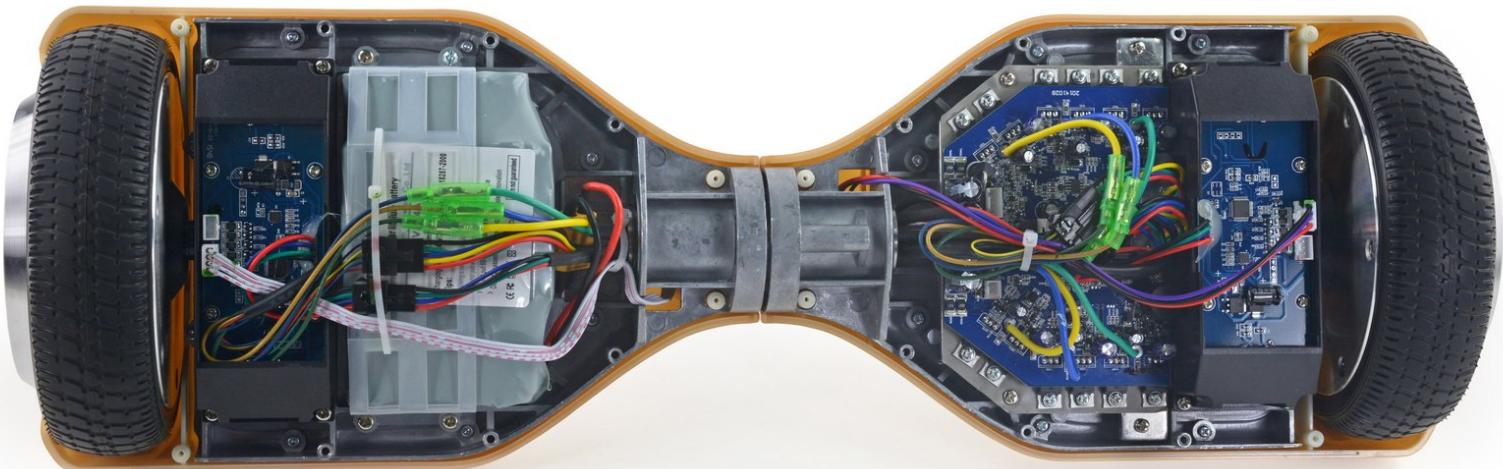




# Swagway Teardown

Teardown of the Swagway "hoverboard" self-balancing scooter.

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## INTRODUCTION

The device that makes walking look pedestrian: the much-blogged-about “hoverboard.” You may have seen those super cool kids, effortlessly gliding around the supermarket while you’re stuck walking the produce section—like a chump. You may have thought to yourself, “Should I get one of those highly advanced, futuristic wheeled-transport platforms? And if I do, will it spontaneously combust, as I’ve seen so many times on YouTube?” Only teardown will tell if this self-balancing scooter will be up to snuff on safety, and repairability.

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## TOOLS:

- Phillips #2 Screwdriver (1)

## Step 1 — Swagway Teardown

### SWAGWAY Hoverboard



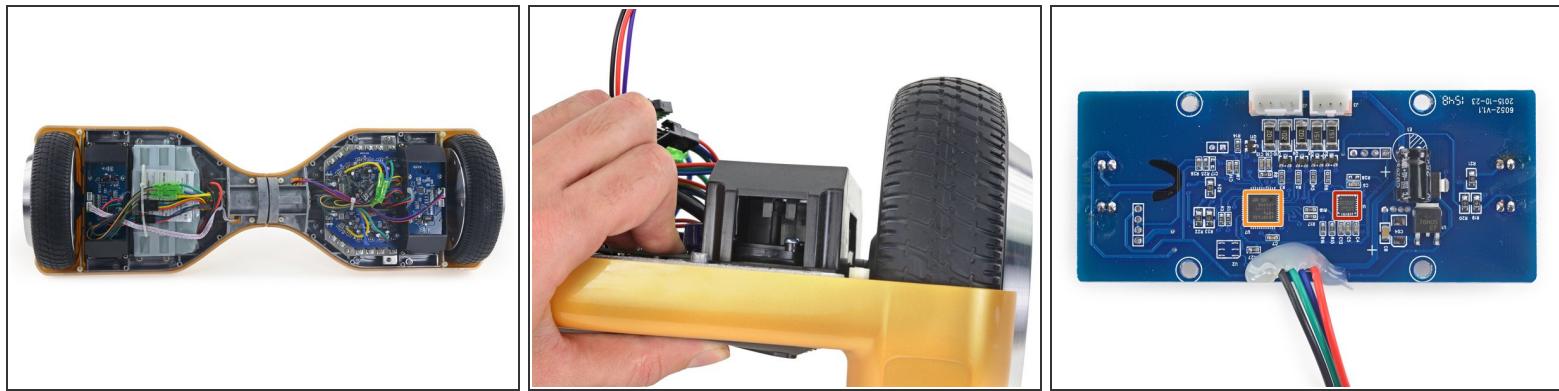
- Just how much "swag" does this Swagway pack? The specs are a good place to start looking:
  - Hard ABS outer body casing
  - Aluminum wheels with rubber tires
  - 10 MPH top speed
  - 23" x 7.3" x 7.3"
  - "Top Quality Brand" lithium battery

## Step 2



- We found some super reassuring warning labels.
- "Risk of Death or Serious Injury"? Yep, nothing to worry about here.
- Looks like someone flunked out of a certification. There's a suspicious hole in that line of approvals...

## Step 3



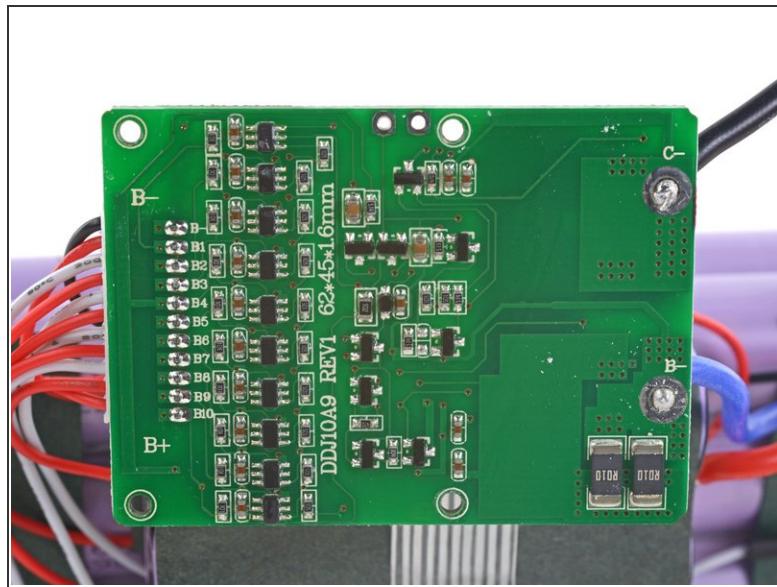
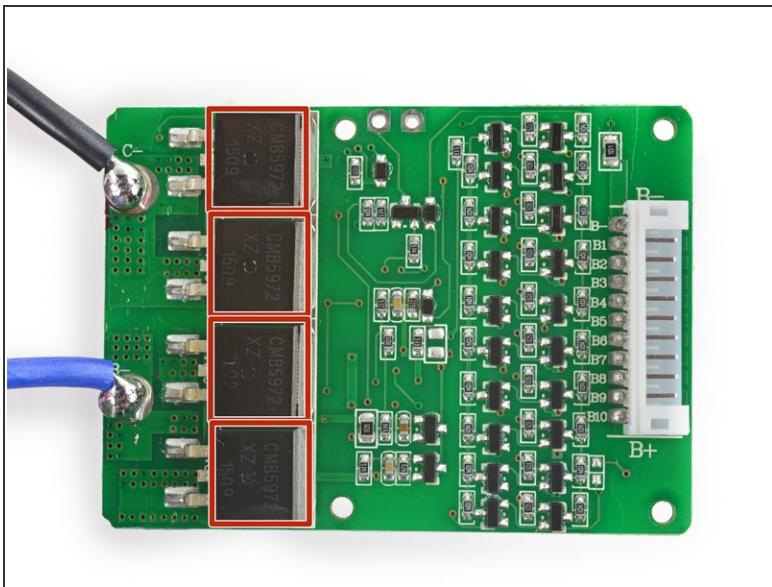
- Phillips #2 screws secure the two bottom covers, so it's not long before we're well within the belly of the beast.
- Things look... not bad! Given these boards' reputation, we weren't expecting clean insides.
- Each foot pad has two infrared sensors. Stepping down on the pad pushes a peg between emitter and receiver; when all four sensors are blocked, you are ready to roll.
- Those sensor switches live on the backs of the two gyro boards—one for each wheel. Each board is home to:
  - Invensense [MPU6050](#) 6-axis gyroscope+accelerometer
  - GigaDevice [GD32F130](#) ARM [Cortex-M3](#) 32-bit microcontroller

## Step 4



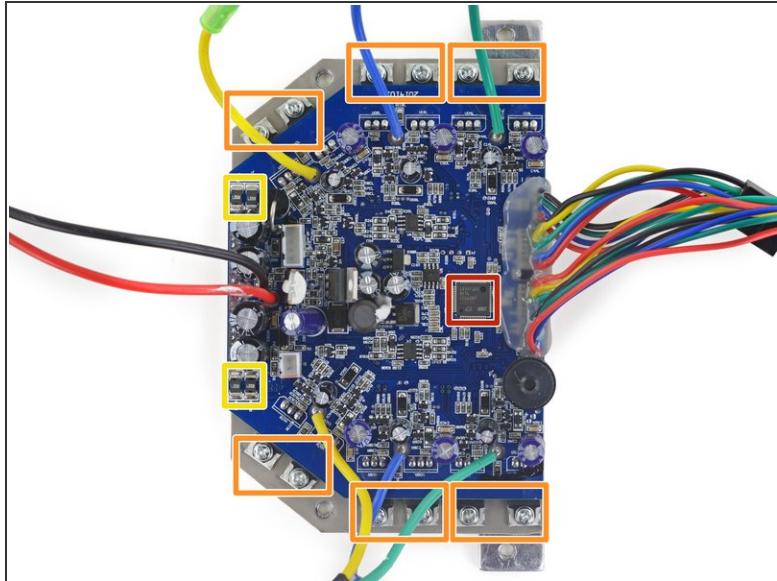
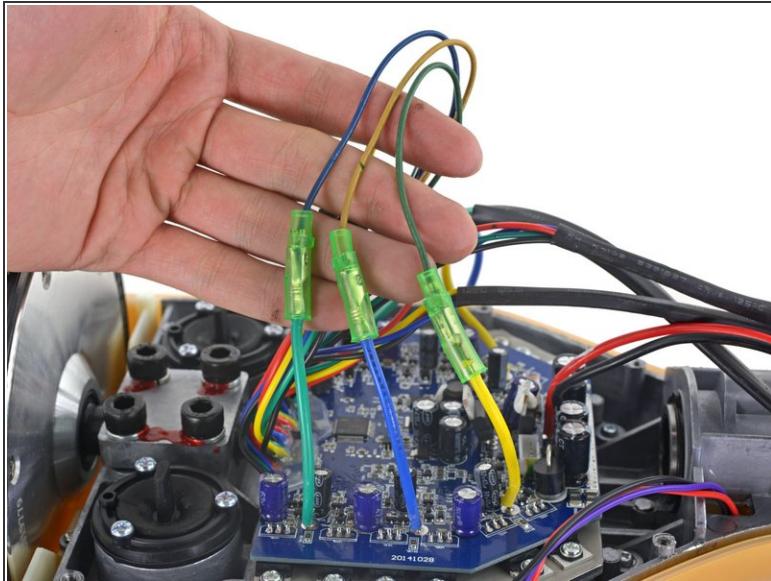
- The real star of the show here is the **firestarter** lithium ion battery pack.
- Looks like we've got a "Shilly-car" lithium battery operating at 36 V with 4.4 Ah (that works out to 158 Wh—just over four times the capacity of an [iPad Pro](#)).
- **(i)** We're pretty sure shilly car is a Chinese term for scooter.
- Inside, we find a tidy block of 20 LG [ICR18650B4](#) batteries with their own protection board. We're glad to see a reputable brand in here!
- Their nominal voltage is much higher than the 158 Wh listed on the shrinkwrap. Li-ion batteries shouldn't be fully discharged, so the battery protection board probably limits the pack to the label's specs.

## Step 5



- Speaking of the protection board: this is a Shenzen Dalishen Technology [DDJ10A9](#).
  - ☒ The board in their product photo got a much better soldering job than ours.
- The four large components are MOSFETs responsible for charging and discharging, and have pretty skimpy solder joints.
- ⓘ So far this is the only sketchiness we've seen, although it is a bit concerning. These particular solder joints are going to see a lot of power as the battery is charging and discharging.

## Step 6



- The motor power lines have some interesting (read: completely mismatched) color coordination going on—fixers take note.
- ⚠ They could also do with some more support and insulation (hot glue) on the solder joints.
- Here's what we found on a quick tour of the main board:
  - [GD32F103](#) GigaDevices ARM Cortex-M3
  - Six [half-H](#) bridge motor drivers, made up of two large MOSFETs each
  - Two pairs of 0.007 ohm resistors by the power inlet (R007).
    - *i* Resistors like these, with very low resistance, are used to sense current—helping to shut things down if a motor stalls out.

## Step 7



- Saving the best for last(ish), we cracked open one of the mysteriously heavy wheels to get a look at the brushless DC motor.
- Inside we find oodles of coiled copper wire, three large power leads (one for each of the three phases) and five leads for Hall effect sensors (for position tracking).
- The motor control board will let the motor know when to switch across those wires, making for a nice smooth ride.

## Step 8



- Real quick though, let's take a peek at the UL-certified charger. After all, house fires from charging hoverboards [have been reported...](#)
- To be honest, it looks pretty messy, but we don't like to judge a charger by its... random epoxy? So we consulted charger guru [Ken Shiriff of Righto.com](#), who said:
  - *"Looks like a straightforward flyback switching power supply. I don't see any cause for complaints...The charger looks solid. I don't see any corners cut. The design is 'unchallenging'—they didn't try to make it as small as possible; Apple probably would have made it half the size."*
- So hey, as long as you have a *real* Swagway, with a *real* UL-certified charger, you should be fine? Probably.

## Step 9 — Final Thoughts

### SWAGWAY Hoverboard



### TEARDOWN

### REPAIRABILITY SCORE:



- Swagway Repairability Score: **8 out of 10** (10 is easiest to repair).
  - Modular design with good use of connectors means many components can be easily replaced.
  - Only Phillips #2 screws are used—nothing proprietary.
  - The battery is easy to replace.
  - Inconsistent wire colors makes reassembly tricky.
- We couldn't get the tire off—replacing a worn-out tire will probably mean a new wheel and hub motor.