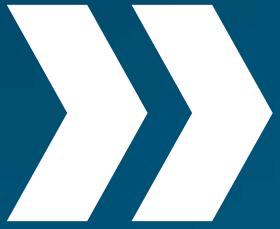


Fraunhofer IML · Dortmund

100% Logistik





**We fascinate and inspire people with ideas and innovations to shape the future's responsible logistics together.**



A photograph of three people standing in a modern office or laboratory environment. On the left is a man with grey hair and glasses, wearing a blue blazer over a white shirt. In the center is a woman with short brown hair, wearing a grey blazer over a pink shirt. On the right is a man with dark hair, wearing a grey blazer over a white shirt. They are all smiling. In the background, there are white panels with some technical diagrams, including a Wi-Fi symbol and a network diagram.

## 100% Logistics

### **100% Mobility**

Prof. Dr.-Ing. Uwe Clausen  
Humans | Goods

### **100% Technology**

Prof. Dr.-Ing. Alice Kirchheim  
Hardware | Software

### **100% Management**

Prof. Dr. Dr. h.c. Michael Henke  
Processes | Organisation

Open



The best way to predict  
the future is to invent it!«

—  
Alan Curtis Kay





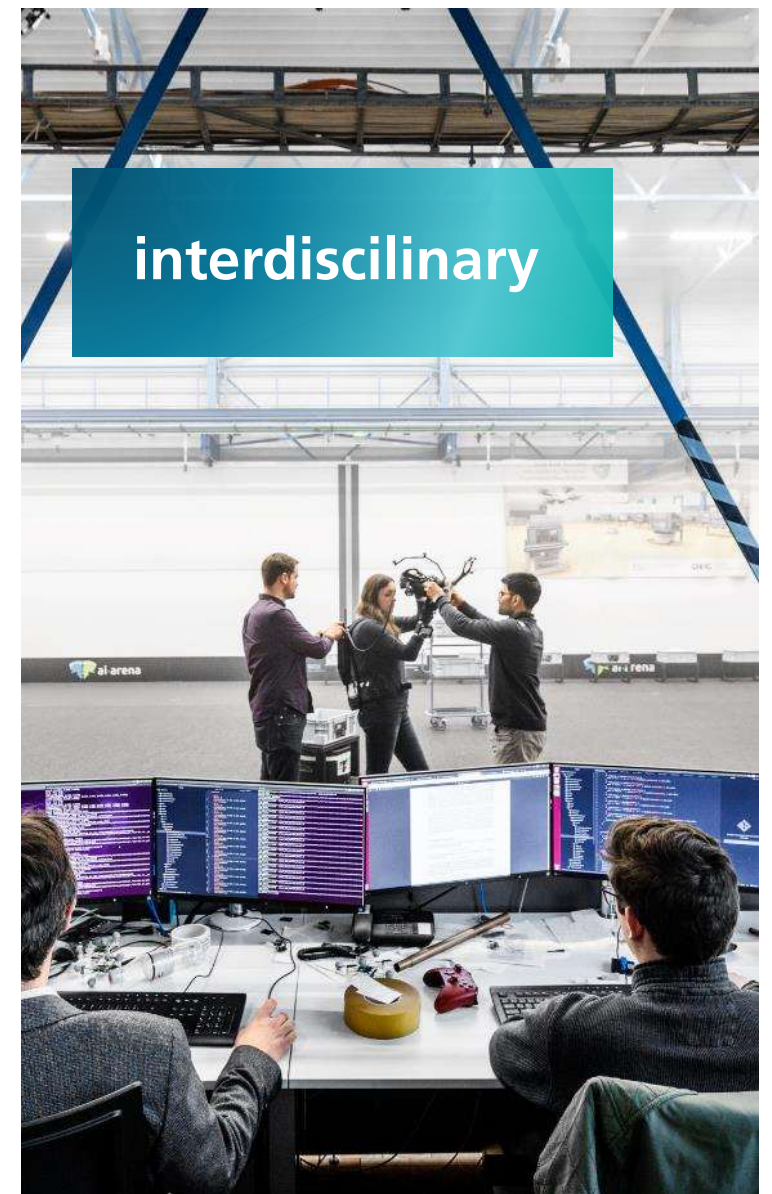
creative



agil



interdisciplinary





A photograph of two young men in a laboratory setting. One man, wearing a light blue button-down shirt and jeans, is leaning over a white humanoid robot, using a red wire to connect components on its chest. The other man, wearing a dark shirt, is kneeling and holding a yellow soldering iron. The robot has a white head, torso, and arms, with a metallic frame for the legs and black wheels at the base. The background shows a large, open-plan industrial or research space with high ceilings, exposed ductwork, and various pieces of equipment. A blue banner with the word "PACE" is visible in the background.

This is where we work

—

Our research infrastructure







A group of four people (three men and one woman) are gathered around a white table in a modern office with large glass windows. They are looking down at electronic components and a yellow multimeter on the table. The man on the right is pointing at something on the table. The woman is in the center, looking down. The man in the middle is looking down. The man on the left is looking down. The background shows a modern office interior with glass walls and ceiling lights.

This is how we work



Our approach





**We do research...**  
in-house and industrial  
contract research



**We support...**  
companies of all sizes  
and from all industries



**We develop...**  
e.g. at the FCC accelerator  
at CERN, Geneva



We understand our customers and know their future challenges!



Wer wir sind?

**DIGITAL.HUB**  
LOGISTICS

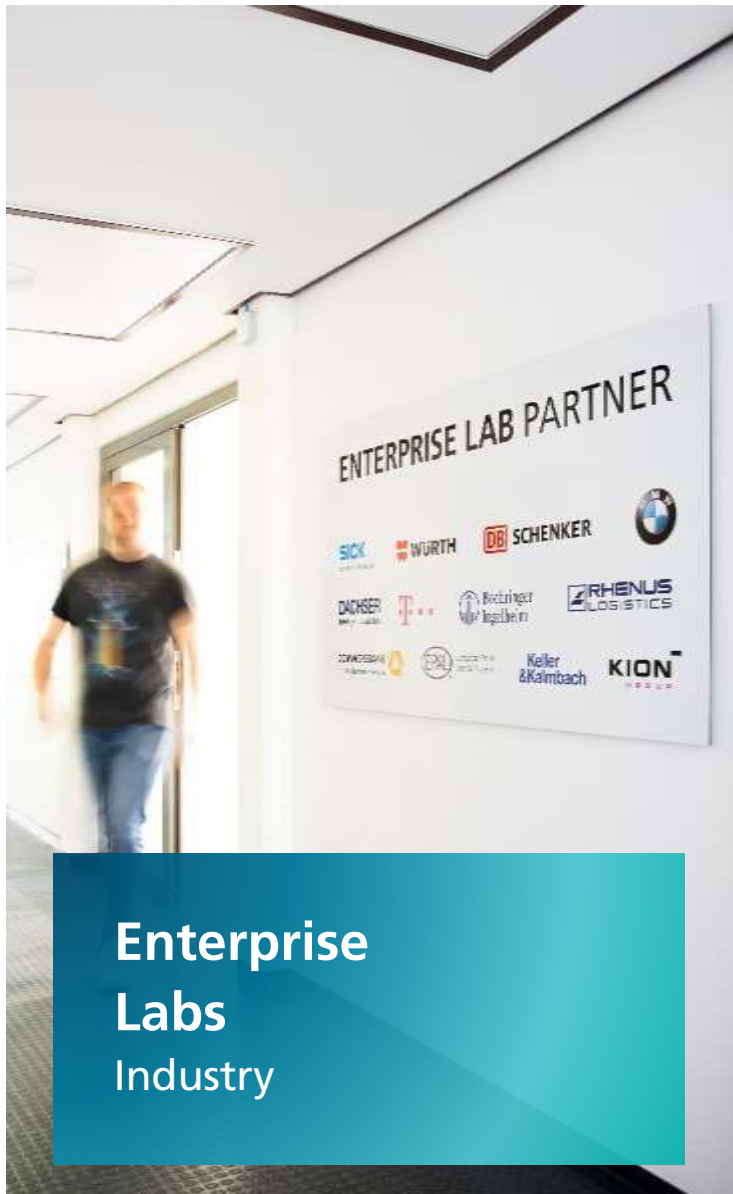
**Fraunhofer IML** **Fraunhofer ISST**

**EffizienzCluster Management** **duisPort**

**de:hub**

Der Digital.Hub Logistics in Dortmund, getragen von den Fraunhofer-Instituten für Logistik und Materialfluss IML, sowie für Software- und Systemtechnik ISST, der EffizienzCluster Management GmbH und der Duisburger Hafen AG, treibt die Digitalisierung der Logistikbranche in Deutschland voran – als Waren- oder Dienstleistungs-, Transport-, Unternehmens- oder Finanzlogistik. Er stärkt das gewachsen und dynamische Ökosystem des digitalen Logistik im Ruhrgebiet – bestehend aus Forschung und Lehre, Industrie und Mittelstand, Netzwerken und Fachkräften – und regiert es um die Bereiche Smart Logistics, Kapital und Start-Up, Smart Supply und Digital Logistics. Der Digital.Hub Logistics ist ein hoch spezialisierter Umfeld für Unternehmen, die ganzheitliche digitale Prozesse von der Produktion bis zur Distribution realisieren wollen. Der Digital.Hub Logistics ist eine Initiative des Digitalverbundes Bitkom und ist Teil der Digital.Hub Initiative des Bundesministeriums für Wirtschaft und Energie (BMWi) mit insgesamt 12 Hubs. Eine gemeinsame Dachmarke (de:hub) und eine gemeinsame Hub Agency erleichtern die Vernetzung und den Austausch von Know-how.





## Enterprise Labs Industry



## Digital Hub Logistics SMEs and industry



## Digital in NRW SMEs



Fraunhofer-Gesellschaft

~ 32.000  
employees

76 institutes  
and research institutions

3.4 billion  
research volume

Main locations  
Branches



Fraunhofer IML, Dortmund

~ 400  
employees

~ 300  
graduate students and  
student assistants

~ 55 million  
turnover, 30% of which is made  
with industrial partners



**> 55 million €**

budget 2023

**~ 700**

employees (12/2023)

about **600 projects**

per year

**~ 30%**

of the budget is made with industrial partners

**~ 850,000 h**

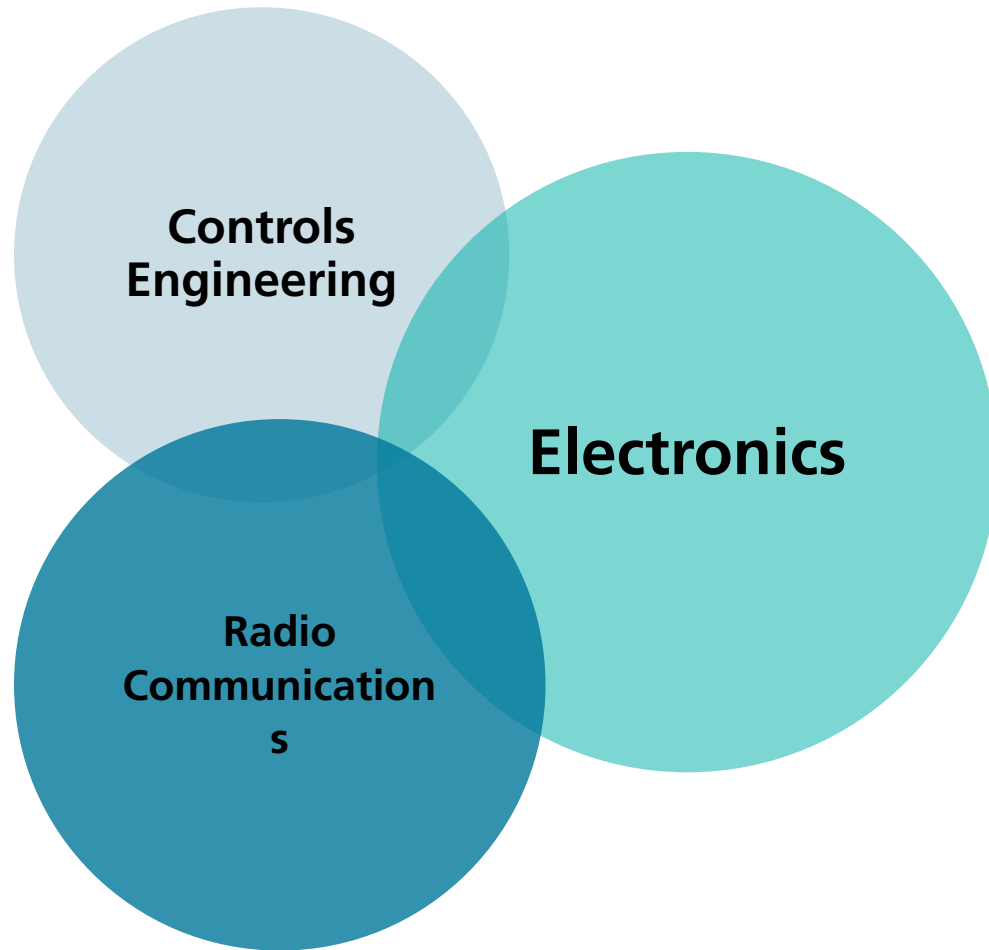
by order of logistics research (2023)





# Department of IoT and Embedded Systems

## Our Focal Points







Control Engineering – The  
evoBOT®



# The evolution of autonomous robots

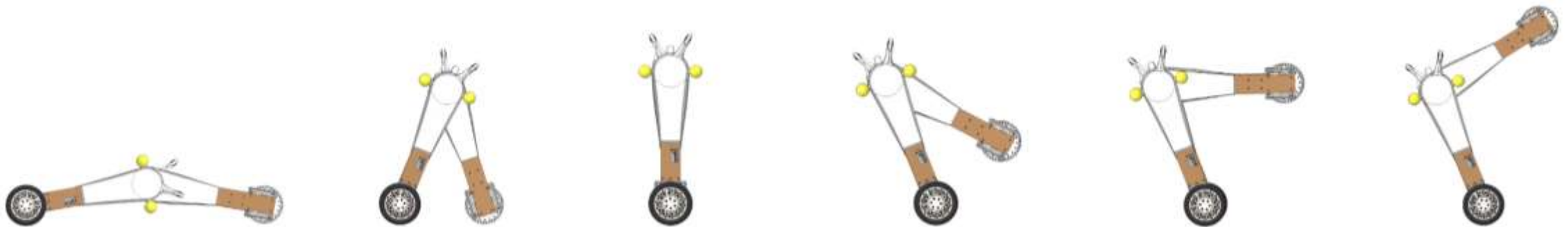
The evoBOT® will serve a wide range of applications. By combining the individual capabilities of previous systems, the evoBOT overcomes the limitations of conventional and highly specialised robot systems available on the market.

## From vision to prototype

The development of the evoBOT® began with the vision of developing a powerful robot system that is reduced to the essentials and at the same time has a wide range of capabilities. These include, for example, transporting, pulling and pushing goods and load carriers, as well as manipulating, picking up and placing on different levels, including the floor.

## Outstanding controls

The principle of the inverse pendulum without external counterweight enables operation in the tightest of spaces and gradients. The pneumatic tyres also ensure movement on uneven surfaces such as gravel and outdoor areas even without a damping chassis. The control is independent of the load to be moved.





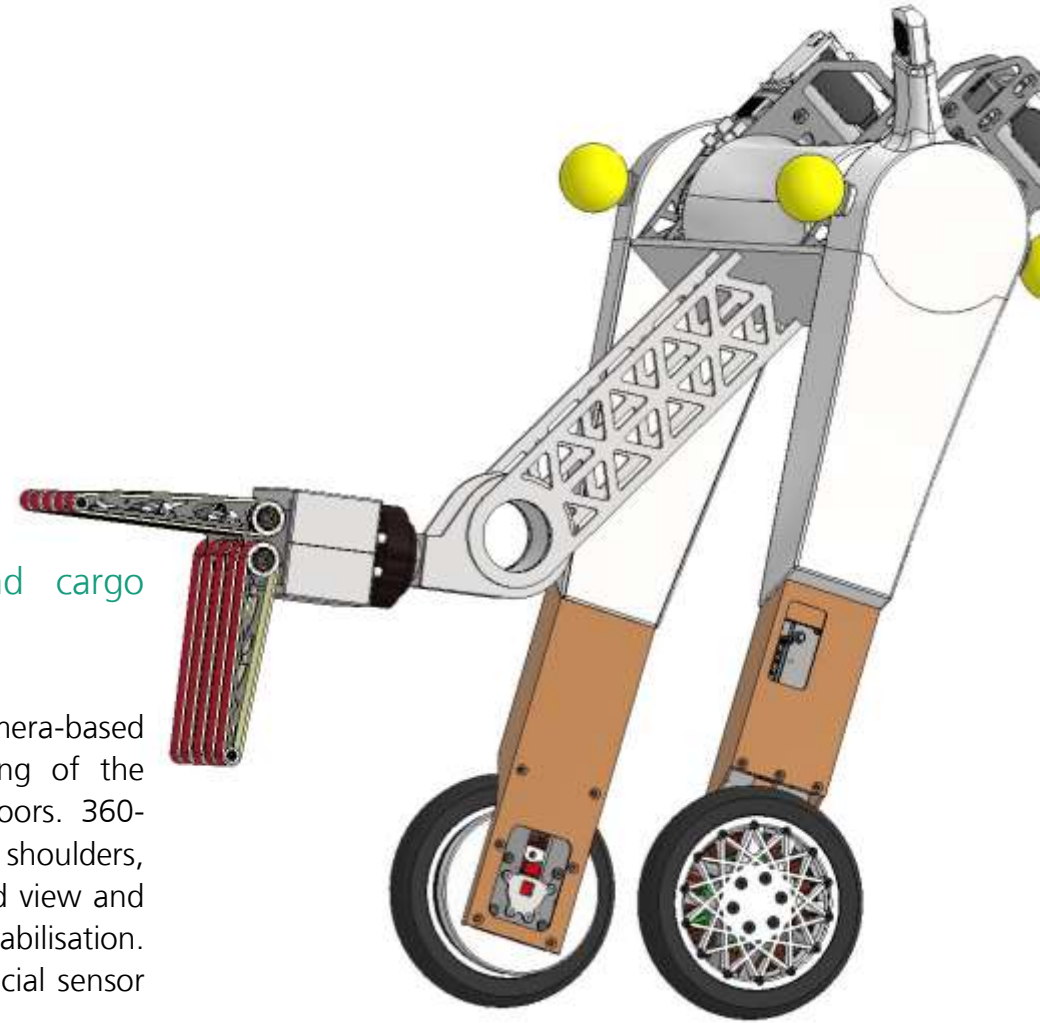
# evoBOT® - Technical finesse

## State of the art

During development, emphasis was placed on hardware components that are state of the art in terms of precision, efficiency and dynamics. At the same time, the focus was on cost efficiency by reducing complexity and minimising the use of actuators, sensors and materials.

### Camera-based environment and cargo detection

For navigation, we rely on camera-based simultaneous localisation and mapping of the surroundings (VSLAM), especially indoors. 360-degree cameras are mounted on the shoulders, providing an almost seamless all-round view and eliminating the need for complex stabilisation. The aim is to dispense with costly special sensor technology as far as possible.

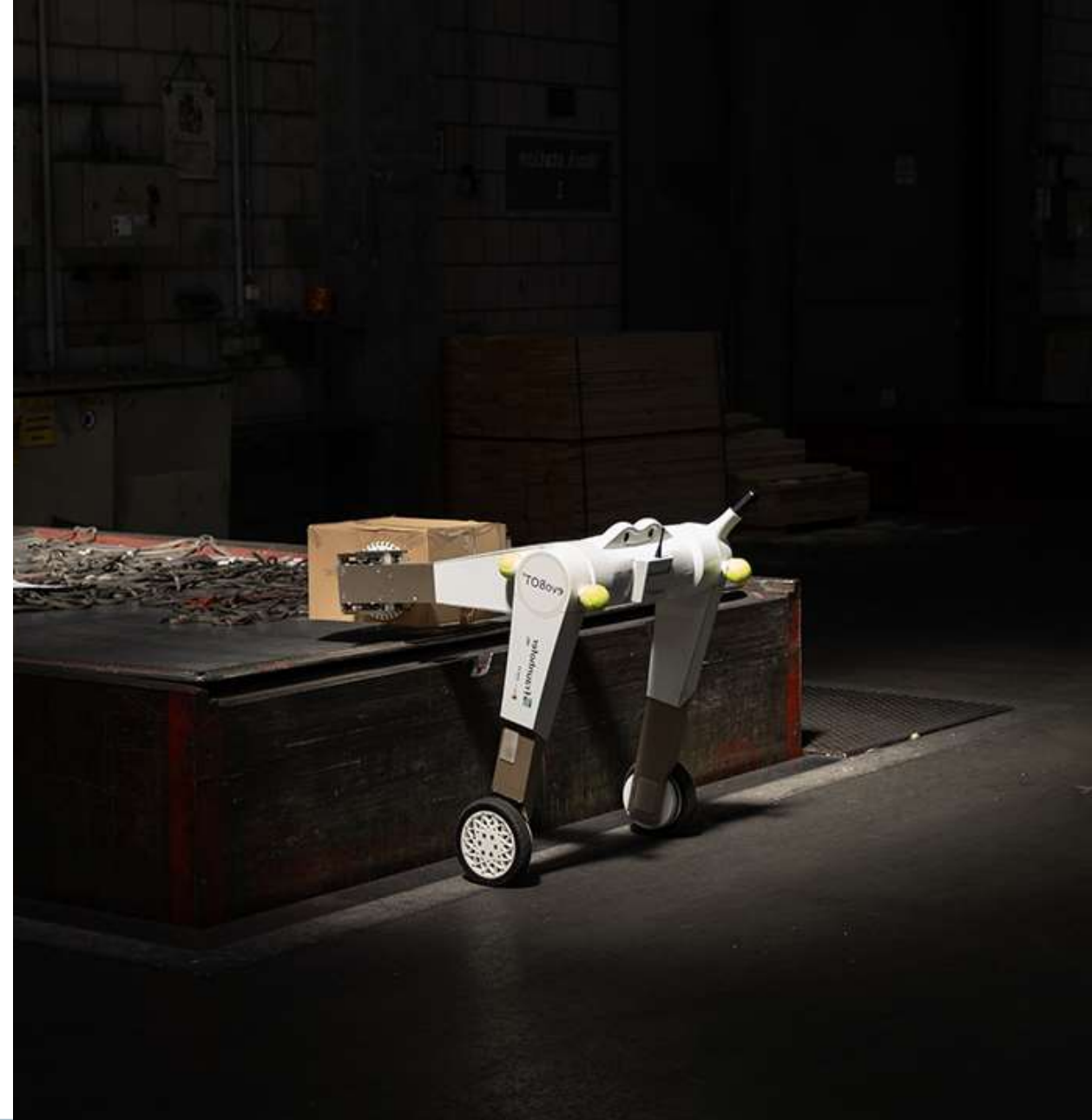




# Key facts

## technical

- Scalable size
- Length: min. 192 mm
- Width: min. 785 mm
- Height: min. 925 mm
- 50 kg weight
- 60 km/h top speed
- 35 kg lifting capacity
- 100 kg load capacity





# Key facts

## operational

- Outstanding control quality leads to high flexibility
- Modular design
- Easily scalable
- Excellent power-to-weight ratio (up to 2:1)
- Small footprint (especially in curves)
- High speeds
- Pick-up from the ground
- Variable transfer height
- Collaboration capability with people and machines
- Low energy consumption in static state
- Camera-based environment detection (VSLAM)







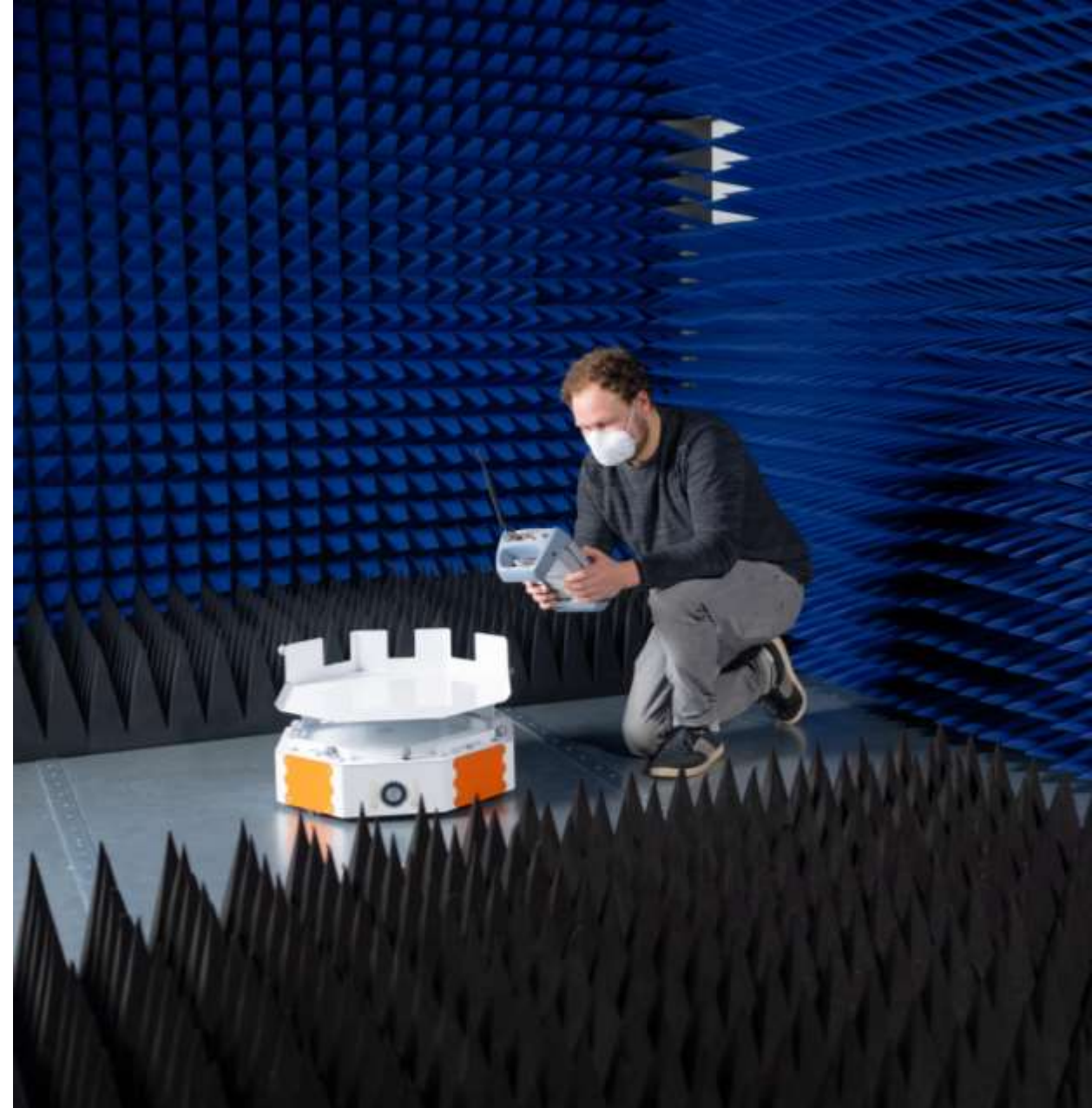
## Radio Communications



# Radio communications

## Connecting worlds

- R&D in 5G and 6G technologies
- Custom-made antenna design
- In-house testing on:
  - Electromagnetic capability
  - Antenna performance
  - Efectuation of components and structures
- Implementation of digital network twins





# Electronics

essem  
SWISS MADE

Open



# Embedded Engineering

in hardware and software

- Consulting and design solutions
- From conceptual design to pre-series production
- In-house development and small scale production of pcbs
- Design follows function concepts for molding enclosures
- Low power and low cost concepts for electronic components (e.g. IoT-devices)

