



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Danny Han	Project Number J1012
Project Title Investigation in Regenerative Braking of AC Induction and DC Brushed Motors	
<p style="text-align: center;">Abstract</p> <p>Objectives/Goals The objective of this investigation is to determine whether AC induction motors or DC brushed motors are superior in efficiency during the process of regenerative braking in electric vehicles.</p> <p>Methods/Materials An Arduino Uno microcontroller loaded with a self-programmed code to control the test circuit; a self-designed test circuit to supply power to the motor and capture the regenerated electrical energy; a 10W 1350 RPM induction motor using 50Hz 120V AC electricity; a 10W 1350 RPM brushed motor using 12V DC electricity; a computer with the Arduino IDE development environment; a multimeter to measure voltage, and a DC power supply to supply power to the circuit.</p> <p>Results After several trials, the electrical energy generated from the DC brushed motor is found to be far greater than the energy generated from the AC induction motor. This indicates that brushed motors are more efficient than induction motors during the process of regenerative braking.</p> <p>Conclusions/Discussion Multiple trials revealed that DC brushed motors consistently produce a greater amount of electrical energy than AC induction motors when connected to the regeneration circuit. Therefore, it could be concluded that brushed motors offer a better efficiency than induction motors during the process of regenerative braking.</p>	
Summary Statement Through the experiment, I found that the regenerative braking capability of a DC brushed motor is far superior to that of its AC induction counterpart due to its permanent magnets and simpler, more efficient circuit.	
Help Received No help was received throughout the span of the experiment. I have designed the test circuit and conducted the experiment myself.	