

Wireless Battery Charger mod for the White Box Robotics 914 PC Bot



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A while ago I was chatting to Chris Schur (<http://robots.net/person/cschur>). He's done some pretty impressive projects with mobile robots, which he sometimes publishes on the internet. He was interested in creating a charger unit for his robot, he wanted to ask the community what methods they used for charging up their different robot projects.

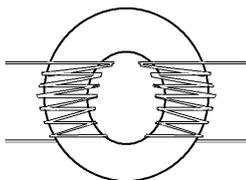
According to Chris Schur, basically people who have tried to build chargers have already run into problems of aligning their robot up correctly with conductive electrodes, getting the polarity right, sparking and other issues, (apparently line powered conductive wheels like model trains are a non starter!)

I thought to myself what approach would I take to avoid all of these issues? Then it struck me... What about just using a magnetic field to charge a robot?. Provided the field was large enough the robot would not even need to be that close to the charger. It could stay near the charge station for a while and just let those magnetic eddy currents top its battery up. Better still I could stay sitting on my backside without even having to get up and plug a mains charger into my 914!

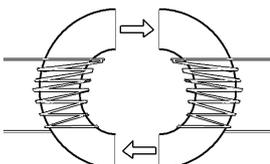
So I dug out those old college books and a calculator, and tried to come up with a workable design, and here's what I came up with.

Concept 1 – Half toroidal charger (double C-Core transformer)

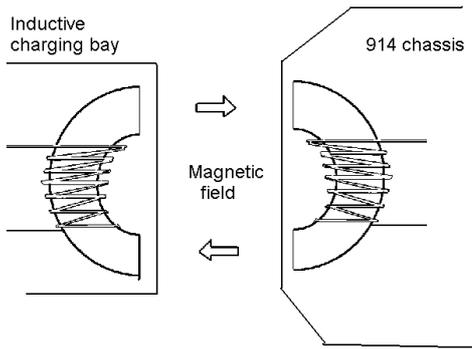
The first idea I had was to make a toroidal transformer and cut it in two. Basically the toroid is the most efficient type of transformer and would be ideal for the task - I would wind two coils with the same number of turn on each side. This would make a 1:1 transformer.



Next I would cut the toroid in two like so: and pass an alternating current through one of the coils, this creates two C-Core transformers.



Then on the other coil I would add a bridge rectifier so I could get DC from the AC it put in on the other end. The whole thing would be mounted on the 914.



All good in principle hey? It looked good on paper and then I tried making it.

Do you know how hard it is to wind a coil by hand over a toroid!? I wound two 50 turn coils onto the toroid. It did charge a 12v battery but only at 3mA. That was all down to the coil resistance being less than 0.5 Ohms. – Back to the drawing board.

Concept 2 – Double Solenoid Transformer

This time I thought I'm not winding any more coils! I purchased a pair of "Hercules Mighty Magnets" – these babies can lift 50Kg for 20 minutes powered by just a little 9v battery! I removed the diodes inside which they put in there to make them work as DC electromagnets. Putting two of these coils together means you are effectively using them as a transformer, and these coils have significantly more turns than many other solenoids I've seen. As we all know more turns on a coil mean more magnetic field strength!

I wired the coils into my AC power supply....



Coils separated – not charging



Coils close together – charging a 6v battery

