EE 491: Wireless Recharging System

Client: National Carwash Solutions

Weekly Report #4
10/8/18 - 10/12/18

Team:
Benjamin Gisler
Miguel Hennemann
Kyle Henricksen
Doruk Er

Faculty Advisor: Craig Rupp

Weekly Summary:
Branching off of last weeks research, we tasked ourselves with finding our rough values of our system's components, and then refining them with equations.Our discussion during our advisor meeting revolves around finalizing our design and minimizing distance between our power transferring coils. We also talked with faculty from the Magnetics Research Group, and they confirmed that it was possible to transfer 24W wirelessly. They emphasized that while it is possible, that we would have to take large considerations into the efficiency and tuning of our system.

Past Week Accomplishments:

Name	**Accomplishments**
Miguel Hennemann	Researched various wireless charging designs and the components involved in that design. Reviewed IEEE articles and various industry related papers referring to wireless charging.
Benjamin Gisler	Was able to get a simpler H Bridge with fewer components to operate. Found that the coil parameters would not need to be as specific as expected.
Kyle Henricksen	Did some general research into power management and figured out the basics of how to detect the charge of the battery and the discharge rate.
Doruk Er	Worked on the calculation factors for coil size and the method of transmission by resonance. Estimated the worst case scenario of power consumption for the car wash.

Pending Issues:

Name	**Issues**
Miguel Hennemann	I am unsure about specific components and manufacturers to rely on. I have a list

	of possible options, but need to narrow them down. Hopefully by next week I will have a more clear idea about what our components are and where they will be ordered from.
Benjamin Gisler	There is more information on how to make systems with smaller power transfer wirelessly, and not as much on our level of power transfer. We will need to keep track of our progress and learn and research as we progress.
Kyle Henricksen	Need to incorporate the information I learned into my pseudocode.
Doruk Er	Calculate better calibrated values for the demanded load with a smaller tolerance. Help decide on getting which component from which manufacturer.

Individual Contributions:

Name	**Individual Contributions**	**Hours this week**	**Hours Cumulative**
Miguel Hennemann	Talked with the faculty from the Magnetics Research Group and confirmed the possibility of transferring 24W wirelessly. I also started to research components that can go into designing our prototype.	5	22

Benamin Gisler	Assembled and tested H bridge. Looked up potential components for transmission. Roughly calculated values of coil(s) and developed a rough design to start from and edit as we progress	5.5	18.5
Kyle Henricksen	Refined pseudo-code for Power management System.	5	16
Doruk Er	Researched and eliminated options for frequency control of the coils by pulsating voltage and by using a pre-built frequency controller.	5	21

Plans for the Upcoming Week:

We plan on doing more research into obtaining the different components to order for our prototype. We have an idea of where these components may come from, but we need to decide on exact suppliers. Wurth Electronics, seems to be a good candidate to obtain the transmitter and receiver coils from. They have an extensive history with designing coils and claim to have coils that can transfer up to 200W. We are also looking at an H-bridge PCB board from Amazon, which we will use to generate the high frequency voltage signal. We will also discuss funding with our client, in order to purchase the necessary parts.

Name	**Plans**
Miguel Hennemann	I am still deciding where our parts are going to come from. I have to do a ton more research to avoid buying components that are unnecessary. After researching various coil manufacturers, I believe Wurth Electronics is a very good option to get transmitter and receiver coils

	from. They have coils that supposedly can transfer up to 200W, which is something I have not seen from other manufactures.
Benjamin Gisler	Determine if we are going to acquire a premade H-bridge controller or if we need to create our own bridge with a controller. I plan to make a basic design of our circuits that we can add and take away from as we further develop our project.
Kyle Henricksen	Start making some means to simulate the power management system. Should be a c program to simulate the development environment. Get an arduino to try this out on.
Doruk Er	Assist in finalizing the circuit design for the initial test plan that involves the H-bridge and the coils.

Summary of Weekly Advisor Meeting:

Our talk was quite extensive, discussing power management and transfer. We concluded that we would make the power transfering coils to be as close as possible to maximize power transfer / efficiency. As mentioned in the upcoming week plans, we discussed finalizing a prototype design and getting materials for it as soon as possible to begin testing the basics of our system. These basic tests we decided on and planned would assess certain aspects of power transfer as well as the feasibility of our current method of using coils to transmit/receive power.