



Trajectory Planning Technology of Docking Station for Automatic Vehicle



✚ Feature

When shuttle buses execute the station docking task, it faces the challenges of occupied parking space, precision docking at a station platform and merging into the lane during out of the station. This technology provides the ability for fully/semi-autonomous vehicles with automated precision docking and pulling out of the station. It can automatically plan the currently suitable path and velocity based on environmental restrictions of stations and the situation of occupied parking space when docking. Furthermore, it can also detect the surrounding environment of the station to choose the suitable parking spaces and determine driving behaviors applying to different scenarios including standing to wait for docking and waiting for traffic flow from the rear passing through when exiting the station to ensure the safety of vehicle during the station docking process and avoid the accidents.

✚ Technique

1. Self-adjusting vehicle docking trajectory generation technology
2. Automatic parking space selection technology
3. Real-time station environment assessment and vehicle docking behavior decision technology

✚ Specification

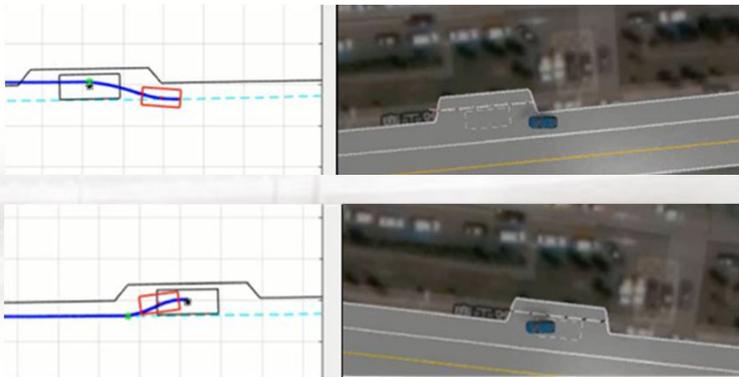
1. Docking initial / Pulling-out end vehicle velocity: 3~10 (km/h)
2. Perception detection distance: front & rear 40 (m) / left & right 8 (m)
3. Applicable vehicle specifications: length \leq 12 (m) / width \leq 2.5 (m) / with abilities of trajectory tracking control and adaptive cruise control with stop-go
4. Distance from curb after parking: \leq 30 (cm)
5. Lateral displacement during docking: \leq 4 (m)
6. Longitudinal space required: docking \geq 2.4 times length of target vehicle / pulling-out \geq 1.8 times length of target vehicle
7. Available parking space: length \geq 7.5 (m) & 1.25 times length of target vehicle / width \geq 3 (m)
8. Import / export zone space: length \geq 1.25 times length of target vehicle / width \geq width of parking space



Demonstration

PreScan/MATLAB Virtual Environment Verification (Model in the Loop)

□ Self-adjusting trajectory generation for vehicle docking



□ Behavior decision-making based on environment detection of station

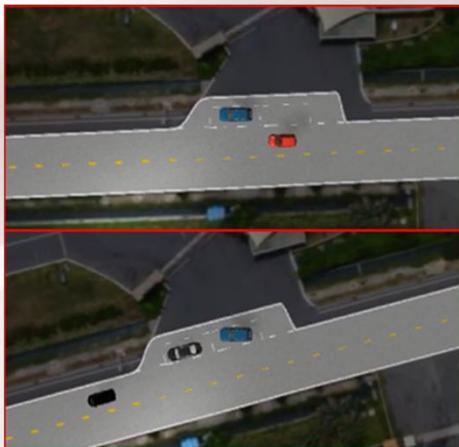


Environmental safety assessment / Waiting for docking
(Obstacles occupy the safe space of the docking path)



Environmental safety assessment / Waiting for pulling out
(Traffic flow from the rear)

□ Automatic parking spaces selection



Unoccupied parking space /
Select the last parking space

Occupied parking space /
Select the first parking space



Parking space is occupied / Waiting for docking