



**CALIFORNIA STATE SCIENCE FAIR  
2007 PROJECT SUMMARY**

<b>Name(s)</b> <b>Kathryn Callander; Rachel O'Leary</b>	<b>Project Number</b> <b>S0803</b>
<b>Project Title</b> <b>A Line Following Robot</b>	
<p style="text-align: center;"><b>Abstract</b></p> <p><b>Objectives/Goals</b> Our objective in this project was to learn about electricity, circuits, and the physics behind them. We accomplished it by building a line following robot and testing the limits of its accuracy over varying courses.</p> <p><b>Methods/Materials</b> We created a circuit that enabled our robot to follow taped lines based on the light reflected off the ground. The robot is capable of following the lines by comparing light on either side of the different colored tape using light sensors. Through this experience we have learned the basics of circuits, motors, sensors, comparators, and gears.</p> <p><b>Conclusions/Discussion</b> By creating the line-following robot, we learned the basics of energy flow and exactly what building a circuit entails. We found out how voltage is potential energy, and how wires can run in series or in parallel depending on how many points the wires share. We understood the purpose of resistors, to transform excess energy into heat, and we discovered the function of transistors, the comparator, variable resistors, photo resistors, headlights, diodes, motors, and light emitting diodes (LEDs). We came to the conclusion that because we used less power than the robot built by David Cook, we could use less resistance. Building the robot consisted of a heavy revision and modification process. For example, knowing that the inside of the robot would be crowded with our circuit and power source, we realized that if the gears were also placed inside the robot, they would be incapable of moving without constant adjustment. Consequentially, we decided to locate the gears outside of the robot, allowing a free range of motion with less friction. Another modification we were forced to make involved the headlight circuit. Because the robot was already crowded, we decided to #electrically glue# the headlights to another breadboard using a soldering iron. However, in the end, we disconnected the headlights from the second breadboard and simply added them to the initial circuit. In the future, if we were to adjust and make further modifications, we would make the wheel size larger and experiment with different gear ratios. After getting a working circuit, we were able to test different configurations and the extent of the the robot's ability to follow a course.</p>	
<b>Summary Statement</b> In building a robot that follows lines, we explored circuits and robotics.	
<b>Help Received</b> Use of Santa Catalina school supplies and lab with supervision from Ms. O'Shea; A modified circuit from "Robot Building For Beginners," by David Cook	