Competence Center
Digital Manufacturing, Automation and Robotics

Technikum Digital Factory

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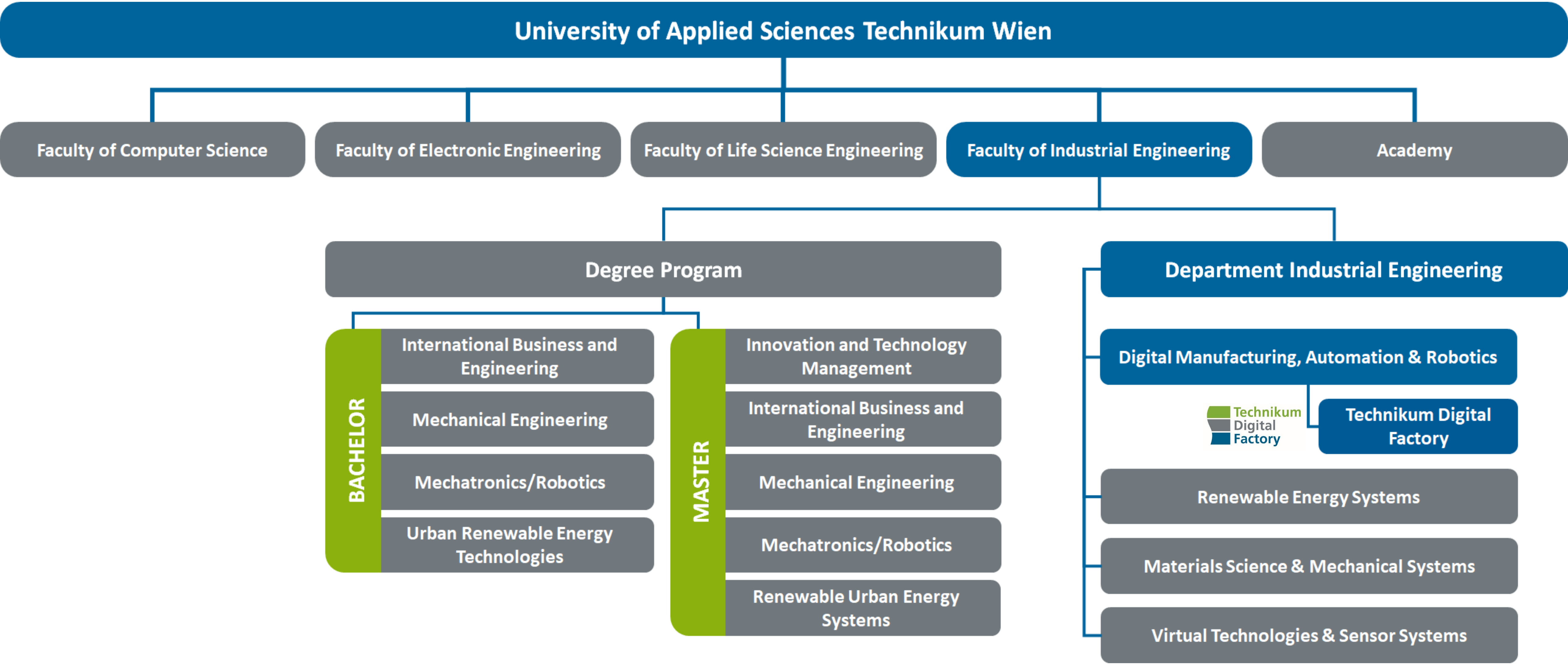
University of Applied Sciences Technikum Wien
Faculty of Computer Science
Faculty of Electronic Engineering
Faculty of Life Science Engineering
Faculty of Industrial Engineering
Academy
Degree Program
Department Industrial Engineering
BACHELOR
International Business and Engineering
Mechanical Engineering
Mechatronics/Robotics
Urban Renewable Energy Technologies
MASTER
Innovation and Technology Management
International Business and Engineering
Mechanical Engineering
Mechatronics/Robotics
Renewable Urban Energy Systems
Digital Manufacturing, Automation & Robotics
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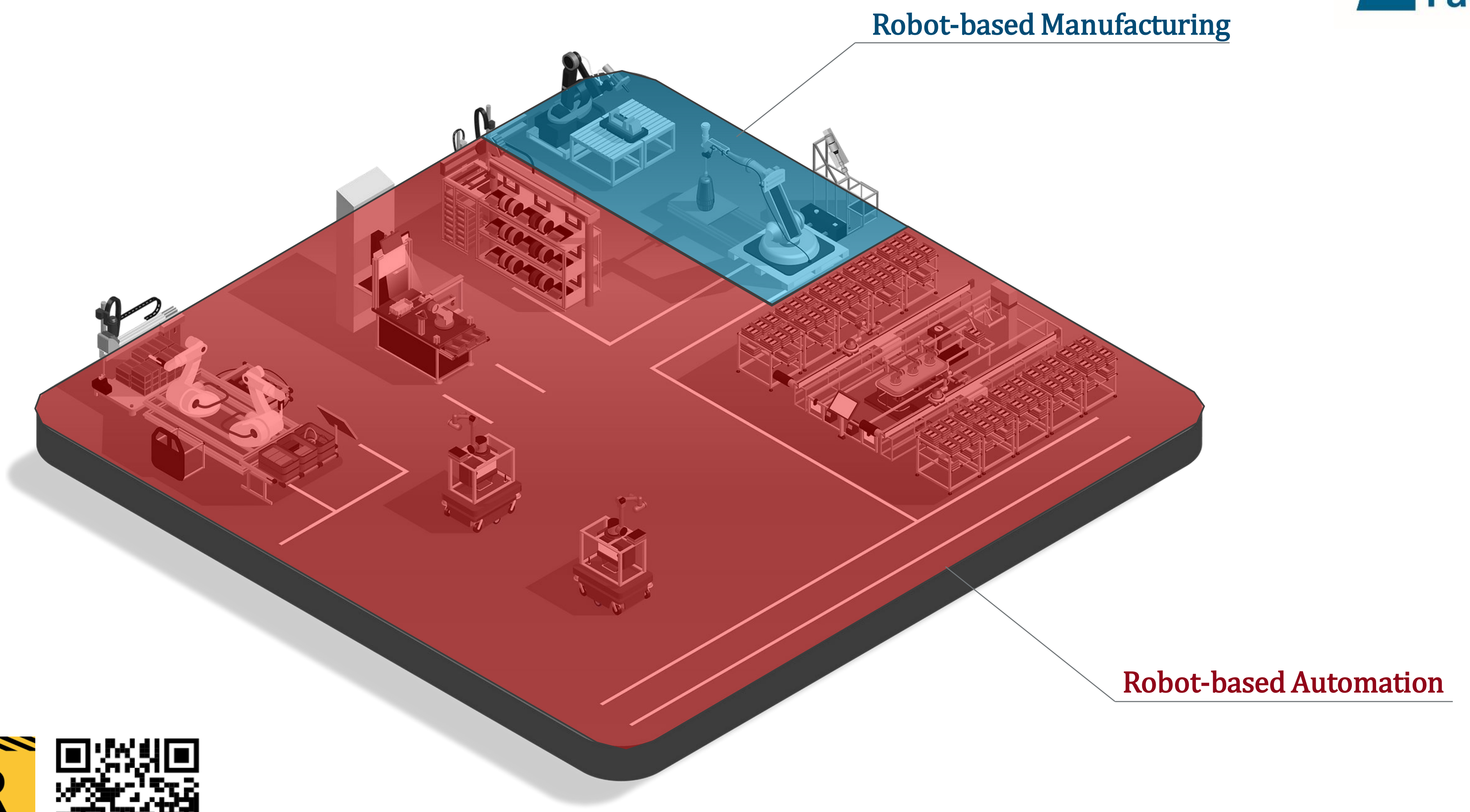
Renewable Energy Systems
Materials Science & Mechanical Systems
Virtual Technologies & Sensor Systems



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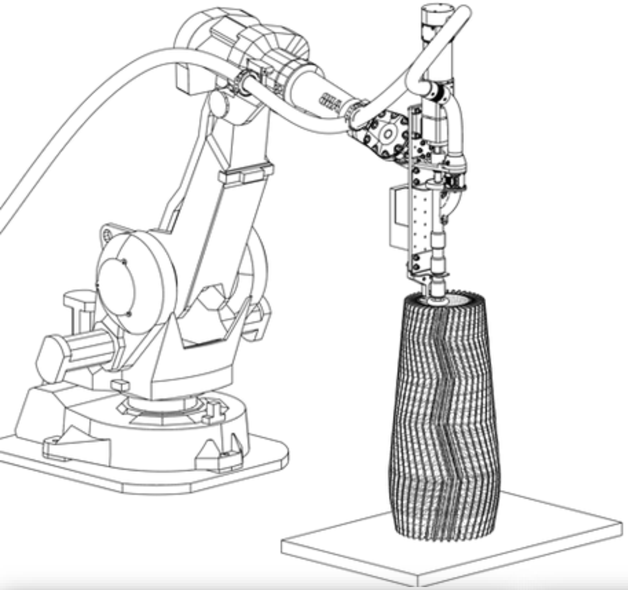
Robot-based Manufacturing

Additive Manufactuing

Robot Machining



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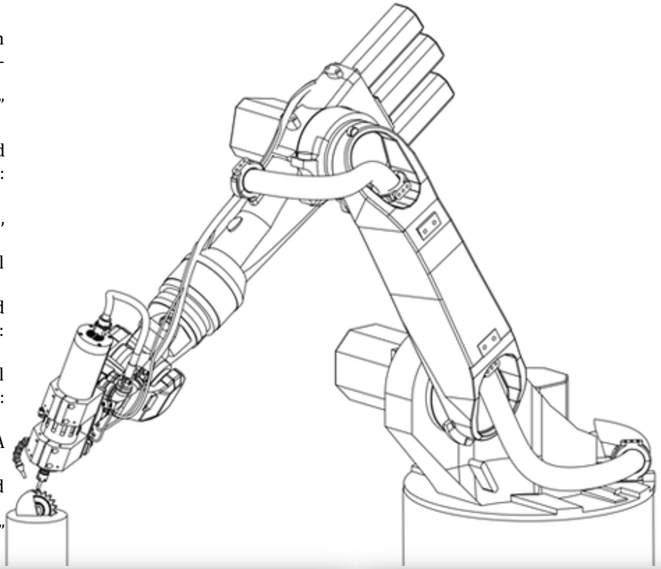
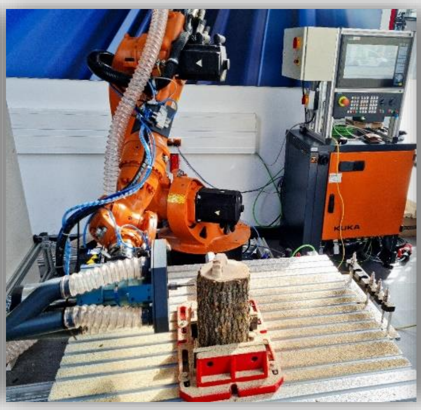
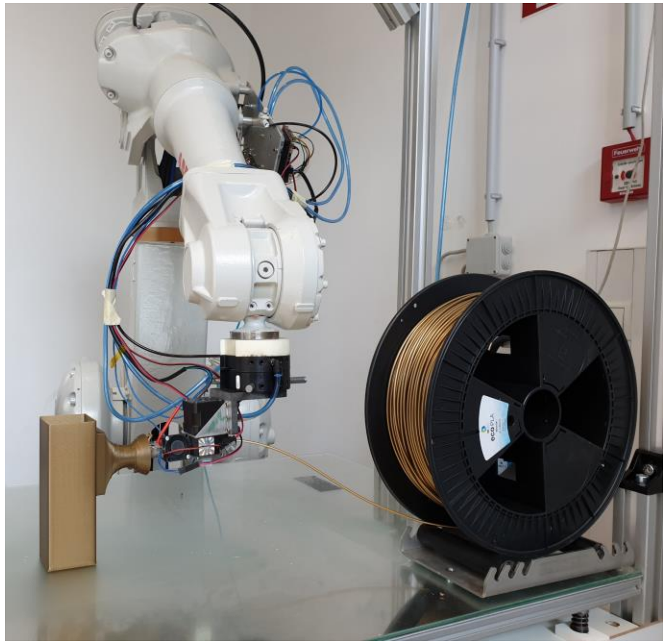


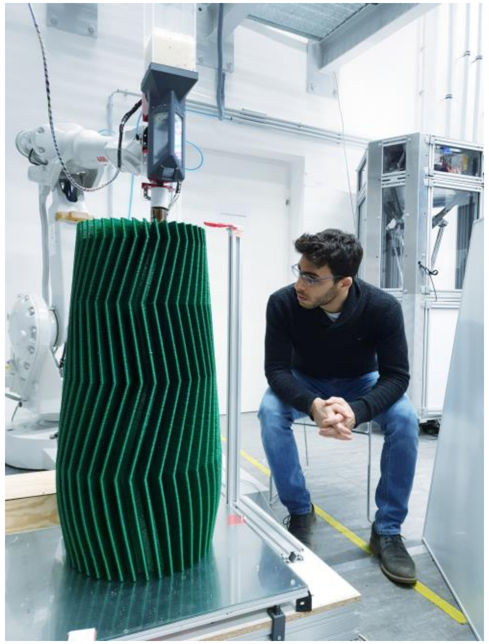


Robot-based Manufacturing - Additive Manufactuing - Use Cases

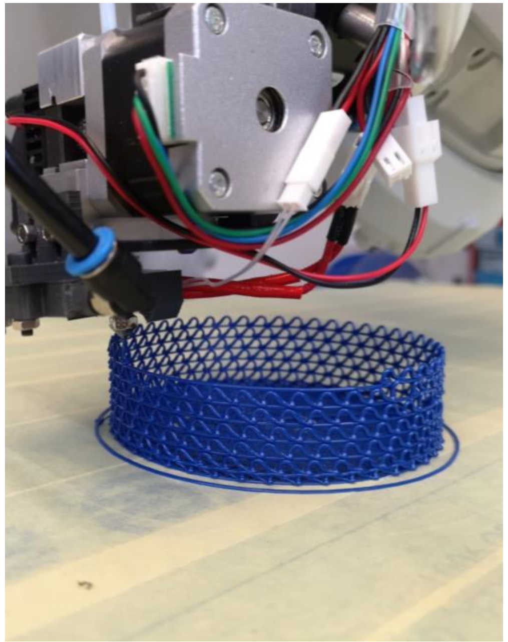
Support-free 3D printing



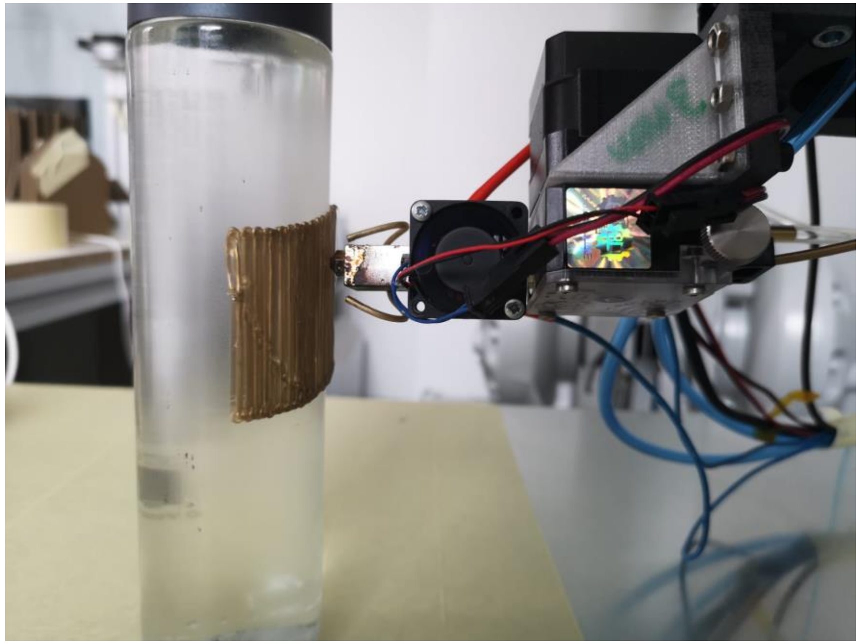
Oversized print



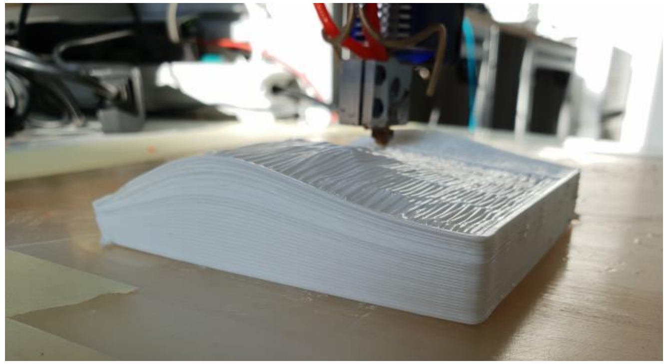
Freeform 3D printing



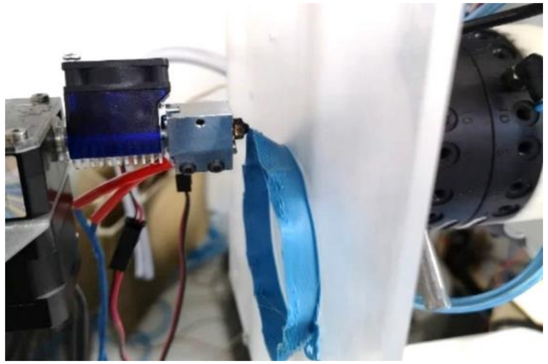
Printing on an uneven surface



Printing of non-planar layers



Inverted FFF printing



Robot-based Automation

Technikum Digital Factory

ABB BECKHOFF DEPRAG FANUC

FESTO KUKA PILZ ROBOTUNITS®

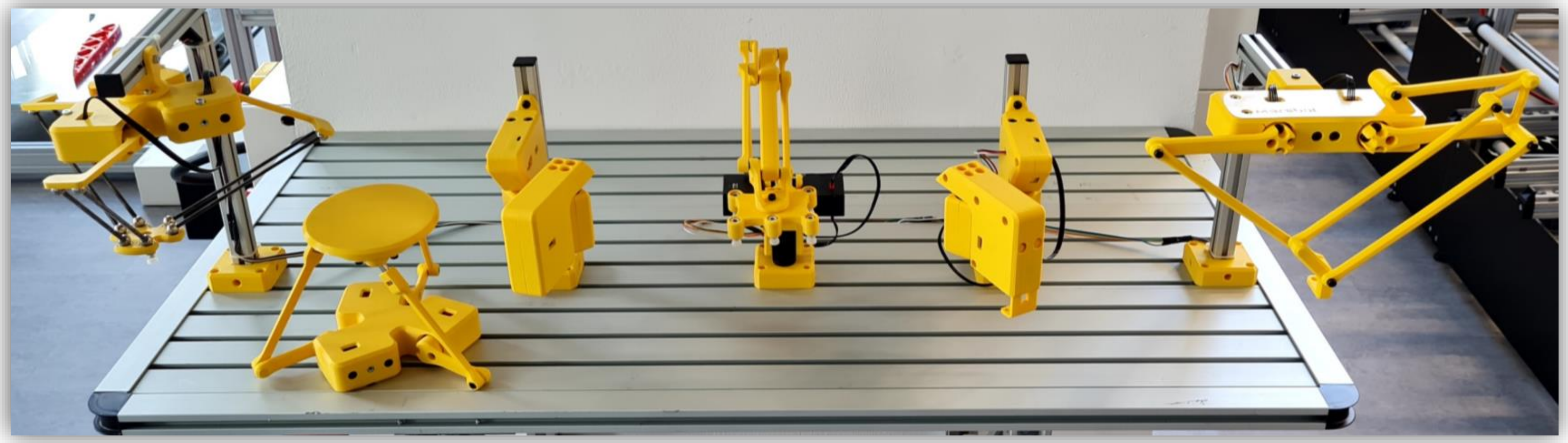
SMC® SIEMENS SICK Wittmann

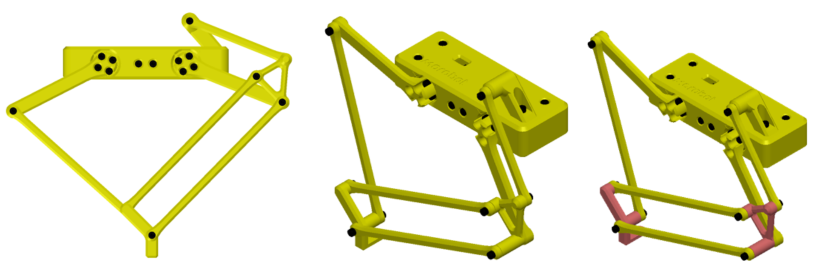
FFG Forschung wirkt.

MA23 Wirtschaft, Arbeit Statistik StaDt+Wien

Robotics in Education

- Basic functions of an industrial robot
- Miniaturized size
- Open hardware and software architecture
- Low-cost components and 3D printing



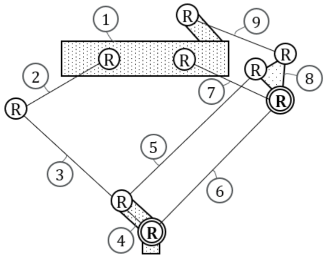


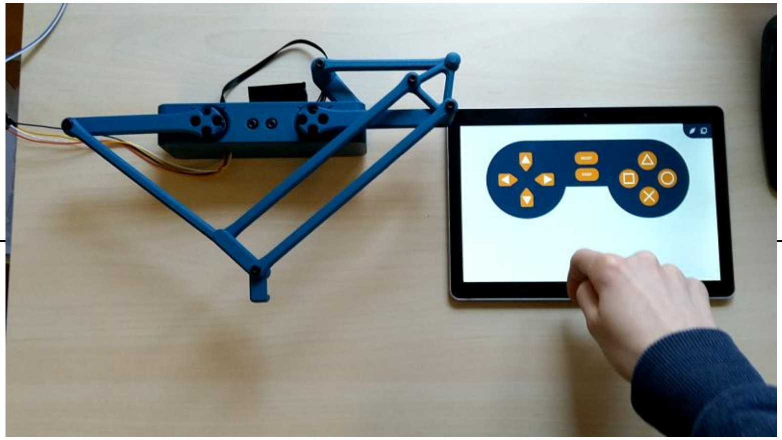
$$DOF = T(n-1-g) + \sum_{i=1}^{g} f_i$$

$$DOF = 3(9-1-11) + 11 = 2$$

n ... Anzahl der Glieder (inkl. Basis)
g ... Anzahl der Glenke
f_i ... Beweglichkeit des Gelenks
T ... Typ des Mechanismus

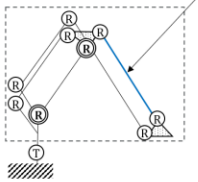
- T=3 für ebene Mechanismen (2D) oder sphärische Mechanismen
- T=6 für räumliche Mechanismen (3D)





Freiheitsgrade: Palettierroboter (hybride Struktur)

Die Orientierung des Endeffektors (ob Parallel zum Boden oder nicht) ist von der Länge dieses Glieds abhängig

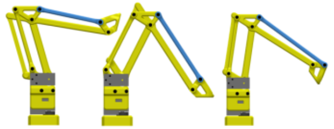


$$DOF_{ebene} = 2$$

$$DOF = T(n-1-g) + \sum_{i=1}^{g} f_i$$

$$DOF_{ebene} = 3(9-1-11) + 11 = 2$$

$$DOF = DOF_{ebene} + 1 = 3$$



n ... Anzahl der Glieder (inkl. Basis)
g ... Anzahl der Glenke
f_i ... Beweglichkeit des Gelenks
T ... Typ des Mechanismus

- T=3 für ebene Mechanismen (2D) oder sphärische Mechanismen
- T=6 für räumliche Mechanismen (3D)

4.2. Übung 2: morobot-2d

Verwenden Sie den Roboter, die Plattform (siehe Abbildung 11) und das zur Verfügung gestellte Bedienpanel um das Objekt aufzunehmen und an den markierten Punkten abzulegen. Nehmen Sie den Roboter in Betrieb und setzten Sie die Aufgabenstellung um. Versuchen Sie im Anschluss an die Übung folgende Fragen zu beantworten:

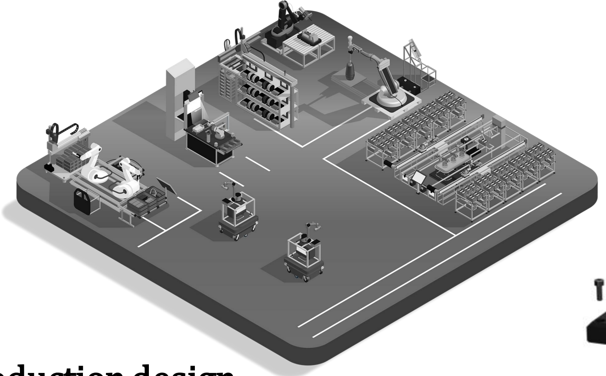
Abbildung 11: Übungsstation DELTA 2D Roboter - morobot-2d

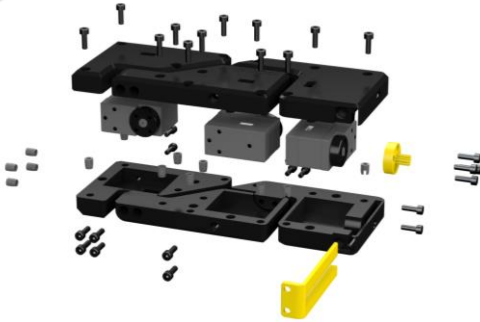
Wie viele Gelenke sind in der Roboterstruktur verbaut?
Wie viele Glieder besitzt der Roboter?
Wie groß ist der Arbeitsraum dieser Roboterstruktur?
Wie viele Achsen besitzt dieser Roboter?
Führen diese Achsen Translations- oder Rotationsbewegungen aus?
Welcher Endeffektor ist verbaut?

Recherchieren Sie über weitere exotische Roboterbauformen. Hersteller, Anwendungen, Eigenschaften, Merkmale, Payload, Achsen, etc.

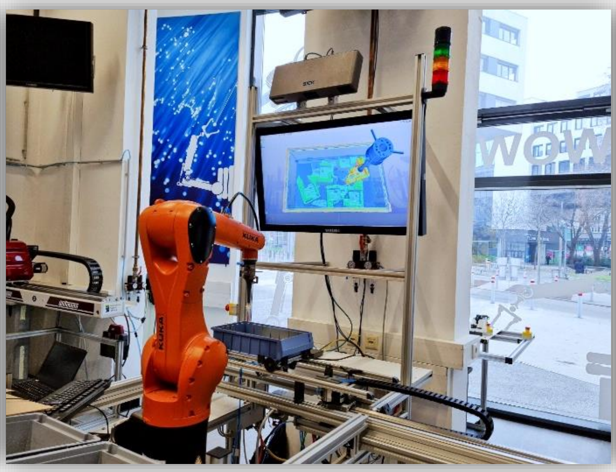
Technikum Digital Factory

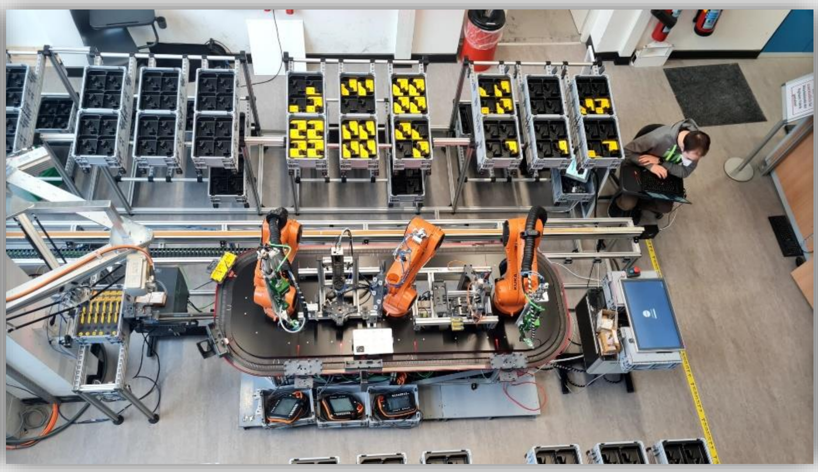
- Technikum Digital Factory – "Robots are made by robots"
  - Meaningful production environment for research
  - Investigation of technologies for the (digital) future of production
  - The main focus is on researching requirements for changeable, efficient and intelligent production design





Manufacturing	Bin picking	Transport	Order picking	Assembly	Transport	Packaging
3D printing island for manufacturing the structural part of the morobots	Storing the structural parts of the morobots	Transport of parts using mobile manipulation	Picking according to product configuration	Assembling the components to the configured morobot	Transport of parts using mobile manipulation	Packing of the assembled and quality tested morobot





Manufacturing	Bin picking	Transport	Order picking	Assembly	Transport	Packaging
3D printing island for manufacturing the structural part of the morobots	Storing the structural parts of the morobots	Transport of parts using mobile manipulation	Picking according to product configuration	Assembling the components to the configured morobot	Transport of parts using mobile manipulation	Packing of the assembled and quality tested morobot

morobot

FH University of Applied Sciences TECHNIKUM WIEN

Manufacturing

3D printing island for manufacturing the structural part of the morobots

Bin picking

Storing the structural parts of the morobots

Transport

Transport of parts using mobile manipulation

Order picking

Picking according to product configuration

Assembly

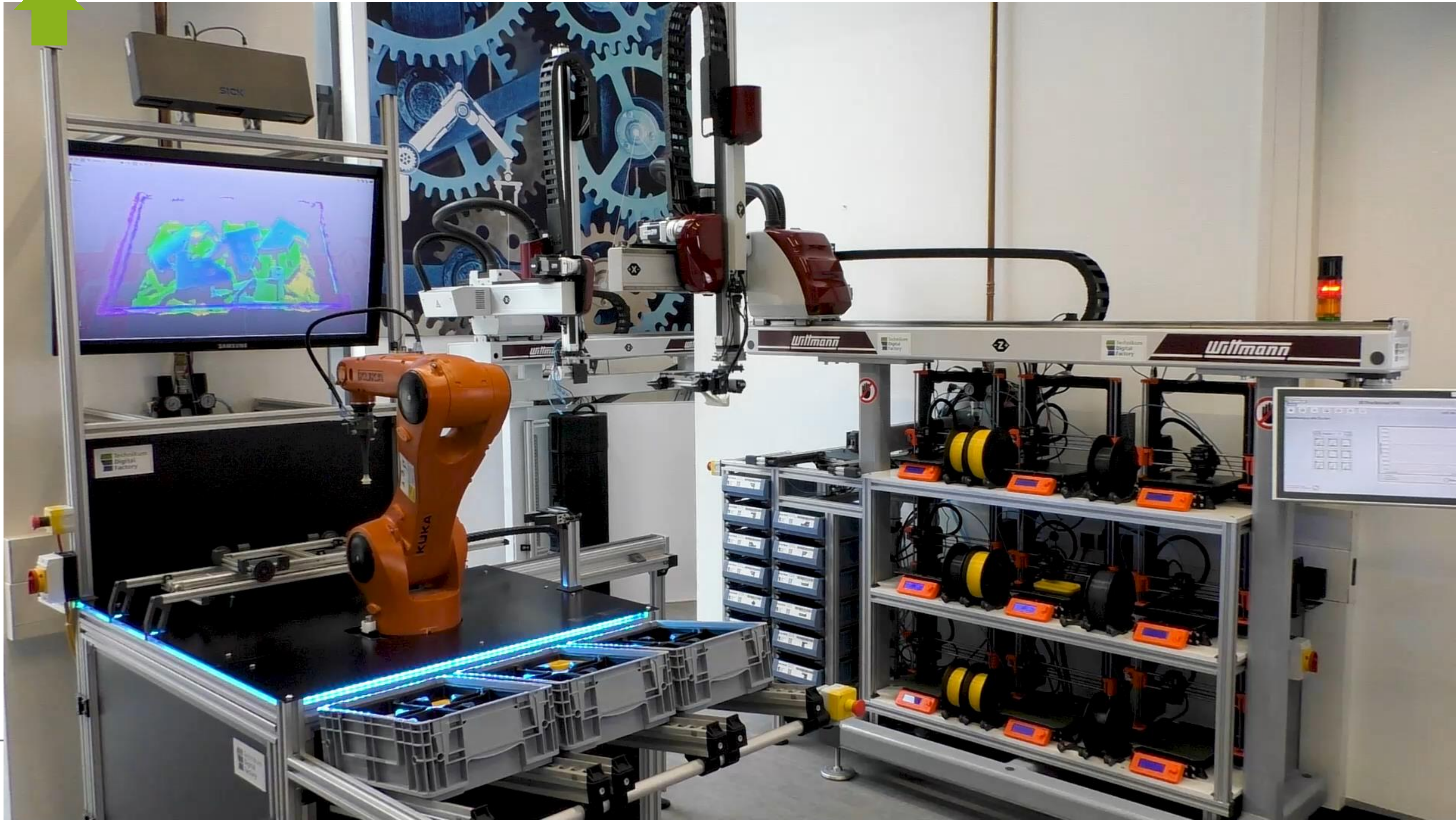
Assembling the components to the configured morobot

Transport

Transport of parts using mobile manipulation

Packaging

Packing of the assembled and quality tested morobot



Manufacturing

3D printing island for manufacturing the structural part of the morobots

Bin picking

Storing the structural parts of the morobots

Transport

Transport of parts using mobile manipulation

Order picking

Picking according to product configuration

Assembly

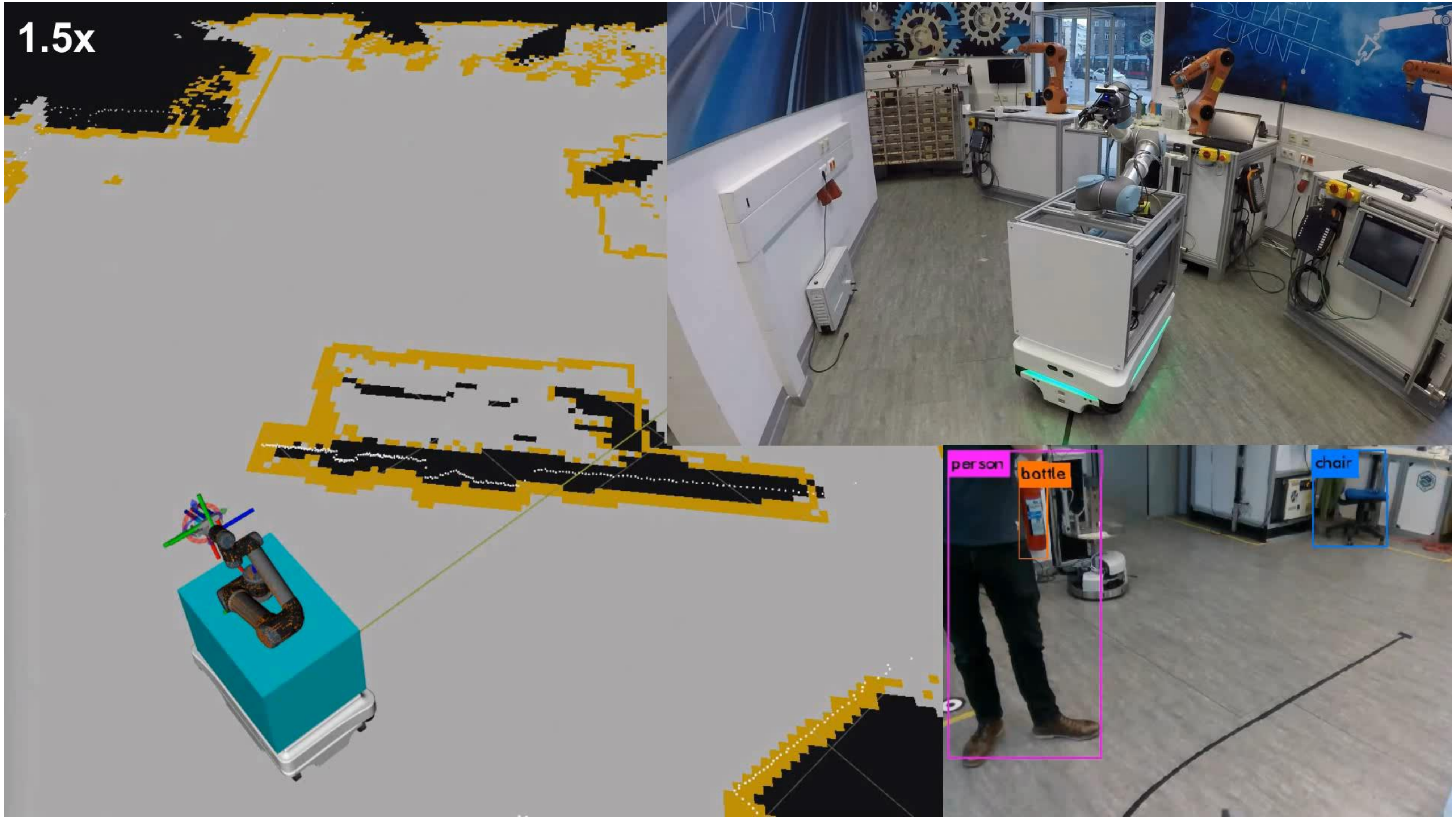
Assembling the components to the configured morobot

Transport

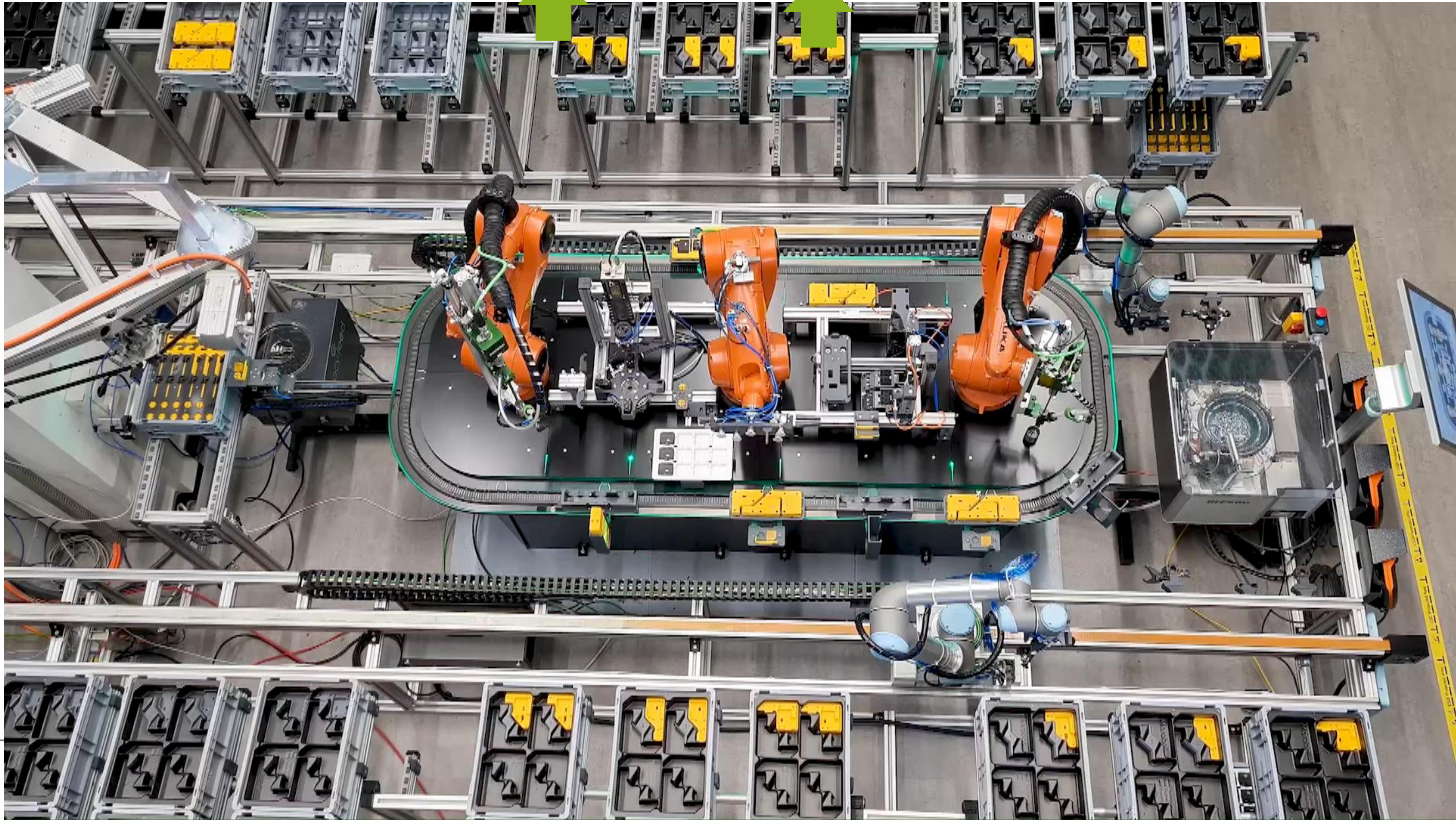
Transport of parts using mobile manipulation

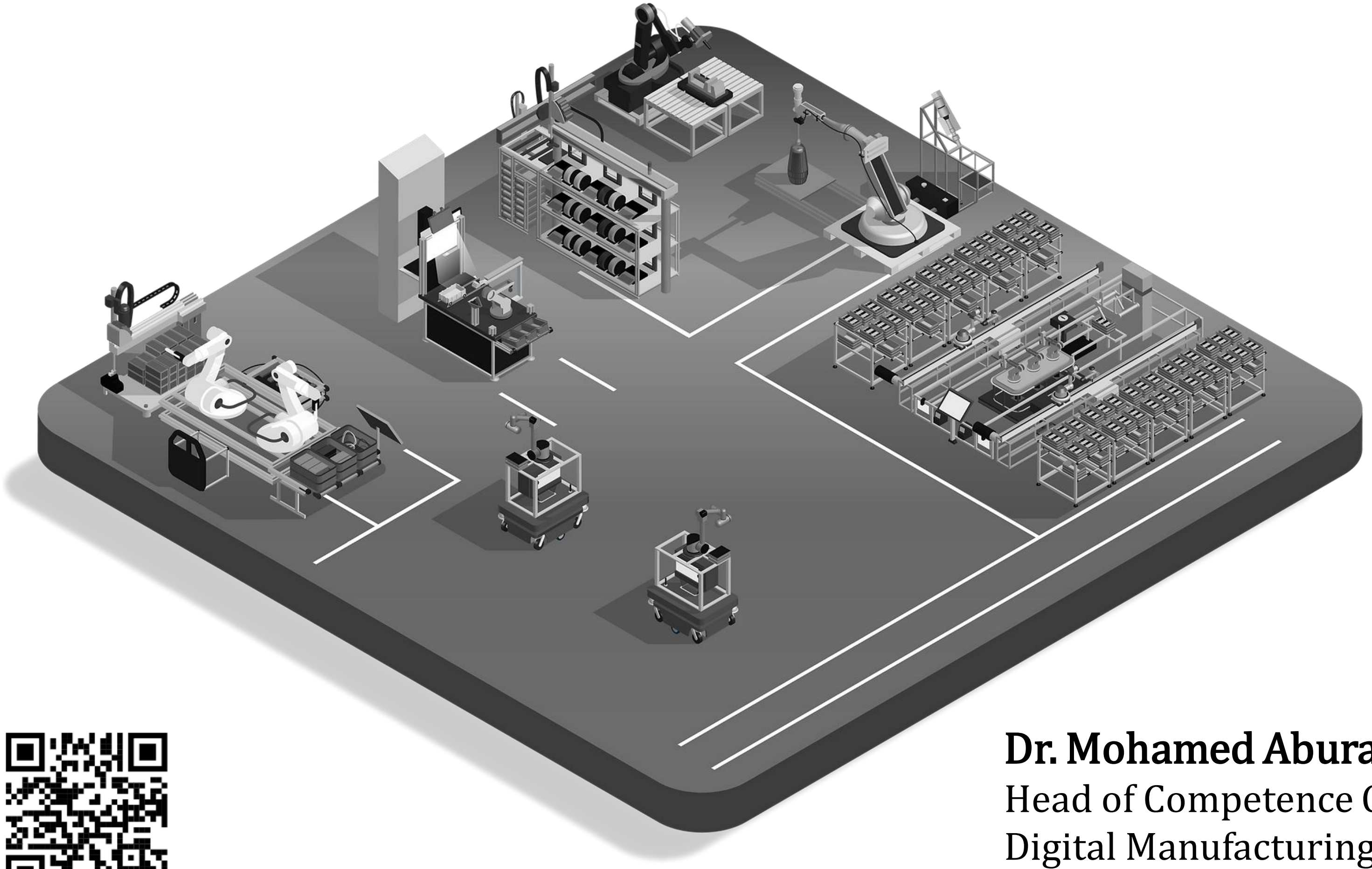
Packaging

Packing of the assembled and quality tested morobot


1.5x
person
bottle
chair

Manufacturing	Bin picking	Transport	Order picking	Assembly	Transport	Packaging
3D printing island for manufacturing the structural part of the morobots	Storing the structural parts of the morobots	Transport of parts using mobile manipulation	Picking according to product configuration	Assembling the components to the configured morobot	Transport of parts using mobile manipulation	Packing of the assembled and quality tested morobot





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