



CALIFORNIA STATE SCIENCE FAIR 2013 PROJECT SUMMARY

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Project Title Electricity Generating Shoe	
Objectives/Goals Our project is to capture kinetic energy generated while walking and transform it into electric energy by induction, and to modify the system into a shoe and is comfortable and convenient to use. This idea, if worked out, not only will offer convenient and portable solution to a personal electricity emergency, but also will provide a legitimate approach to the environmental struggles and energy shortage we are facing and grant an impetus for a healthier and more active lifestyle. Abstract Methods/Materials 1) First we did some useful research on electricity shoes and employed a comparatively simple concept-induction to achieve the goal at a low cost to conduct our experiment. 2) In order to better understand the characteristics of induction and to assure the feasibility of the shoe, we performed a few preliminary experiments with a shake flashlight that applies a similar principle as the shoe. 3) Having analyzed the flashlight tests, we came up with a design involving a diode bridge. We then employed an oscilloscope that offered a visual evidence of the process, to prove the diode bridge to be helpful and effective. We then made several necessary adjustments after further testing with various specifications of electronic components, especially the material of the tube the magnet is going through. 4) We then further modified the size of the system to meet the average sole thickness of shoes on market and made other improvements for customary convenience. Results The induction system was made more efficient, that is it can charge up a battery with 500mAh and 5.5V standard voltage within 9 hours under normal walking pace. Also, the core part of the system can be dismantled from the shoe for other uses. Conclusions/Discussion The inductance is affected by 4 major factors: number of coils, coil area, length of solenoid and core material. During system improvement, we had to sacrifice one factor for another, and finally came up with this design of a better performance. We believe that there is a better model than what we have currently, and we will keep exploring new methods to perfect the model until the efficiency can reach a level high enough to be widely accepted as a product people would embrace in their daily life. Even if the efficiency is ultimately limited, a far-ranging application of this product would still be a boon to the recycling of energy; just as the old saying implies: many a little makes a mickle.	
Summary Statement Building an electricity-generating shoe that is able to convert the kinetic energy to electrical energy when a person is walking	
Help Received Physics teacher Jack McAleer helped with concepts	