

Proposal for a Workshop at IEEE CASE 2021

Goal:

The robotics community provides many ideas to help manufacturing end users improve their production systems by enabling agility. Technologies that help setting up advanced production processes, e.g. programming by demonstration, mobile/collaborative robots, passive reconfigurable fixtures and tools, are great examples of supportive ideas from academia. However, these novel technologies still have not been accepted by industry to a sufficient extent to fulfil modern agile manufacturing needs. One of the main obstacles is the existing gap from research to industrial usage. A solution oriented mindset and additional tools, such as safety standards and new interaction modalities, can support the needed innovation transfer. The main topic of this workshop will be how different approaches can support the dream of agile manufacturing.

The workshop consists of invited talks by top robotics researchers and practitioners with emphasis on the integration of new advanced robot technologies to support the implementation of agile manufacturing cells. To summarize the results of the workshop and propose new directions, an interactive round will be held at the end of the event.

Title: Novel robot technologies for agile manufacturing (**online**)

Organizers:

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Abstract:

Modern manufacturing companies can remain competitive only if they maintain a high level of agility in their production processes, i.e. if they are able to effectively respond to changing customer requirements. The aim of this workshop is to gather top researchers and experts from academia and industry in order to discuss opportunities that increase the agility of manufacturing by introducing advanced robot technologies into the production processes of manufacturing companies. We have identified several main advanced robot technologies that can contribute to this goal, e.g. collaborative robotics, possibly supplemented by sensory systems to ensure safety, programming by demonstration, advanced user interfaces based on augmented reality and speech, reconfigurable robot work cells, reconfigurable peripheral equipment (fixtures, jigs, grippers), automated guided

vehicles (AGVs), soft robotics.

The workshop is divided into two different kind of sessions that will be held in the morning: research session with industrial relevance and interactive session. The research session features talks of renowned researchers in different areas mentioned above. They are focusing on how their technologies can contribute to increase the agility of industrial production. The aim of the interactive session is to collect representative use-case implementations and demonstrations of promising new robotic technologies. Afterwards industrial technology providers will speak about their innovative approaches and required developments from the research community to help them implement these solutions in industrial production processes. During the following interactive session, the audience can get in contact with the contributors by asking questions.

Descriptions:

The workshop primarily serves as an exchange between the TRINITY network and experts from research and industry. Our network consists of companies, research institutions and universities specializing in advanced robotics technologies, Internet of Things (IoT) and Cybersecurity. The network partners develop solutions that enable small and medium-sized enterprises (SMEs) to increase flexibility in production. We are supporting currently 19 use-case demonstrators from different EU-wide SMEs in a first Open Call. Our focus is to inform and discuss new developments in the robotic sphere and to show best practice solutions, which are enhancing under our funding. Especially young researches should get a chance to improve the understanding of industrial needs and customer-focused solutions. In addition, a discourse of the introduced topic should be improved by an interactive session. The interactive session will attract all types of researchers and industrial partners.

The very nature of this workshop is interactive. We will invite two distinct groups of speakers that is:

- i) Industrial leaders,
- ii) Internationally reputed academics.

Historically there has been a gap between these two groups. We expect an audience that is as diverse as the speakers are. We expect the talks to provide a distinct gap between the state of the practice and the state of the art. This should generate a very healthy discussion in Q&A sessions. Existing restraints to ask questions to the high-level experts directly are reduced by the option to use Mentimeter to raise questions. The discussions shall be channeled in a dedicated interactive session that includes videos and real demos. By generating influential ideas from diverse viewpoints in the interactive session, the topics can be picked up during the panel discussion with experts. The organizers will ensure that during the session, invited experts and early-career researchers can present their views. The audience will have the floor available to present their views as well.

Format:

Half-day workshop

Time	Talk
9:00 – 9:15	Welcome & Introduction
9:15 – 10:15	Research Session
9:15 – 9:45	<i>The use of mobile robotics,</i> Levente Raj , Research Fellow, Budapest University of Technology and Economics
9:45 – 10:15	<i>Robotic object grasping and manipulation in Agile Production,</i> Dr. Roel Pieters , Associate Professor, Cognitive Robotics, Faculty of Engineering and Natural Sciences, Automation Technology and Mechanical Engineering, Tampere University, Finland
10:15 – 11:15	Industrial Session

- 10:15 – 10:45 *New Approaches for Agile and Collaborative Multi-Agent (Human, Robot and Machine) production systems,*
Dr. Mohamad Bdiwi, Head of Robotic Department, Fraunhofer Institute for Machine Tools and Forming Technology (IWU), Chemnitz. Germany
- 10:45 – 11:15 *Introduction to Spin Robotics,*
Thomas Sølund, CTO and Co-founder
Spin Robotics is a Danish Robotic startup with a mission to remove manual and repetitive task during industrial assembly operations by introducing a collaborative screwdriver tool for collaborative robots,
- 11:15 – 11:30 Coffee break**
- 11:30 – 13:00 Interactive Session**

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