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Daniel Hoppe

Bertrandt Ingenieurbüro GmbH

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INTEGRATION OF A WHEELCHAIR OCCUPANT IN A VEHICLE WHEN USING A DETACHABLE WHEELCHAIR SEAT SHELL

Technische Aufgabe:

The task of the technical innovation is to facilitate wheelchair users getting in and out and loading the wheelchair with a flexible automated wheelchair concept.

Ausgangssituation:

Wheelchair users have different options to be transported in vehicles or even to drive vehicles themselves.

A key point is the entry into the vehicle, be it as a driver or Passenger in front or as rear passenger.

In special vehicles, wheelchair users can drive in and at the same time use the wheelchair as the driver's seat.

Also known are equipped with stages vehicles, with the help of the entry is mastered. As a rule, however, the wheelchair user balances himself out of his wheelchair into the vehicle. The wheelchair either he or a passenger transported into the vehicle.

There are known manual methods in which the wheelchair is moved by means of a hydraulically assisted swivel arm into the vehicle and continues to serve as a seat without wheels. In addition, there are also wheelchairs whose seat shell can be detached from the wheelchair.

These special solutions are reserved for high-building vehicles whose doors or tail-gates offer sufficient access space.

In sports cut vehicles such solutions can not be realized due to the lower passage dimensions and door opening widths.

The transport of a wheelchair as a unit in a vehicle also requires a lot of effort on the part of the physically disabled person or the help of fellow travelers. In addition, a lot of space is still needed to store the wheelchair, so that the number of passengers to be transported is severely limited.

In many cases, modifications to the vehicle are necessary for the realization. This applies in particular to fixtures that should allow for easier mechanical lifting of the wheelchair occupants in the vehicle.

Solutions which provide for a separation of the seat pan from the undercarriage of the wheelchair require additional equipment to allow anchoring of the seat pan in the vehicle to its safety equipment, such as a seat. the strap is guaranteed. In addition, here also a part of the wheelchair remains outside the vehicle and must be stowed separately.

Lösung:

The technical innovation describes an electrically operated wheelchair with a detachable seat shell. This seat shell has attachment elements to connect it to the vehicle via the existing Isofix anchorages, similar to a child seat. It has similar functionalities as a vehicle seat in terms of seating comfort. Additional compartments such as armrests or footrests are not connected to the seat shell.

The axle of the wheelchair is designed so that both the height of the structure including the seat shell and the track width of the wheelchair can be adjusted. In addition to the pure height adjustment further transverse and rotary degrees of freedom are integrated into the adjustment and controlled by motors, which allow a translation of the occupant including seat into the vehicle. For this purpose, the wheelchair should position itself optimally to the vehicle thanks to its networking with the vehicle and its sensor equipment as well as its capabilities for automated driving. The translation procedure, including the opening of vehicle doors or flaps, is controlled by wheelchair-to-vehicle networking.

The wheelchair loads automatically after translating the occupant in the trunk of the vehicle. Here it is connected to the electrical system and thus electrically integrated into the vehicle.

Charging the wheelchair battery should then be just as possible as the use of the wheelchair battery for electrical consumers in the vehicle.

The exit of the physically disabled occupant is carried out using the techniques described in reverse order as the boarding.

Technical implementation:

Core of the invention is a seat, which allows the wheelchair occupant maximum comfort. This seat shell is designed so that it can be detached from the base of the wheelchair. In addition, it has an Isofix connection like child seats. The wheelchair itself is equipped with at least one electric motor and one high-voltage battery. This drives both the axle of the wheelchair and the adjustment motors for automated loading. The control takes place via a control module, which is attached to the seat shell. This operating module also represents the interface to the vehicle and is connected to the vehicle by radio via the Internet interface.

In addition to 2 main wheels, the wheelchair has a maximum of 2 further front or rear mounted support wheels, which prevent tilting forward or backward and at the same time take over the stabilization of the wheelchair when lifting the occupant. These support wheels do not have to be aligned. They are connected to the drive shaft via joints, which allow a bridging of height differences.

The axle is designed to allow a change in track width. For this purpose, the seat is raised to reduce the track width to the minimum possible seat width.

The connection of the seat shell to the undercarriage of the wheelchair via an extendable joint, which has translational and rotational degrees of freedom and is to be controlled by servo motors.

The wheelchair has an equipment on cameras and sensors on board like an automated parked vehicle. This technique determines the optimal position to the vehicle.

The vehicle-networked control module allows access to vehicle functionalities such as automatically opening doors and flaps.

Vorteile:

- A lot of autonomy for wheelchair users.
- Concept supported in all phases (entry / exit, drive, wheelchair loading).
- In-vehicle safety features still fully usable.
- Only minor changes to the vehicle necessary.
- Also suitable for vehicles with normal interior volume.
- Also usable outside your own vehicle.

Mögliche Anwendung:

- All vehicles with a minimum interior volume (for example, compact class) and networking (online connection).