# CALIFORNIA STATE SCIENCE FAIR
# 2011 PROJECT SUMMARY

**Name(s)**

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**Project Number**

31516

**Project Title**

## Autonomous Robotic Vehicle's Guide to Eliminate the Traffic Problem

**Abstract**

**Objectives/Goals**

By 2030 the number of cars will double, leading to more traffic jams and accidents. In the U.S., there are fewer options to add more roads or to even create more lanes. A smarter transportation system is needed and the first step is to create intelligent cars that can operate autonomously. My project implementation has three major milestones within 1 to 25 years: (1-5) The Marginal Protection System, is like a the car's virtual bubble, helping the driver be aware of where obstacles are and avoid them, (5-10) Semi-autonomous Carpool Lane, the vehicles will be able to go up to speeds of 100 mph, a couple feet away from each other, and (10-25) Fully Autonomous Car, with vehicles driving autonomously from point A to B.

**Methods/Materials**

I took a remote controlled car, removed the transmitter and connected an array of infra-red sensors and a LIDAR. A camera with a variable lens was used to capture the images and send to the Processing Cluster. The onboard hardware was connected to a Tablet PC. This year I installed a GPS system connected to a TTL RS232 and increased the computer power to six HP DL360 Servers Quad Core. The cluster runs Windows Server 2003 R2 and 2008 R2, to do the image processing. I added HP StorageWorks MSA1000 fibre channel share drive system to increase the handling of the captured video. I created these modules: Obstacle Detection and Avoidance, Pattern Recognition with Multistage Recognition, Behavior Generation, and Mission Planning mapped over Google Earth

**Results**

For my final test, I created a Mission Plan with GPS waypoints on a running track. As soon I turned it on, the car went around the track from beginning to end, time after time. To test the obstacle detection, I placed obstacles on the lanes making the car change lanes to the left or right, depending where the unobstructed lane was. When I obstructed all lanes, the car stopped before the barrier

**Conclusions/Discussion**

My project creates a vehicle that can drive autonomously, follow a mission planner, and recognize and avoid obstacles with a cost of only a couple thousand dollars; confirming that a cost-efficient autonomous car is not a pipe dream. After three years and over 20,000 lines of programming, I not only designed and implemented the hardware and software for this project, but also a safer and more convenient approach to modifying our ancient and broken highway system eliminating traffics jams within a realistic timeline

**Summary Statement**

I created a cost efficient autonomous car that can navigate from point A to point B without pre-knowledge of the environment and prevent traffic jams and accidents.

**Help Received**

Father recorded the videos and design for the display board. School helped with the metal components.