



Self Balancing Scooter Ver 2.0

by [ScitechWA](#) on February 20, 2012

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Intro: Self Balancing Scooter Ver 2.0

After building the first Self Balancing Scooter as a test platform we found it to be quite cool and we thought we would build another.

This time we would add a few extra features.

- 2 x 14.4Volt Li-ion batteries
- Solid frame for motor and wheel mounts
- Adjustable height handle
- A nice CNCed platform
- And Tread Plate!

So we took the exact same parts we used on the first scooter to build the next one.

<http://www.instructables.com/id/Self-Balancing-Scooter-Ver-10/>



Step 1: Details about the build

We looked at the issues we had with the first unit and fixed them with this version.

The main issue was that the rear end of kids scooters were a cheap pressed plate that would buckle and bend when under weight. So we laser cut some plates to replace the frame to hold the motor and wheels.

The frame was made from 25mm tube and reinforced to hold a lot of weight.

The front handle was made adjustable so smaller people can ride it too.

Because there wasn't any cheap torches which used the batteries we were using. We had to make our own holder to handle the batteries.

Oh and we added tread plate to make it look professional.



Step 2: Parts

The parts are the same as the previous build except we used different batteries.

Parts Needed:

- Arduino UNO - Check your local suppliers or eBay.
- Sabertooth 2x52 Motor Controller- www.dimensionengineering.com or a local supplier.
- 5 DOF accelerometer - <http://www.sparkfun.com/products/9268>
- 2 rear end off kids scooters or buy motors and wheels seperatly.www.oatleyelectronics.com or eBay. Have a look around your area.
- Batteries - SLA batteries are good and cheap, Power drills can be quite inexpensive too or LiPo's if your game!
- Shielded multi core cable for the accelometer and heavy power cable for the motors
- Deadman switch
- Toggle switch for turning.
- Toggle switch for adjusting balance position.
- DC connector for Arduino.
- DIL pins to suit Arduino
- Double sides tape
- Screws etc



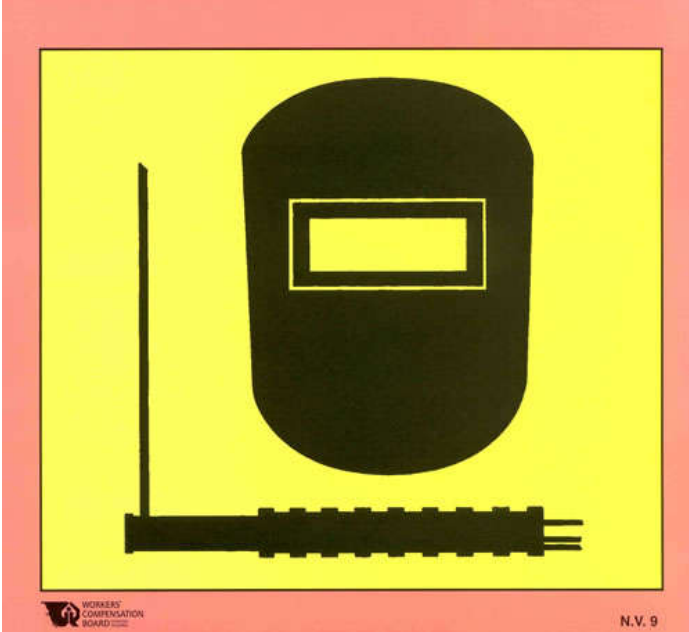
Step 3: Tools

You're going to need some tools.

Other than the normal bits you will need somebody with a welder and can weld to make the frame.

Some other tools you will need:

- Drill and drill bits
- Soldering iron and solder
- Wire cutter and wire strippers
- Heat shrink and hot air gun to shrink it

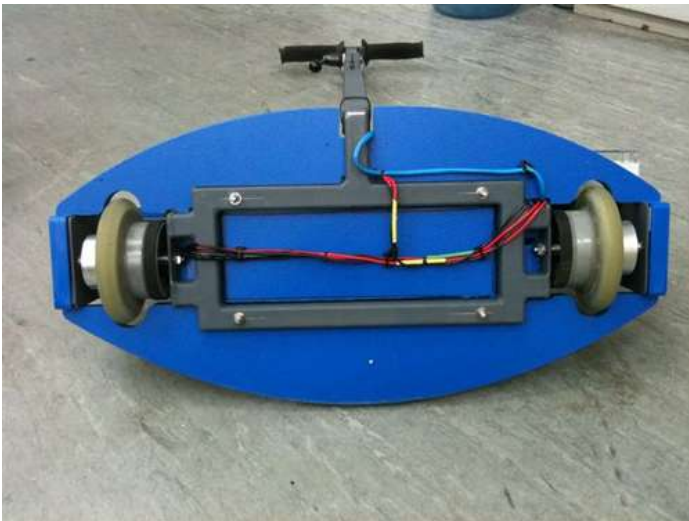


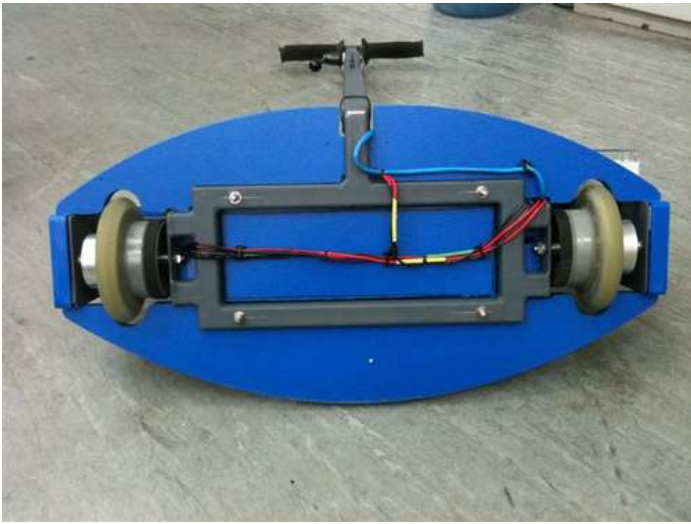
Step 4: Frames/Motors

This frame was made a lot stronger.

We used 25mm RHS tube and laser cut plates for the wheel/motors mounts. This stopped the twist we got in the previous frame.

The front handle was made adjustable and nice grips were added to the top.









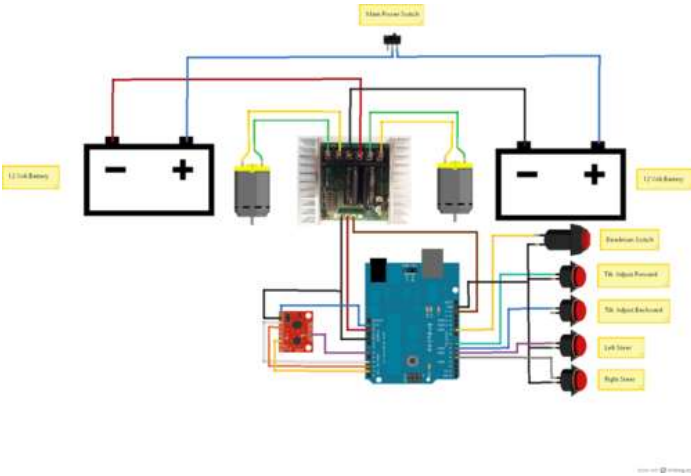
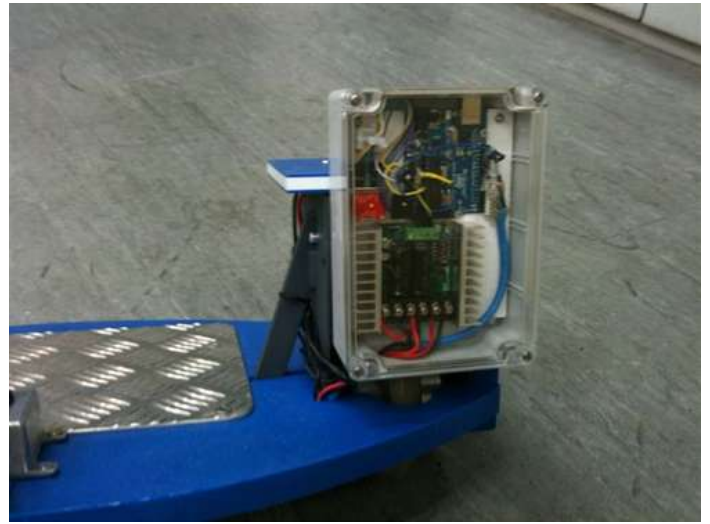
Step 5: Electronics

The electronics is quite basic as you can see on the circuit diagram. It is exactly the same as the previous version we built.

All cabling for the switches and IMU should be shielded cable. Except if the IMU is right next to the Arduino.

The IMU should try and be mounted under the centre of the platform or in front if possible. We mounted ours in a box out the front.

You can see in the pictures we fitted everything in a box and just run the killswitch, L/R steer and tilt adjust up to the handle. The batteries are mounted on top of the motors.



File Downloads

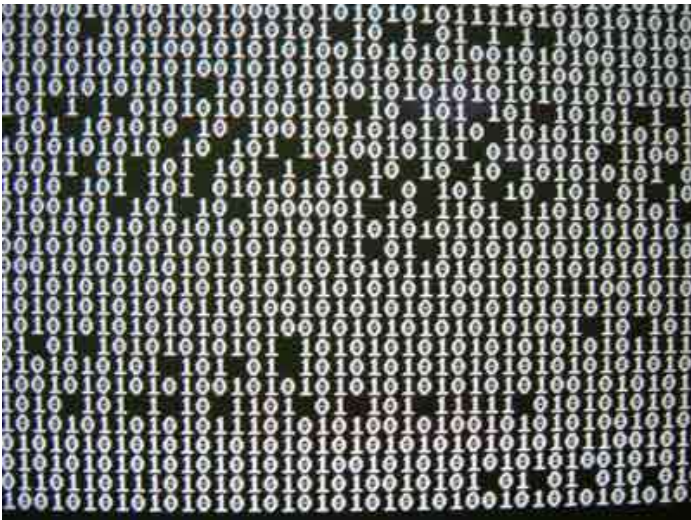


Standon Circuit.pdf (1 MB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Standon Circuit.pdf']

Step 6: Code

The code is basically the same as XenonJohns code but we adjusted some of the power/torques values. At the start of the code there are 2 variables to play around with to adjust the power and torque



File Downloads

<http://www.instructables.com/id/Self-Balancing-Scooter-Ver-20/>



Standup.txt (28 KB)

[NOTE: When saving, if you see .tmp as the file ext, rename it to 'Standup.txt']

Step 7: Video

Coming Soon.

Related Instructables



Self Balancing Scooter Ver 1.0
by ScitechWA



Angle measurement using gyro, accelerometer and Arduino by otaviousp



Seg...stick. by scolton



Easy build self balancing electric skateboard by XenonJohn



Self balancing one wheeled electric skateboard by XenonJohn



Guide to gyro and accelerometer with Arduino including Kalman filtering (Photos) by Lauszus