

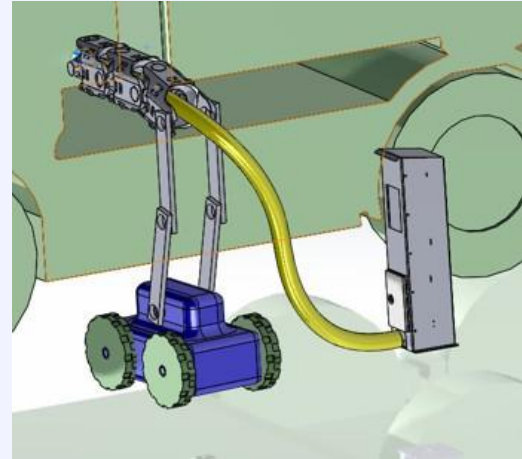
A practical pathway to hands-free charging in depots, yards, and industrial sites.

## WHY THIS MATTERS

### Charging stops when no one is is there to plug in.

Heavy-duty charging cables are already difficult to handle, and they keep getting heavier as power levels rise. In overnight depots, bus yards, and industrial fleets, that creates a simple operational problem: vehicles may be parked and ready, but charging still depends on a person being there. Traditional robotic arms can automate the task only when parking is highly repeatable, which is rarely the case in real fleet operations.

*The bottleneck is not electricity. It is the last meter of cable handling.*

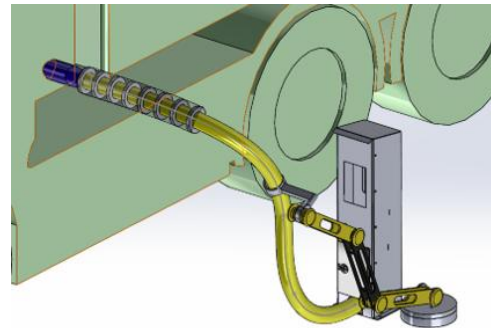


Compact concept showing the cable-guiding mechanism near the vehicle inlet.

## HOW IT WORKS

### Instead of adding a bulky robot, the cable becomes the robot.

The concept combines two motions. A larger positioning unit brings the charging assembly into the right area, while a flexible tendon-driven cable tip performs the final alignment and insertion. This gives the system enough reach to handle real parking variation without relying on a full robotic arm on the depot floor. The result is a smaller automation footprint, better adaptability in tight spaces, and a more realistic route to autonomous charging for trucks, buses, and work machines.



Simulation model used to study cable behavior, routing, and controllability before scale-up.

## WHAT THIS PROJECT DELIVERS

### From concept to practical charging automation.

The project turns an advanced robotics idea into something operational teams can assess. It combines simulation prototyping, and validation around the practical issues that matter most: cable motion, plug-in precision, force levels, and the feasibility of scaling toward real heavy-duty charging hardware.

## WHO IT IS FOR

### For fleets, depots, and charge point providers.

The immediate market is heavy-vehicle depot charging: fleet operators, charge point providers, and infrastructure companies that need reliable plug-in without manual intervention. In commercial terms, the value is reduced labor dependence, higher charger availability, and more scalable depot operations.

## PROJECT SNAPSHOT

Lead  
Assoc. Prof.  
Grzegorz  
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Researcher  
Maksim  
Kovalevskii

Timeline  
2025–2026  
12 months

Partner  
Kempower

Primary output  
Prototype + simulation  
validation roadmap