

EE 491: Wireless Recharging System

Client: National Carwash Solutions

**Weekly Report #3
10/1/18 - 10/5/18**

Team:

**Benjamin Gisler
Miguel Hennemann
Kyle Henricksen
Doruk Er**

Faculty Advisor: Craig Rupp

Weekly Summary:

This week we discussed the main issues and concerns facing our project. We decided that the main focus should be shifted to whether we can practically deliver 24W wirelessly. We also decided that we should work on getting prototype, proving that we can transfer that much power wirelessly. Currently we are looking at purchasing an H-bridge circuit board and a pair of coils to perform our experiment.

Past Week Accomplishments:

Name	Accomplishments
Miguel Hennemann	Obtained MOSFETs, resistors and additional components from ETG. tested H-Bridge circuit in the lab. Used breadboard to connect components to. Connected bench function generator and power supply to circuit for power. Circuit was not working as intended after a few hours of testing.
Benjamin Gisler	Discovered using BJTs is not ideal for creating H-bridge. Test H-bridge. Acquired basic electronics, wires, and breadboard to do this.
Kyle Henricksen	Initial algorithm was designed as follows, "We have n batteries in the system, for battery0 is dedicated to the crash sensor, battery1-n is connected to the rest of the system. If battery0 current charge is \leq to its dead zone (the charge where its drain begins to increase dramatically) Connect sensor to battery system (1 to n) Disconnect battery0 from sensor Perform priority charging for battery0 If battery0 near full charge Connect sensor to battery0 Disconnect sensor from battery system (1 to n)
Doruk Er	Chose 2 best candidates for coils and 3 for the batteries, calculated approximate

	load values, enhanced knowledge on the frequency effects on wireless power transmission.
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Pending Issues:

Name	Issues
Miguel Hennemann	Finding a way to control H-bridge and plausibility of transferring 24W wirelessly. I am still very unsure of whether this project can be done, so more research will need to be done.
Benjamin Gisler	Testing and understanding the operation of an H-bridge. Will it work?
Kyle Henricksen	Are there better systems and standards for the programming to manage the flow of electricity via software?
Doruk Er	Deciding on which coil and which battery to order, estimating the load for busiest day of the car wash, researching the rectifying design alternatives/choices of circuits. Enhance perspective about the frequency effects on wireless power transmission.

Individual Contributions:

<u>Name</u>	<u>Individual Contributions</u>	<u>Hours this week</u>	<u>Hours Cumulative</u>
Miguel Hennemann	Researched the concept and components involved with designing an effective wireless charging system	5	17

Benamin Gisler	Investigated how to find inductive values of coils which is needed for resonance calculations. Investigated power transfer feasibility.	6	13
Kyle Henricksen	Researched power management systems.	5	11
Doruk Er	Researched unknown factors for calculating the coil sizes and transmitting by resonance. Estimated load value for the busiest day of the car wash.	5	16

Plans for the Upcoming Week:

Name	Plans
Miguel Hennemann	I plan to talk to some of the faculty in the Magnetics Research Group, to determine if it is practical to transfer 24W over a pair of coils. Dr. Mina, is a very good resource and he will be able to let us know if it can be done with the available resources we have.
Benjamin Gisler	Further test H-bridge as well as roughly finding the parameters our coils should have as well as alternative coil options.
Kyle Henricksen	Improve pseudo-code to account for variable loads and figure out how to modulate the energy flow to the LED's.
Doruk Er	Research the frequency control alternatives/choices of circuits. Help decide on which battery and coil to order.

Summary of Weekly Advisor Meeting:

We discussed our progress with testing an H-bridge design in the lab. After explaining our difficulties with driving the gates of the MOSFETs, Craig advised us to shift our focus more on the practicality of transferring 24W wirelessly. We talked about where this information could be accessed and some potential professors we could seek advice from. We also discussed the need to perform power calculations to obtain design parameters for our system.

