

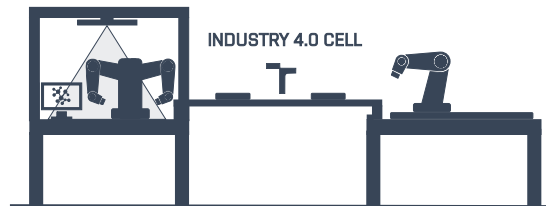


INSTITUTE OF AUTOMATION AND
COMPUTER SCIENCE



Industry 4.0 Cell (I4C) : A Brief Overview

Roman Parak



Brno, 2023



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

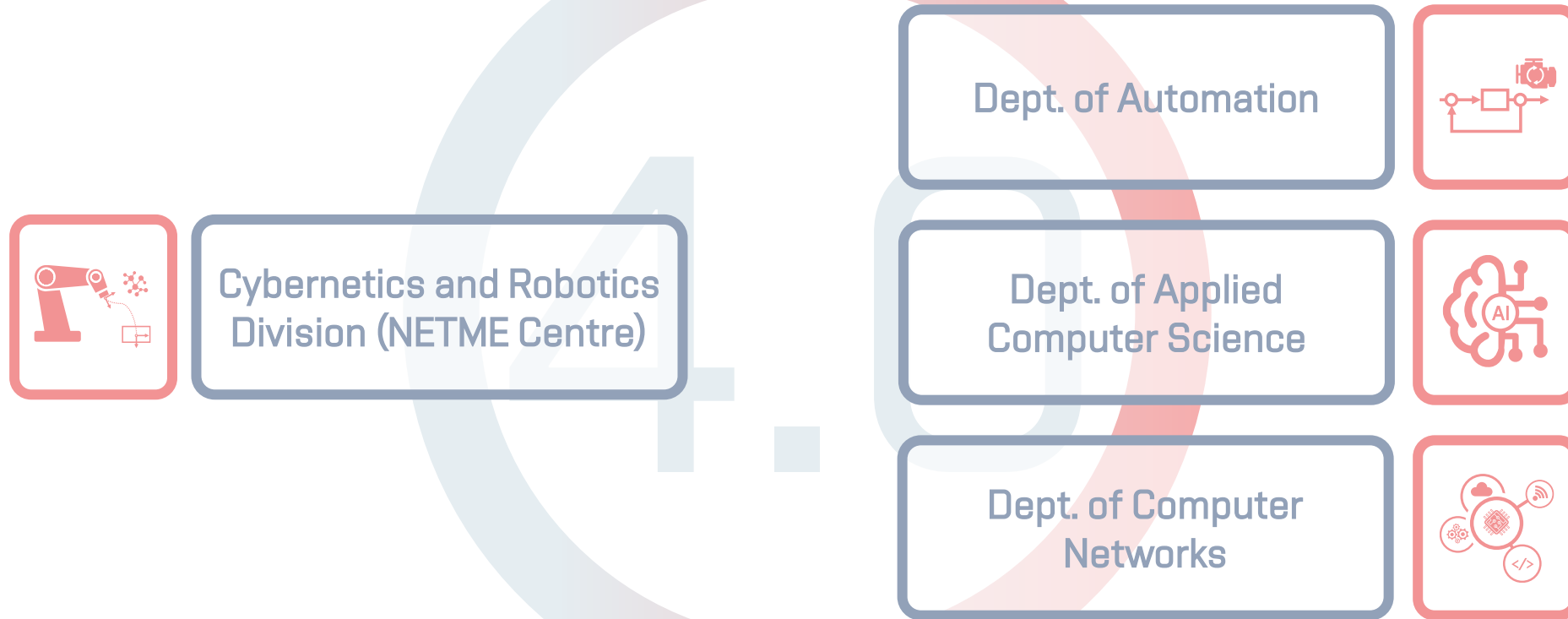
2.3 Educational Activities

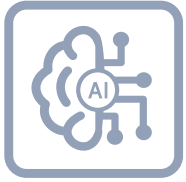
2.4 Research Activities

3. Vision of the future

4. Contact

IACS





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

Assoc. Prof. Radomil Matousek, PhD.

Director of Department, Head of Laboratory

Contact:

matousek@fme.vutbr.cz

MSc. Roman Parak

Head of Research and Development (R&D)

Contact:

Roman.Parak@vutbr.cz



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

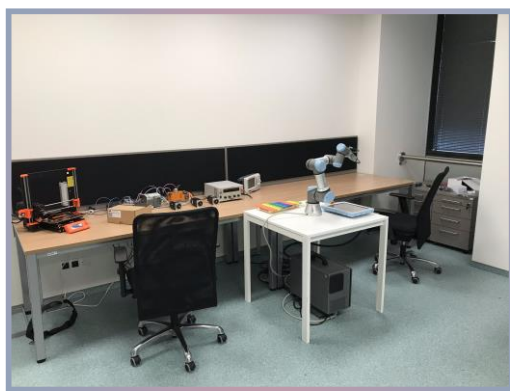


2019

2020

2021

2022









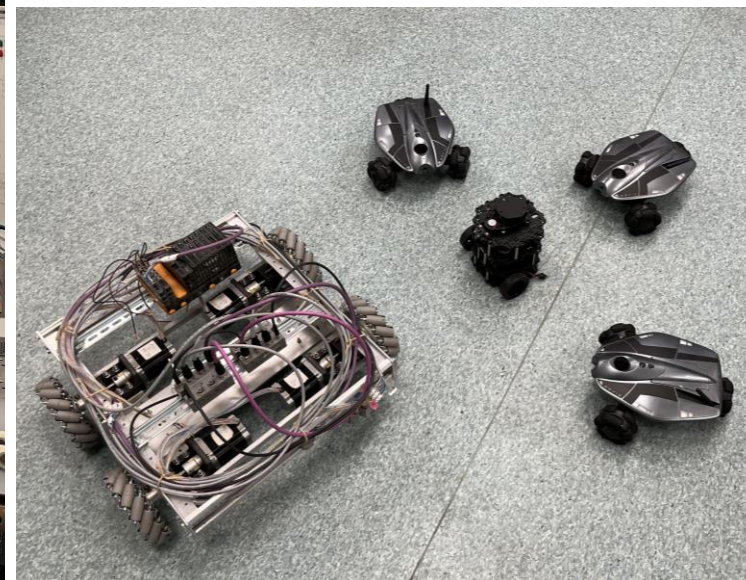
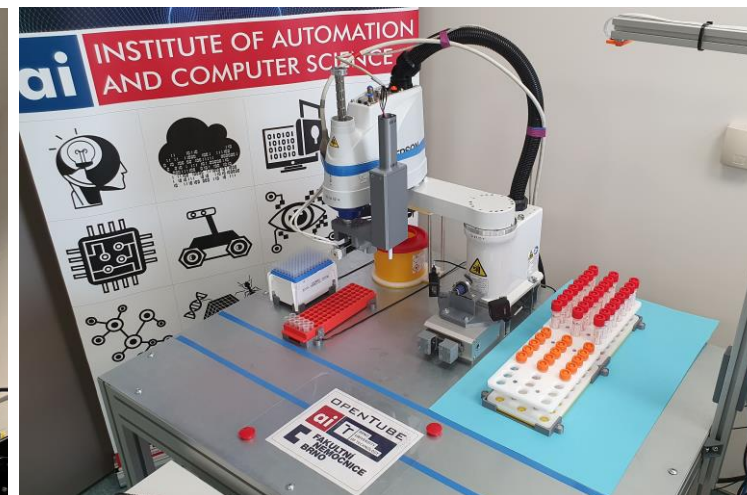
Advanced Robotics
in Healthcare





Mobile Robotics





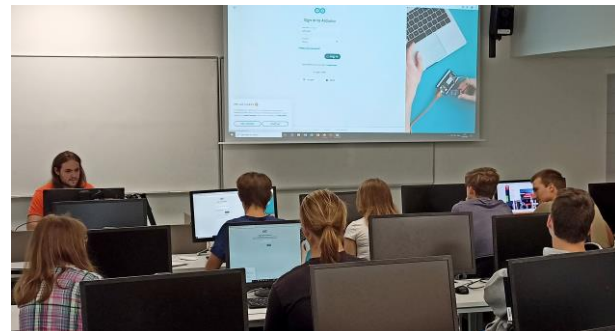


Main Activities

- 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

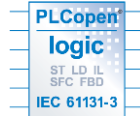
- Workshops, Open Days, Robotics promotion (Science enjoys us, Night of Scientists, Summer University for secondary school students), Robotics Conferences, International Engineering Fair, etc.
- Brno University of Technology helps with COVID-19





The main technologies used to teach Robotics and Artificial Intelligence

○ Programming Languages



○ Tools & Technologies





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

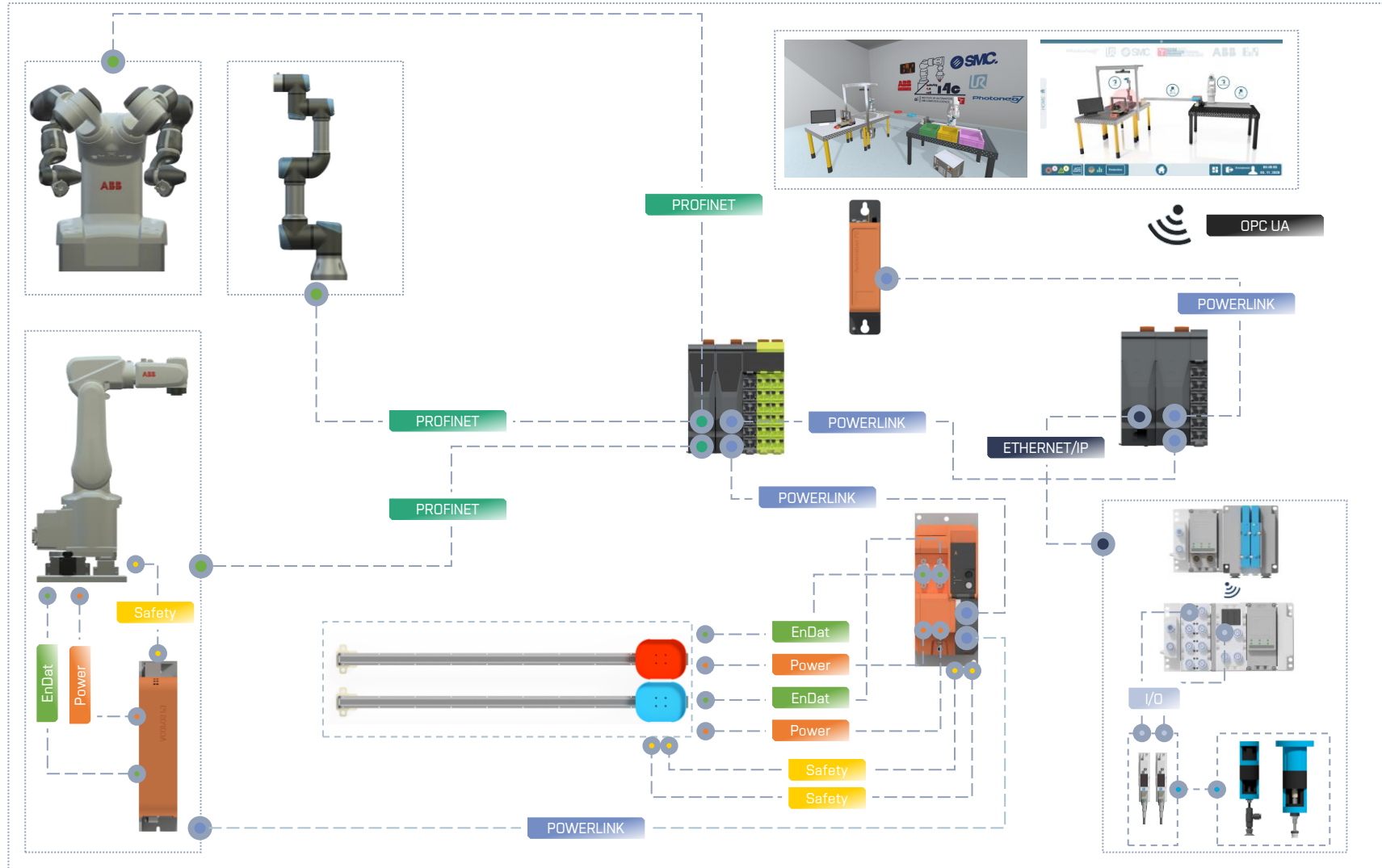


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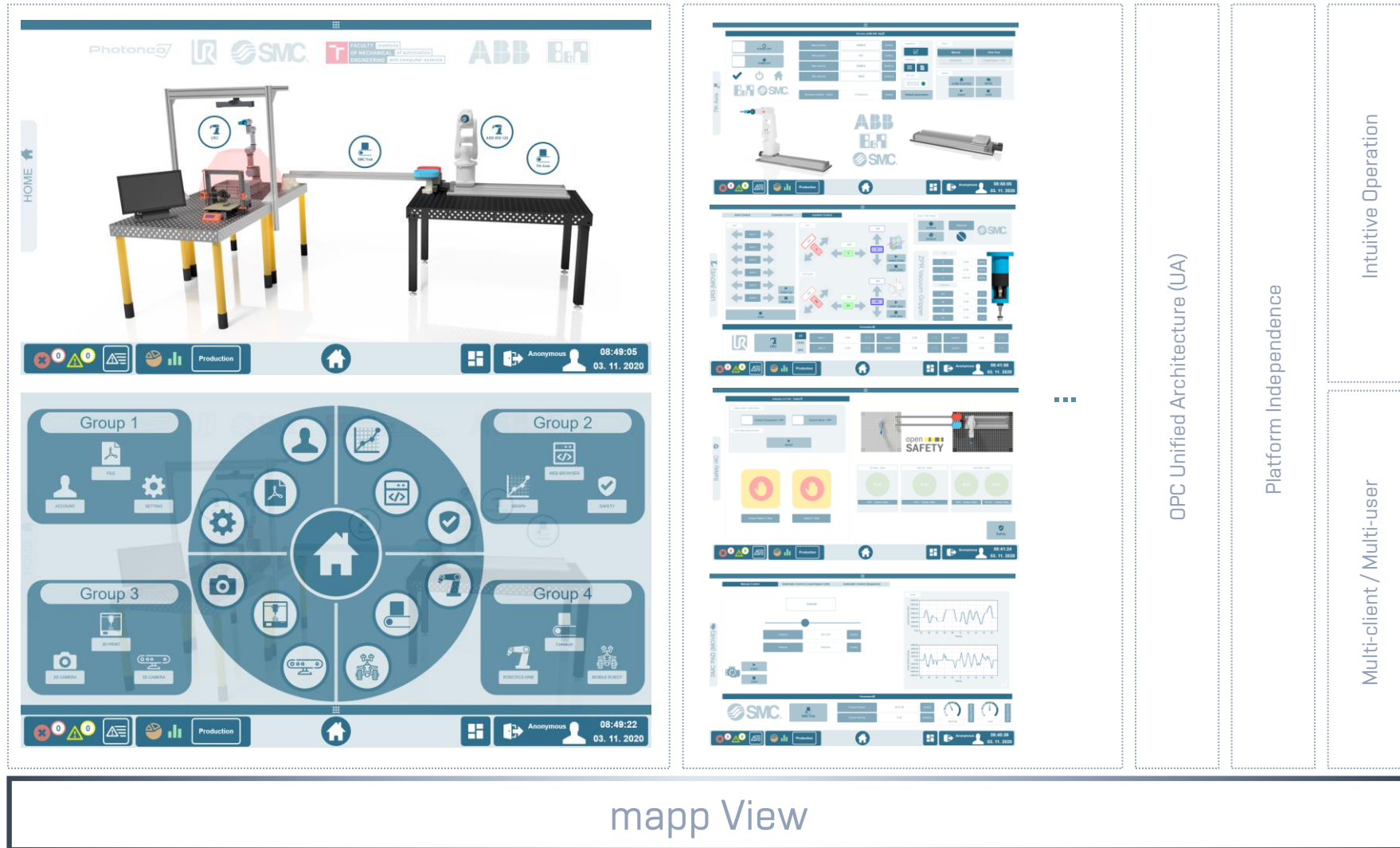
POWERLINK

PROFINET

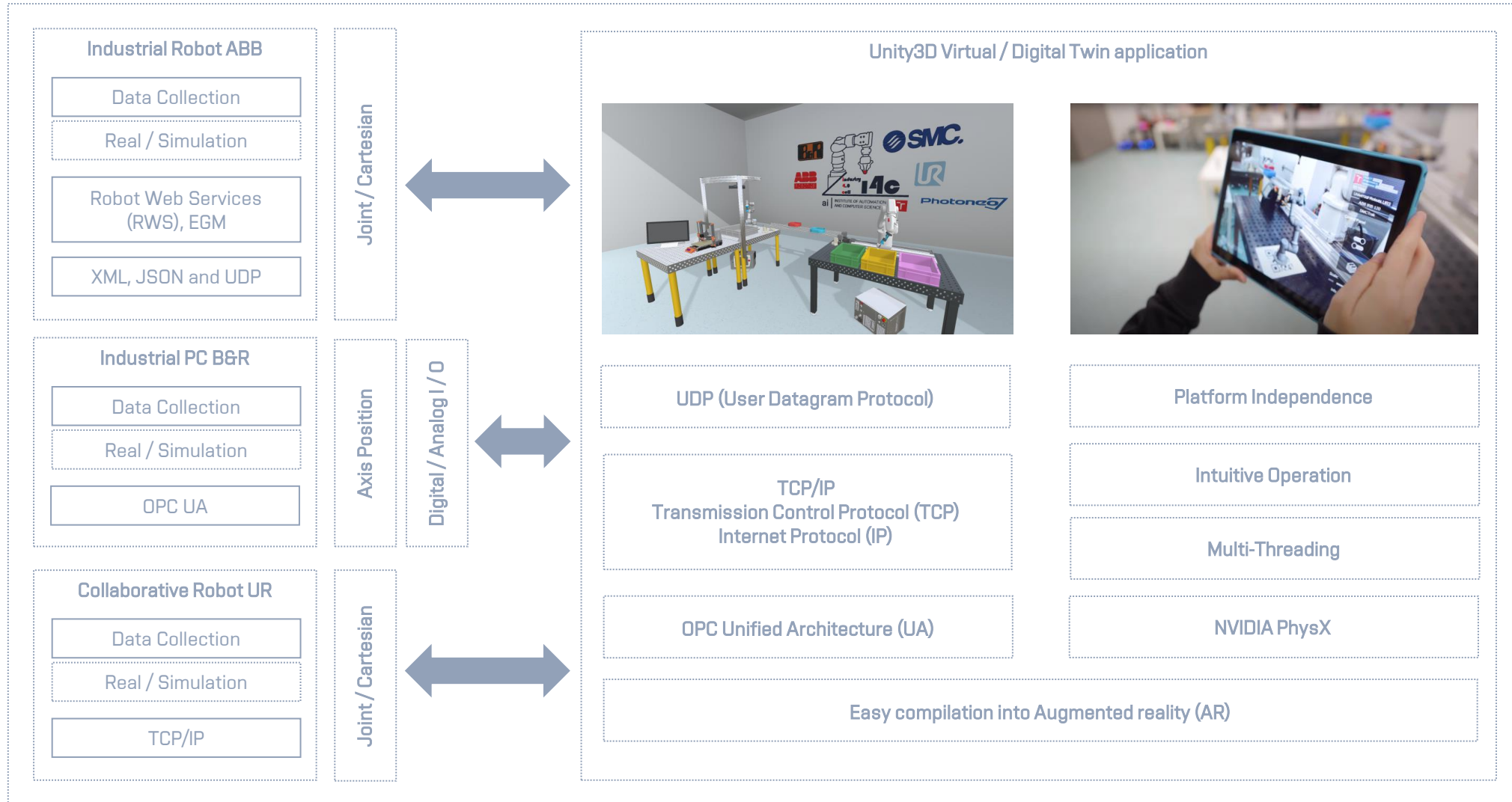
ETHERNET/IP

Digital/Analog I/O

OPC UA



mapp View





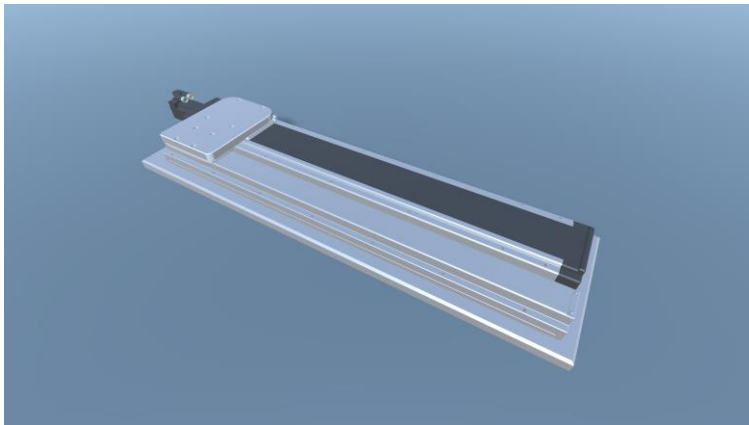
Industry 4.0 Cell: Sorting Line



B&R Automation ACOPOStrak



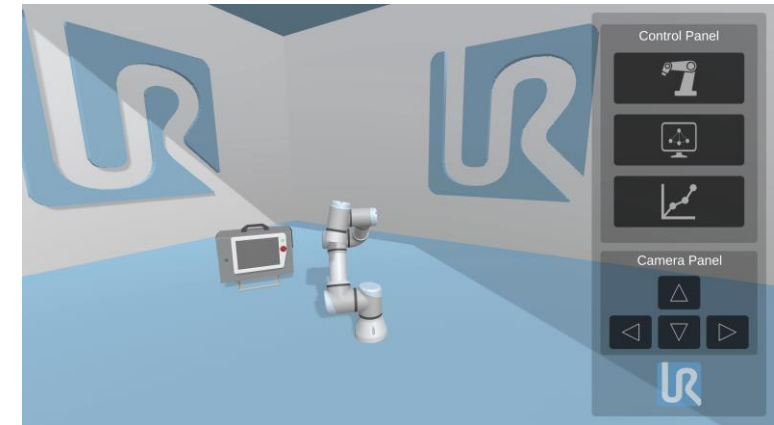
Industrial Robot ABB IRB 120



Simple Linear Axis (B&R Automation, SMC)



Sorting Machine (B&R Automation, SMC)



Collaborative Robot Universal Robots UR3

Vision of the Future



Contact

Contact:

Radomil Matousek
Director of Department



matousek@fme.vutbr.cz

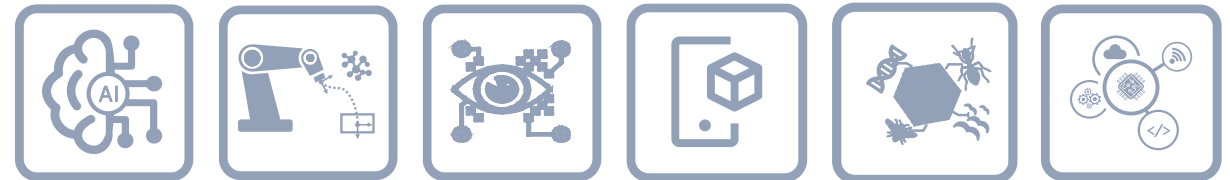
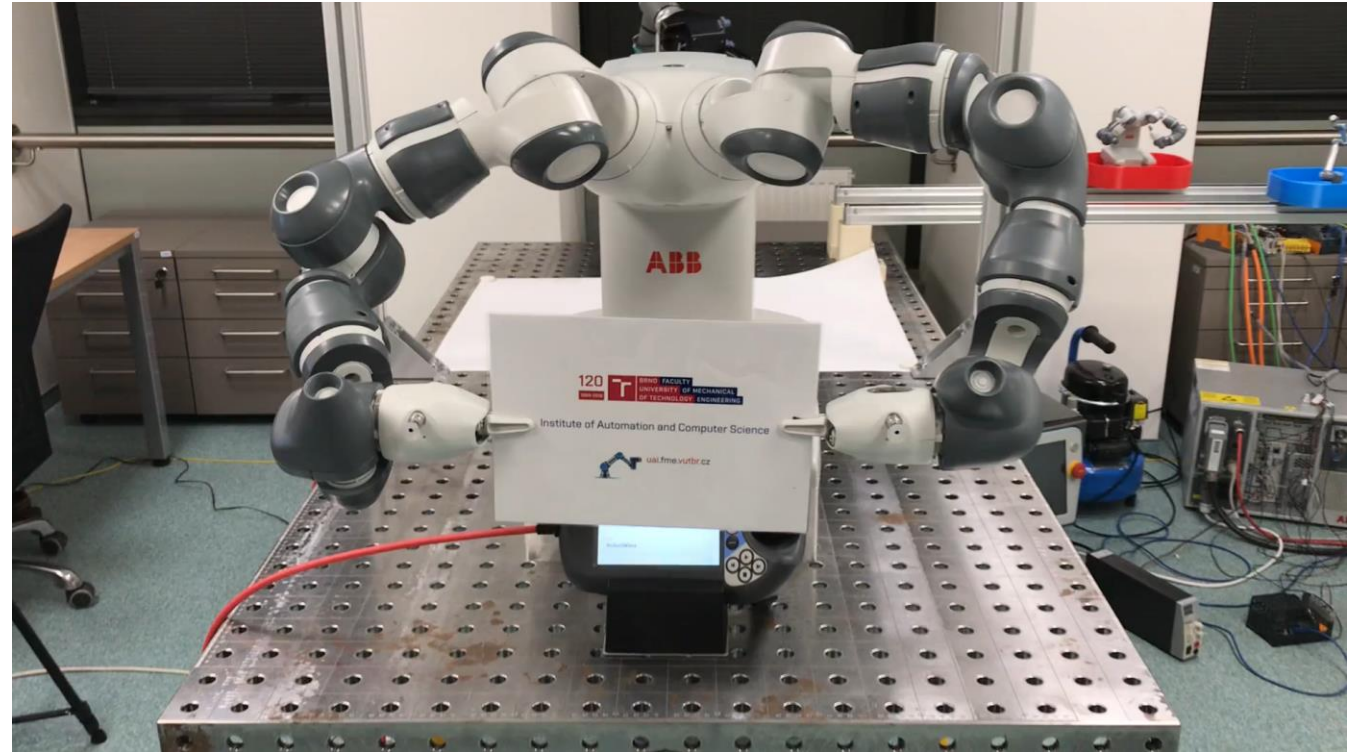
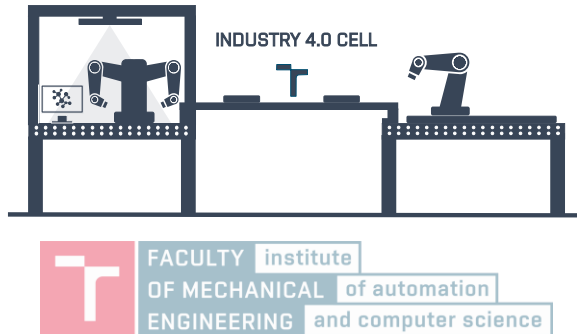
Roman Parak
Research and Development
(R&D)



Roman.Parak@vutbr.cz

Room:

A1/0642 (Technicka 2896/2, Brno 616 69, Czech Republic)



Thank You!



Questions?





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