



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

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Project Title Levitation: Applied Electrohydrodynamics	
Objectives/Goals The scientific exploration of unconventional flight is exciting and full of surprises. This science project explores the relationship between thrust and voltage of an asymmetric capacitor as a means of generating thrust. The Biefeld-Brown effect also referred to as electrohydrodynamics (EHD) provides the primary theoretical foundation for the project in conjunction with Newton's 1st, 2nd, 3rd laws of motion and Coulomb's law. The core objective of this year's project is to apply directional control to a lifter using a joystick.	
Abstract	
Methods/Materials The craft is made of balsa wood, aluminum foil, super glue, sewing thread, scotch tape, 30 gauge enameled copper magnet wire and 0.0028# stainless wire. The GRA10 circuit board powered by a RPS1220 power supply provides the voltage and current to the lifter that generates thrust. The lifter levitates using only EHD; it has no wings or conventional propulsion.	
Results The result was a lifter that can achieve sustained levitation using only EHD using direction control.	
Conclusions/Discussion The innovating new way to use a lifter is through a joystick. The joystick gives the new and improved lifter a application for direction control. There has been four designs manufactured in this report for lifter trials. Wire Mess Lifter, Original Triangle Lifter, Original Square Lifter, Square Lifter 2 are all trialed to see which design will be chosen for a controllable lifter. The lifter uses five circuit boards as a application of power for directional control. The first circuit board is a function for lift, and the other four circuit boards are for Forward, Reverse, Left and Right. My conclusion is that with careful construction and attention to detail, a lifter can be controlled using a joystick and five circuit boards. Throughout the scientific discovery, there were many failures along the road to success. With patience, lots of hard work, study, sacrifice, trial and error, attention to detail, analysis and a relentless pursuit of success, I present to you #Levitation#.	
Summary Statement Levitation - Electrohydrodynamics as a sole means of propulsion.	
Help Received Father helped construct apparatus	