

# **EE 491: Wireless Recharging System**

**Client: National Carwash Solutions**

**Weekly Report #8  
11/2/18 - 11/9/18**

**Team:**

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

**Faculty Advisor: Craig Rupp**

**Weekly Summary:**

After the useful advice and help from our last group meeting with our advisor, we were able to get the prototype wired correctly and working. We say two square waves at opposing gates that were out of phase by 180 degrees. This was an amazing achievement to see our hard work and dedication pay off in actual tangible results. It was also noted that our original prototype was pseudo working, and that its output was the output associated with the ICs over current protection function. In other words, our initial prototype was off by a single resistor placement and sizing.

**Past Week Accomplishments:**

| Name             | Accomplishments   |
|------------------|---|
| Miguel Hennemann | Put components together that we recently ordered. Tested coils individually and their ability to transfer power wireless over a varying set of distances.   |
| Benjamin Gisler  | Reassembled circuit and discovered that our integrated circuit was faulty. Prepared another IC for use, confirming the IC was the issue. With approximate values, we got the IC to output square waves.                 |
| Kyle Henricksen  | Taught group how to update the website through basic principles of web design, and worked on the Design Document, Algorithm was refactored.   |
| Doruk Er         | Tested the coils with the function generator again to compare the responses with the h-bridge. Identified the issues with the h-bridge circuit. Decided to rewire the h-bridge circuit to correct the suspected shorts. |

**Pending Issues:**

| Name             | Issues  |
|------------------|---|
| Miguel Hennemann | We tested the coils more and they were not transmitting power as expected. They |

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|                 | <p>were working effectively at around 12.5MHz, which was self resonance, but the IC that we are using will not be able to generate frequencies that high. We have to create a resonator circuit by adding capacitors on both the transmitter and the receiving sides.</p>   |
| Benjamin Gisler | <p>The square waves were not at operating at the frequency that we had originally planned (100kHz +), but we can simply size capacitors to our coils to achieve resonance at any frequency. We also need to size our resistors to the gates correctly to prevent signal degradation through the resistors to the gates.</p> |
| Kyle Henricksen | <p>Need to finish setting up the circuit for the Power Management Systems test.</p>   |
| Doruk Er        | <p>H-bridge circuit need to operate at a higher frequency. The signals received at the gates of the MOSFETs need to be cleaner. Battery pack calculations need to be modified in accordance with the recent alterations of our circuitry.</p>   |

### Individual Contributions:

| <u>Name</u>      | <u>Individual Contributions</u>  | <u>Hours this week</u> | <u>Hours Cumulative</u> |
|------------------|--|------------------------|-------------------------|
| Miguel Hennemann | <p>Changed capacitor and resistor values for our circuit and did some testing. Tested coils some more and found out that we need to design a resonator circuit with capacitors on both the transmitter and receiver sides.</p> | 7                      | 46                      |

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|-----------------|--|-----|----|
| Benamin Gisler  | Rewired circuit to make it much cleaner and easier to navigate. Soldered new IC and tested it with good results (IE square wave output at gates of FETs) | 6.5 | 44 |
| Kyle Henricksen | Began setting up the circuit for the Power Management System after receiving the parts for it.   | 6   | 37 |
| Doruk Er        | Assisted to the rewiring and the reorganization of the circuit, and evaluating the test results.   | 6   | 44 |

#### Plans for the Upcoming Week:

| Name             | Plans  |
|------------------|--|
| Miguel Hennemann | Plan to design a resonator circuit on both the transmitter and the receiving ends. Will focus on ensuring our H-bridge circuit works as intended by continuously testing and changing component values as necessary. |
| Benjamin Gisler  | Plan to get the circuit driving a load asap and find the values of the resistors we will need in order to properly drive our H-bridge.   |
| Kyle Henricksen  | Finish setting up Power Management System Small Scale circuit for testing, and start testing the code.   |
| Doruk Er         | Modify calculations for the battery pack with the most recent load necessities.  |

|  |   |
|--|---|
|  | Estimate the busiest day load stress on the battery to re-evaluate the battery pack capacity. |
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**Summary of Weekly Advisor Meeting:**

Meeting with Craig, we were able to show our Integrated circuit giving a desired square wave output. We also discussed how we would move forward in testing other aspects of our IC and H-bridge combo.



