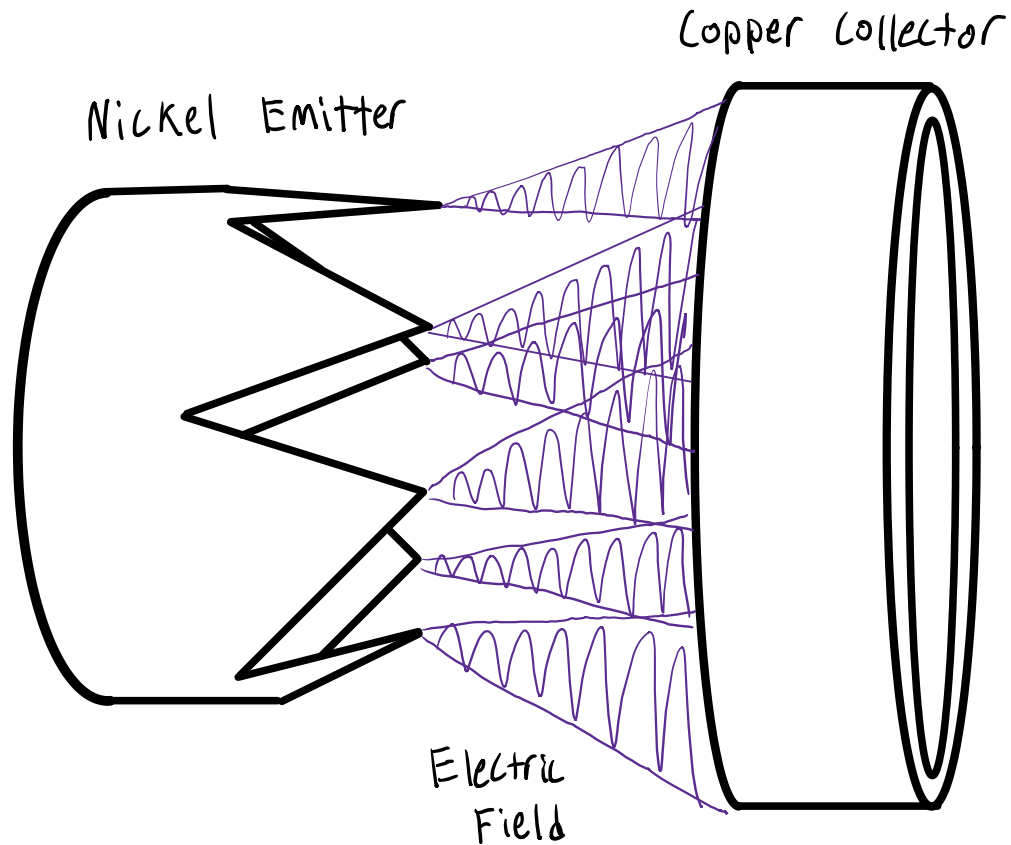


Ionic Wind Thruster Prototype Development



JOSEPH LILLY
PHYSICS II / ELECTROMAGNETISM
/ EXPERIMENTAL DESIGN

The goal of this prototype was to create and measure ionic wind using a sharp positive nickel emitter and a smooth negative copper collector. A high-voltage potential ionizes air between the rings, accelerates charged particles through the electric field, and transfers momentum to surrounding neutral air through collisions.

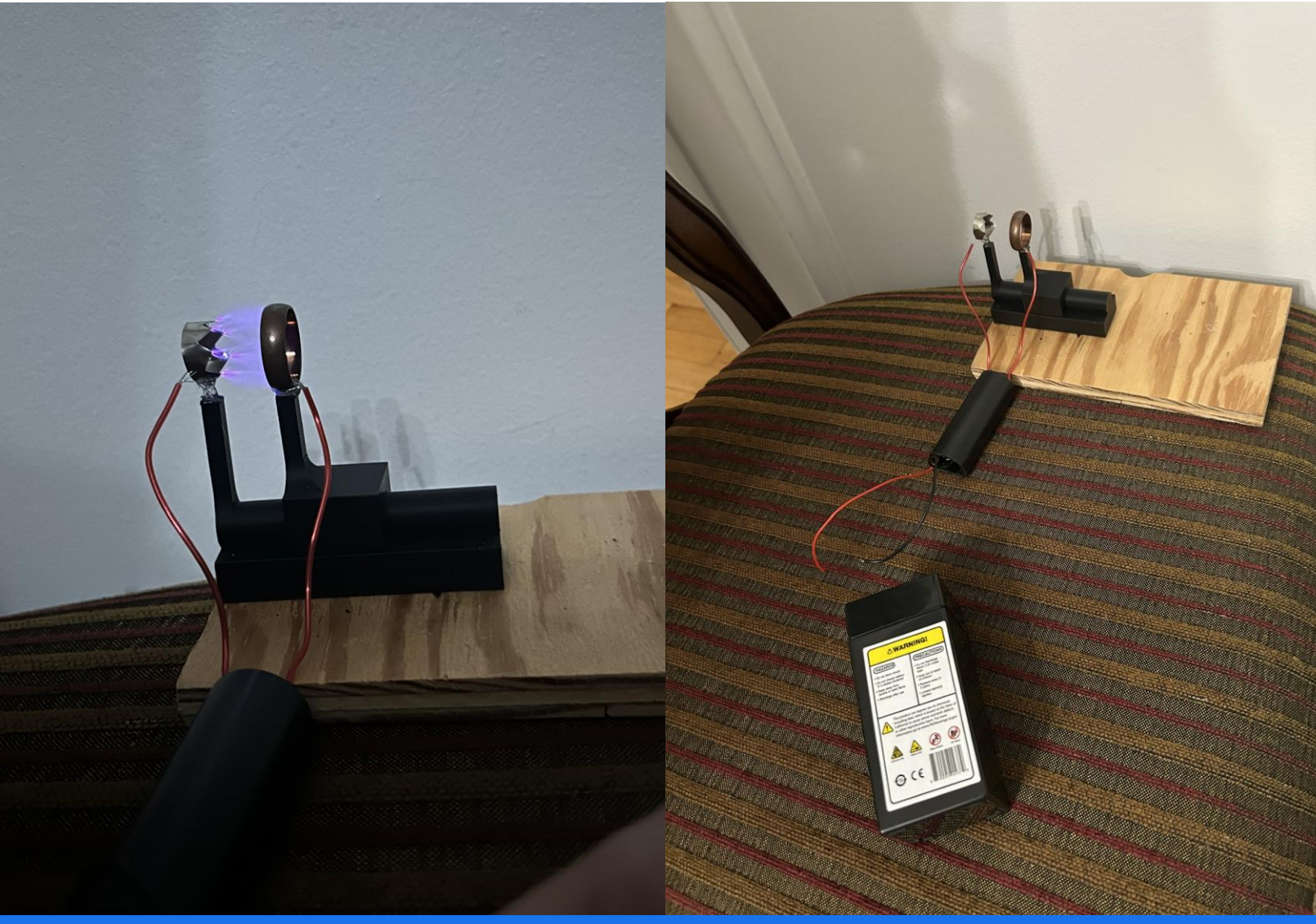


Prototype goals:

- Build a prototype that allows adjustable ring spacing
- Create ionization and corona discharge
- Measure airflow with an anemometer
- Test how ring spacing affects airflow

Physical Concepts

NICKEL EMITTER RING
COPPER COLLECTOR RING
HIGH VOLTAGE GENERATOR
BATTERY
3D PRINTED FRAME
ADJUSTABLE SLIDER/GAP
SYSTEM
WIRING/ELECTRICAL
CONNECTIONS



WHAT I BUILT:
INITIAL 3D-PRINTED SUPPORT STRUCTURE WITH
NICKEL AND COPPER RINGS MOUNTED ACROSS AN
ADJUSTABLE GAP.

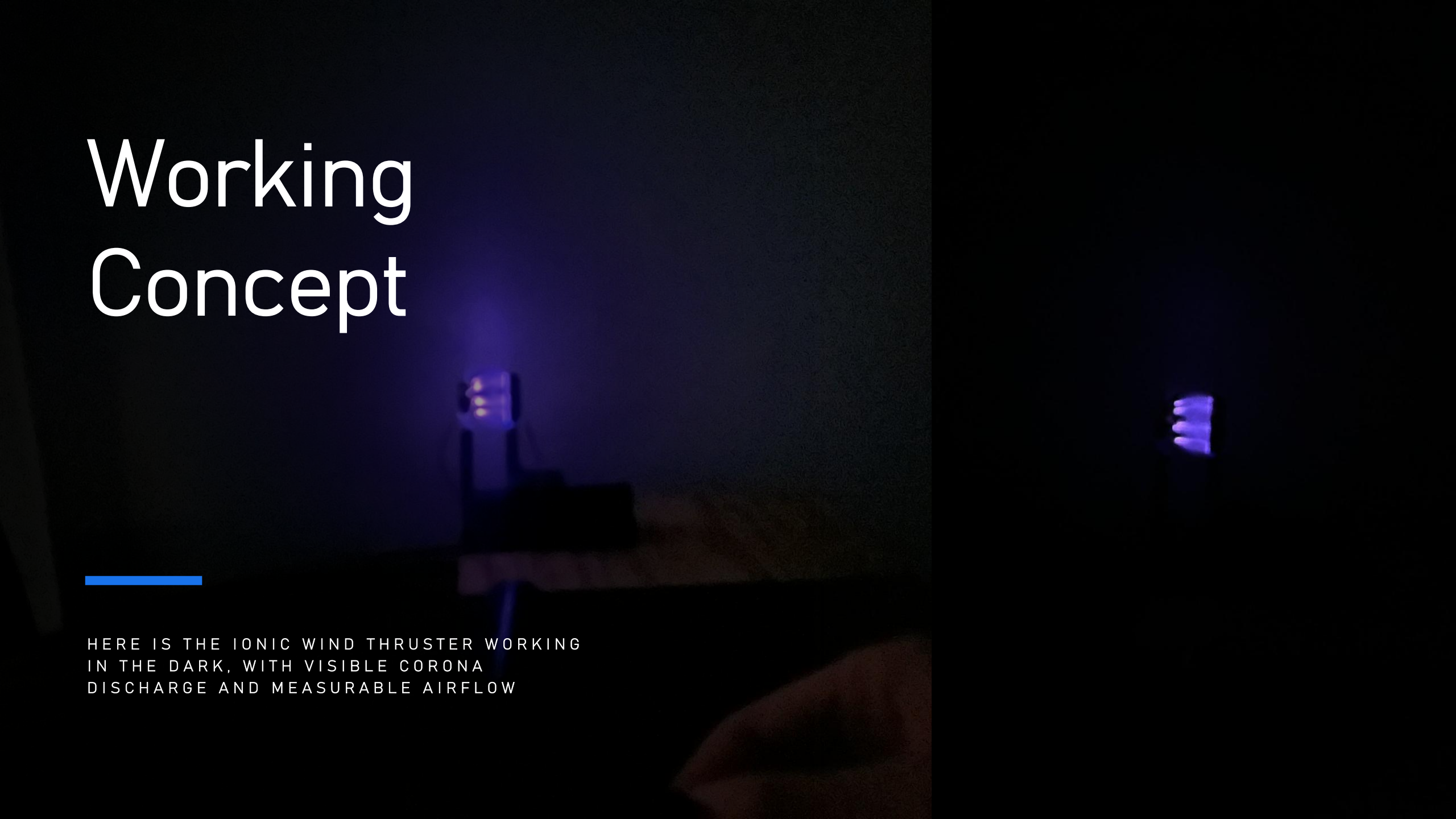
WHAT WORKED:
PRODUCED VISIBLE DISCHARGE AND SOME
MEASURABLE AIRFLOW.

PROBLEMS FOUND:
THE SLIDER ALIGNMENT WAS NOT STIFF ENOUGH,
IF THE RINGS ARE TOO CLOSE, ARCING HAPPENS
INSTEAD OF CORONA DISCHARGE, ELECTRIC
CONNECTIONS ARE UNSTABLE AND THERE IS NO
SWITCH FOR THE SYSTEM.

LESSON LEARNED:
THE GEOMETRY NEEDED TO BE MORE
CONSTRAINED SO TEST RESULTS COULD BE
COMPARED MORE RELIABLY.



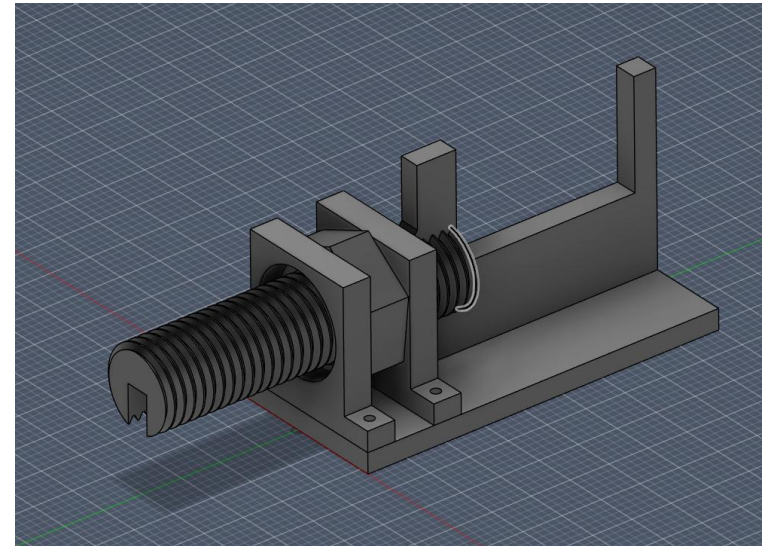
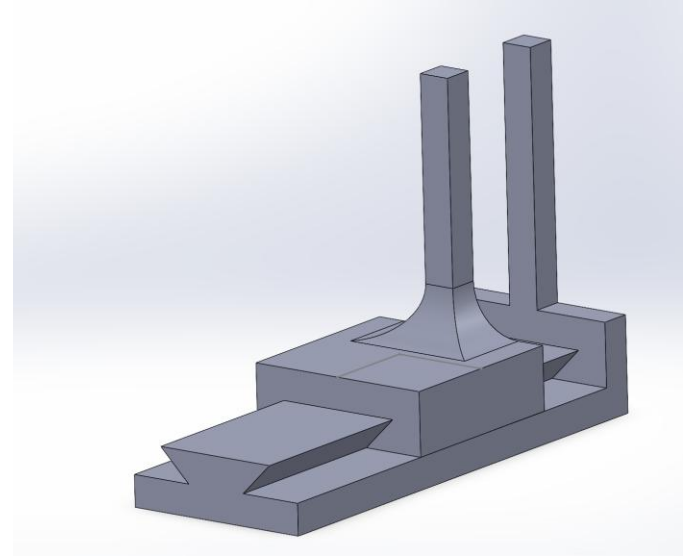
Working Concept

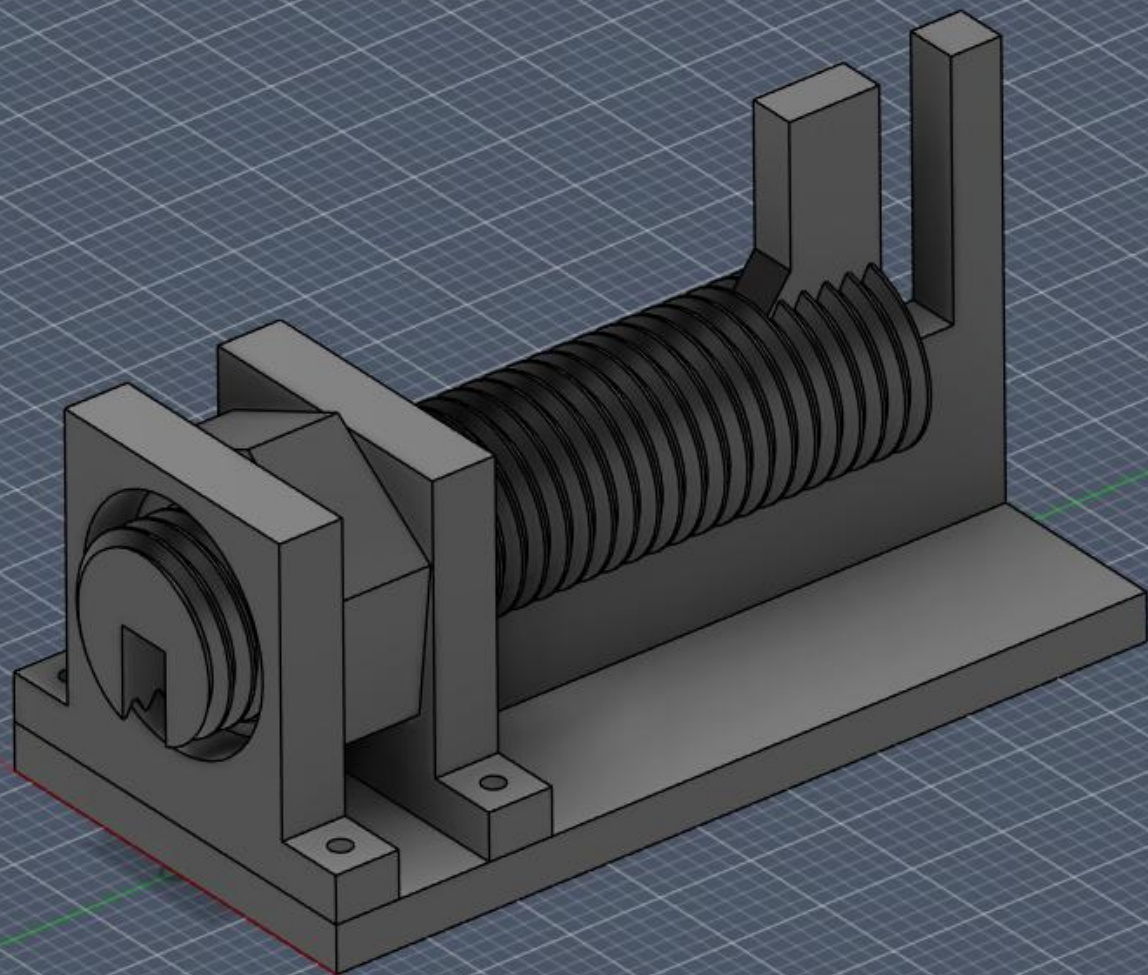


HERE IS THE IONIC WIND THRUSTER WORKING
IN THE DARK, WITH VISIBLE CORONA
DISCHARGE AND MEASURABLE AIRFLOW

Prototype Improvement Ideas

HERE ARE SOME CAD DESIGNS TO
IMPROVE SLIDER ALIGNMENT STIFFNESS





Next Steps

I WILL 3D PRINT ONE OF THESE PROTOTYPE DESIGN IDEAS, THEN DO WIND TESTING AND MAKE MORE PRECISE GAP TUNING AND AIRFLOW CHARTS AND UPDATE MY PROGRESS HERE.