



EUROPEAN
ROBOTICS FORUM

03-05 March 2020



COLLABORATE



TECHNISCHE
UNIVERSITÄT
WIEN
Vienna University of Technology

ERF2020 Workshop

**Human-Robot
Collaboration & AI
for industrial applications**

Organizers

- Sharath Chandra Akkaladevi
Profactor
- Fotis Dimeas
Aristotle University of Thessaloniki, CoLLaboratE
- Franziska Kirstein
Blue Ocean Robotics, CoLLaboratE
- Marcus Vincze
TU Wien



Invited speakers

- **Sylvain Calinon**
IDIAP, CoLLaborate
- **George Michalos**
Laboratory for Manufacturing Systems & Automation
- **Carlos Celemins Paez**
Cognitive Robotics
- **Christoph Walter**
Fraunhofer IFF Magdeburg
- **Sotiris Manitsaris**
Mines Paristech, CoLLaborate
- **Turgut Köksal Yalcin**
Arcelik A.S., CoLLaborate
- **Jure Skrabar**
Kolektor, CoLLaborate

Workshop program

- Introduction
- Impulse talks by our invited speakers
- Group discussion
- Panel discussion
- Wrap-up of findings

Research topics

1. What are the **current challenges** and experiences when integrating HRC to industrial workplaces?
2. Which **novel interfaces** could help non-experts to easily interact with robots?
3. What **AI technologies** can be exploited to endow intelligence to HRC systems for faster integration?

Current state of the art? Challenges? Where things are going?
Where would you like things to go?



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Co-production Cell performing
Human-Robot Collaborative Assembly

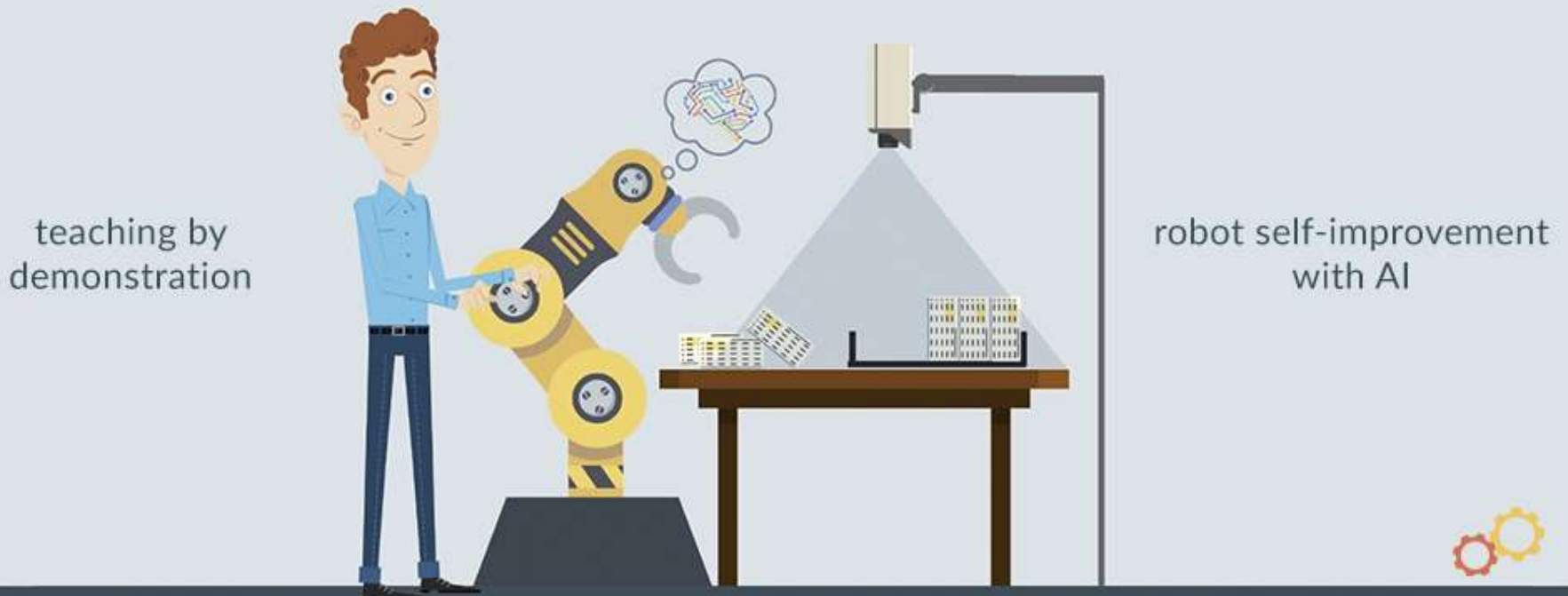


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Use-case 1: Car Starter Assembly

Challenge: Demonstrate the task to the robot (visually, kinesthetically) until the robot has learned to execute it autonomously

- Learning from demonstration
- Dynamic task sharing allocation



Use-case 2: Windshield visual quality check and assembly

Challenge: Assist the worker in handling large, heavy and fragile parts

- Human intention estimation
- Collaborative manipulation of large objects
- Ergonomic adaptation to the worker

collaborative handling
of large objects



estimation of human's
intentions



Use-case 3: Performing TV Assembly

Challenge: Parallel assembly operations of a worker and a robot on the same board ensuring performance and human safety

- Human presence awareness and safety
- Visual scene recognition
- Online motion generation with dynamic obstacle avoidance

parallel operations &
workspace sharing



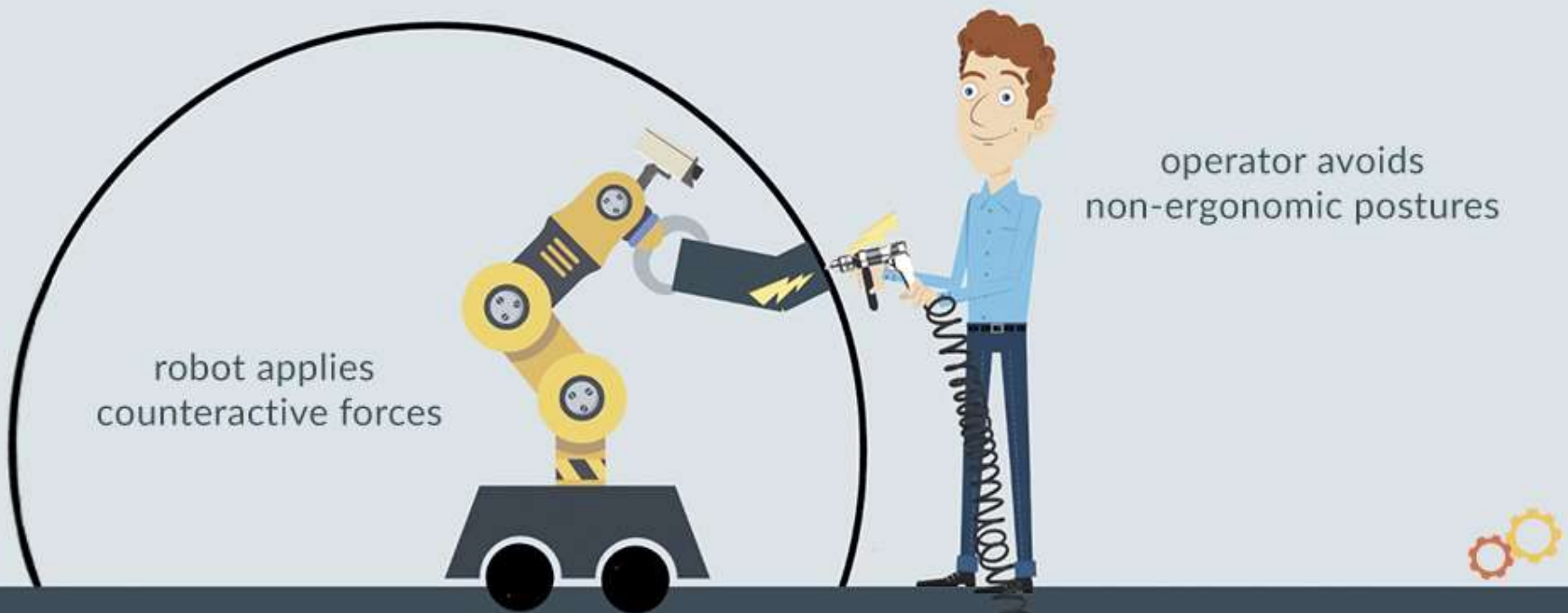
utilization of AGV's



Use-case 4: Aerospace structure riveting

Challenge: Reduce physical effort and avoid non-ergonomic positions with human-robot collaboration in difficult-to-automate procedures

- Physically coupled human and robot during assembly with the robot applying counteractive forces.
- Human monitoring and adaptation.



Thank you



Fotis Dimeas

Aristotle University of Thessaloniki

Greece

dimeasf@ee.auth.gr

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info@collaborate-project.eu



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