Self-Aligning Wireless Charger

Team: sdmay23-21
Client/Adviser: Cheng Huang
Members: John Welch, Greg Matson, Jeremy Noesen, Malakhi Barkely, Remington Greatline, Noah Pritchard

Overview

Problem:
Most wireless chargers on the market require precise alignment to achieve the most optimal charging speed and efficiency.
Goal:
Design a wireless charger that aligns the charging coil to the phone automatically for optimal charging.

Requirements

Who?
- Frequent users of wireless chargers
- Users with devices from varyious manufacturers

What?
- Affordable and easy to use
- Big enough to be able to charge any phone
- Able to detect phone and its location
- Able to move the coil to the phone's location

Methodolgy

- Use IR sensors to detect phone presence
- Utilize Arduino to control motors for phone position scanning
- Measure voltages in the coil to determine alignment

Implementation

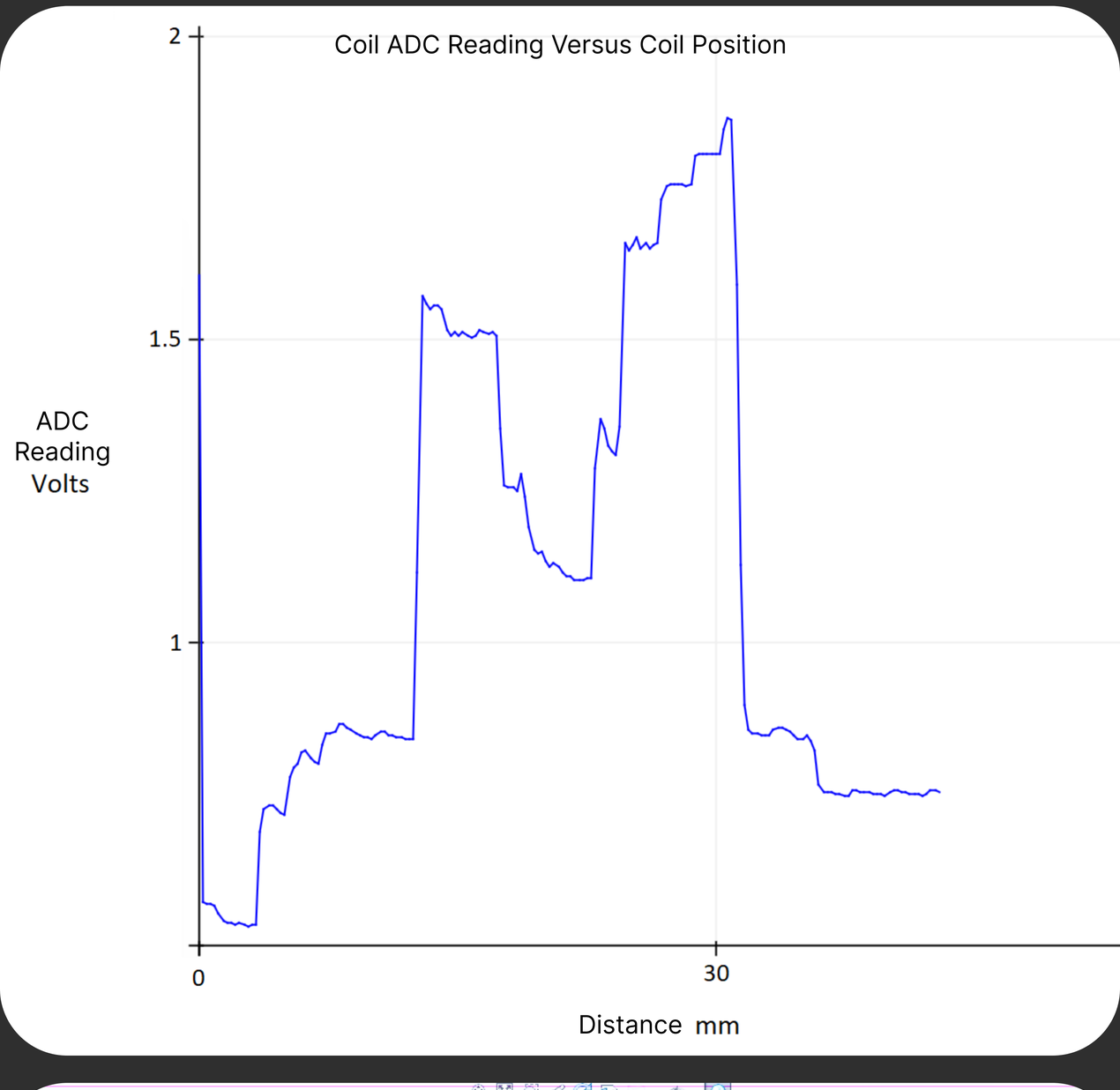
Tools used:
- Solidworks - 3D modeling software
- Oscilloscope - Waveform reader
- Arduino - Micro-controller to read sensors and control motors

Challenges:
- Our printed 3D models did not match our measurements accurately
- The motors needed to be calibrated in order to scan properly

Solutions:
- Tested 3D model parts with slight measurement variations by printing multiple copies
- Stored coil platform positions after every motor step using Arduino EEPROM

Results

- Created a 2D rail system to move the center coil platform and developed a program to move motors based on voltage readings after IR sensors detect the phone.
- Designed a half-wave rectifier to measure incoming voltage from the phone's coils for the Arduino.



Conclusion

Our testing proved that our design could work, but unexpected mechanical issues during integration prevented its completion with our current experience. If completed, it would significantly improve convenience for frequent wireless charger users and boost their productivity.