

Instructions

This directory has information for building your own Sawppy the Rover. Some of the tools required are listed in the [tools list](#).

3D Printed Components

[General overview](#) of 3D-printed rover parts.

Details:

- [Servo accessories](#)
- [Steering knuckle](#)
- [Fixed knuckle](#)
- [Wheel](#)
- [Wheel hub](#)
- [Corner Steering Joints](#)
- [Suspension Bogie Joints](#)
- [Suspension Rocker Joints](#)
- [Main Body Box Corners](#)
- [Differential](#)
- [M3 Nut Installation Tool](#)

Customized Metal Components

- [15mm square aluminum extrusion beams](#)
- [8mm diameter shafts](#)

Mass-produced Components

- Turnbuckles are used to connect both sides of rocker-bogie suspension together, see the end of [this document](#). The two connection endpoints need to accomodate M3 fasteners as used in the rover, and the distance between connection endpoints should be roughly 5cm - 7.5cm. Example: [Hobbypark 16617](#) is seen in the assembly pictures.

- "608" Bearings are widespread. It's the type used in products like rollerblades, skateboards, and scooters. Since Sawppy does not run bearings at high speeds or put heavy loads on them, expensive [industrial strength 608 bearings](#) are unnecessary. Shop around for [inexpensive alternatives](#), they'll probably suffice for a hobbyist rover.
- M3 Heat Set Inserts give metal threads for 3D-printed parts which are more durable than threads tapped into printed plastic. Sawppy's default design is sized for [these inserts](#) on my printer, and reportedly works well with [these inserts](#) as well.
- [Purchased Parts List](#)

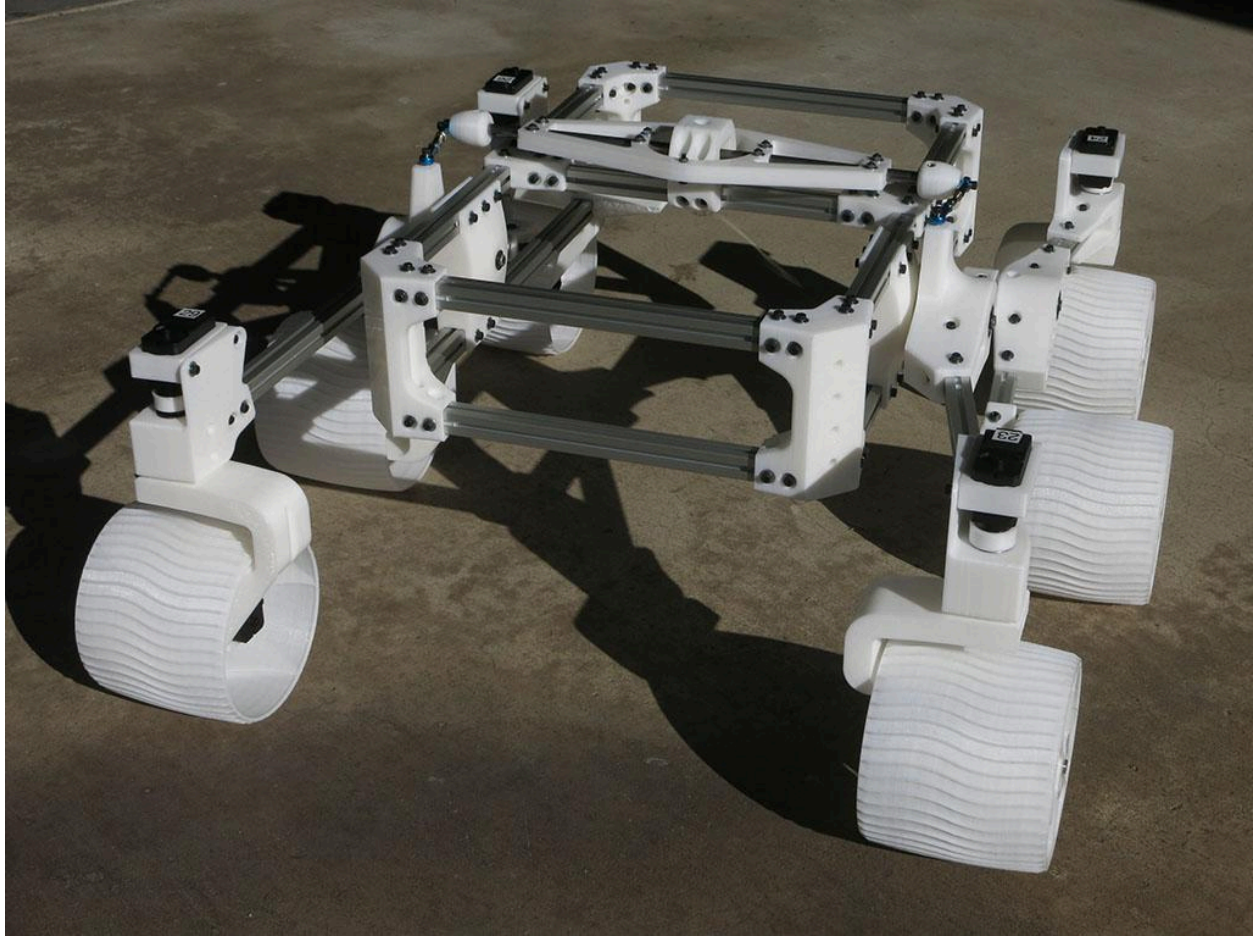
Mechanical Assembly

For an overview of the construction technique used here, combining aluminum extrusion beams with 3D printed connectors plus using design-specific M3 nut installation tools, please [see this article on Hackaday.com](#).

If any part of the assembly instructions are unclear, consult [the CAD file](#) to see how parts are supposed to fit together.

- [Servo Actuator Module](#)
- [Wheel Drive Modules](#)
- [Suspension Pivot Joints](#)
- [Main Rover Body](#)
- [Suspension Differential](#)
- [Suspension Bogie](#)
- [Suspension Rocker and final assembly](#)

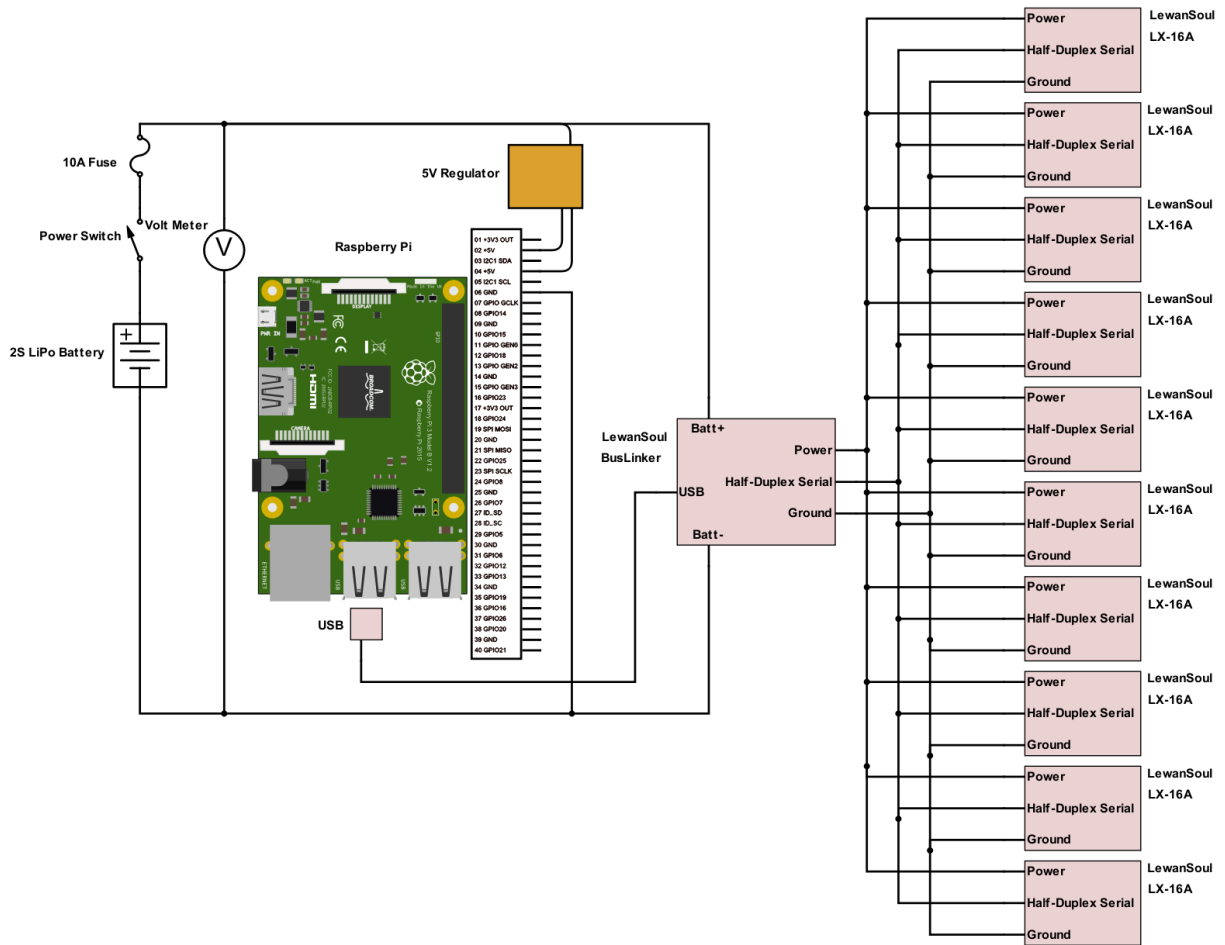
Once all the wheels are bolted on to the suspension, your Sawppy will be mechanically complete!



Electronic Schematic

A bare-bones Sawppy build will have the following electronic components:

- A 2-cell lithium polymer battery. (Visible in pictures is a 30C 5200mAh RC monster truck battery)
- A power switch
- Because the battery can deliver up to 150A and nothing on the rover can tolerate more than a few amps, a [10A fuse to protect against short circuits](#).
- A volt meter to monitor battery voltage.
- A [voltage regulator](#) to convert battery power to 5V.
- A Raspberry Pi 3 powered by 5V regulator output, either via micro USB port or GPIO voltage pins.
- A USB cable connecting Raspberry Pi 3 to serial bus translator board.
- Ten serial bus servos connected in parallel to the translator board.



Optional components visible in some Sawppy pictures:

- A [USB webcam](#).
- Google [AIY Vision kit](#).
- A dual-band wireless router for [greater range and access to 5GHz band](#).

Rover Control Software

For driving Sawppy like a remote controlled vehicle (a.k.a. 'teleoperation') Sawppy can borrow software from [SGVHAK Rover](#). See [instructions to modify SGVHAK Rover software to Sawppy](#).

The standard SGVHAK Rover software will present a web-based control interface. Rover builders who prefer a more traditional remote control unit can draw from [Marco Walther's implementation](#).

Wired Arduino Control

As an alternative to Raspberry Pi based wireless control, there is now an option to build Sawppy as a wired control rover. This avoids wireless communication issues in crowded environments (like a Maker Faire) and can be kept as a backup option. Alternatively, it allows interfacing with anything that can communicate with an Arduino. Code for Arduino sketch is under the [arduino_sawppy](#) directory.

Here's a wiring diagram contributed by [Martin](#)

