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SYSTEM FOR THE AUTOMATIC RECOGNITION OF TRAILER FEATURES FOR THE AUTOMATIC TAKE-OVER IN VEHICLE ON-BOARD COMPUTERS

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SYSTEM FOR THE AUTOMATIC RECOGNITION OF TRAILER FEATURES FOR THE AUTOMATIC TA- KE-OVER IN VEHICLE ON-BOARD COMPUTERS

AUDI AG

Technical task:

The object of the technical innovation is to increase the safety of automated vehicles.

Initial situation:

Nowadays, various functions in the vehicle, especially during trips in trailer operation, are suitable for automatic adjustment. Examples include the re-parameterization of features of the vehicle behavior (e.g., greater damping of vehicle dynamics), or of the design of so-called driver assistance systems (e.g., adjustment of acceleration and deceleration characteristics of automatic clearance systems).

Precondition for such adjustments are information about the vehicle trailer (e.g., residential, transport or sports trailer). This information has to be entered by the driver - if the vehicle is provided - by means of CarMenu settings in the on-board computer.

The disadvantage of such manual input of trailer features in the vehicle's on-board computer is the error of this process. In addition to possible (inadvertent) error inputs during data input by the driver, relevant information on trailer characteristics is often not available to the driver. This is e.g. The case where information materials, in which relevant trailer features are described which are not registered in the vehicle letter, are lost.

In addition, this information should always be entered again by the driver when using different trailers with a passenger car. On the one hand, this is cumbersome for the driver, on the other hand, the above-mentioned disadvantages of manual input also have an effect here.

Solution:

A system for the automatic recognition of trailer features with the aim of automatically taking over this information in vehicle on-board computers is proposed.

Core components of this idea are:

- (1) Determination of trailer characteristics over the towing vehicle
- (2) Match the identified trailer features with a database of generally available trailer types
- (3) Automatic transfer of the trailer type (including feature profile) into the vehicle's on-board computer system

In the first step, relevant characteristics of the trailer, which are one-unambiguous for the respective vehicle type, are to be identified (e.g. via cameras at the vehicle tailgate and/ or on the exterior mirrors of the vehicle). Examples which may be mentioned are features such as height, width, contours, color, pattern, position and size of peculiarities (e.g., window) of the trailer. Due to the perspective distortion of the camera image, it is provided that the relative position of the trailer to the towing vehicle is determined by sensors in the trailer head.

This relative position of the trailer thus ascertained can be taken into account in the plausibility check of trailer features. In addition, the traction vehicle could determine the weight of the trailer when the vehicle is approaching horizontally via the starting behavior and/ or the braking behavior.

In the second step, these identified trailer features are to be compared with information on all available trailer types in a database. This database can be available locally in the vehicle's on-board computer or as a back-end database. The result of this is a clear naming of the currently used trailer.

Finally, in the third step, this information about the trailer is automatically transferred to the vehicle's on-board computer, whereby, for example, an adaptation of features of the vehicle behavior and/ or parameterization of driver assistance systems is made possible.

This system can be started and executed automatically when a trailer is attached. Only in the case of an ambiguous identification of trailer features (see step 1) does the driver have to support the identification of trailer features (as before).

Alternatively, the driver should be able to select presets in the vehicle's on-board computer if no automatic recognition of trailer features including retrieval of a database is desired.

The technical requirements for this system are:

- (1) Recognition of a trailer operation (via sensors in the trailer head)
- (2) Camera - coded identification of trailer features (via cameras at Vehicle rear and/ or exterior mirrors of the vehicle)
- (3) Identification of the relative position of the trailer relative to the trailer Towing vehicle (via sensors in the trailer head)
- (4) Comparison of automatically recognized trailer features with information on trailer types in database (local database on board computer or Provided via wireless link, such as C2X or back-end server)
- (5) Determination of the trailer weight by starting / deceleration behavior of the trailer (Via sensors in the trailer head and / or CanBUS)
- (6) Automatic transfer of the trailer type including feature profile in vehicle-on-board computer
- (7) Adaptability of characteristics of vehicle behavior, driver assistance Systems, etc., based on knowledge of the current trailer type

Advantages:

- Automate the manual input of trailer features into the vehicle's on-board computer.
- Relevant trailer features are fully and reliably on the vehicle side due to automation.
- Possible error inputs by the driver are no longer possible.
- After the automatic recognition and acceptance of the trailer features, a reliable adaptation of vehicle behavior and driver assistance designs by the driver can be carried out.

Possible application:

- All vehicles in trailer operation.