



Wireless Cell Phone Charger

By: Derek Kissinger
Brad Marlow

ECET491
Senior Design Phase 2

5-2-14

Overview of Content

- Motivation Behind project
- Quick description
- Goals/ Deliverables
- Scope
- Risk
- Requirements
- Architecture
- Data
- Pictures of Construction
- Schedule
- Current Status
- Questions



☐ Motivation

- Our motivation behind this project is to make an easy and reliable way to charge your cell phone wirelessly.
- Also in todays world almost everyone is using their cell phones constantly draining the battery life faster. With this wireless charger there is no outlet needed to plug your phone in making it easy to get a quick charge about anywhere.



-for more info...
List location or contact for specification (or other related documents)

3



☐ Quick Description

- Wireless Cell phone Charger
- Transmitter and receiver
- The Coils
- Voltage



4



☐ ☐ **Project Goals/ Deliverables**

- ☐ • Prototype - a wireless charger that supplies power to the device
- ☐ • Presentation/demo of our prototype
- ☐ • A final report of our device we developed



5



☐ ☐ **Scope**

- ☐ • Scope - A Wireless Charger is defined as any of several methods of charging batteries without the use of cables or device-specific AC adaptors. In our case we are using transmitting and receiving coils for wireless charging. We will do this by hooking the phone up to the receiving part of the charger, once the transmitter and receiver senses the each other the charger will begin to charge the phone. The logic of this project will be done with a set of resistors, capacitor, inductors, and also the coils to begin charging of the cell phones. Our project will not be capable of charging devices other than cell phones and iPods.
- ☐ • Schedule - The project will require a total of 16 weeks to complete: 13 weeks of engineering & testing, 3 weeks of writing effort.
- ☐ • Cost - Total project cost of \$77 and 182 labor hours



6



☐ Risk

- ☐ • Out of all the risks that were possible to have during the development of the design we did have issues with two of them
- ☐ • The first one being missing days to be able to work on the project. Brad having to have back surgery really slowed us down in our design. Something that neither of us could prevent because he had to get it done.



-for more info...
List location or contact for competitive analysis (or other related documents)

7



☐ Risk

- ☐ • The second one being is that we our having issues with the transmitter shorting out with the inductor connected to the center tap of the transmitting coil making the MOSFETs over heat. This we our still currently trying to figure out.



-for more info...
List location or contact for competitive analysis (or other related documents)

8

Requirements - Making Changes

Operational Requirements

ID#	Requirement	Inspect, Analyze, Demo or Test
A-1	The wireless phone charger shall charge a cellular device using wireless connection.	Demo
A-2	The batteries in the wireless phone charger shall be capable of being recharged.	Test
A-3	The wireless charger shall operate through a transmitting and receiving coil.	Test

Performance Requirements

B-1	The charger shall be capable of charging up to 80% of maximum charging current drain from the internal batteries.	Test
B-2	The charger shall be able to charge at least 80% of the charging rate of a plug in charger does.	Test
B-3	The wireless charger shall be capable of running for a minimum of 8 hours off of one charge.	Test

Physical Characteristics Requirements

C-1	The wireless charger shall weigh less than 1 pound.	Inspect
C-2	The wireless charger shall be no larger than 6" x 6" x 1" in dimensions.	Inspect
C-3	The wireless chargers batteries shall be lithium ion.	Inspect

Utilization Environment Requirements

D-1	The system shall operate between temperatures of 60F to 85F.	Analyze
D-2	The wireless phone charger should perform without interference from other devices that are within the field generated by an operational cellular phone.	Inspect
D-3	The wireless charger shall operate on earth	Test

Functional Requirements

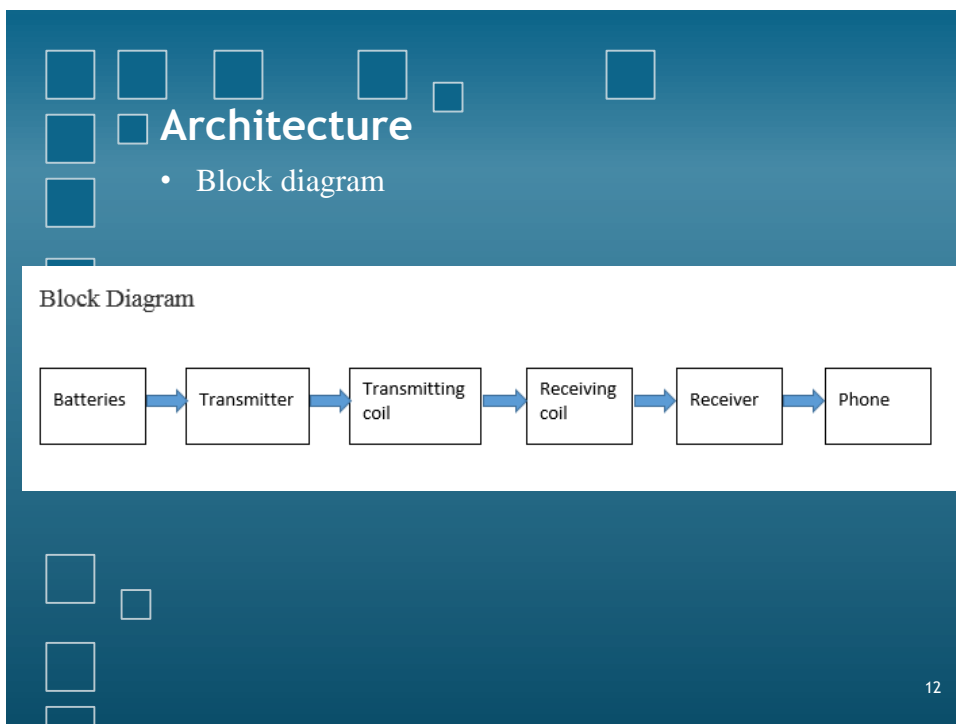
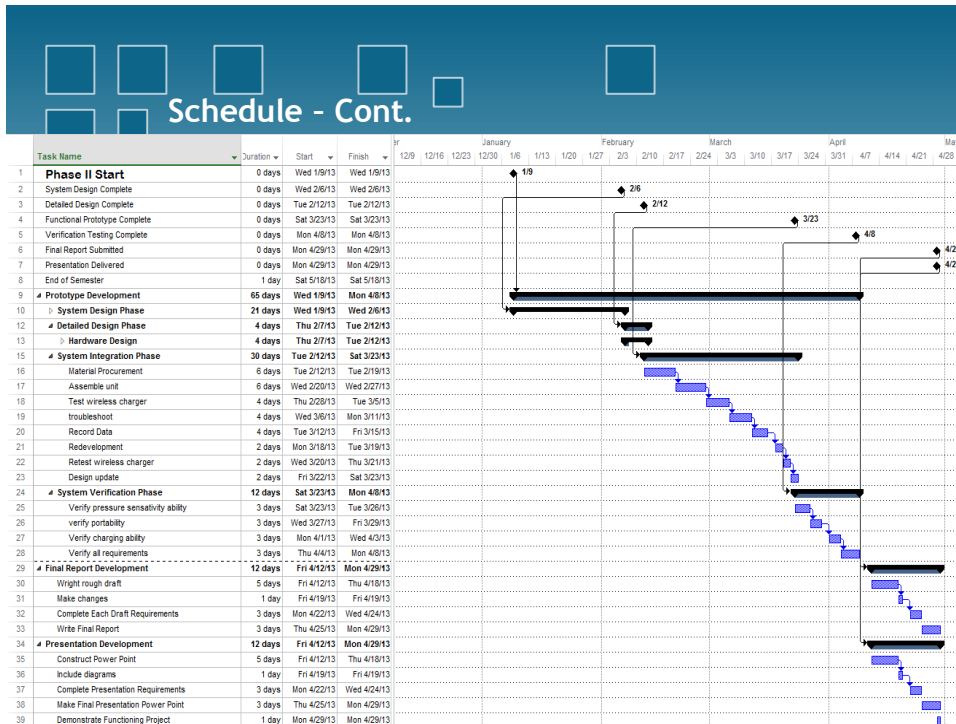
E-1	The wireless phone charger shall start charging cellular devices by using a receiving and transmitting coil.	Demo
E-2	The batteries within the charger shall be rechargeable.	Demo
E-3	A USB cable shall connect phone to receiver.	Demo

9

Schedule

- As a schedule goes we have stayed pretty close to on track with the schedule we created in Phase 1 of Senior Design. In order to do this though like we showed above we had to change some of our requirements around.

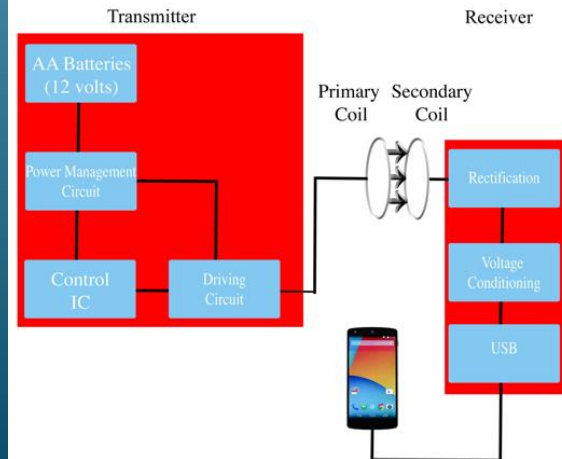
10



Architecture Cont.

- System Block Diagram

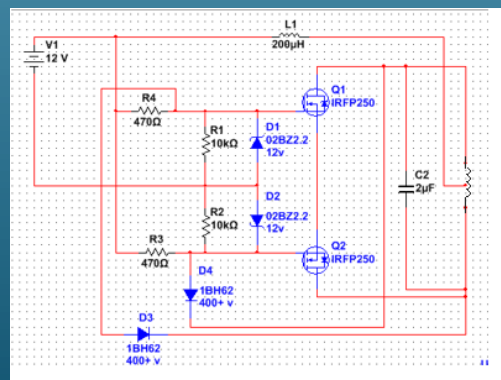
Control flow chart



13

Architecture Cont.

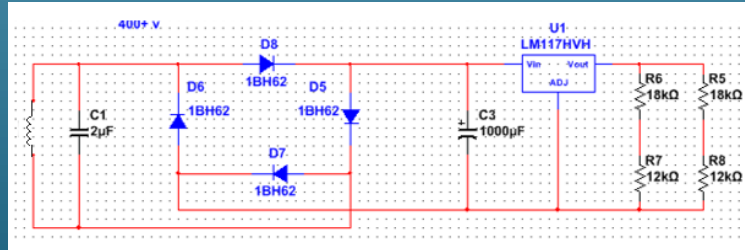
- Circuit Diagram - Transmitter



14

Architecture Cont.

- Circuit Diagram - Receiver



15

Data - Transmitter

- Max voltage we could achieve before circuit shorted out

Transmitter	Voltage In	Resistor 1	Resistor 2	Resistor 3	Resistor 4	Inductor
Voltage	<u>10.76</u>	<u>4.69</u>	<u>4.64</u>	<u>6.06</u>	<u>6.11</u>	<u>2.93</u>
	Diode 1	Diode 2	Mosfet 1 Drain	Mosfet 1 Source	Mosfet 2 Drain	Mosfet 2 Source
Voltage	<u>4.63</u>	<u>4.53</u>	<u>7.24</u>	<u>4.45</u>	<u>7.26</u>	<u>4.75</u>

16

Data - Receiver

- Voltage and amperage is with receiver hooked up directly to power supply that is the minimum voltage need to get phone to start charging. We did it this way to get some reading and to make sure the receiver worked correctly.

Receiver	Voltage In	USB leg 1	USB leg 2	USB leg 3	USB leg 4
Voltage	<u>7.5</u>	<u>5.05</u>	<u>1.9</u>	<u>1.9</u>	<u>0</u>
	Resistor 5	Resistor 6	Resistor 7	Resistor 8	Capacitor 3
Voltage	<u>1.66</u>	<u>1.66</u>	<u>2.58</u>	<u>2.58</u>	<u>5.53</u>

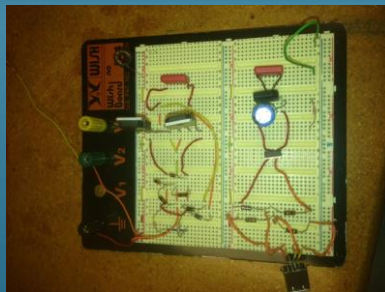
Receiver	Amps In	USB leg 1	USB leg 2	USB leg 3	USB leg 4
Amperage (m)	<u>403 mA</u>	<u>268 mA</u>	<u>.242 mA</u>	<u>.164 mA</u>	<u>.010 mA</u>

- Voltage with receiver hooked up to coils before it shorted out

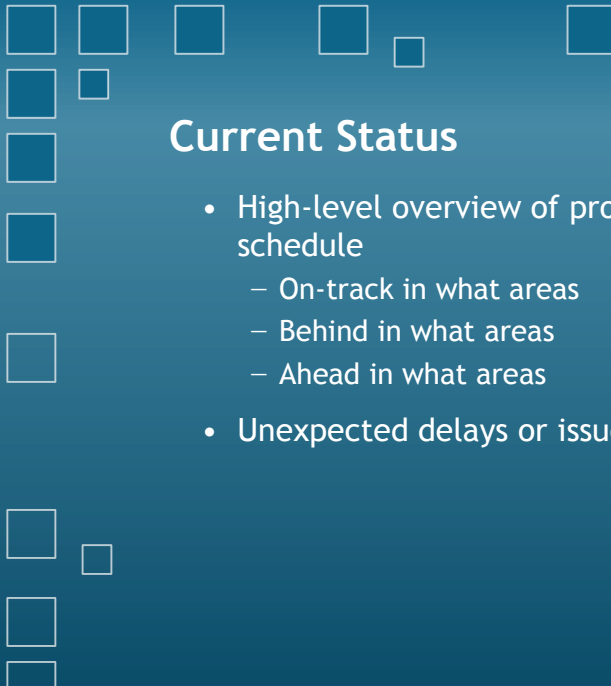
Receiver	Voltage In	USB leg 1	USB leg 2	USB leg 3	USB leg 4
Voltage	<u>7.44</u>	<u>5.03</u>	<u>1.84</u>	<u>1.84</u>	<u>0</u>
	Resistor 5	Resistor 6	Resistor 7	Resistor 8	Capacitor 3
Voltage	<u>1.66</u>	<u>1.66</u>	<u>2.58</u>	<u>2.58</u>	<u>5.12</u>

17

Construction



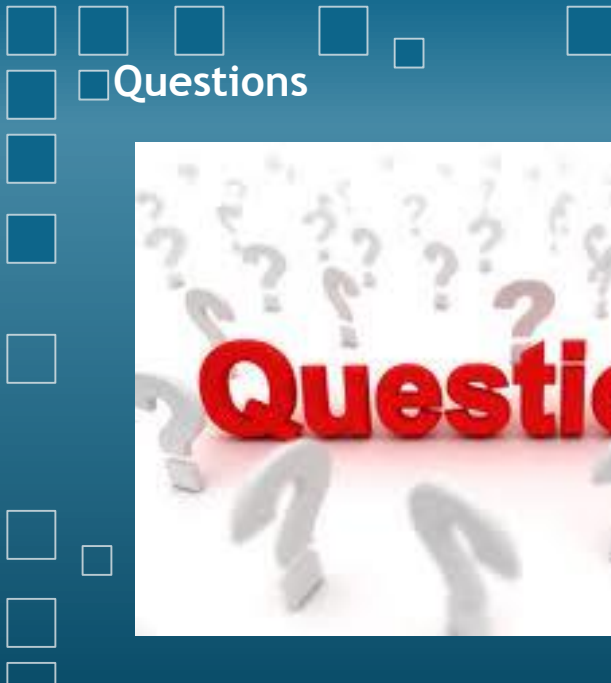
18



Current Status

- High-level overview of progress against schedule
 - On-track in what areas
 - Behind in what areas
 - Ahead in what areas
- Unexpected delays or issues

19



Questions



20