



INSTITUTE OF AUTOMATION AND
COMPUTER SCIENCE

Industry 4.0 Cell (I4C): A Brief Overview

Roman Parak

Research & Development – Advanced Robotics

Brno, 2022



1. Institute of Automation and Computer Science

2. Industry 4.0 Cell

2.1 Organization Structure

2.2 Industry 4.0 Cell (I4C) at the IACS

2.3 Educational Activities

2.4 Research Activities

3. Vision of the future

4. Contact

IACS



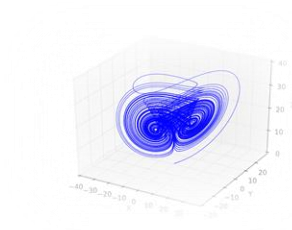
Cybernetics and
Robotics Division
(NETME Centre)

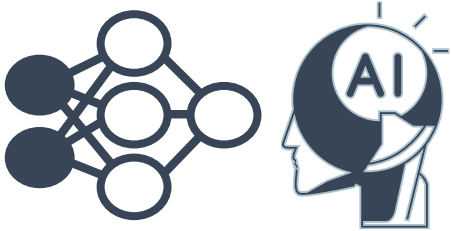


Dept. of Automation

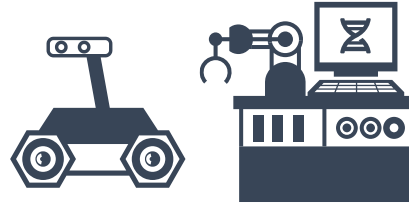
Dept. of Applied
Computer Science

Dept. of Computer
Networks

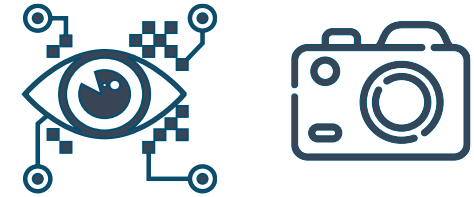




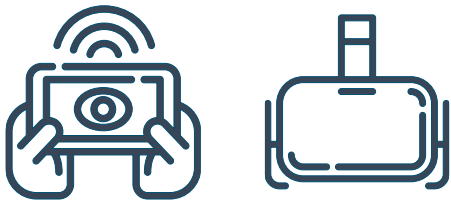
Artificial Intelligence
Machine Learning



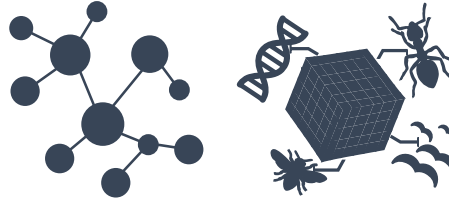
Advanced Robotics
Industry 4.0



Computer Vision
Image Processing



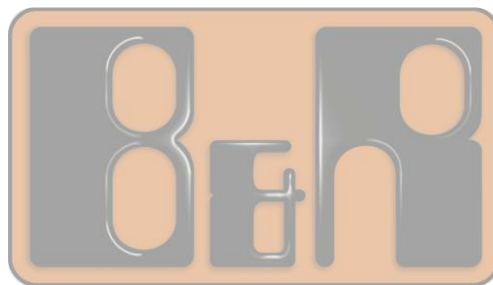
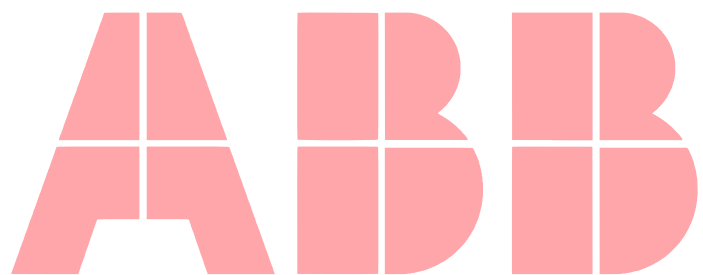
Augmented / Virtual
Reality



Optimization
Logistics



Cloud Computing and
Cybersecurity



Amtech



BRNO REGIONAL
CHAMBER
OF COMMERCE

Industry 4.0 Cell

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MSc. Roman Parak

Head of Research and Development (R&D)

Contact:

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Assoc. Prof. Branislav Lacko, PhD.

Industry 4.0 Consultant

Contact:

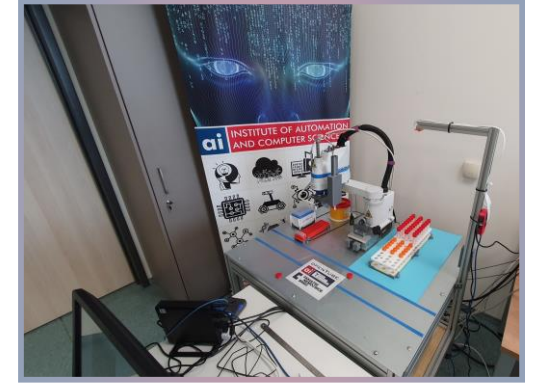
lacko@fme.vutbr.cz

**Assistant Professor, Assoc. Prof. &
Prof.:**

≈ 5

**Students (PhD., MSc. &
BSc.):**

≈ 20

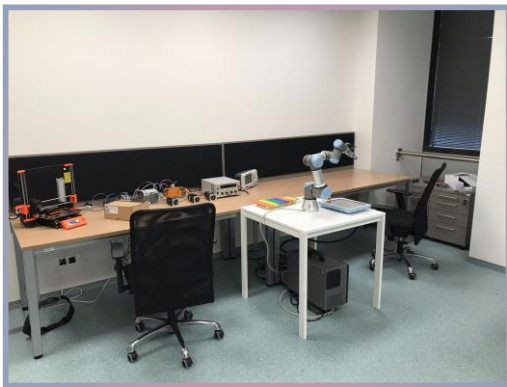


2019

2020

2021

2022





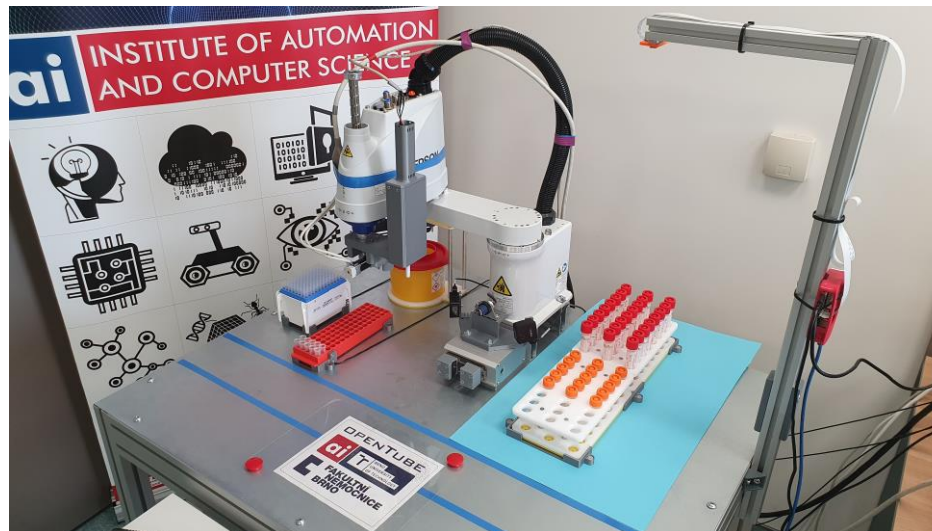
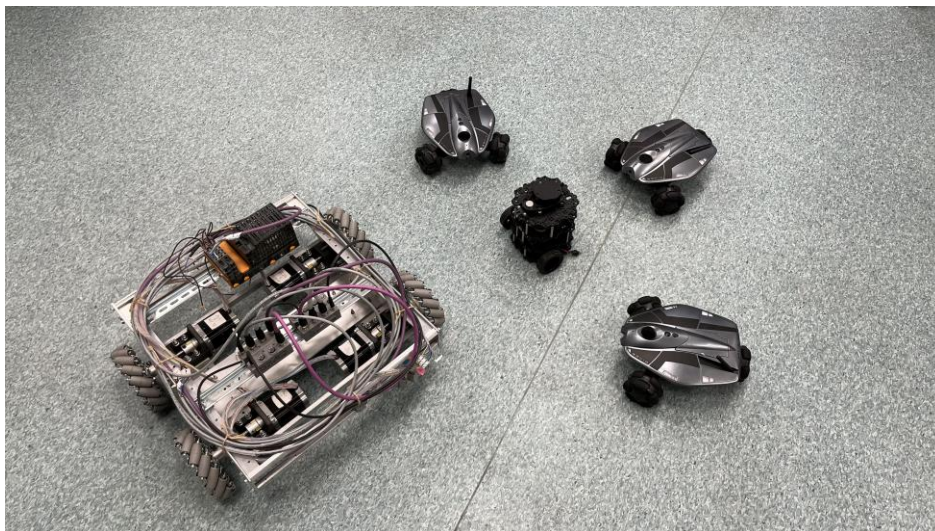
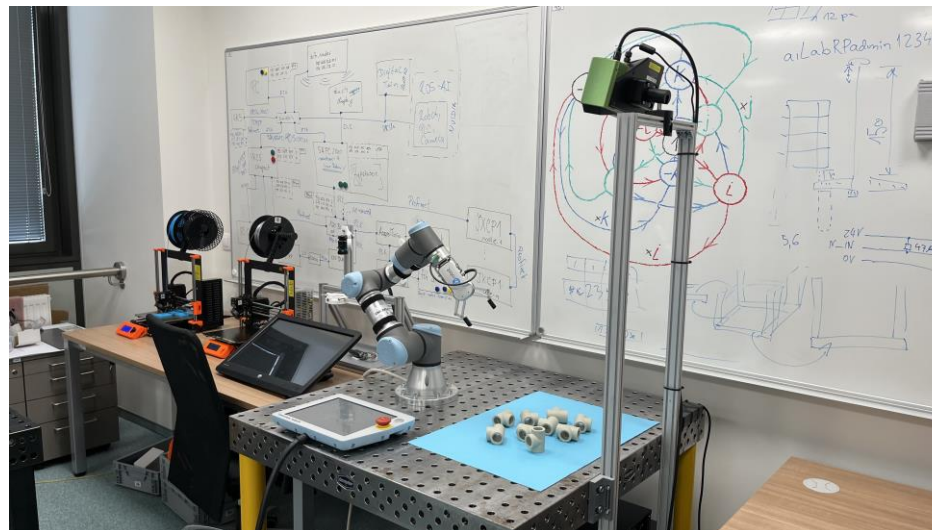




Advanced Robotics
in Healthcare







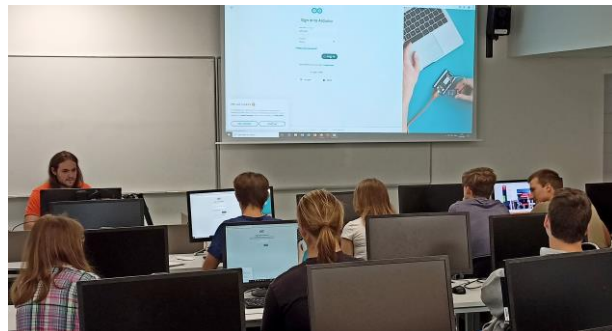


Main Activities

- Lectured courses (Programmable Logic Controllers, Machine Vision, Industry 4.0, AI Algorithms, Neural Networks and Evolution Methods, Programming for robots and manipulators, etc.)
- Doctoral and Bachelor's / Master's theses

Other Activities

- Workshops, Open Days, Robotics promotion (Science enjoys us, Night of Scientists, Summer University for secondary school students), Robotics Conferences, etc.
- Brno University of Technology helps with COVID-19





Main Activities

- Advanced System Integration, Artificial Intelligence Techniques (ML, DL, etc.), Trajectory optimization / Motion planning, Kinematics, Data Analysis and Processing
- Visual Inspection, Structured / Random Bin – Picking, Human – Machine Collaboration
- Virtual / Digital Twin (Simulation), Human-Machine Interface, Functional Safety

Other Activities

- Virtual / Augmented Reality
- 5G networks, IoT (Internet Of Things), Cybersecurity

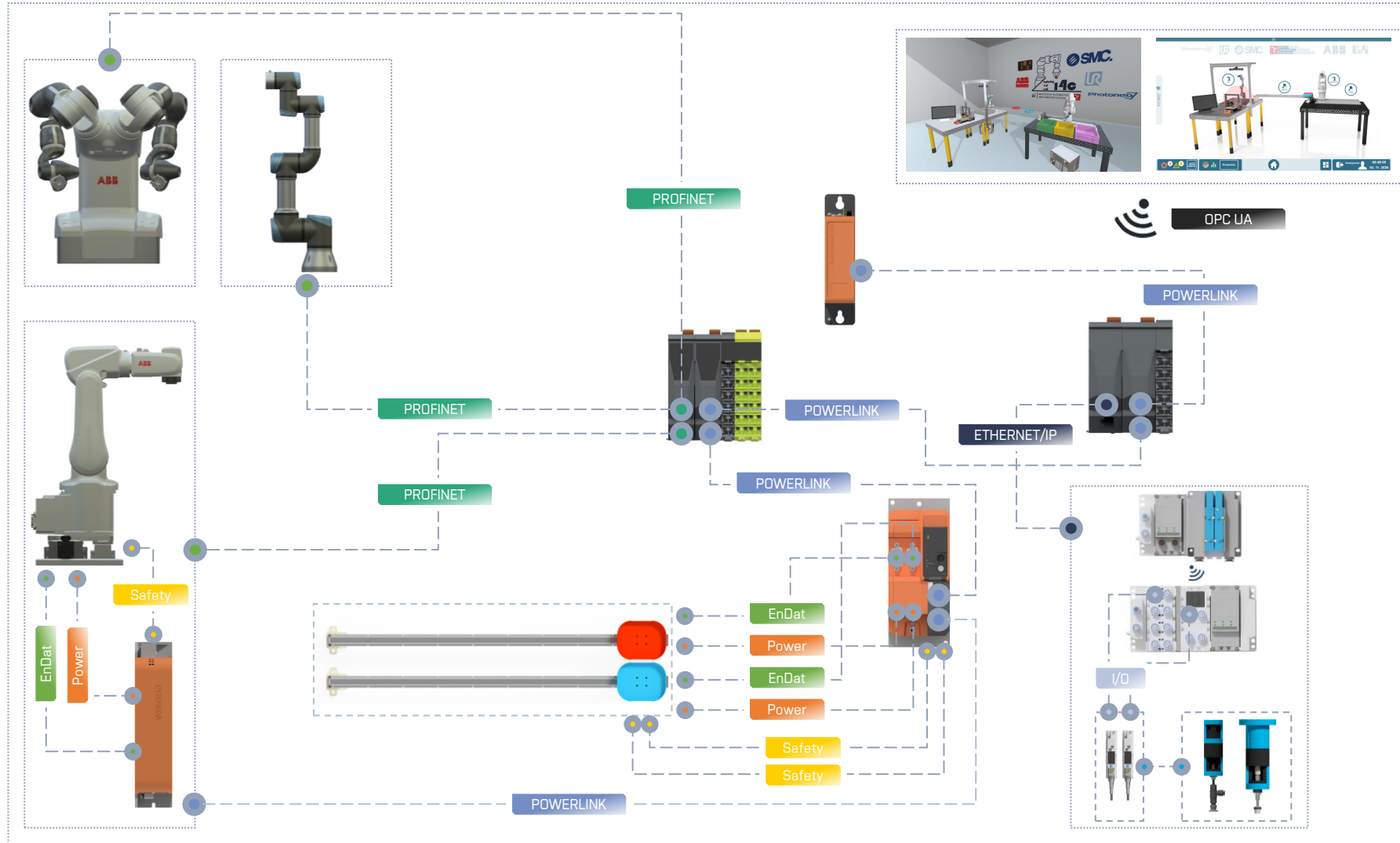


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POWERLINK

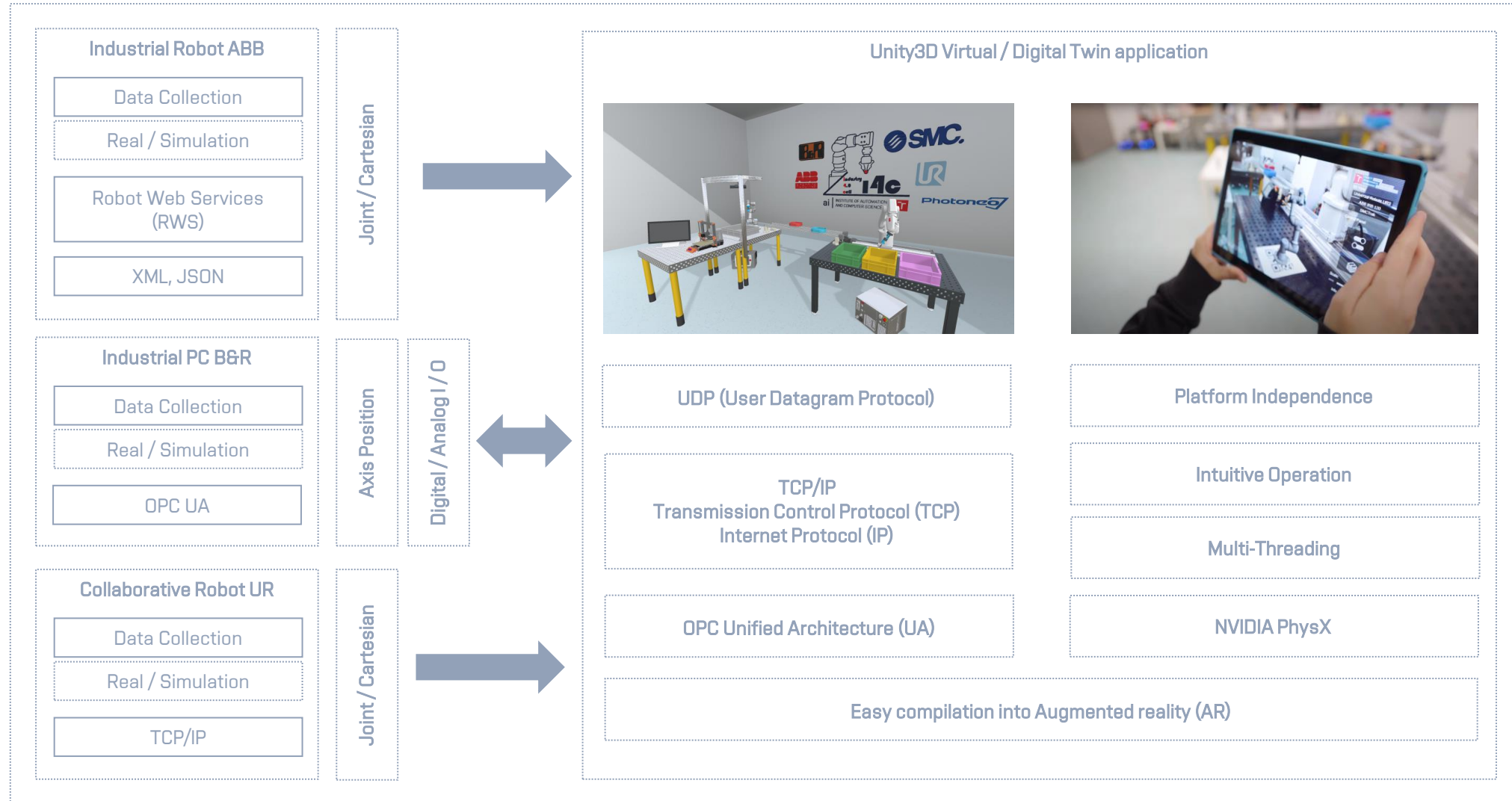
PROFINET

ETHERNET/IP

Digital/Analog I/O

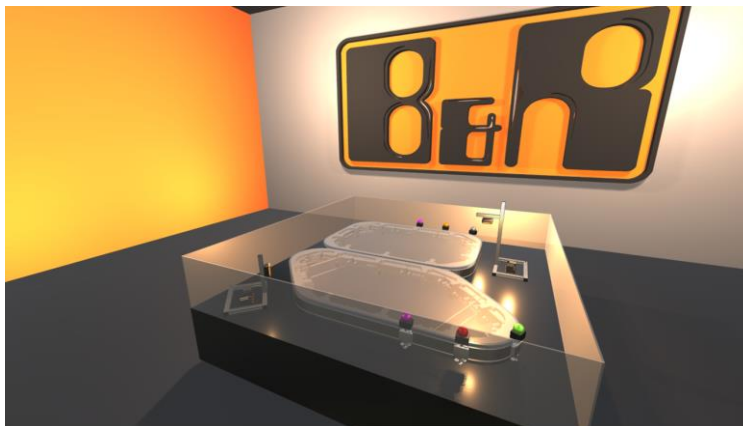
OPC UA







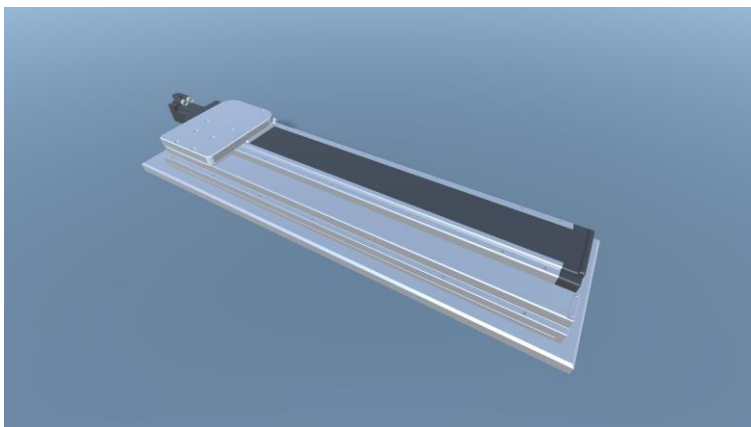
Industry 4.0 Cell: Sorting Line



B&R Automation ACOPOStrak



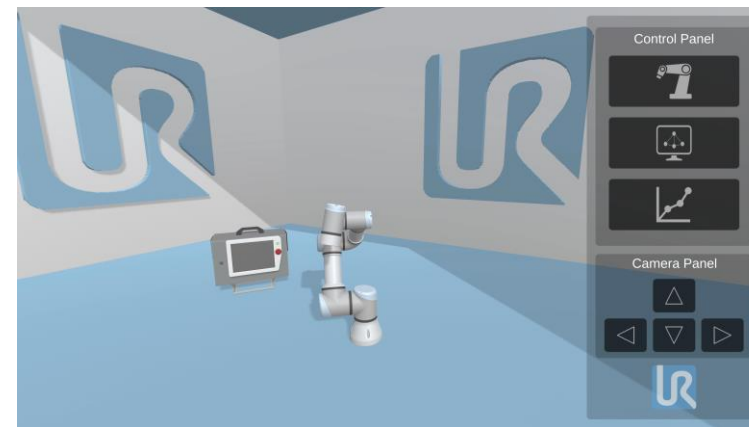
Industrial Robot ABB IRB 120



Simple Linear Axis (B&R Automation, SMC)



Sorting Machine (B&R Automation, SMC)



Collaborative Robot Universal Robots UR3

Vision of the Future



Contact

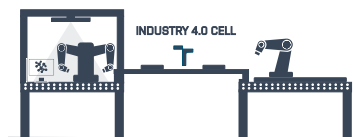


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Brno University of Technology

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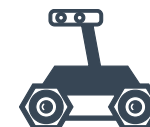
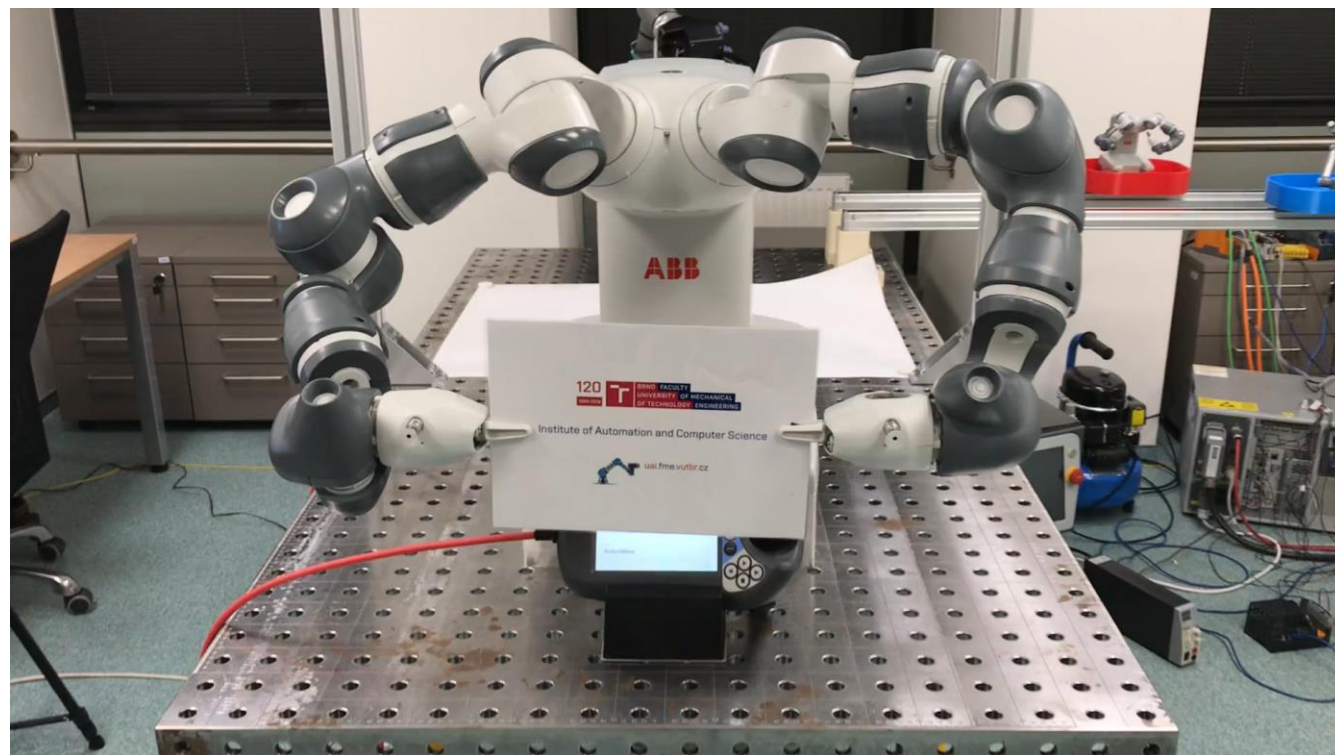
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Other:



Thank You!



Questions?





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COMPUTER SCIENCE