



**CALIFORNIA STATE SCIENCE FAIR
2009 PROJECT SUMMARY**

Name(s) Thomas K. Houser	Project Number S0820
Project Title Using the Wasted Heat of a Car with Thermoelectric Modules	
Abstract Objectives/Goals The objective of my project was to see how much power could be generated by placing a thermoelectric module on the exhaust pipe of the car. From the data recorded I could then see if enough power was generated to replace the car's alternator. If it could replace the alternator it would increase the fuel efficiency of the car. Methods/Materials The first thing I did was measure different surface temperatures of the car to determine the best place to put a thermoelectric module. Based on the temperatures recorded I ran a test using an electric skillet set to the recorded temperatures to see what the possible voltage produced would be when the module was on the car. Using a clamp I strapped a thermoelectric module to the exhaust pipe of my car and ran wires in through the base of the passenger side door. This way I could record data while the car was in motion with my thermocouple reader and multimeter. Results Based on my calculations, the most effective setup is with aluminum foil on the exhaust pipe, which increased the heat flow to the thermoelectric module. The maximum power that I generated with my thermoelectric module was 0.258 watts. The highest average power that was generated was about 0.1 watts. This means that it would take about ten hours for the module to produce about one watt hour of power. That is the power that only one module can generate. An exhaust pipe that is 75 inches long (the length of my car's exhaust pipe) can hold up to 50, 1.5 inch thermoelectric modules. With all of those modules connected in series, there could be a constant flow of 5 watts of power and a maximum of 13 watts. If the exhaust pipe was flat, it could produce about five times as much power. That would mean there would be a constant flow of about 25 watts of power and a maximum of 65 watts. To utilize this power, you would also need a DC-DC power converter, which keeps the power flow at a constant current. Conclusions/Discussion It is evident that the thermoelectric module at this point in its development would not be a complete and economical source of electrical power for a car. Still, it does produce a reasonable amount of energy to power some smaller devices. As further advances are made in the technology and as it becomes less expensive and more efficient in design, it could definitely be used as a future energy provider.	
Summary Statement My project is about using thermoelectric modules to capture the wasted heat energy of a vehicles exhaust system and convert it into usable electricity.	
Help Received Dad assisted with driving the vehicle while i recorded data and developing procedures.	