BEAR

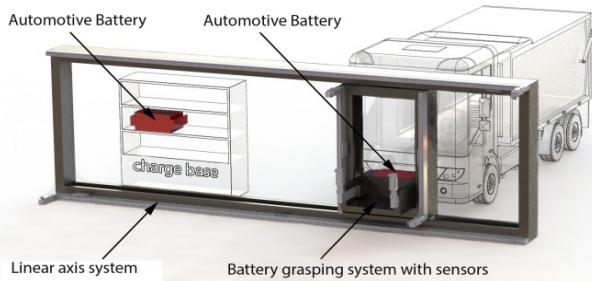## Battery electric waste management with robotic assistance

Fig. 1: Exemplary concept of a battery replacement station (Photo: Marc Manz, DFKI GmbH)
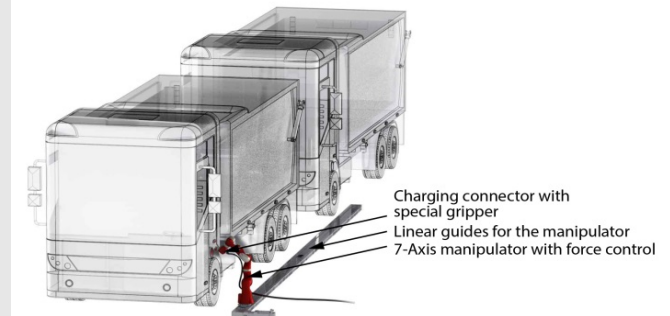

Fig. 2: Exemplary concept of a battery charger unit (Photo: Marc Manz, DFKI GmbH)

Objectives of the project

The "BEAR" project deals with the development and realization of a holistic concept for the use of pure electric refuse collection vehicles. The project partner FAUN is developing a purely electric driven refuse collection vehicle on the basis of an existing platform. In addition, the DFKI will develop a robot system with which the batteries installed in the vehicle can either be automatically connected with the charging system or replaced and charged externally. The project partner BEG will test the developed vehicle as well as the robotic load system in everyday operations.

Development of the robotic system

The decision about the solution for the loading concept which will be realized is made according to an analysis of existing driving profiles from the real application of a refuse collection vehicle from BEG. Either a robot system will be developed and designed, which allows the batteries to be replaced without the intervention of the driver / operator. The battery exchange system to be developed (see Fig. 1) is then used to remove the battery from a maintenance opening which has already been opened by the vehicle and to replace it with a charged battery from the charging station. However, should the evaluation of the driving profiles identify the charging of the battery in the vehicle as a preferred method, a standard robotic arm will be adapted for handling the charging unit in order to realize an autonomous charging system (see Fig. 2).

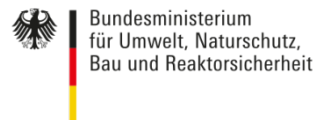### Data-analysis and generation of load profiles

In addition, relevant load profiles from available mass data are elaborated within the framework of the project. These data are collected during the operation of existing conventional refuse collection vehicles. The aim is to determine whether and which typical stress profiles can be found in the data of the tours of the refuse collection vehicles. The typical profiles can then be used by the vehicle developer FAUN to develop battery concepts and to define the dimensioning of batteries as well as drive systems for the most common profiles. In order to achieve this goal, methods of machine learning are to be used.

Duration: 01/2017 – 12/2019

Partner:

FAUN KIRCHHOFF GRUPPE   BEG

Sponsored by:

Bundesministerium für Umwelt, Naturschutz, Bau und Reaktorsicherheit

Contact:
DFKI GmbH & University of Bremen
Robotics Innovation Center

Director: Prof. Dr. Frank Kirchner
Phone: +49 421 - 17845 - 4100
E-mail: robotics@dfki.de
Website: www.dfki.de/robotics