

Model Predictive Control Based Trajectory Generation For Low Speed Scenarios

Krishna Satish

January 7, 2022

Abstract

Trajectory generation abstract goes here....

Contents

1	List of figures	1
2	List of tables	1
3	List of abbrivations	1
4	Introduction	1
4.1	background	1
4.1.1	Route planner about RRT , A* and stuff	1
4.1.2	Manoever planner	1
4.1.3	Path generators	1
4.1.4	Trajectory generators	1
4.2	Thesis outline and Objectives	1
5	Vehicle Models	1
5.1	Model types	1
5.2	Dynamic Bicycle model	1
5.3	Kinematic Bicycle model	1
6	Technical background	1
6.1	Model Predictive Control	1
6.1.1	Introduction to MPC	1
6.1.2	Optimal control problems	1
6.1.3	Constraints	1
6.1.4	Non-Linear Programming	1
6.1.5	Quadratic programming	1
6.1.6	Fractional programming	1
6.2	Shooting Methods	1
6.2.1	Single Shooting	1
6.2.2	Multiple Shooting	1
6.2.3	Direct Collocation Shooting	1
7	Implementation	1
7.1	Tools and Techniques used	1
7.1.1	MATLAB	1
7.1.2	CasADi	1
7.1.3	Carla Simulator	1
7.1.4	ROS2	1
7.2	Mehodology	1
8	Validation	1
9	Results and Discussion	1
10	Conclusion and Future Scope	1

11 References

1

1	List of figures
2	List of tables
3	List of abbrivations
4	Introduction
4.1	background
4.1.1	Route planner about RRT , A* and stuff
4.1.2	Manoever planner
4.1.3	Path generators
4.1.4	Trajectory generators
4.2	Thesis outline and Objectives
5	Vehicle Models
5.1	Model types
5.2	Dynamic Bicycle model
5.3	Kinematic Bicycle model
6	Technical background
6.1	Model Predictive Control
6.1.1	Introduction to MPC
6.1.2	Optimal control problems
6.1.3	Constraints
6.1.4	Non-Linear Programming
6.1.5	Quadratic programming
6.1.6	Fractional programming
6.2	Shooting Methods
6.2.1	Single Shooting
6.2.2	Multiple Shooting
6.2.3	Direct Collocation Shooting
7	Implementation
7.1	Tools and Techniques used
7.1.1	MATLAB
7.1.2	CasADi
7.1.3	Carla Simulator
7.1.4	ROS2
7.2	Mehodology
8	Validation