EE/CprE/SE 492 WEEKLY REPORT 1

2/5/23 – 2/18/23

Group number: **sdmay23-21**

Project title: **Self-Aligning Wireless Charger**

Client & Advisor: **Cheng Huang**

Team Members & Roles:
Jeremy Noesen - Software Designer, Scribe
Noah Pritchard - Hardware Designer, Client Interactor
Greg Matson - Tester, Researcher
Remington Greatline - Hardware Designer, Researcher
Malakhi Barkley - Software Designer, Prototype Designer
Jack Welch - Tester, Prototype Designer

- **Weekly Summary**

  In these past couple weeks, the team ordered and received the first batch of parts to construct the prototype. Some members are learning how to use Solidworks to create a detailed 3D model of the design for prototyping and printing. With the parts here, the hardware designers are working on wiring the electrical components up to the Arduino. The software designers will use these parts next to test out the libraries needed to interact with them. Progress on the project has been slow this reporting period. To help speed up the process, additional meeting times are being discussed to allow steady creation of the prototype.

- ***o*** **<u>Past week accomplishments</u>**
    - Jeremy Noesen
        - Helped plan out implementation of the rail system. Began to think and plan deeper for the embedded software, such as situations ignored in the initial planning stages. Reached out to one of the individuals who watched this group's 491 presentation to get resources and help with Solidworks and CAD in general. Decided to increase the number of team meetings to speed up development.
    - Noah Pritchard
        - Began the process of learning the connections between the arduino and the stepper motor shield with Remington. Found that the stepper motor is meant to be soldered to the pins on the arduino. Upon realizing this, a decision was made that it is best to plan the pin assignments for the entire circuitry before beginning actual construction. This will ensure proper connections for all components.
    - Greg Matson
        - Researched 3D models of the wireless charger to assemble in Solidworks. This will help see how the assembled pieces will look and help refine the overall size of the rail system. Also recreated the rail bar in Solidworks and modified certain parts found online, in order to better match the parts we purchased. Currently researching how to construct CAD files for each of the individual components and planning out how the shell of the wireless charger will fit into the overall design.
    - Remington Greatline
        - Began coordinating with Noah on design work for the Arduino MCU as well as power supply design work for both the Arduino and DC Stepper motors. Initial sketches were drawn of the rail structure for the modeling team to digitally refine with CAD. Coordination with ETG was also done for the purposes of acquiring appropriate electrical components.
    - Malakhi Barkley
        - Installed and began learning Solidworks, working with Jeremy to start writing and testing software, polished the website a small amount and made navigation easier/more intuitive. Looked into arduino libraries and their compatibility with different software languages. Started on researching the usability of voltage regulation for the motors using PWM vs resistors (to improve efficiency)
    - Jack Welch
        - Assisted Greg along with Jeremy in researching 3D models for the various components in the wireless charger, in addition to learning how to make CAD files in Solidworks to help Greg model the wireless charger.

- *o* **Pending issues**
  - Jeremy Noesen
    - The software needs to accommodate the action of moving the phone while it's still on the charging plane. The design uses IR sensors to detect when the phone is initially placed down, but may have to use the coil to continuously sense when the alignment is broken. A current bottleneck as well is that the hardware is being used to figure out wiring, which holds back learning the libraries and using them with real hardware.
  - Noah Pritchard
    - The stepper motor shield used to drive the stepper motors uses all of the pins on the arduino. In order to avoid partial connections the construction will have to be designed such that there will be access to the pins after the stepper shield is soldered onto the microcontroller.
  - Greg Matson
    - The metal bar that was ordered to use for the rail system didn't come with the metal piece to slide alongside the rail itself. It was to be used to help slide the two vertical rails side to side. Right now, the plan is to either recreate this piece in solidworks, or purchase it separately.
  - Remington Greatline
    - Arduino shield's power supply has the potential to overwhelm small stepper motors. Questions also linger on final dimensions of the rail system as well as appropriate belt length.
  - Malakhi Barkley
    - The stepper Motor shield seems to be for 5-12v whereas the motor maxes out at ~3.9v. If PWM is an unusable fix, resistors will have to be used.
  - Jack Welch
    - Learning Solidworks to assist Greg has been slow-going due to the current course schedule.

- **Individual contributions**

NAME	Individual Contributions	Hours this week	HOURS cumulative
Jeremy Noesen	Begin planning out embedded software implementation, including new potential issues and solutions, as well as reach out for CAD help. Brainstorm rail system ideas.	4	4
Noah Pritchard	Created a list of parts and ordered them through the ETG. Began construction of the circuit for the stepper motors.	5	5
Greg Matson	Collected 3D models of project parts, and made a 3D model of the rail.	6	6
Remington Greatline	Helped compile a list of electrical components for ETG. Drew initial hand sketch of rail system. Aided Noah with preliminary circuit designs.	5	5
Malakhi Barkley	Started learning solidworks and solid works modeling, worked on website improvements, worked on software testing program.	4	4
Jack Welch	Collected 3D models of project parts.	5	5

- **Plans for the upcoming week**
    - Jeremy Noesen: Start on a working software prototype and reach out to industrial designers for help with Solidworks.
    - Noah Pritchard: Finish the circuitry for the arduino and stepper motors. Begin working on the circuitry for the charging coil. Will need to order the remaining parts next week.
    - Greg Matson: Learn Solidworks, model the assembled wireless charger in Solidworks, and learn how to make CAD drawings of each part of the wireless charger.
    - Remington Greatline: Continue working closely with the team in regards to circuit design as well as aid in completion of rail hardware where able.
    - Malakhi Barkley: Learn Solidworks, Set up microcontroller for testing, look into further website improvements.
    - Jack Welch: Learn Solidworks, and model the wireless charger in Solidworks.

- **Summary of weekly advisor meeting**

  Updated client and advisor on current progress and immediate plans, including updated parts lists. Received useful advice for testing the design and potential issues that could occur.