

EE 491: Wireless Recharging System

Client: National Carwash Solutions

Weekly Report #1

9/10/18 - 9/14/18

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This week was a huge step forward for our team. We made a visit with our client National Carwash Solutions (NCS) and had many questions answered. Their headquarters, located in Grimes, IA, took us about an hour and a half round trip in just driving alone. We spent an additional 2 hours touring their Customer Experience Bay, where the engineers and technicians test their car washing designs. In all, it was an amazing experience and we hope to visit their facility once a month to get updates and accomplish more milestones in regards to our project.

Pictured on the right is Ivan Chan, one of our contacts from NCS, and to the left is Miguel, discussing how the robotic washing arm would operate. Whilst touring, we also had the opportunity to look at some of the programming and electrical systems involved in their process. Viewing all of this as well as talking with our hosts gave us a lot of insight as to the purpose of our project.

To summarize, we learned that the car washing experience for the customer is not as engaging as people would like it to be. What NCS is doing is making the chore of car washing a more involved process. In order to accomplish this, NCS wants to add LEDs to the arm to make it more entertaining. However, there was a catch. In order to power the LEDs, we would need

to use batteries on board the arm to run everything. Since the LEDs are powered from the batteries and the arm can rotate 360°, the batteries not only need to be charged, but they also cannot be charged directly from source with wires as the 360° motion would cause constant strain to the wires. The only way we can reasonably charge the batteries without using wires directly connected to them means we must use a wireless



power transmission method. Two ways to do this would be through either the use of a tesla coil or two wire coils for electromagnetic induction of power.

Clearly the tesla coil is not a reasonable solution, therefore, induction coils are what we plan to use.



Pictured left, Ivan shows Miguel and Doruk the area we will have to work with. With this detailed walkthrough, we got a very clear picture of the parameters and limitations the system we needed to design would have. On top of powering LEDs and charging wirelessly, we would also need to keep a safety sensor powered in the event of an accident. With all of this perspective from the manufacturer we have a much more clear idea of what our next steps are. We will draw out the entire system of our design using a block diagram to visually see how all of the pieces of our project will fit together. Also, we started seeking different types of batteries that may be suitable for us to implement in our design.

Although we are expecting to receive the exact values for the necessary load, voltage and current in the next couple of weeks from Ivan, we plan on discussing and calculating possible approaches with the available battery and transmission options we have this coming week. Lastly, we will consider alternative ways to avoid changing the position of the current battery, sensor and the board on top while thinking through our solution next week. Below are some pictures we took on our trip to the manufacturing facility of NCS.



