Fraunhofer IML

Fraunhofer Institute for Material Flow and Logistics IML

Fraunhofer IML · Dortmund

100% Logistik

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

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!«

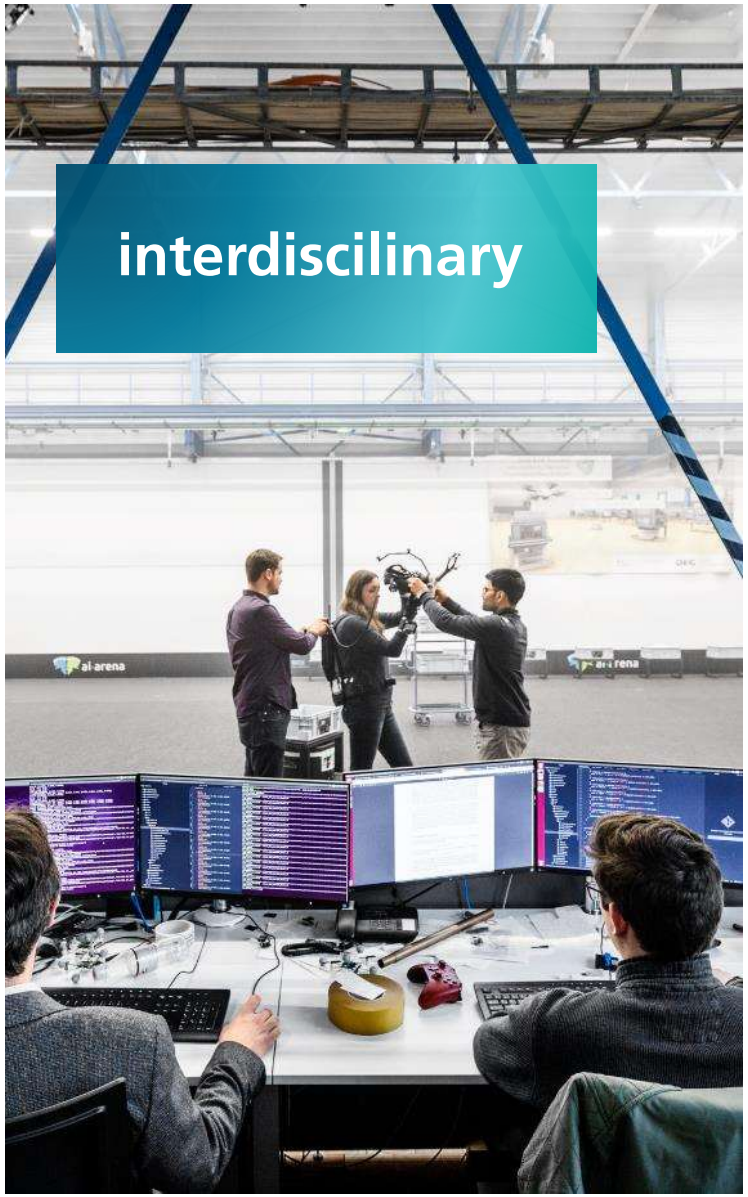
—

Alan Curtis Kay

creative

agil

interdiscilinary



  Open

Fraunhofer IML

This is where we work

Our research infrastructure












This is how we work

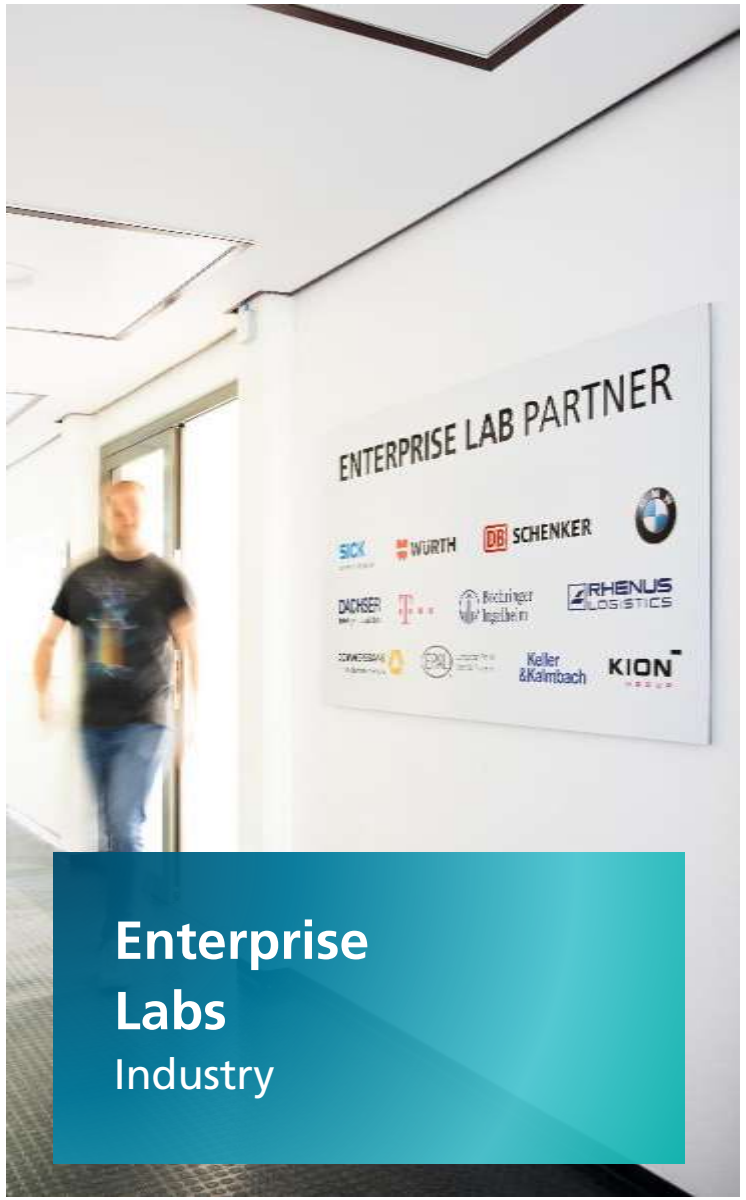
Our approach

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!



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

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%

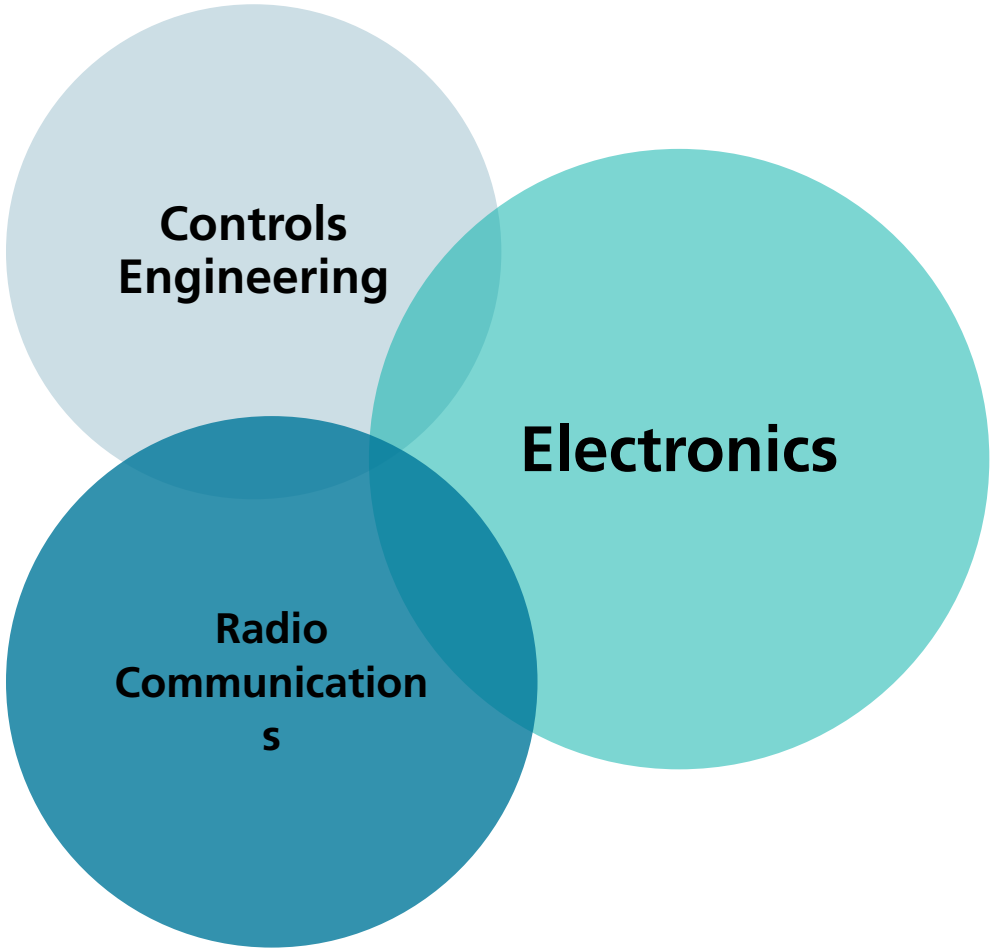
of the budget is made with industrial partners

~ 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

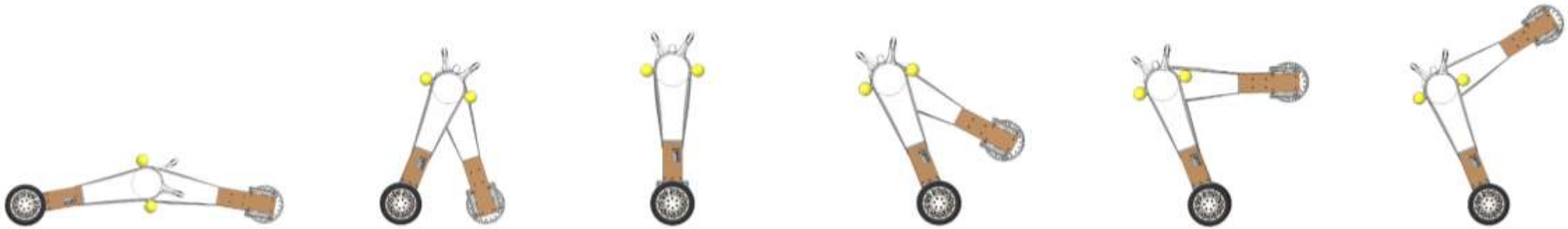
The evoBOT® will serve a wide range of applications. By combining the individual capabilities of previous systems, the evoBOT overcomes the limitations of conventional and highly specialised robot systems available on the market.

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.



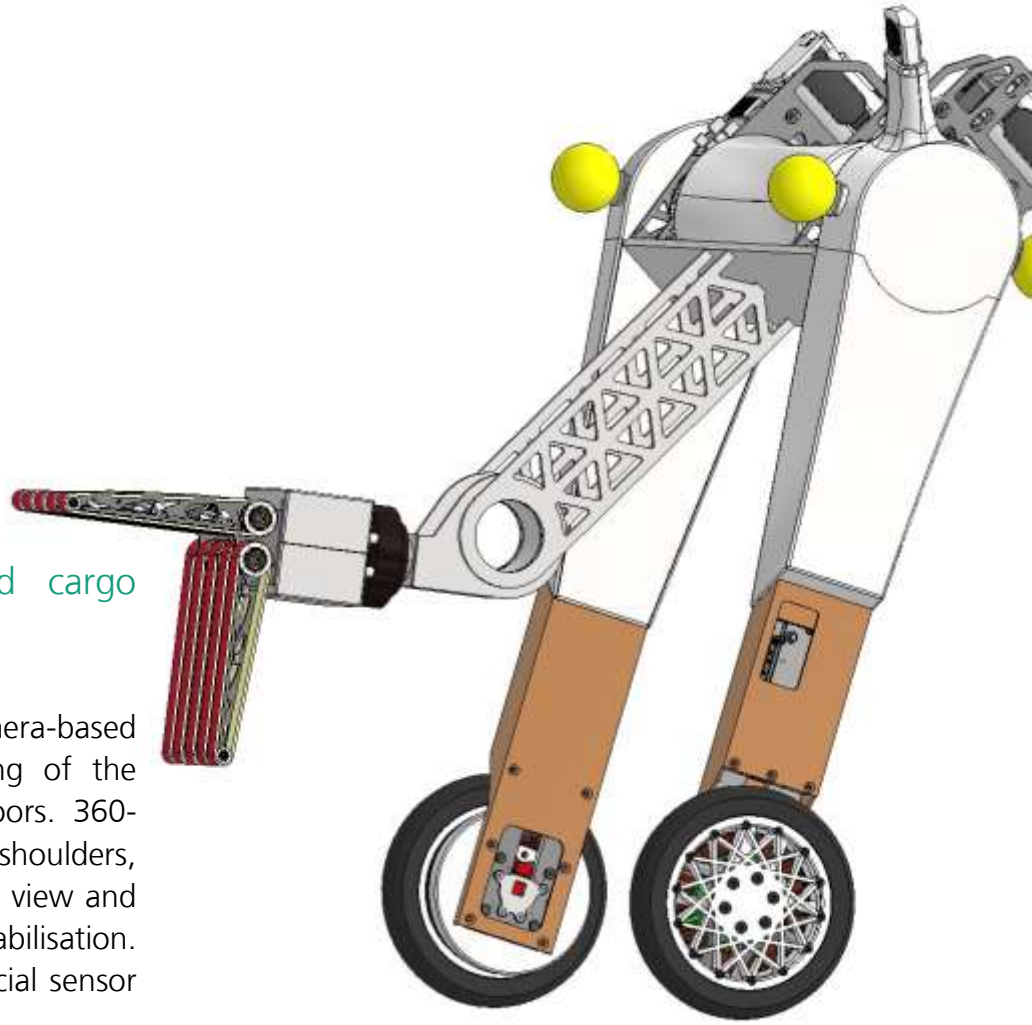
evoBOT® - Technical finesse

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.

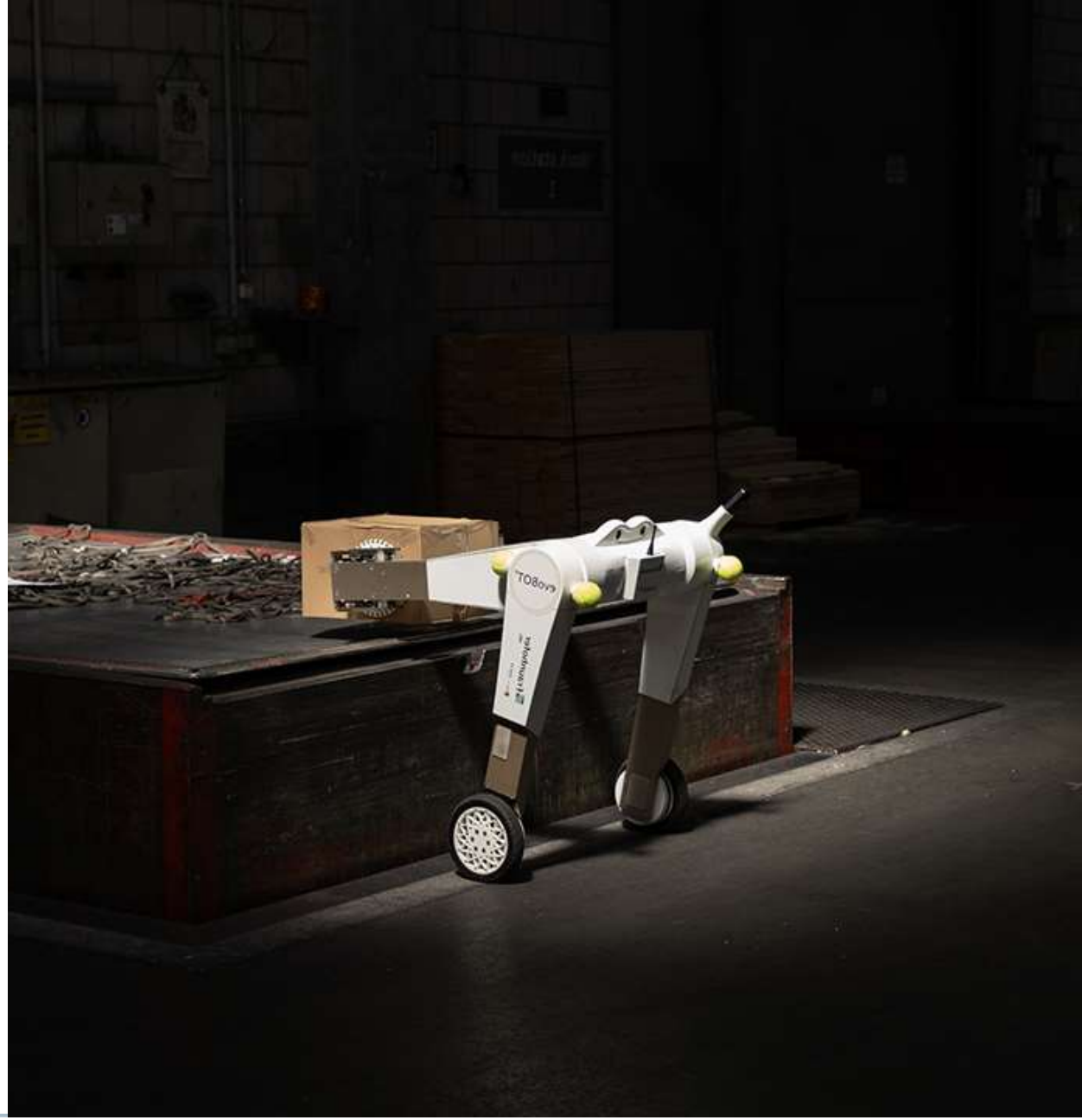
Camera-based environment and cargo detection

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

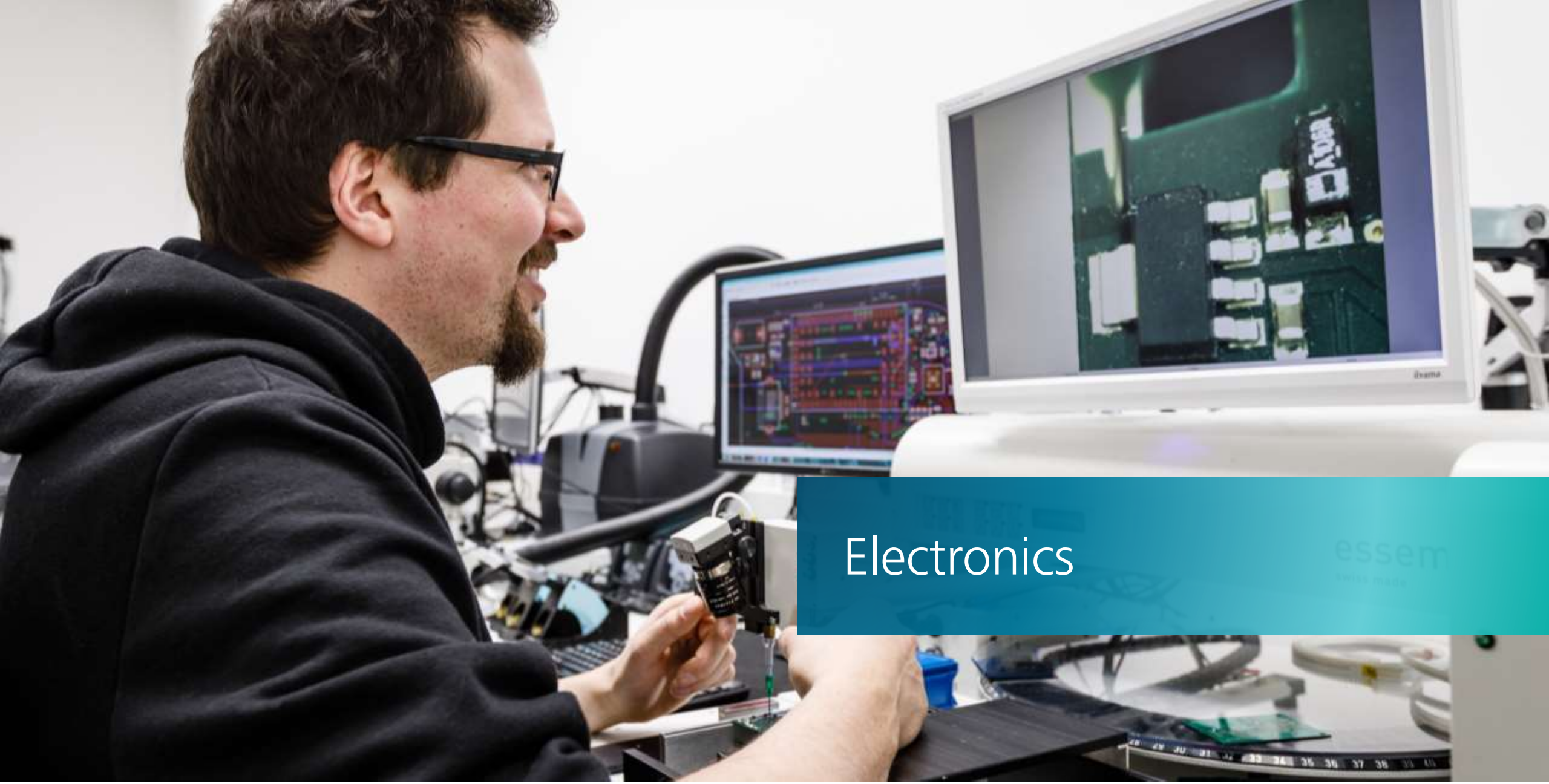
- Outstanding control quality leads to high flexibility
- Modular design
- Easily scalable
- Excellent power-to-weight ratio (up to 2:1)
- Small footprint (especially in curves)
- High speeds
- Pick-up from the ground
- Variable transfer height
- Collaboration capability with people and machines
- Low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

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)