AeroE 407X Final Project Proposal

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Group Name: Cars in Suits
Project Type: Model Checking

The goal of this project is to verify the absolutely safety of a custom designed algorithm for an autonomous vehicle control platform and to improve it's design. The algorithm is currently incomplete, therefore it is known to contain error states. By formally specifying the system and using model checking, I will eliminate error states within the control algorithm, and use the knowledge gained to make further design changes to the system until the entire system has been verified safe through model checking.

By formally specifying the system we will be able to eliminate the error states that currently exist, and use that to design a more complete and thorough system. This system can be benchmarked against the previous system to compare effectiveness. To demo this in class, comparative data can be shown, along with videos of the system functioning as intended.

The algorithm mentioned is something that I created about a year ago, with the intention of adding self driving capability to my car, a 1996 Oldsmobile. The project was partially successful, in that it was able to operate and steer the car on a road, with the problem being that there were too many error states and the control system would fair after a short amount of time.

Final successful deliverables would be, a working control algorithm functioning in the system as a whole, a system model used for model checking, model validation, and LTL specifications for the system, along with analysis of the project and it's results.

Project Schedule:

Week ending Oct 27th:
- Analysis of the problem
- initial requirements set

Week ending Nov 3rd:
- Completion of requirements
- Initial Model developed
- Gather baseline performance data for comparison

Week ending Nov 10th:
- Finalization of Model
- LTL specification of requirements
- Model Verification against LTL specifications

Week ending Nov 17th:
- Redesign of model based on results from previous week

Week ending Nov 24th:
- Verify redesigned model against current model
- Implement new model in system
- Gather data using improved system

Week ending Dec 1st:
- Data Finalization, Testing, and Reporting