



**CALIFORNIA STATE SCIENCE FAIR
2015 PROJECT SUMMARY**

Name(s) Max Freedman	Project Number J0910
Project Title KAPower Ball: Generating Power with a Soccer Ball	
Abstract Objectives/Goals The purpose of this project was to build a device that generated power from a soccer ball. I researched existing products, build and designed a prototype and then analyzed its performance in different experiments. My project goal was to develop a solid-state power generating soccer ball using piezoelectric transducers that is more effective, more reliable and more fun than existing designs on the market. Methods/Materials My device uses an array of piezoelectric transducers embedded in a foam soccer ball. The circuit has a diode bridge to convert AC to DC, a capacitor to rectify the spikes in voltage, a rechargeable battery to store the energy for later use and an output a port for an LED array. I completed my project with seven different revisions. In each revision, I tested the design using a kicker apparatus, and refined the circuit to modify the resistors, capacitors, and battery. Results My final prototype successfully generated power from a kicked soccer ball. In Designs 1-3, I added a bridge rectifier, and tested to find the correct resistor to maximize power output. In Design 4-6, I used various capacitor and battery combinations to store power. In Design 7, I add an existing circuit board with a regulator, a simplified input/output system and a lithium battery. Conclusions/Discussion My results show that a soccer ball can generate usable energy. My prototype outperforms the existing design in reliability and game play. This is an innovative way to harness waste energy using piezoelectric transducers.	
Summary Statement I created an innovative way to generate power using piezoelectric transducers embedded in a foam soccer ball.	
Help Received Miguel Anzar for helped me with circuit design. Adam Draeger my teacher helped me with physics and circuitlab.com. Josh Freedman for helped me build the kicker apparatus. Patty Freedman for helped me with board layout and editing.	