Optimization Report

Vehicle autonomy is critically dependent on an accurate identification and mathematical representation of road and lane geometries. Many road lane identification systems are ad hoc (e.g., machine vision and lane keeping systems) or utilize finely-discretized path data and vehicle tracking systems such as GPS. The method was evaluated by discretizing three road segments: a hypothetical road consistent with the American Association of State Highway and Transportation Officials (AASHTO) Green Book design standards, a road segment discretized using satellite photography and GPS data points, and an in-vehicle GPS trace collected at 10 Hz. Improvements and further research were recommended to expand findings, but results indicated potential for implementation into road modeling which could be the foundation of new autonomous vehicle guidance systems that are complimentary to existing autonomous systems.

Background (curves, street design etc)

In the United States, the prevailing standards for road design come from The American Association of State Highway and Transportation Officials, referred as the Green Book. This book offers an extensive review of road design considerations that comply with vehicle dynamic behavior. Road design parameters include, road friction, superelevation, and maximum width, while the vehicle parameters considered are velocity, acceleration, trackwidth, and vehicle length.

The relationship between all these parameters is found using Newton’s Second Law of motion

Optimization Problem Formulation

Models available

Implementation

Results

Conclusions

Code

Mention different types of curves

Mention how aashto green book uses its own criterion to develop their design standards for friction

Usually these are made in a underestimated considerations (conservative values).

Mention how the values that we have try to find the optimal curvature and optimal travel velocity (because both velocity and heading angle are the only variables that we cant control during driving).

Some variables we cannot control:

Understeer gradient

Coefficient of Friction