

Claims

1. A method for creating a probabilistic free space map with static (2a, 2b, 3) and dynamic objects (V1-V7),
5 having the following steps:
- retrieving (S1) static objects (2a, 2b, 3) as well as a perception area polygon (WP) from an existing environment model, wherein the perception area polygon (WP) represents a 360-degree view around an
10 ego vehicle (1) and is based on sensor ranges and a geometry of a road;
 - collecting (S2) predicted trajectories (T1, T2) of dynamic objects (V1-V7);
 - merging (S3) the static objects (2a, 2b, 3) of the
15 perception area polygon (WP) and the predicted trajectories (T1, T2) in a first free space map;
 - fixing (S4) a maximum prediction time;
 - fixing (S5) prediction time steps;
 - fixing (S6) a current prediction time and setting the
20 current prediction time to the value 0 in order to fix a start of a fixed prediction time period;
 - fixing (S7) confidence regions (K) around the static (2a, 2b, 3) and dynamic objects (V1-V7);
 - fixing (S8) at least one uncertain region (U) around
25 at least one static (2a, 2b, 3) or dynamic object (V1-V7);
 - producing (S9) a first probabilistic free space map for the current prediction time;
 - producing (S10) at least one further free space map
30 for at least one prediction time step;
 - evaluating (S11) the produced free space maps.
2. The method according to Claim 1,

characterized in that
a free space map is produced for each prediction time
step until the maximum prediction time is reached.

5 3. The method according to Claim 1,
characterized in that
the at least one uncertain region (U) is fixed based on
the existing environment model and the trajectory
prediction of the dynamic objects (V1-V7).

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4. The method according to Claims 1 - 3,
characterized in that
the at least one uncertain region (U) is extended along
at least one predicted trajectory (T1, T2) of the
15 dynamic object (V1-V7).

5. The method according to any one of Claims 1 - 4,
characterized in that
the uncertain region (U) is adjusted in each time step.

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6. The method according to any one of the preceding claims,
characterized in that,
following the evaluation of the probabilistic free space
map for the entire time horizon, at least one driving
25 function is adjusted and/or a trajectory (Te1, Te2) of
the ego vehicle (1) is planned, which is optimized for
comfort, performance and safety.

7. The method according to any one of Claims 1 to 6,
30 characterized in that
the perception area polygon (WP) is also considered for
the planning of a trajectory (Te1, Te2) of the ego
vehicle (1).

8. The method according to Claim 6,
characterized in that
the at least one driving function and/or the trajectory
(Te1, Te2) of the ego vehicle (1) is/are optimized by a
cost function.
9. The method according to any one of the preceding claims,
characterized in that
the confidence regions (K) are fixed based on an
existence probability, variances of position and speed
vectors of the objects (2a, 2b, 3, V1-V7) as well as the
values of the speed and acceleration vectors.
10. The method according to any one of the preceding
claims,
characterized in that
the uncertain regions are fixed based on the
probabilities of trajectories, the values and variances
of positions, speeds and accelerations of the individual
predicted trajectory points of the objects (V1-V7).
11. The method according to Claim 1,
characterized in that,
prior to evaluating the free space maps, grid cells
having the same occupancy probability are merged to form
regions which are delimited from one another by means of
a polygonal chain in the free space maps.