

# **EE 491: Wireless Recharging System**

**Client: National Carwash Solutions**

**Weekly Report #6  
10/22/18 - 10/29/18**

**Team:**

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

**Faculty Advisor: Craig Rupp**

**Weekly Summary:**

After doing some more extensive research, we finalized our parts list and ordered them. We ordered a few gate driver ICs, which have a pre-built oscillator in them. This is ideal because it allows for us to use a constant DC source instead of worrying about generating our own oscillator. We also ordered some high frequency power MOSFETs that are designed to switch really fast. Currently, we are waiting on these parts to be delivered, along with the coils.

**Past Week Accomplishments:**

| <b>Name</b>      | <b>Accomplishments</b>  |
|------------------|---|
| Miguel Hennemann | Last week I ordered the transmitter and receiver coils from Wurth Electronics. I also added the Timer 555 IC to a list of parts to be ordered. I also did some extensive research into necessary parts to design our prototype.     |
| Benjamin Gisler  | Ordered extra Timing circuits for testing and earlier prototypes. This was done so that in the event these extras we damaged, we would still have plenty extra to use and continue working.   |
| Kyle Henricksen  | Made program to simulate algorithm without arduino, algorithm became out of date because of change in battery concept.  |
| Doruk Er         | Realized that the power generators in the lab are sufficient for our initial tests for the coil and H-bridge implementation. Modified the circuit design in accordance with the changed and available components for test purposes. |

**Pending Issues:**

| <b>Name</b>      | <b>Issues</b>  |
|------------------|--|
| Miguel Hennemann | I almost got the 555 Timer IC, which I later realized was not practical for our application. Luckily I did more research and found out that we needed a gate driver IC for the FETs. Currently I am just waiting for the parts that I ordered, so we can test them in the lab. Also, the coils have not arrived yet, as they are coming from Germany. We expect all the parts to come next week. |
| Benjamin Gisler  | As Miguel stated, although we had come to a decision on our components, we will not have them for a few days, which means there will be less work to go round than we would prefer.  |
| Kyle             | Need a better mode of testing the power management system. Should need to get a rechargeable battery, an arduino, and several LEDs. Then test the various loads and whether or not the code responds properly.   |
| Doruk Er         | Searching & deciding on buck/boost converters and relative circuit design to implement on our system.  |

**Individual Contributions:**

| <b><u>Name</u></b> | <b><u>Individual Contributions</u></b>   | <b><u>Hours this week</u></b> | <b><u>Hours Cumulative</u></b> |
|--------------------|--|-------------------------------|--------------------------------|
| Miguel Hennemann   | After doing more research, I determined that it was necessary to incorporate a | 6                             | 32                             |

|                 |   |   |      |
|-----------------|---|---|------|
|                 | <p>gate driver IC into our prototype. Usually MOSFETs that are used for switching need high currents to source and sink swiftly. I found a gate driver IC that is self oscillating, meaning that we just supply a DC voltage source to it and it will generate its own high frequency signals that can drive the gates of the MOSFETS efficiently. I also found high powered MOSFETs that are designed to switch fast, which is necessary for our design. I ordered these components and this should complete our parts list.</p> |   |      |
| Benamin Gisler  | <p>Practiced soldering components together before soldering our more delicate main components.</p>  | 5 | 29.5 |
| Kyle Henricksen | <p>Taught the rest of the group how to update the website and worked on the Design Document, Refactored algorithm.</p>  | 5 | 26   |
| Doruk Er        | <p>Searched frequency effects on transmission range. Narrowed down a list of buck/boost converters. Enhanced understanding of the H-bridge by examining its use in different circuits.</p>  | 5 | 31.5 |

**Plans for the Upcoming Week:**

| Name | Plans |
|------|-------|
|------|-------|

|                  |   |
|------------------|---|
| Miguel Hennemann | We expect all of our parts to come next week. When they come, we have plans ready in order to test individual components and also testing the overall circuit.  |
| Benjamin Gisler  | Once the components arrive, we will be able to start our work immediately and apply all of our researched knowledge to our design and testing. Put more simply, we would like to get the parts in, assemble the prototype, and begin doing basic testing with it. |
| Kyle Henricksen  | Continue to refactor program to properly simulate without an arduino.   |
| Doruk Er         | Start assembling the H-bridge and the coils to test the transmission efficiency and range limitations. Use the assembled test circuit to troubleshoot design flaws and inefficiencies.  |

**Summary of Weekly Advisor Meeting:**

We talked to Craig about our parts list composition. We explained to him the need for a gate driver IC, and the high frequency power MOSFETs and he supported our decision. He relayed to us some experience with circuits he has designed and worked on in the past, in order for us to get a broad understanding of the factors that could affect our project. He also told us that when the parts come in, he would like to have next week's meeting in the lab in order to run tests.



