Development of Power Generating Sub-System of Kite Power Generator

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Project Scope

This project is meant to investigate a new form for clean, renewable energy, and determine if it would be a feasible to deploy for mass power generation. We will try to power a 40W lightbulb.

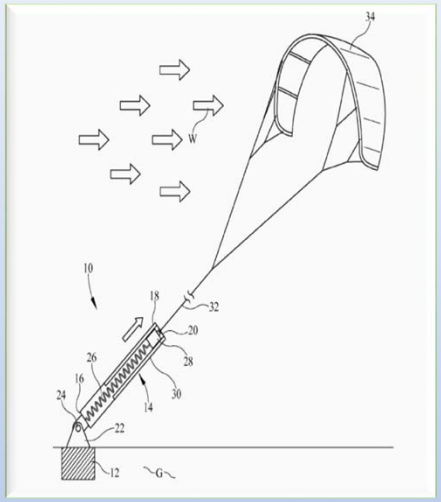
Background and Motivation

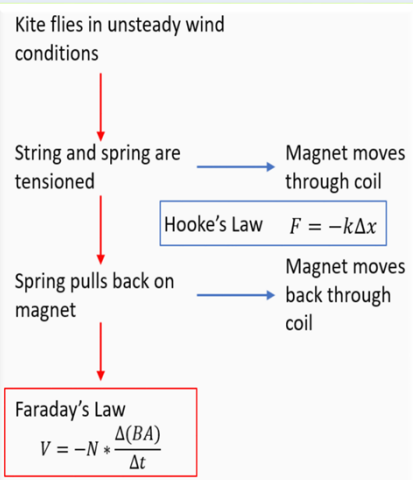
- Worlds Energy consumption expected to increase by 48% by 2040
  - Wind turbines are loud and large
  - Solar is expensive and inefficient
  - Nuclear is efficient but comes with inherent risk
- New forms of clean, renewable energy need to be investigated

Power Generation

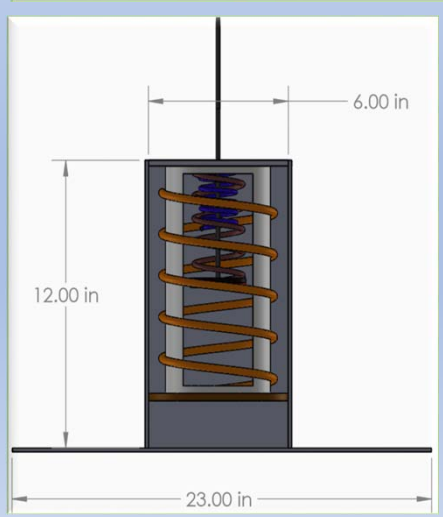
- Theoretical calculations via Faraday's Law
  - Magnet strength = 1.32T
  - Induced voltage = 120V
  - Total wraps = 400
  - Radius = 1.5in
  - Speed needed = 50 wraps/s
- Preliminary hand crank testing showed Vmax~20mV
  - Oscillating at ~2Hz
  - Electrical coil was not wrapped tightly and moved relative to magnet
  - Permanent housing in machining process

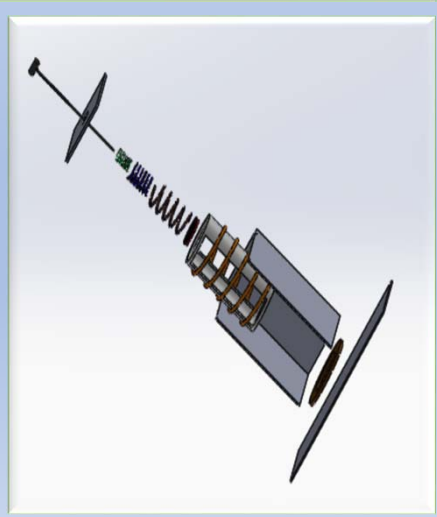
How it Works





Design





Kite Manipulation

- Demonstration kite will be flown in figure-8 pattern to drive oscillation
  - Not the most efficient path
- The concept kite would be flown in an up and down motion
  - Optimal for oscillation
  - Define AOA regime from 5-10 degrees
  - 70N-200N of force
- If kite for the demonstration model is not able to be flown a motor will be used to simulate kite motion
  - Simulates higher wind speeds when springs are further compressed

Challenges

- Controlling the Demonstration Kite
- Losses in force due to elasticity of kite string
- Loss in induced voltage due to interacting magnetic fields
- Finding consistent wind to fly kite in

Future Work

- Test Demonstration Kite
- Iterate for optimal kite path
- Attach motor for demonstration testing
- Feasibility of mass power generation kite