**Trajectory generator**

**System model (point mass kinematic)**

where:

**Modelling**

where:

**State-space discretization**

**Prediction**

where:

**Predicted state**

where:

**Predicted output**

where:

**System model (bicycle linear kinematic)**

**Modelling**

where: position and orientation

longitudinal velocity

longitudinal acceleration

steering angle

**State-space discretization**

**Obstacle avoidance**

**Data**

Map data

Range

* – activation range
* – safe range

**Constraints**

**I Set**

A constraint is active if the vehicle position lies inside a range for which that constraints exists.

**II Set**

A constraint is active if the constraint lies within an activation range with respect to the vehicle position.

**Intersection**

**Optimization**

**Objective function**

where:

Reordering:

**Constraints**

* State constraint
* Input constraint

where:

* Input rate constraint

where:

* Output constraint

**Quadratic Program formulation**

where:

**Optimization (Terminal cost/set)**

**Objective function**

where:

Reordering:

**Constraints**

* State constraint
* Input constraint

where:

* Input rate constraint

where:

* Output constraint

**Quadratic Program formulation**

where:

**Trajectory generation**