

# Short Introduction of project **KARIS**

**(Kleinskalige Autonomes Redundantes  
Intralogistiksystem)**

Dali Sun

Research Group Foundations of Artificial Intelligence  
Faculty of Engineering  
Department of Computer Science  
University of Freiburg

# Overview

- KARIS: A **autonomous** transport robot system
- Goal: deploy hundreds of these elements to solve tasks in **intra-logistics**
  - Material flow task between stations
- Problems to solve
  - Mapping
  - Localization
  - Task Assignment
  - Motion Planning
  - Safe Control
  - ...



**KARIS System**

# KARIS Robot

Size: 50x50x35 cm. Weight: 50 kg. Payload: 60 kg.

Conveyer for loading / unloading crates



RFID reader

Contactless rechargers



High precision docking

# Multi-robot path planning

- Decoupled and prioritized path planning
  - Planning the paths for the individual robots
  - If a conflict of path is detected, a priority scheme will be used to re-plan the path of the robot with lower priority
  - Problem: **not complete**
- Adaptive Road Map Optimization (ARMO)
  - The road map **adapts** itself with the change of environment in real time
  - **Optimizes** the road map w.r.t. to environmental constraints and demand for transportation tasks
  - Successfully tested up to 100 robots

# If you are interested in ...

- Task assignment
- Multi-robot path planning
- Multi-agent system
- 3D simulation

**Please contact me:**

**[sun@informatik.uni-freiburg.de](mailto:sun@informatik.uni-freiburg.de)**