

Laboratory for Manufacturing Systems and Automation - LMS

Factories of the Future Community Day 2018

27 June 2018



Dexterous manipulation using mobile dual arm robots

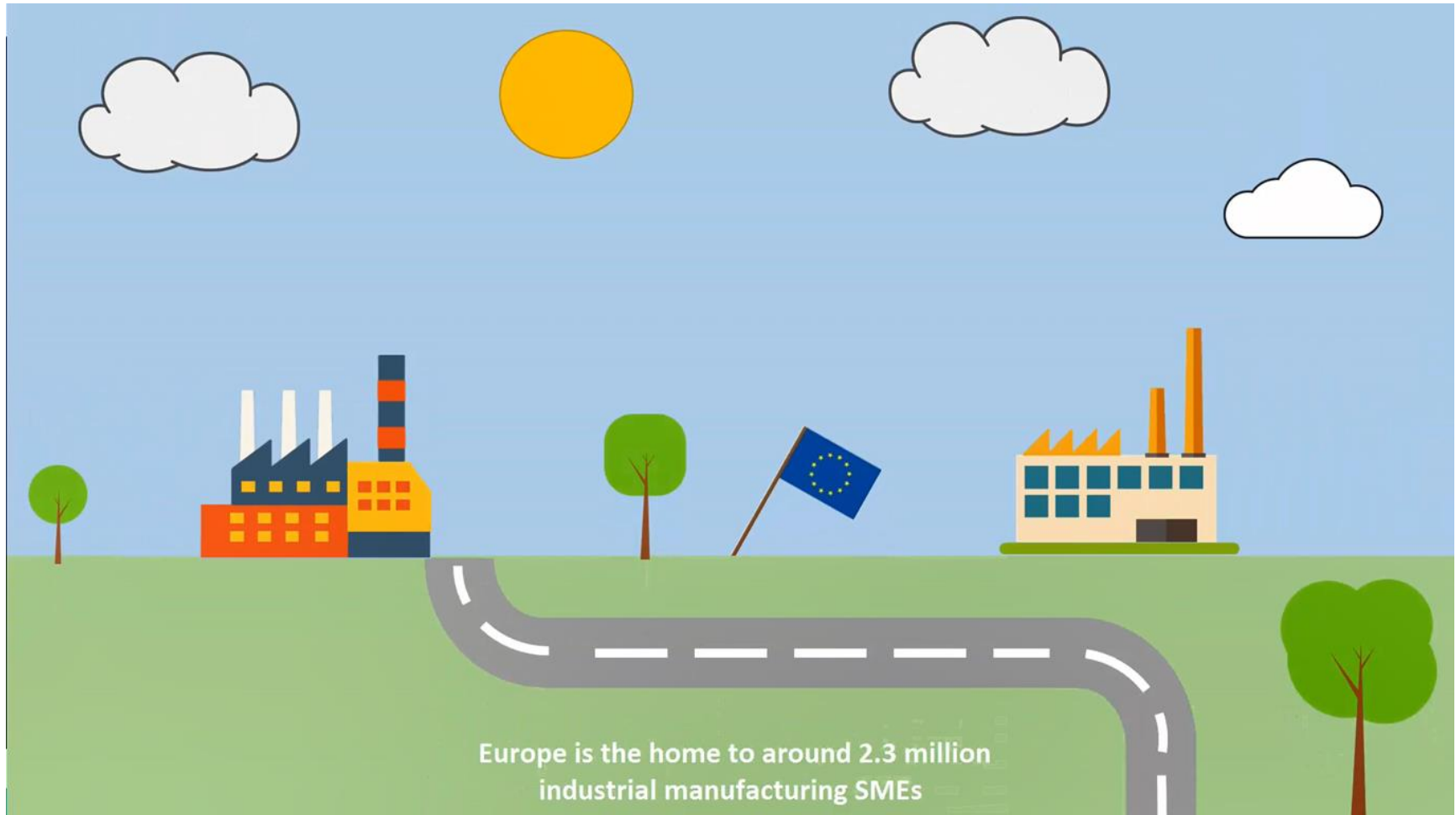
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Laboratory for Manufacturing Systems and Automation
University of Patras



Current Industrial Practice & Motivation



[Link to THOMAS Main Concept video](#)

“Enabling mobility on products and resources”

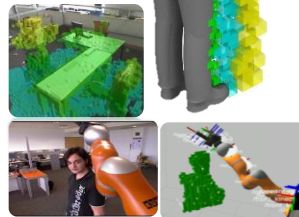
Mobile Product Platform (MPP)

Mobile Robot Platform (MRP)

Environment Perception

“Dynamic balancing and redirecting to stations”

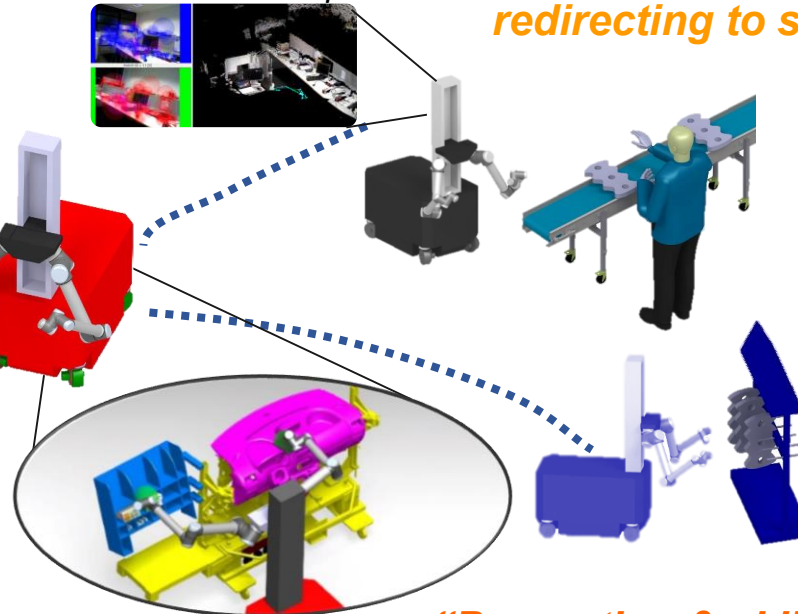
“Human-Robot & Robot-Robot collaboration in a safe way”



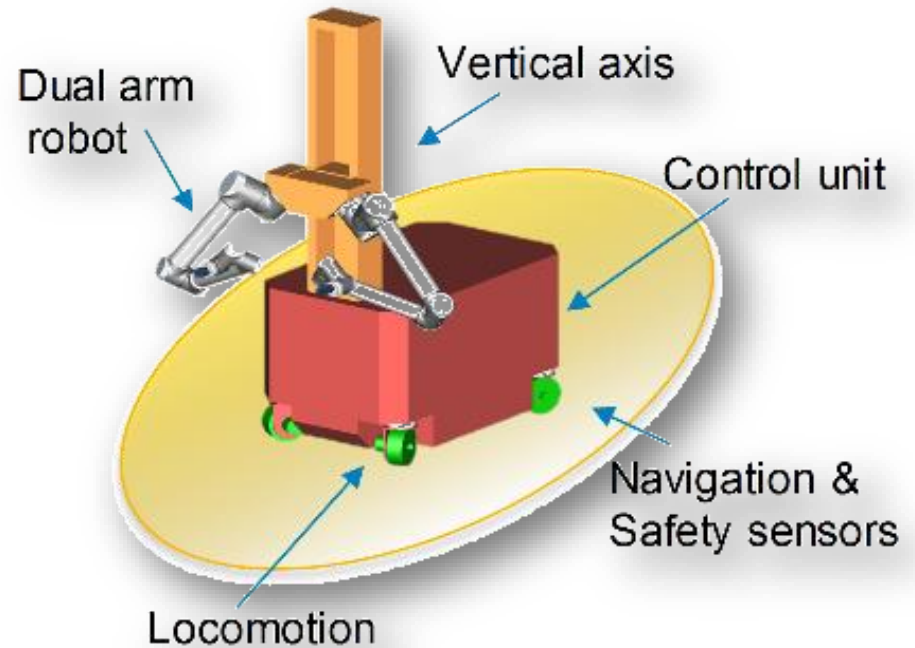
Human awareness

Product & Process Perception

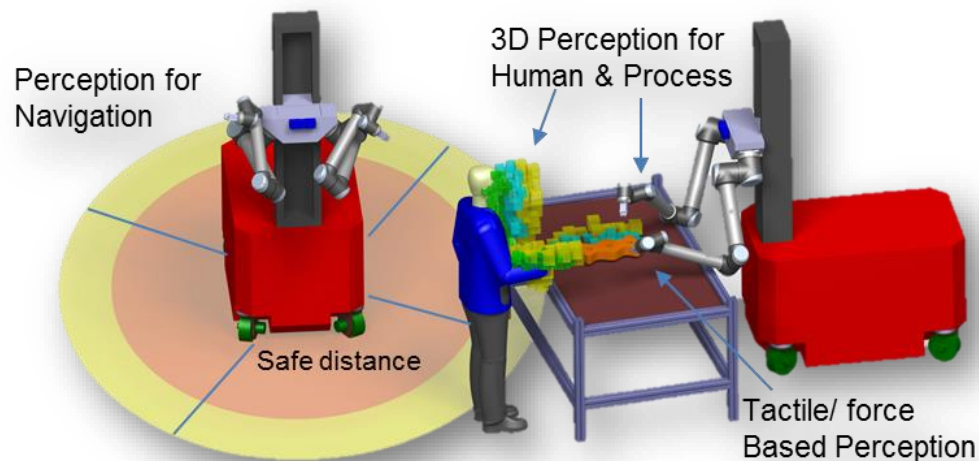
“Perception & skills to automatically program and execute multiple tasks”



- ✓ **Mobile Robot Platforms (MRP)**
- ✓ **Autonomous navigation** across the shopfloor **in a safe way**
- ✓ **Perform a variety of tasks** using on-board tooling
- ✓ Collaborate with humans **acting as assistant** to them
- ✓ Collaborate with **other mobile resources** through share perception



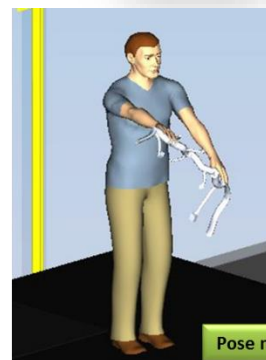
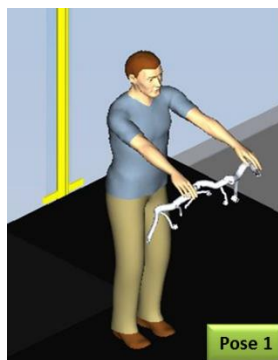
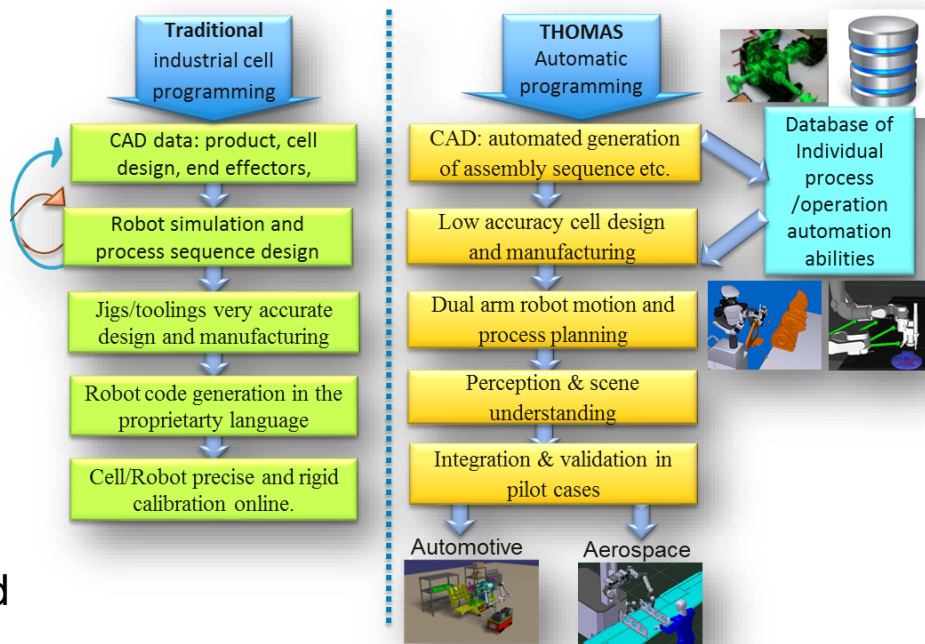
- ✓ 3D vision enables **process perception** for manipulation
- ✓ Process **context awareness** perception
- ✓ In cell & Cell to Cell navigation
- ✓ Multi sensors based **enhance safe navigation**



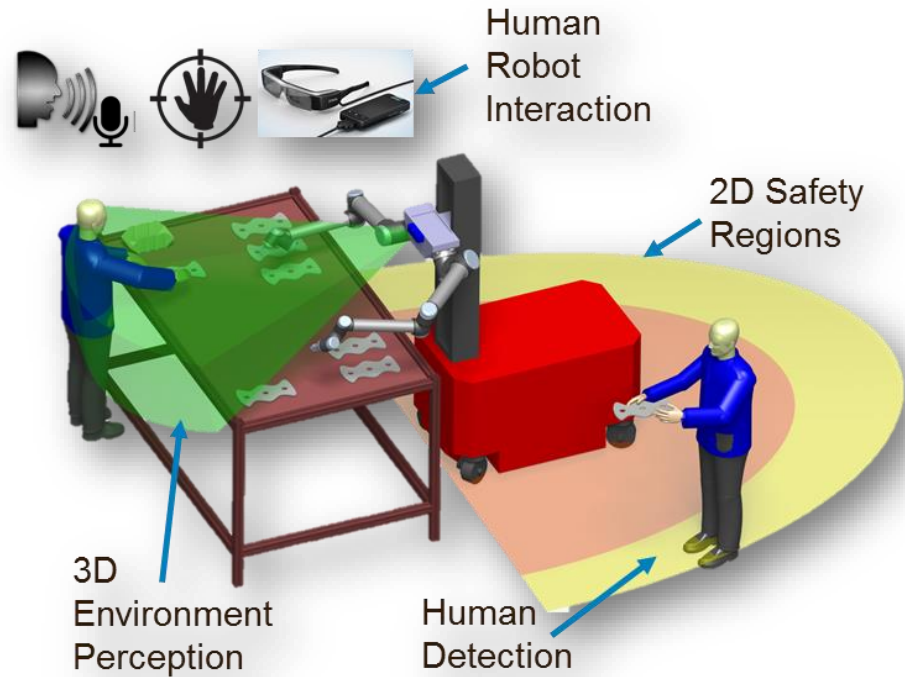
Autonomous Object detection & Motion generation

Simplified programming and execution

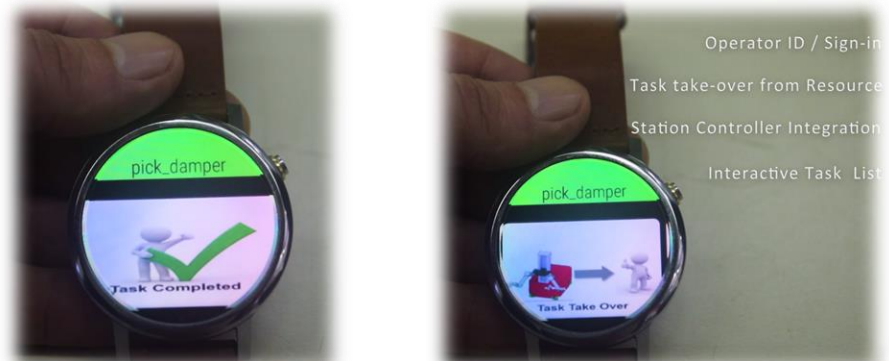
- ✓ CAD based **autonomous program generation**
- ✓ Collision free **grasp, path & motion planning**
- ✓ Offline **robot skills composition**
- ✓ Online **skills refinement** based on sensor input
- ✓ **Programming by mimesis** for flexible parts dual arm manipulation



- ✓ **Hybrid Safety** : fusing 2D – 3D sensor data
- ✓ **Direct H-R interaction**: (voice, gestures, wearables)
- ✓ **In – direct H-R interaction**: (human intention detection)
- ✓ Manipulator **End of Arm Safety**
- ✓ Human – Robot **workspace supervision**

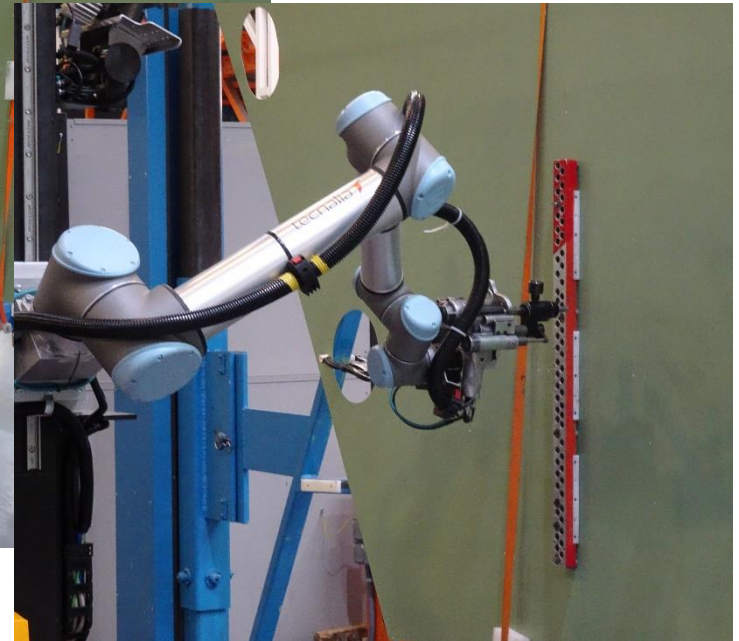


Interfaces on “Smart” wearables





THOMAS 1st Demonstration in AERNNOVA



THOMAS 1st Demonstration in AERNNOVA



For more information:



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[LMS YOUTUBE Channel](#) 