



**CALIFORNIA STATE SCIENCE FAIR  
2012 PROJECT SUMMARY**

<b>Name(s)</b> V.V. Sandy Ryan	<b>Project Number</b> <b>J0931</b>
<b>Project Title</b> <b>Shaking Up Some Energy: Electromagnetic Induction</b>	
<b>Abstract</b> <b>Objectives/Goals</b> While investigating how a crank flashlight gets energy to power a bulb without batteries, I learned about electromagnetic induction. Based on this idea a simple flashlight can be made from magnets, conducting wire and a low voltage bulb. My project was to determine if using these materials, enough electricity could be produced to light a bulb and to determine factors that affect the voltage created. <b>Methods/Materials</b> The flashlight was created by wrapping 30 gauge magnet wire around a short length of PVC pipe. Varying numbers of Neodymium magnets were placed inside the pipe and sealed with caps. The wire ends were attached to the LED light and the flashlight was shaken to observe the LED brightness. The wire ends were then attached to a multimeter and the flashlight was shaken over a 60 second period to determine average voltage output. <b>Results</b> Even with the lowest amount of coil turns (500) and magnets (1) enough electricity was produced to light the LED bulb. This combination produced the lowest voltage and the brightness of the bulb was dim. The most voltage and brightest lighting of the bulb was produced with 2000 coil turns and 4 magnets. <b>Conclusions/Discussion</b> It is possible to create a simple flashlight from magnets, conducting wire and a low voltage bulb. Higher magnetic field strength and number of coil turns does increase voltage produced. Data shows that the increase is not consistent. Based on this information, the distance between the wire and the magnetic field also affects voltage production.	
<b>Summary Statement</b> My project was to determine if enough voltage could be produced with magnets and copper wire to light up a low-voltage LED bulb and determine factors that affect the voltage produced.	
<b>Help Received</b> Aunt helped obtain materials, apparatus set-up, record data, type report and assemble display.	