



# ROBO-PARTNER Project Newsletter Issue 4

October, 2015

## MOTIVATION

## COVER OF ROBO-PARTNER PROJECT FOURTH SEMESTER

Human skills are the main driver that enables producing high added value products in Europe. Thus the manufacturing processes are based on utilizing these skills. ROBO-PARTNER aspires the integration of the latest

industrial automation systems for assembly operations in combination with human capabilities, combining robot strength, velocity, predictability, repeatability and precision with human intelligence and skills.

## Message from the Coordinator

Dear Readers,

The fourth issue of the ROBO-PARTNER newsletter is signaling a significant milestone for our project which is reaching the end of its second year. For all the project members this signifies the transition from the design board to the first prototypes being available for testing, demonstration and integration, bringing us one step closer to achieving our vision of safe human robot collaboration.

In this issue you will have the chance to obtain an overview of the most recent developments but also to get a glimpse of the impressions that our project is creating in the scientific and industrial community around the globe. Having established clear ideas and technological progress in its core objectives within the first year, ROBO-PARTNER is now extending its outreach to the wide audience. The industry driven approach of the project requires that all developments are of benefit and interest to a cross sectorial market and therefore a lot of effort has been put to achieve high visibility of the project results and activities. Fairs, conferences, workshops, multimedia material and scientific publications are some of the activities that initiated the coordinated effort of the project to attract interest of the production and research community. The feedback that we received allowed us to

confirm that the original objectives of the project towards a safe Human Robot Collaborative environment are still valid and most importantly, in the leading trends of the EU manufacturing world.

Looking at the immediate future, the project is facing its next big challenge which is the full replication of its pilot cases in a controlled environment. Within 2016 most of the individual prototypes will be integrated within real world replicas of the actual production cells at the premises of LMS and TEKNIKER. This early testing and validation will be a critical step in the project's roadmap as it will allow to identify all safety and functional implications that arise in real world conditions. Thanks to the continuous efforts of our consortium we feel that the gap between the laboratory tests and the production is constantly decreasing and this further motivates us to keep up.

In the coming year we are preparing several exciting events and we invite all readers to stay tuned for the rollout of the first project results.

Best Regards,

ROBO-PARTNER Coordinator



### ROBO-PARTNER 6<sup>th</sup> GA Meeting & Impedance Control Workshop

On May 26<sup>th</sup>, 2015, COMAU, hosted a two-day Impedance Control workshop conducted by Fraunhofer IPK's Dr. Dragoljub Surdilovic. The whole ROBO-PARTNER consortium gathered for a set of lectures, discussions and demonstrations on the implementation specifics and possibilities in both general and ROBO-PARTNER applications. Invited speakers offered different perspectives on alternatives and future avenues the technology may pursue.



On the 28<sup>th</sup>, the workshop made way for the project's 6<sup>th</sup> General Assembly Meeting. The partners discussed the project's current state-of-affairs, namely test results of some early implementations and projected task completion for the forthcoming months. Succeeding those presentations, an important debate on future milestones to prepare the next most prominent event: the project's 2<sup>nd</sup> Review Meeting.

# Progress

The 2<sup>nd</sup> term of Year 2 brought further ROBO-PARTNER's developments:

- ROBOSOFT concluded all design customizations to their commercialized mobile robotic platform. The addition of the Cartesian system and all safety-related sensory and fail-safe mechanisms are now under construction.
- The IMAU's perception building blocks have also been under development during the last period. Specifically, the ROS (Robotics Operating System) packages responsible to detect and classify obstacles and other objects in the intra-factory environment have been developed and tested at UNINOVA through emulated real live testing scenarios mimicking the expected operation phases on TOFAS's suspension assembly.



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➤ The interface between with the high-level task-planner and all case scenarios' robotic solutions have also had its first

testing stages. INTRASOFT, has been pivotal to the platform and developments reached to this point.

- The overhead robot's development for the large part inspection scenario is in its last stages at JATORMAN. Meanwhile, TEKNIKER is still progressing with path planning and gesture recognition and all human-robot interaction simulations on Gazebo. The experimentation is expected to be transferred to the real world scenario, at TRIMEK, as soon the overhead crane robot is ready for action.



The project's second year is coming to an end, and so the time to present the first real-world applications of our work draws near. While at LMS the demonstrative scenarios are being set up, the whole consortium, suppliers, developers and end-users alike, are increasing their efforts to have a set of demonstrations of each of the three elected application scenarios ready for the upcoming review meeting. On our project's 1<sup>st</sup> Review Meeting in Berlin, our Technical Advisor, PTA, gave a special emphasis safety certification to consolidate the proposed robotic solutions. PILZ's initial risk assessment will make way to continuous and exhaustive performance evaluation throughout next year's testing. During this period, each solution's implementation-test loop phases are likely to promote some little design deviations, and assuring those do not violate any pre-set safety requisites is a continuous effort of the utmost importance.

## CIRP CMS 2015



### CIRP CMS 2015

#### 48<sup>th</sup> CIRP Conference on MANUFACTURING SYSTEMS

Research and Innovation in Manufacturing:  
Key Enabling Technologies for the Factories of the Future  
24 - 26 June 2015, Ischia (Naples), Italy

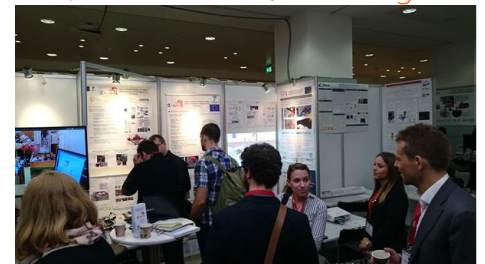


The 2015's edition of CIRP Conference on Manufacturing Systems, held in Ischia (Naples), Italy, included the submission of two papers from LMS concerning the ROBO-PARTNER's developments. On June 24<sup>th</sup>, in the *Digital Factory* session, the paper *Augmented reality applications for supporting human-robot interactive cooperation* was presented and promoted questions addressing such issues as:

- The need for functionalities providing the operator the ability to give feedback for his/her performance (e.g. notification when he/she starts a task);
- The fact that if the operator moves his/her head, and loses the marker from his/her field of view, the AR visual element will also disappear. For that reason, further research on the ability to support markerless visualization needs to be performed.

Finally, the paper *Performance assessment for production systems with mobile robots* was presented on Day 2 (May 25<sup>th</sup>), specifically in the session titled *Assembly Systems*. The most pressing issue in Q&A related to the need for further research on mobile robot's hardware development in order for their performance to be more robust and efficient.

## IEEE/RJS IROS 2015, Hamburg



Hamburg, Germany, hosted this year's edition of the International Conference on Intelligent Robots and Systems (IROS 2015), from September, 28<sup>th</sup> to October 2<sup>nd</sup>. For the duration of the conference, LMS had a booth set up presenting the ROBO-PARTNER's results, namely a poster, videos and a live demo of the augmented reality technology employed on the project. The most relevant questions posed by the audience related to such topics as the safety technologies, HRIs and their benefits, the type of robots used or the transferability of the system to applications other than automotive (Huawei, Samsung were among the companies that have shown interest). Flyers and the latest version of our Newsletter were circulated throughout the conference duration.

# The Project's Consortium

Project coordinator:



Project Manager:



**Electrolux**



4th CIRP Global Web Conference

**CIRPe  
2015**  
"Understanding the life cycle  
implications of manufacturing"

29 September 2015 – 1 October 2015

## 4th CIRP Global Web Conference

LMS was a presenter of a ROBO-PARTNER funded paper in the session *Design* for the paper *Design considerations for safe human robot collaborative workplaces*. The paper covered one of the most important topics in today's production research: safety in a human robot collaborative environment. Following the presentation, a question on the applicability/economic viability of safety technologies for small companies was raised by the audience. Indeed, the costs for a complete risk assessment and the full design of a safety concept is prohibiting at the moment for small companies. The Human and robot interaction applications are far more demanding in terms of safety and as a result costs are large. The need to simplify the deployment of such technologies and to standardize as much as possible the safety solutions so they can be easily deployed in deferent systems with small customization effort.

## ROBO-PARTNER Videos Uploaded!

We have just published on our YouTube channel the first three videos detailing some features of the project's developments. The *AR Operator Support*, the *Planning of Logistics* and the *Task Planner* videos unveil the results on operator support and high-level intra-factory planning. Subscribe our channel, for more videos on other features of our project will follow.

## Upcoming Events

The project's 7th GA meeting & Integration Workshop @ UNINOVA.



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Next meeting:

7th General Assembly Meeting:  
November 2015 @ Almada, Portugal

<http://www.robo-partner.eu/>  
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## Contact us

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