



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> <b>Trevor A. Swafford</b>	<b>Project Number</b> <b>J0933</b>
<b>Project Title</b> <b>Magnetic Propulsion: Does Coil Size Make a Difference?</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> The purpose of my experiment is to see if different size coils have an effect on the velocity of a given projectile with a controlled voltage. I believe the same voltage sent through a 3cm coil will shoot a projectile at a higher velocity than through a 5cm and 7cm coil.</p> <p><b>Methods/Materials</b> I used three different length coils, each coil consisting of five magnetic copper wire wraps around a single pen casing. The circuit that was used to test each coil was created with a breadboard, a 1.5v AA battery, a circuit board and three capacitors from several disposable cameras. Using the same projectile, I tested the coils 20 times each at 315v per shot. Not having a direct way to measure the velocity of the projectile from the coil barrel, I used a parabolic method to calculate the velocity of each shot. The distance from the height of the coil barrel to the impact of the projectile on the target was measured and applied as the vertical drop in the parabolic equation. An average velocity per coil was determined using the calculated velocities.</p> <p><b>Results</b> Using this method I was able to calculate that the 3cm coil averaged 16.7cm/sec, while the 5cm averaged 20.9cm/sec and the 7cm only averaged 11.2cm/sec. These calculations show that the 5cm coil produced shots at a higher average velocity.</p> <p><b>Conclusions/Discussion</b> The experiment did not support my hypothesis as the 5cm coil shot at a higher average velocity than both the 3cm and the 7cm coils. My experiment could provide scientists with data to advance research on creating a faster vehicle that could transport a payload across vast distances in a faster amount of time.</p>	
<b>Summary Statement</b> The experiment provided data to so that different coil sizes with a controlled voltage will affect the velocity.	
<b>Help Received</b> Father helped with creating coils and circuitry.	