

Laboratory for Manufacturing Systems and Automation

Department of Mechanical Engineering and Aeronautics

University of Patras, Greece

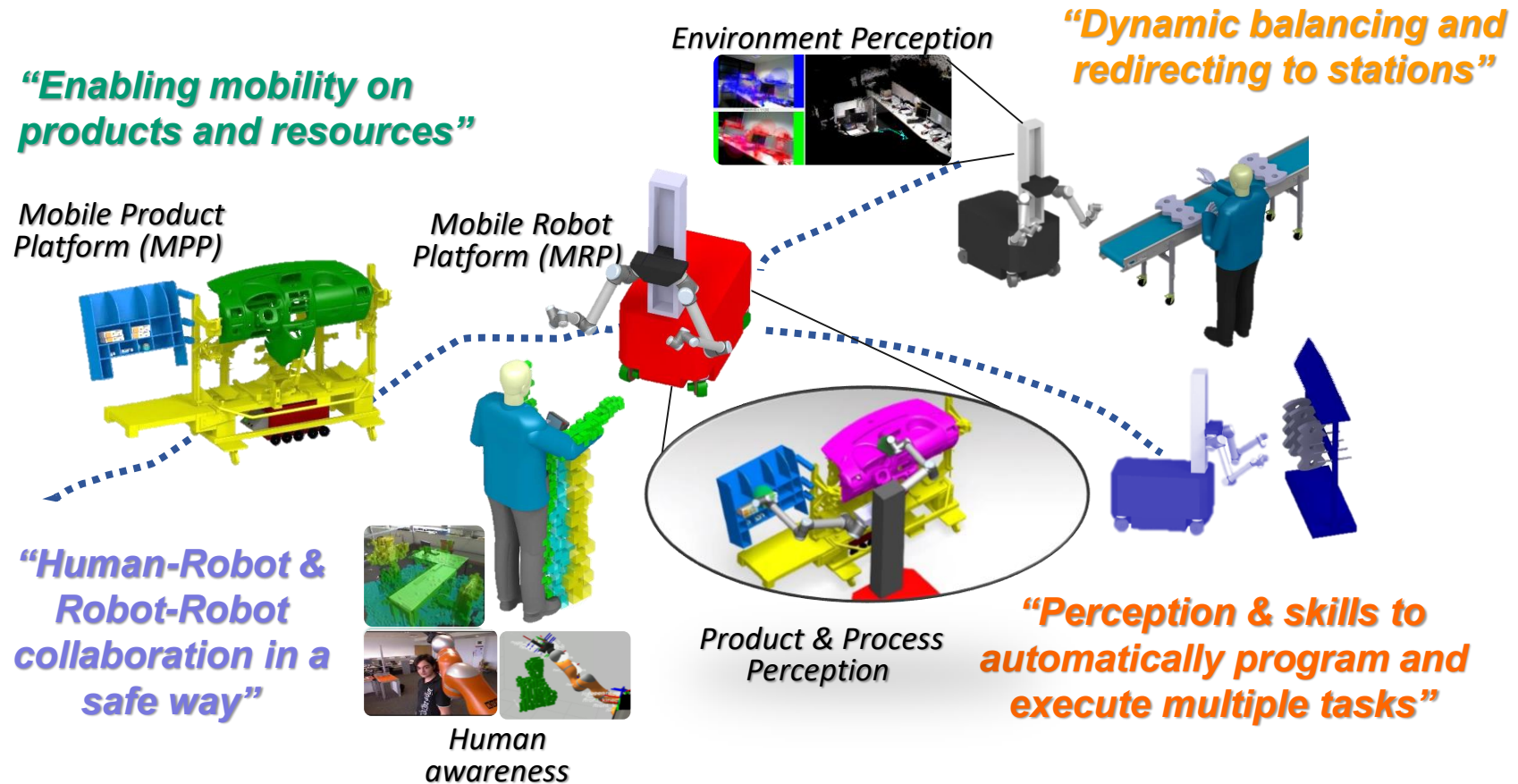


AI enabled task allocation for smart logistics operations using flexible mobile robots

MSc. Niki Kousi

ERF 2019, March 20, 2019, Bucharest

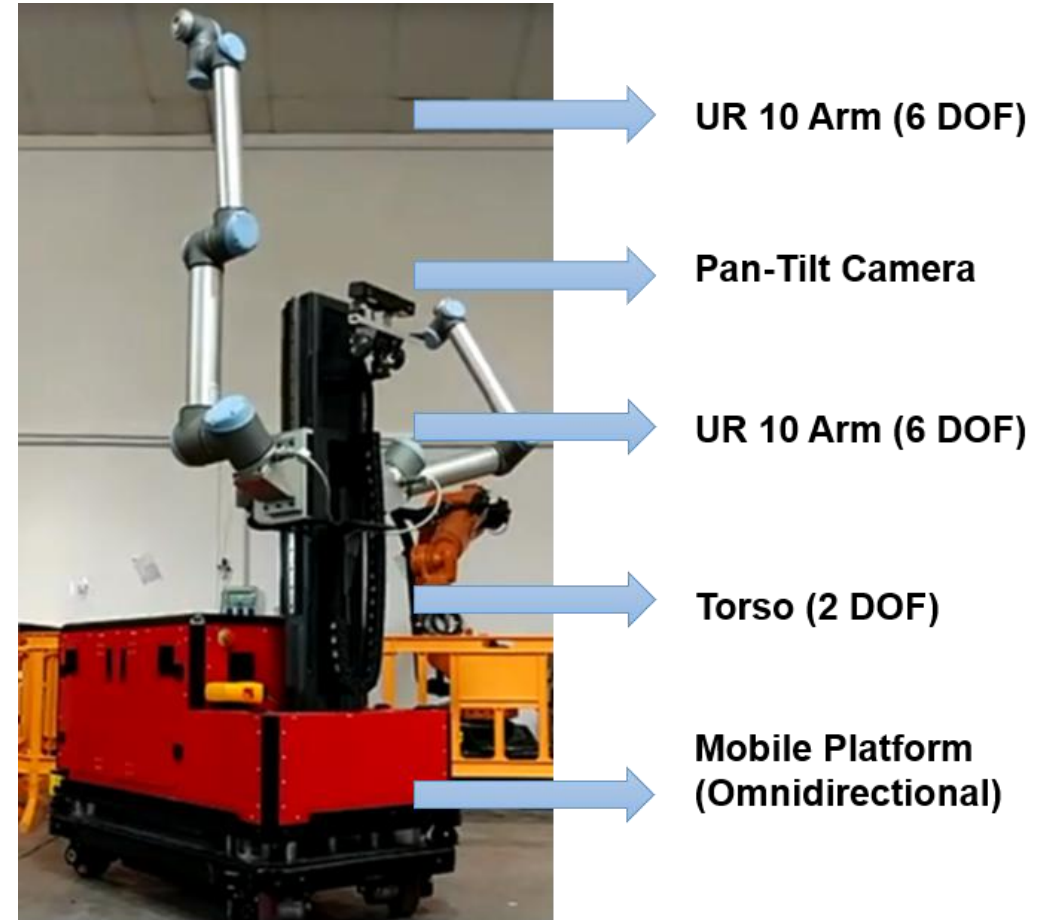
Dynamic reconfigurable shopfloors



[Link to YouTube Video](#)

Mobile Robot Platform (MRP)

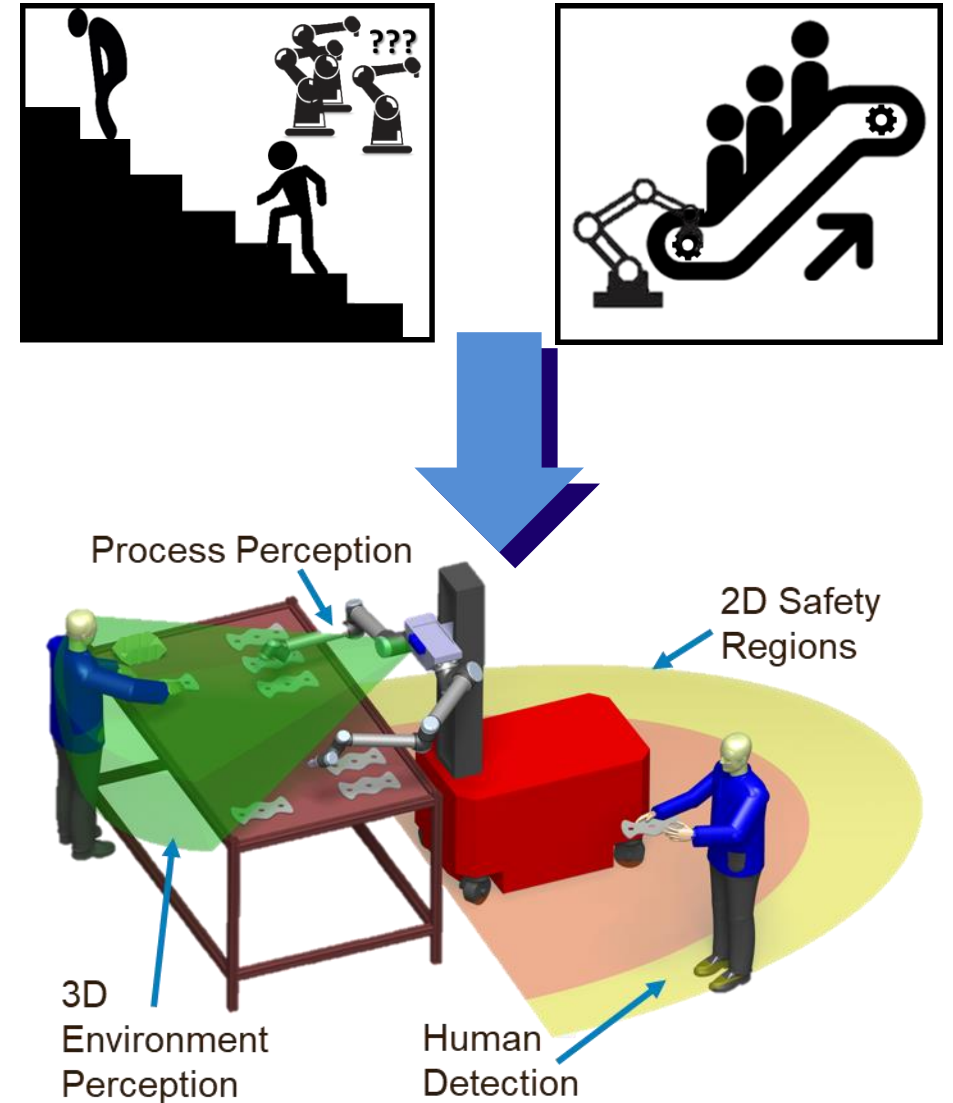
- ✓ **Autonomous navigation** across the shopfloor **in a safe way**
- ✓ **Perform a variety of tasks** using on-board tooling
- ✓ **Dual arm manipulation** enhancing dexterity
- ✓ Collaborate with humans **acting as assistant** to them
- ✓ Collaborate with **other mobile resources** through share perception



Challenges

Mobile dual arm workers acting as assistants to humans are in the forefront of research agenda for industrial applications in EU manufacturing

- Existing challenges
 - Safety issues for removing fences
 - Accuracy in navigation / localization
 - Easy programming techniques
 - Intuitive interaction mechanisms
 - Monitoring and control of execution



Challenges

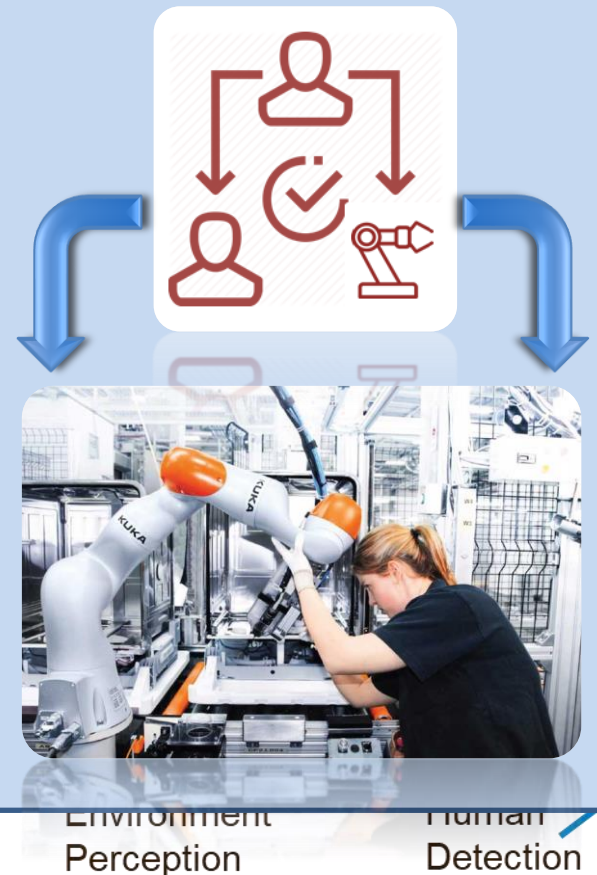
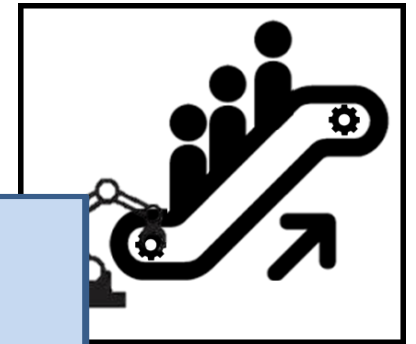
Mobile dual arm workers acting as assistants to humans are in the forefront of research agenda for industrial applications.

- Existing challenges

- Safety issues
- Accuracy in
- Easy program
- Intuitive inte
- Monitoring a

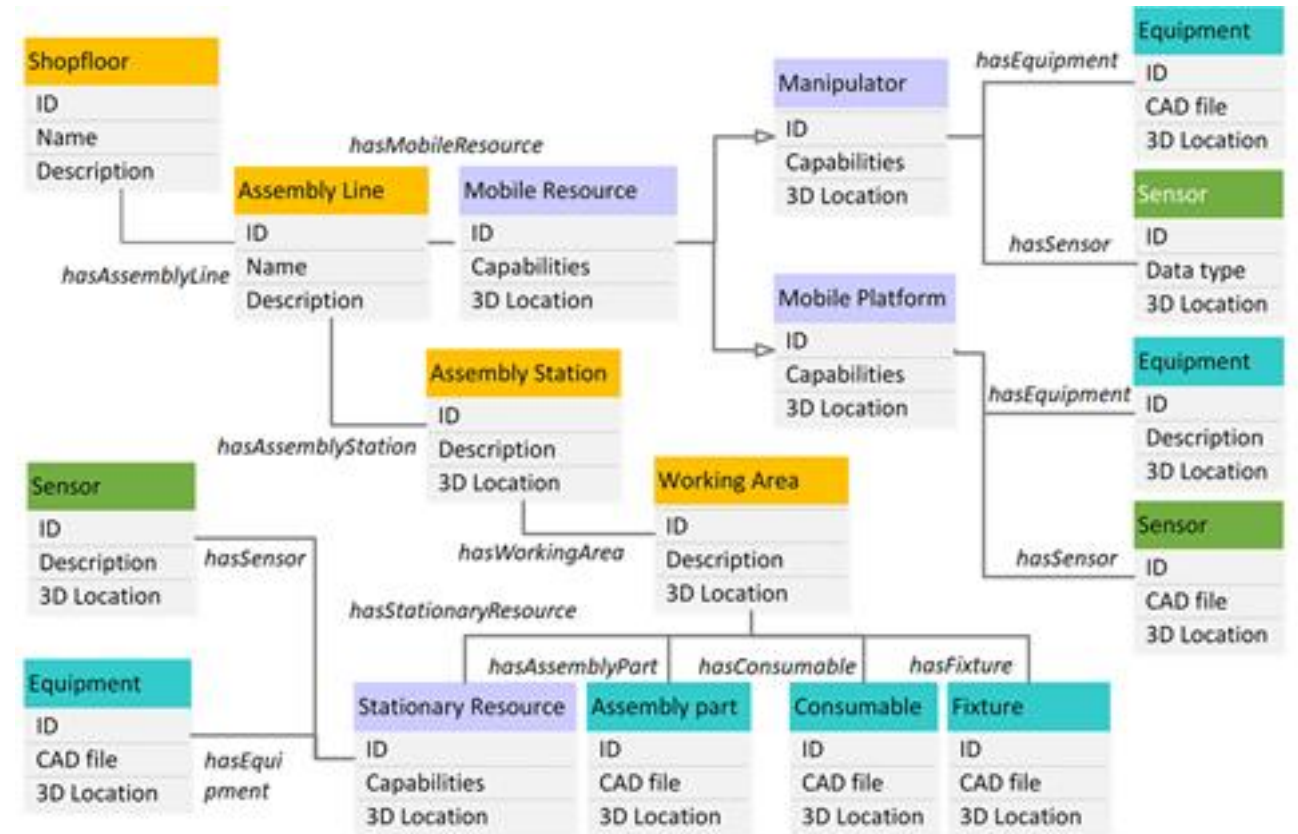
Thus, in this topic the focus is on **HOW:**

- ✓ To model this dynamically changing environment
- ✓ To distribute the task to the available resources
- ✓ To ensure collision free paths and arm motions

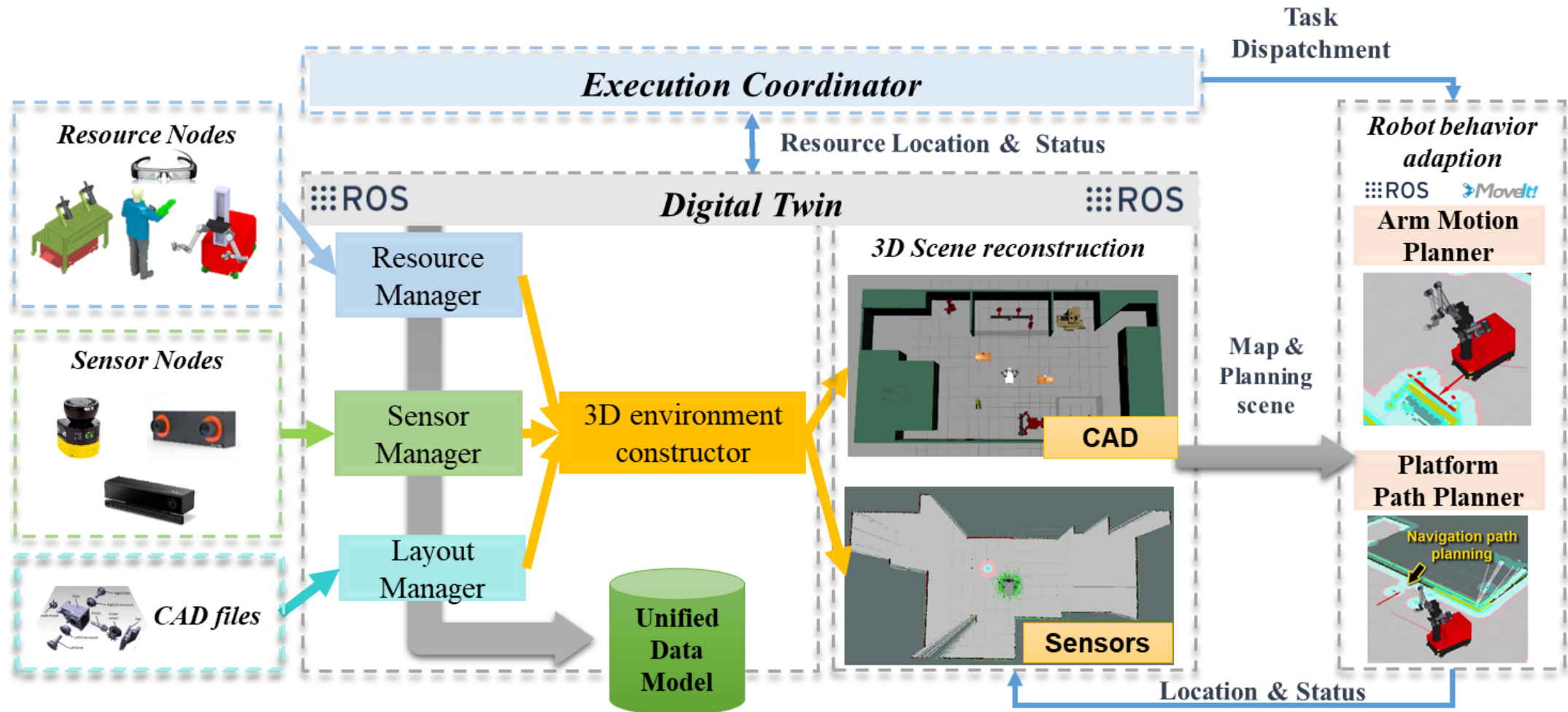


How to model and (re)-distribute the tasks to the resources?

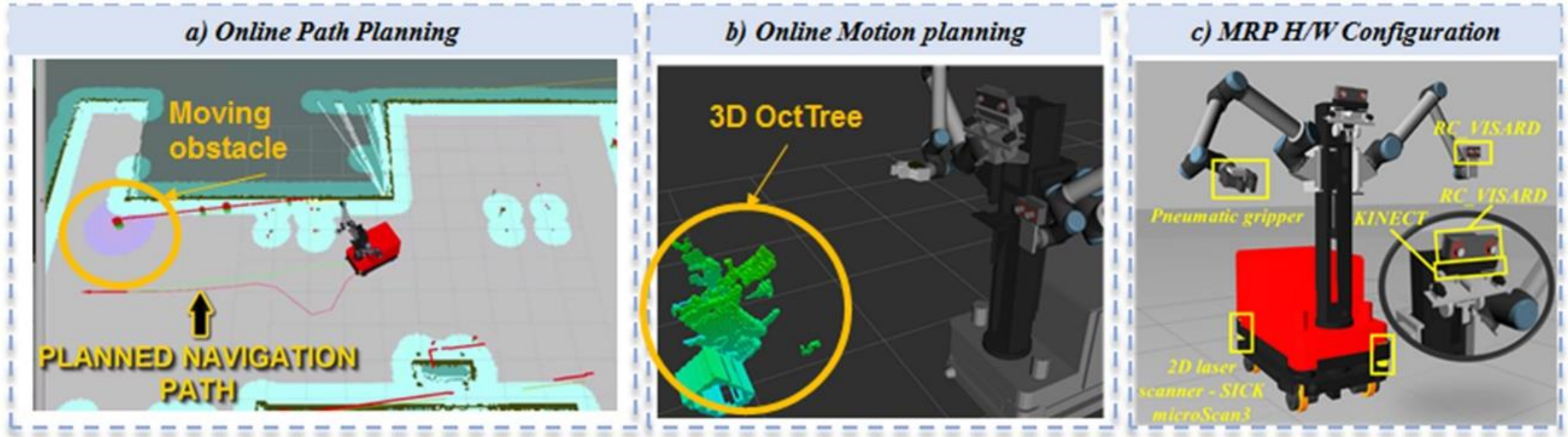
- ✓ **Hierarchical modelling** of the shopfloor / process
- ✓ **Resources suitability** assessment
- ✓ **Intelligent** – search based – **multi - criteria** decision making
- ✓ Digital world model based dynamic robot programming
- ✓ Alternative scenarios assessment based on **real time shopfloor data**



How to enable collision free robot behaviour?



Outcome and Conclusions



Acknowledgements



**Mobile dual arm robotic workers
with embedded cognition for hybrid
reconfigurable manufacturing systems**

<http://www.thomas-project.eu>



LMS

*Laboratory for
Manufacturing Systems
& Automation*

Project Coordinator Contact

MSc Niki Kousi

Laboratory for Manufacturing
Systems and Automation (LMS)

E-Mail: kousi@lms.mech.upatras.gr



This research has been partially supported by the research EU H2020 project “THOMAS - Mobile dual arm robotic workers with embedded cognition for hybrid and dynamically reconfigurable manufacturing systems”
(Grant Agreement: 723616) funded by the European Commission.





Thank you for your attention!
Questions?

**Laboratory for Manufacturing Systems &
Automation (LMS)**

University of Patras, Greece

www.lms.mech.upatras.gr