



**CALIFORNIA STATE SCIENCE FAIR
2017 PROJECT SUMMARY**

Name(s) Gregory V. Saldanha	Project Number J0811
Project Title Building a Driverless Toy Car	
Objectives/Goals The aim of this project is to construct a driverless toy car that must avoid obstacles and proceed autonomously from its current location to a target location using a map of available paths.	
Abstract Methods/Materials The vehicle is built using Lego Mindstorm pieces and is equipped with two standard servo motors, one for movement and the other for steering, controlled by an onboard Arduino Uno microcontroller. The car is equipped with sensors used to detect and avoid obstacles. I have written the software programs which run on a laptop and an Arduino in C++ and Python. The software uses a map to compute the best path to reach the destination and generates the necessary steering commands. It uses artificial intelligence algorithms such as a steering angle computer known as PID control; I have devised a few algorithms myself, including the trajectory generation and evaluation. Steering commands are sent wirelessly from the computer via Bluetooth to the Arduino Uno.	
Results The vehicle is able to successfully navigate to target locations without colliding with obstacles. The map routes include multiple feasible paths and turns. The software and hardware are able to communicate seamlessly over Bluetooth and the servo motors correctly control the mechanical systems.	
Conclusions/Discussion I was able to program an autonomous vehicle system composed of a server program running on a laptop and an Arduino (client) program. I built a car chassis with working mechanical modules including a steering system, and connected servo motors to these systems. This project demonstrates the practicality of building a self-driving vehicle with a small budget.	
Summary Statement I built and programmed a self-driving toy car that uses a map for navigation, and is able to drive and avoid obstacles.	
Help Received I wrote the software myself and built the car entirely from scratch. The only supervision I needed was for soldering pins to the circuit boards.	