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. Vehicle Velocity υ

3.1. The Vehicle Velocity $\boldsymbol{\upsilon}$ is defined as the rate of change of Vehicle Speed with respect to Time.

4. Angular Velocity ω

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

5. Brake Pressure μ

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

6. Automatically Driven Vehicles

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

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

7. V2V Communication

7.1. 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.

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

8. Vehicle Type *T*

8.1. 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).

8.2. 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****.*

9. Road type *R*

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

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

10. Distance to Crash *c*

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

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

11. Collision Avoidance Algorithm (CAA)

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

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

12. Safe Distance *h*

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

13. Maximum Achievable Speed *A*

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

14. Time to Intersection δ

14.1. The Time to Intersection $\boldsymbol{\delta}$ is calculated based on the Coordinates of the Intersection, Coordinates of the Vehicle, and Vehicle Velocity.

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

14.3. Vehicle Type T is used to decide the Maximum Achievable Speed $\boldsymbol{A}$ for certain vehicles and Location Specific Speed Limits (Schools, Hospitals, and Highways).

15. Maximum Permissible Speed Limit L

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

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

15.3. Any Vehicle achieving speed beyond the Maximum Permissible Speed Limit $\boldsymbol{L}$ will be centrally imposed with a fine digitally.

16. Emergency Flag E

16.1. Every vehicle has a right to publish an Emergency Flag $\boldsymbol{E}$ if it has to bypass the standard regulations (Maximum Permissible Speed Limit L) in case of an emergency.

17. Assigned Vehicle On-Road Priority Θ

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

17.2. Vehicle Priority Θ is defined based on Vehicle Type T (Common Vehicle, Ambulance) and Emergency Flag $\boldsymbol{E}$.

18. Intersection Management System

18.1. 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.

19. Pedestrian Time to Cross T

19.1. The Pedestrian Time to Cross is defined by the number of crossing requests ***N * 0.5 * 10 sec*** (constant).