



Self Balancing Scooter Ver 1.0

by [ScitechWA](#) on October 16, 2011

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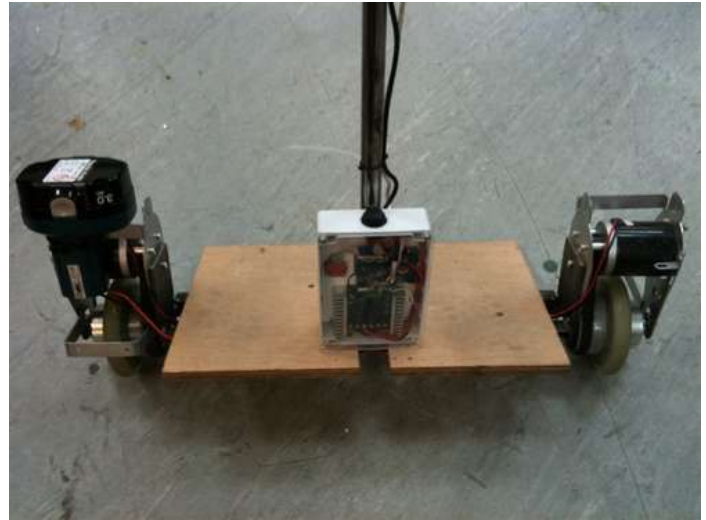
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Intro: Self Balancing Scooter Ver 1.0

After seeing the balancing skateboard we thought we would build a Balancing platform to test out the technology. So we bought some rear ends of kids scooter for the drive wheel/motor and the electronics that XenonJohn suggested. <http://www.instructables.com/id/Easy-build-self-balancing-skateboardrobotsegway/>

Making a stand on balancing unit is the same as a skateboard but the wheels are wider apart and the board is turned 90deg. The rear end of kids scooters were used which are quite small but quick and easy for testing! Just don't hit any big bumps.

We only got a few bit of skin missing from our shins and one hole in the wall!



Step 1: Details about the build

So we bought some rear ends of kids scooter for the drive wheel/motor and the electronics that XenonJohn suggested. We grabbed a couple pieces of angle, some flat plate and some tube. We welded this all together to make an area to stand on and a handle out the front. The motors bolted on the sides and the electronics was fitted to the front. We cut a battery torch in half to use as a battery holder which fitted to the top of one of the motors. The electrician now needs a new torch!

We found an old piece of plywood for the standing platform. Now it looks like a real prototype.

I took a couple of goes to get the polarity to the motors right but it worked pretty much first go. We played around with the torque and power values as we are running a 18Volt battery instead of 24volts that the motors are rated at.

It worked quite well.



Step 2: Parts

Ok your going to need some parts.
eBay can be your friend here.

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 accelerometer and heavy power cable for the motors
- Deadman switch
- Toggle switch for turning.
- Toggle switch for adjusting balance poision.
- DC connector for Arduino.
- DIL pins to suit Arduino
- Double sides tape
- Screws etc



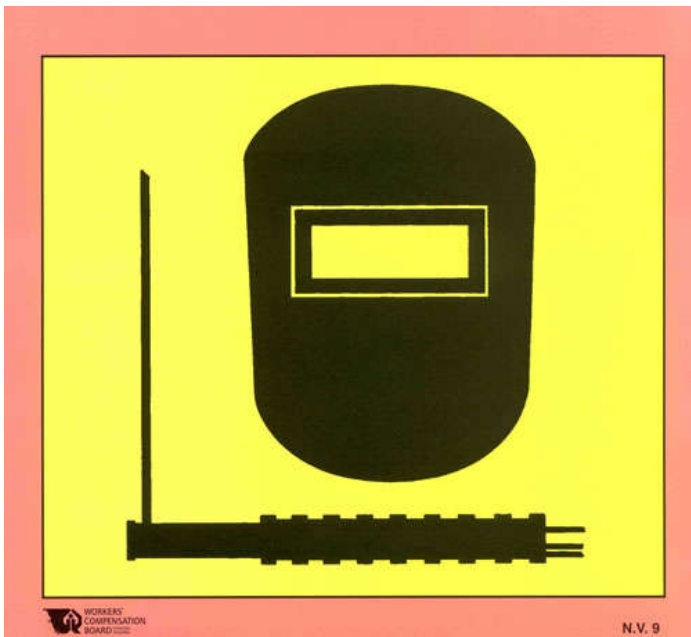
Step 3: Tools

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: Frame/Motors

For the frame we used a couple of pieces of angle iron and two plates either side to bolt the rear end scooter motors onto. Cut your 2 pieces of angle iron to the width you want for your feet to fit into.

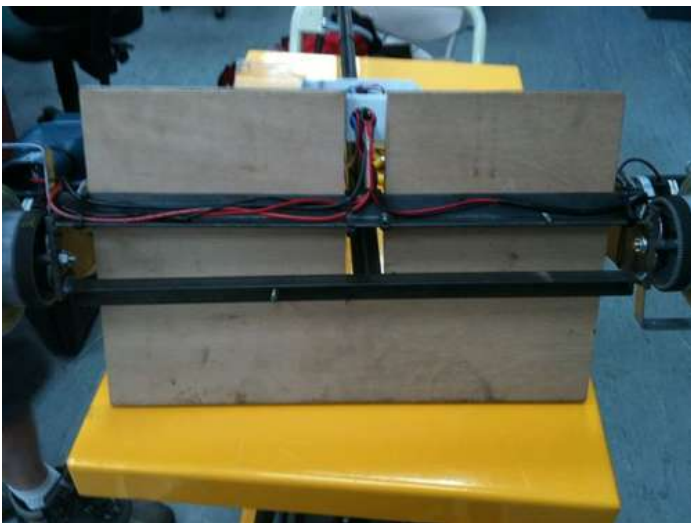
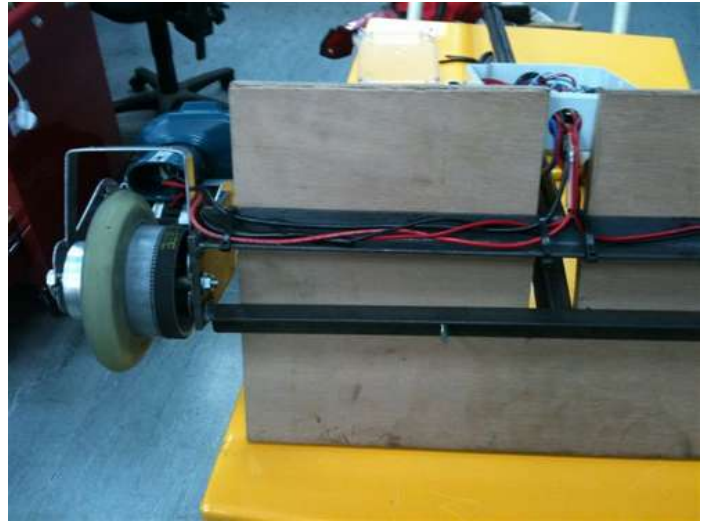
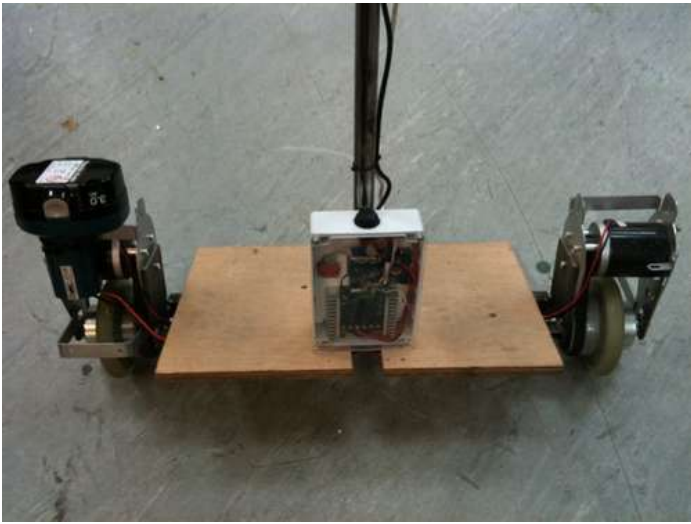
We drilled a few holes in some plates to match the bolt holes on the rear end scooter wheels.

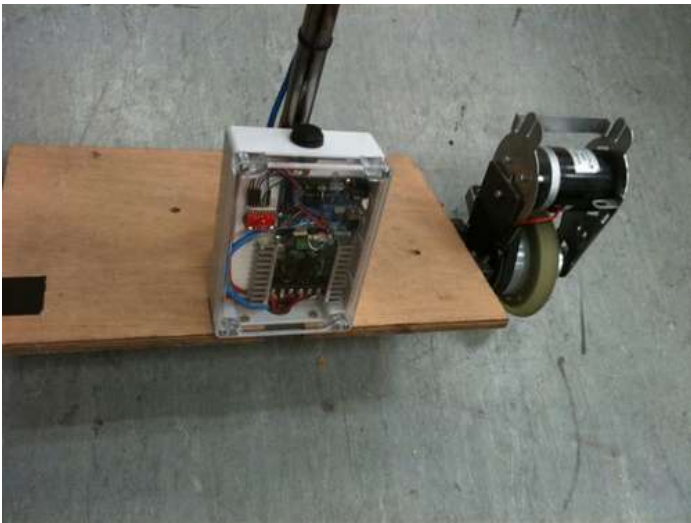
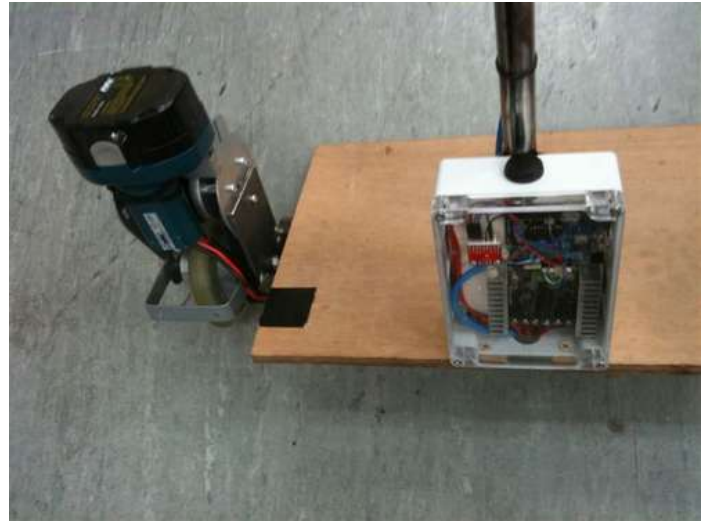
These plates were welded to the angle iron plates.

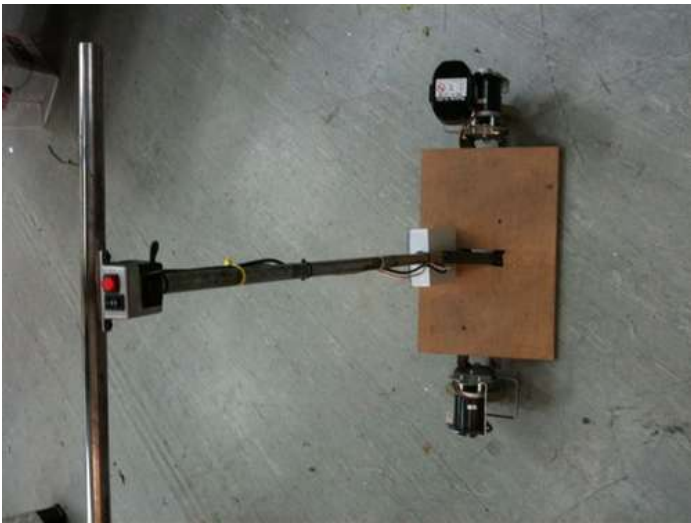
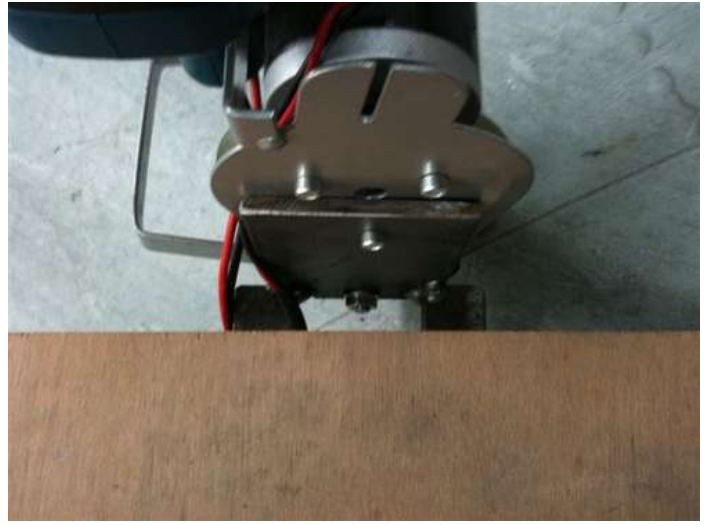
We added a post out the front and welded a T-Bar handle on this to hold onto.

A piece of angled reinforcing from the upright handle to the second Angle iron piece was added. Now we can bolt the wheels on.









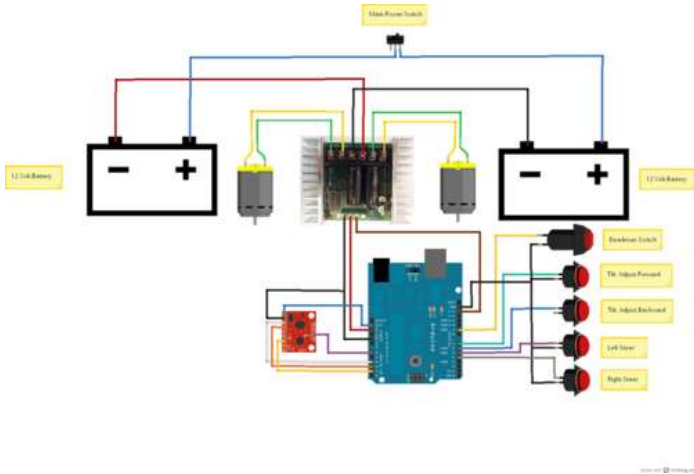
Step 5: Electronics

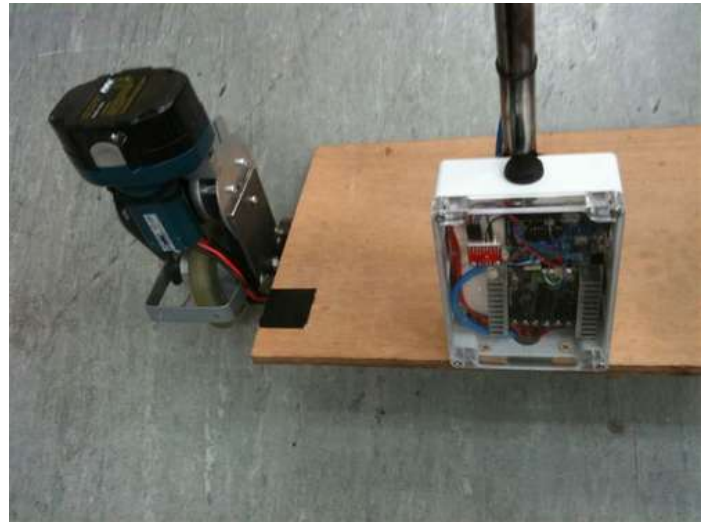
As you can see there isn't much to the electronics.
Just an Arduino, IMU, Motor drive and a bunch of switches.

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 battery was mounted on top of one of the motors.





File Downloads



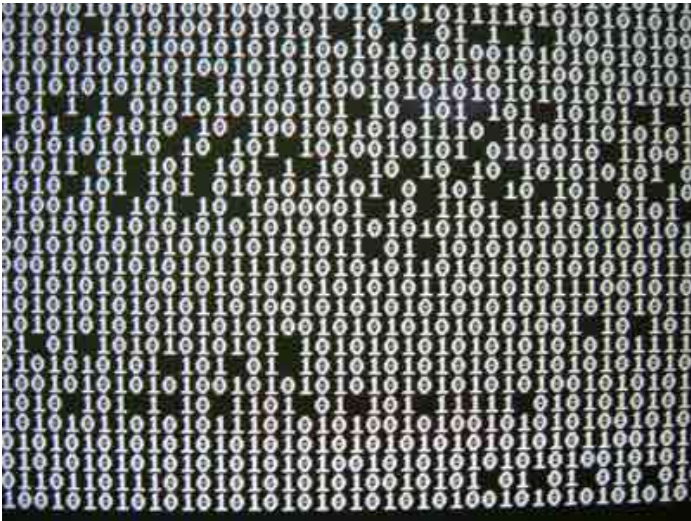
Standon Circuit.pdf (1 MB)

[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 because we were running 24Volt motors with an 18Volt battery.

At the start of the code there are 2 variables to play around with to adjust the power and torque.



File Downloads



Standup.txt (28 KB)

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

Step 7: Videos

Coming Soon.

Related Instructables



Seg...stick. by
scolton



**Easy build self
balancing
electric
skateboard** by
XenonJohn



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



**Angle
measurement
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