



**CALIFORNIA STATE SCIENCE FAIR  
2002 PROJECT SUMMARY**

<b>Name(s)</b> <b>Risha R. Bera</b>	<b>Project Number</b>  22794
<b>Project Title</b> <b>Pollutant Reductions of Directed Motor Vehicles in Commercial Parking Lots</b>	
<b>Abstract</b> <b>Objectives/Goals</b> The objective was to determine whether directed parking could reduce emissions of pollutants from motor vehicles and, if so, to identify strategies that shopping malls and other large attractions could implement to reduce idling time and emissions. <b>Methods/Materials</b> A 1999 Toyota Sienna van was driven in a regional shopping mall parking lot under a variety of simulated congestion and management conditions. Engine RPM (revolutions per minute) and vehicle velocity were monitored continuously using a video recorder and global positioning unit. The vehicle's emissions as a function of RPM were measured at a Smog Check station. Emissions from different driving patterns were calculated by compiling second-by-second emission factors based on the observed RPM. Top emission rates were then applied to the observed population of vehicles searching for parking spaces at the mall. <b>Results</b> I concluded that a simple parking management strategy could reduce hydrocarbon emissions by 61%, carbon monoxide by 88%, carbon dioxide by 58%, and nitrogen oxides by 7%. <b>Conclusions/Discussion</b> Major destinations such as shopping malls can employ parking attendants or automated systems or other cost efficient strategies to direct visitors to the first available parking space. Doing so would significantly reduce mobile-source emissions in urban areas.	
<b>Summary Statement</b> The objective was to determine if directed parking could reduce emissions from motor vehicles and, if so, identify strategies that shopping malls and other large attractions could implement to reduce idling time and emissions.	
<b>Help Received</b> Used laboratory equipment at the University of California, Riverside College of Engineering-Center for Environmental Research and Technology (CE-CERT) under the supervision of Mr. Mitch Boretz and Ms. Nicole Davis; Father drove during field study; and emissions data gathered at Hall's Expert Auto Repair.	