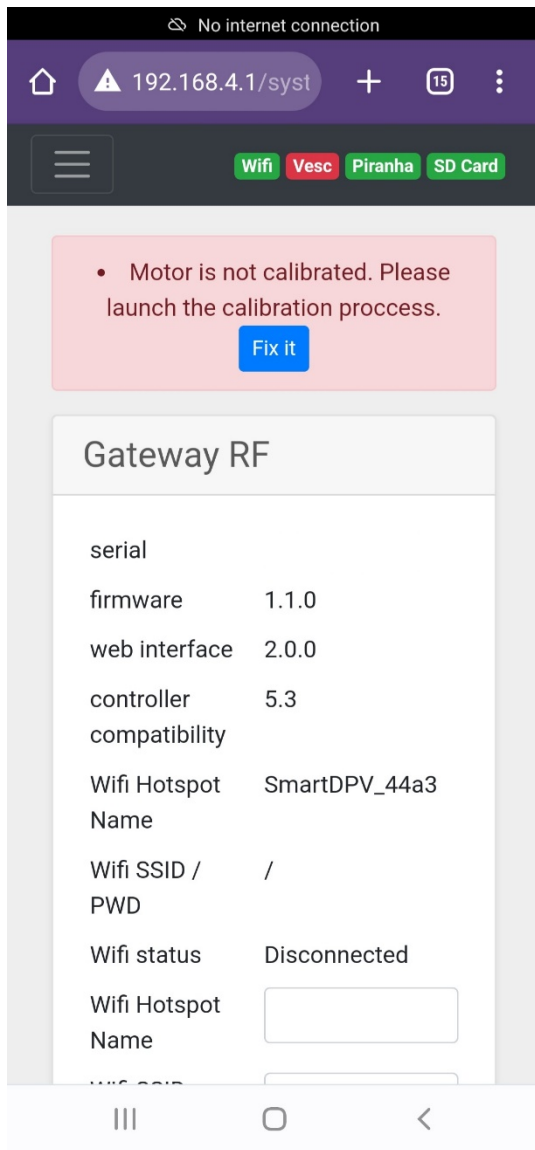


Figure 15. Motor calibration error message upon first connection to WiFi gateway.

To calibrate, select the “Motor” page from the menu button (three lines) at top left, and scroll down to the bottom of the page. Before calibrating, make sure the propeller is clear of any obstructions, as the calibration routine will cause the propeller to spin both forwards and backwards. Click “Start calibration”. Don’t forget to click the blue “Save” button at the top when calibration is complete.

13. Test trigger

In the “Setup” menu, the “Test Trigger” button allows you to test the trigger response. This shows the results of various trigger clicks, and allows you to test various configurations. Importantly, ensure that it registers the trigger pull and release correctly. If this is reversed (reads “release” on click and “click” on release), the reed switch plug wiring needs to be corrected.

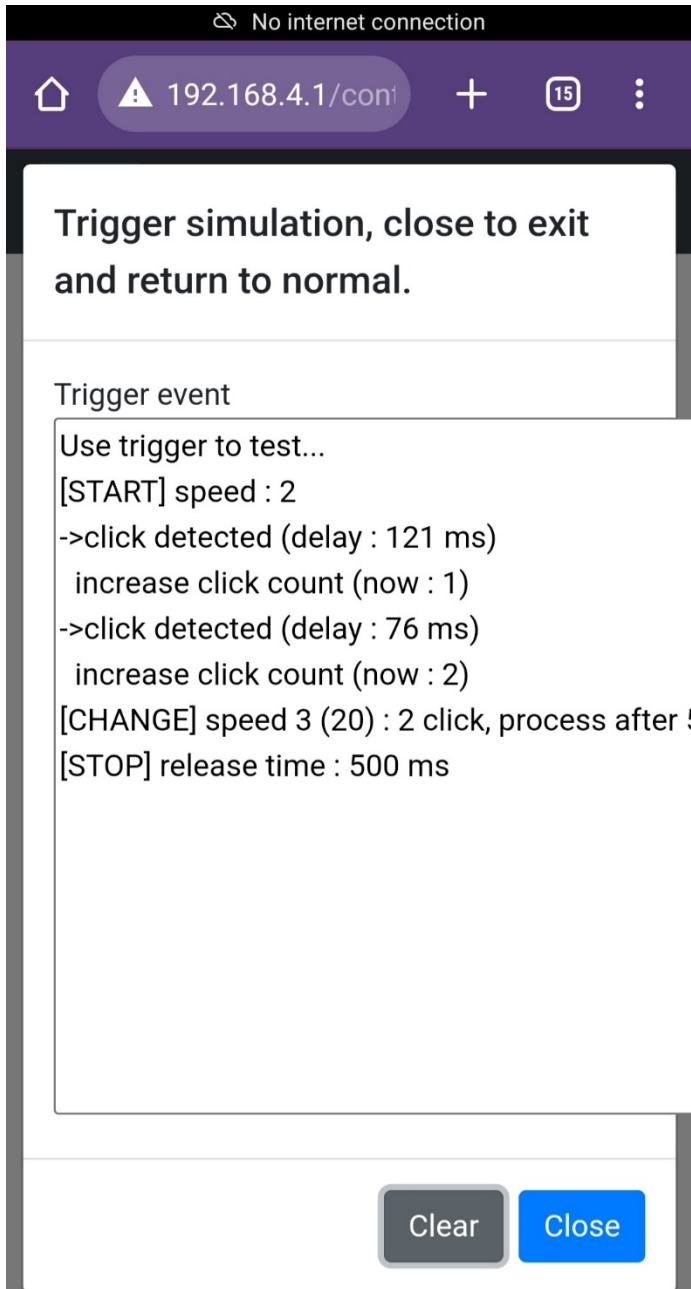


Figure 16. Results from trigger testing.

14. Test motor direction

After testing the trigger and reed switch (above), close the trigger test window and test the motor. You may want to drop the first gear to a low speed (5%) to more clearly see the propeller turning. Ensure the propeller rotates in the correct direction. If it does not, click the “Invert” option on the motor page. Don’t forget to click “Save” after any changes are made.

15. Set up speeds

From the “Setup” menu, you can customize the speeds for each gear, click patterns, and other options like ramp speed. Click “Save” when you are done.