

# EE 492 Progress Report    **MAY15-23**    **Period 3 (2/16/15-3/1/15)**

---

**Advisors:** Daji Qiao

**Client:** Halil Ceylan

**Members (roles):**    **Brandon Wachtel, Tyler Fish (Team Communicators)**

**Mitch Balke (Team Leader)**

**Brandon Maier, Johnnie Weaver (Web Masters)**

**Trieu Nguyen, Christofer Sheafe (Key Concept Holders)**

**Project Title: Wireless Embedded Roadway Health Monitoring**

---

## Period Summary

During the third period we have finalized the PCB design for the circuit excluding the charging portion, contacted Linear Technology about the current being drawn from the chip. It looks like we may need to change the chip that we are using. More communication with the representative from Linear Technology later in the week. Finalized the design for mounting the PCB to the enclosure. Further testing with the inductive coils on power efficiencies and output.

### 2/16    Group Meeting with Advisors

**Duration:** 1 Hour

**Members Present:** All

#### **Purpose and Goals:**

Discussed efficiencies in our charging circuit, mainly the efficiencies across the inductive charging portion. We were advised to meet with Professor Song to talk about why the coils are not as efficient as our calculations suggest. Talked about final changes being made to the PCB before we add the charging portions onto it. We have decided that we will create two different products at the end of the semester, one with and another without the inductive charging circuitry. Decided that we would have a presentation on the wireless charging for the next meeting.

#### **Meeting Notes:**

Better distance on coil charging

Measure and check the input impedance to the circuit

Look at impedance matching for the transmission side

Large imaginary impedance due to inductive coil will reduce current output

- Need charging coil presentation slide for the next adviser meeting

On PCB, get rid of ground/power loops

Fix a couple of spots on the PCB layout

Look into higher capacity battery for stand-alone model

Get mounts for PCB in enclosure

Meet with Professor Song about charging coils

### 2/23    Group Meeting with Advisors

**Duration:** 1 Hour

**Members Present:** All

#### **Purpose and Goals:**

The main purpose of this meeting was to present our information regarding the research, design, and testing of the charging circuit that we are working on. Discussed the finalized PCB design with our advisers and decided to start ordering prototypes this week. Talked about the discussion with the Linear Technology representative and why the chip that we have is drawing large amounts of current.

#### **Meeting Notes:**

Presentation on different power sources

- Piezoelectric – not going to be possible for our application
- Thermolectric – not going to be possible for our application

Create an excel spreadsheet with current draws and duty cycles

Redo and look over our battery calculations

RF – Government regulation of 4W maximum power output

- Circuit is large because of the patch antenna
- Not receiving enough current draw for our charging circuit minimum requirement

#### Inductive Coupling

- Need to use the network analyzer
- Talk to DR. Neihart to use the network analyzer

#### Order non-charging PCBs

#### Finish non-charging enclosure

- Don't need threading on pegs
- make peg holes the size of the screw minor diameter

## Pending issues

Efficiencies for charging coils are still too low

Need to look into a larger source for charging

Current LT charging chip is still drawing too much current

Planning on contacting LTI representative to discuss options

Assemble PCB boards as they come in

## Plans for Third Period

Brandon Wachtel – Work on the LT charging chip we have; look into a new charging chip for the battery; work with Mitch on PCB layout for charging chip.

Trieu Nguyen – Work on charging coils and their circuitry.

Johnnie Weaver – Work with Trieu and Brandon Wachtel on the charging coils and chip respectively

Tyler Fish – Finalize node enclosure for non-charging nodes; work with Brandon Wachtel on charging chip testing.

Christopher Sheafe – Working with Brandon Maier on the Raspberry Pi base station.

Mitch Balke – Working on PCB layouts; Finishing up multiple node communications; Assembling PCBs as they come in.

Brandon Maier – Assist Mitch with the communications; Work on the base station

## Individual Contributions (This Period)

Johnnie Weaver: Attended advisor meetings (2hr), attended group meeting (3hr), inductive coil and charging chip discussion after meeting (1hr), meeting with Dr. Song about coils (1hr), worked on inductive charging presentation (2.5hr), researched battery charging chip with Brandon Wachtel (1hr)

Brandon Wachtel: Attended advisor meetings (2hr), attended group meeting (3hr), inductive coil and charging chip discussions after meeting (1hr), research on charging chip (2hr), writing progress report (1hr)

Tyler Fish: Attended advisor meetings (2hr), attended group meeting (3hr), worked on enclosure design (2hr)

Mitch Balke: Attended advisor meetings (2hr), attended group meeting (3hr), PCB layout design (5hr), discussed base station design with Brandon Maier (1hr), cleaned up code (0.5hr)

Brandon Maier: Attended advisor meetings (2hr), attended group meeting (3hr), implementing SPI for the base station (4hr), met with Mitch and Chris about the base station (1hr)

Trieu Nguyen: Attended advisor meetings (2hr), attended group meeting (1.5hr), met with Dr. Song about the charging coils (1hr), stayed after meeting and worked on charging coils and chip (1hr)  
Christofer Sheafe: Attended advisor meetings (2hr), discussed base station with Mitch and Brandon Maier (1hr)

### **Total Contributions this Period**

Johnnie Weaver: 10.5 Hours  
Brandon Wachtel: 9 Hours  
Tyler Fish: 7 Hours  
Mitch Balke: 11.5 Hours  
Brandon Maier: 10 Hours  
Trieu Nguyen: 5.5 Hours  
Christofer Sheafe: 3 Hours

### **Total Contributions to project**

Johnnie Weaver: 87.75 Hours  
Brandon Wachtel: 87.5 Hours  
Tyler Fish: 88.25 Hours  
Mitch Balke: 87.75 Hours  
Brandon Maier: 82.75 Hours  
Trieu Nguyen: 75.5 Hours  
Christofer Sheafe: 58.5 Hours