Requirements

Ver: 1.2 Date - 13/01/2023

1. Braking Time β

1.1. The Braking Time $\boldsymbol{\beta}$ is calculated based on the Current Velocity ***V*** and Vehicle Type ***T.***

2. Turning Angle α

2.1. Turning Angle $\boldsymbol{\alpha}$ is the rotary angle of the front wheels of the vehicle and is directly proportional to the steering torque.

3. Angular Velocity ω

3.1. The Angular Velocity ω of the vehicle around its axis is depending upon the Turning Angle $\boldsymbol{\alpha}$ w.r.to. Time.

4. Brake Pressure μ

4.1. The Brake Pressure $\boldsymbol{\mu}$ is calculated based on the Braking Distance $\boldsymbol{\beta}$ and Vehicle Type ***T.***

5. Automatically Driven Vehicles

5.1. The Vehicles Send and Recieve the Braking Distance $\boldsymbol{\beta}$ Signal with respect to Time.

5.2. The Brake Pressure $\boldsymbol{\mu}$ is estimated by Current Velocity ***V*** and Braking Distance.

6. V2V Communication

6.1. The vehicles in the close vicinity communicate their Current statistics (Geo-coordinates, Velocity/Speed, Route Map, Headed To, and Hault Status) and Route map to a Localised Server.

6.2. Vehicles may convey an SOS signal and Pass-by Signal to Ego Vehicles (to demand way/overtake).

7. Vehicle Type *T*

7.1. Vehicle type **T** is defined by the physical characteristics of the Vehicle such as Height *H*, Length *L*, Width *W,* and Utility *U* (*SUV, MUV, Sedan*) or Emergency Services (Fire Truck, Ambulance).

7.2. The Power Train characteristics of the vehicle (Engine Power in *HP*, Cylinder capacity in *CC*, Fuel Type [*Petrol, diesel, Gas*]) also vary based on the Vehicle Type ***T.***

8. Road type *R*

8.1. Road Type ***R*** is defined by the Urban Planning Database.

8.2. The Road Type signifies the Maximum Permissible Speed Limit ***L*** in *KMPh.*

9. Distance to Crash *c*

9.1. The Distance to Crash ***c*** is calculated based on the the values of Distance sensor (on both sides Front & Back).

9.2. This is the minimum maintainable distance between two vehicles without causing any accidents.

10. Collision Avoidance Algorithm (CAA)

10.1. The vehicle will Calculate the Distance to Crash ***ω*** (distance between the immediate Ego vehicle and the immediate Rear Vehicle) with the help of a Distance sensor (on both sides Front & Back).

10.2. The vehicle will maintain a Safe Distance ***h*** between the Ego vehicle and itself to avoid contact/crash.

10.3. This distance *h* is subject to vary based on Vehicle Type ***T*** (SUV, Sedan, MUV) and road type *R* (Metro/Highway).

11. Maximum Achievable Speed *A*

11.1. Maximum Achievable Speed ***A*** is calculated based on Vehicle Type ***T,*** Distance to the Destination ***D,*** and current traffic conditions.

12. Time to Destination *δ*

12.1. The Time to Destination '*δ*' is calculated based on the Distance to Destination ***D*** from the Maps.

12.2. Real-Time Traffic Model is used to bias(+/-) the Time to Destination '*δ*'.

12.3. Vehicle Type T is used to decide the Maximum Achievable Speed ***A*** for certain vehicles and Location Specific Speed Limits (Schools, Hospitals, and Highways).

13. Maximum Permissible Speed Limit *L*

13.1. All vehicles are fitted with Speed Governors and the speed data is pushed to the localized cloud continuously.

13.2. The maximum achievable speed S is determined by the Distance between Ego Vehicle *h*, Road Type *R*, and Time Required to reach destination *T.*

13.3. Any Vehicle achieving speed beyond the Maximum Permissible Speed Limit ***L*** will be centrally imposed with a fine digitally.

14. Emergency Flag *E*

14.1. Every vehicle has a right to publish an Emergency Flag ***E*** if it has to bypass the standard regulations (Maximum Permissible Speed Limit *L*) in case of an emergency.

15. Assigned Vehicle On-Road Priority *Θ*

15.1. Every vehicle has its predefined Vehicle Priority Θ set.

15.2. Vehicle Priority Θ is defined based on Vehicle Type T (Fire Truck, Ambulance) and Emergency Flag ***E.***

16. Intersection Management System

16.1. The Intersection Management System will use the planned route maps of the vehicles, V2V Communication, Distance sensors, and all the above-mentioned parameters to manage the intersections efficiently.