

Perception Challenges in Times of Deep Learning and Cognition

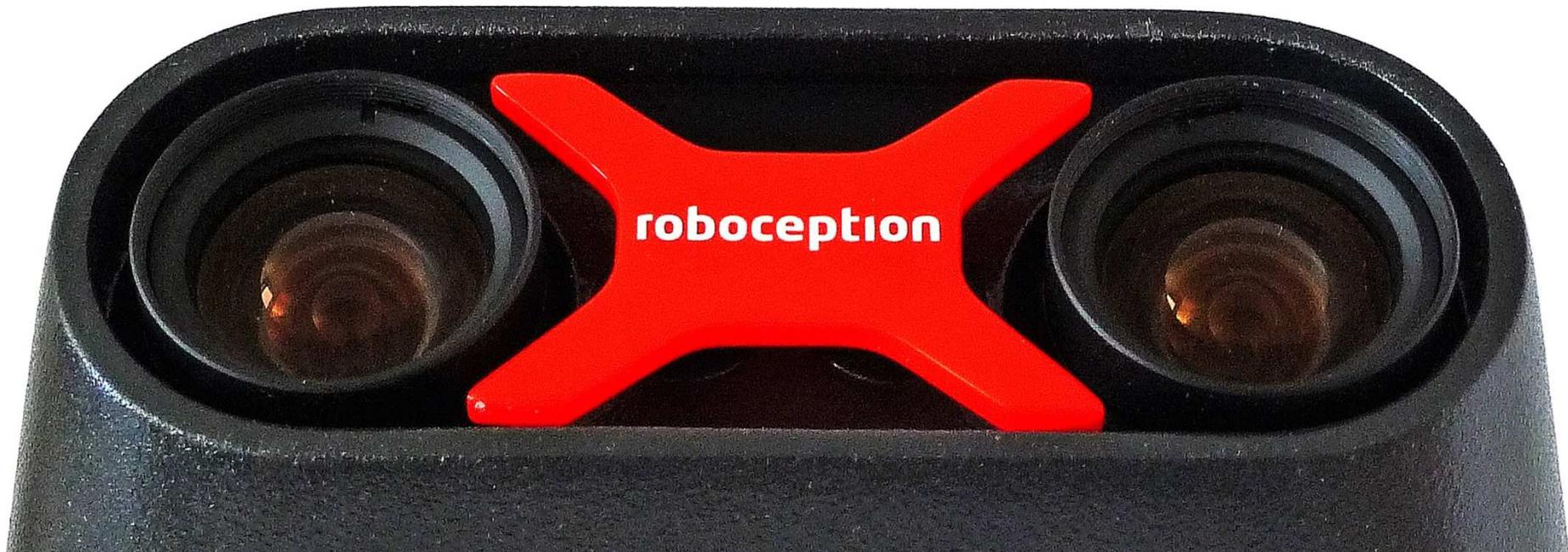
Dr. Michael SUPPA, Roboception GmbH, Germany,
michael.suppa@roboception.de

Prof. Darius BURSCHKA, Technical University of Munich, Germany,
burschka@tum.de

Prof Achim J. LILIENTHAL, University of Orebro, Sweden
achim.lilienthal@oru.se

Prof Michael BEETZ, University of Bremen, Germany
beetz@cs.uni-bremen.de

March 23rd, 2017



Agenda

- 16:15 Introduction by the moderators/definition of key questions
- 16:25 Darius Burschka, Technical University of Munich, “Challenges in Perception for Learning, Cognition and Control Approaches”
- 16:35 Achim Lilienthal, University of Örebro.” Robot-Assisted Environmental Monitoring”
- 16:45 Michael Beetz, University of Bremen, “Perception for manipulation in real environments”
- ~~16:55 Markus Vinzce, Technical University of Vienna, “Challenges of modelling full 3D objects for pose recovery”~~
- 17:05 Michael Suppa, Roboception GmbH, “Perception made easy in industrial applications”
- 17:15 Dr. Guglielmo Gemignani, Magazino GmbH, “Learning and Model-based Approaches in Logistics”
- 17:25 Discussion of the key questions with all speakers and the audience and their implication on the roadmapping process
- 17:35 Conclusion for roadmapping and take home message
- 17:45 End of workshop

Link to the website: <http://roboception.com/erf2017>

roboception

3D Perception Testimonial

“3D vision is a disruptive technology that enables robots to operate in a partially-structured environment”.

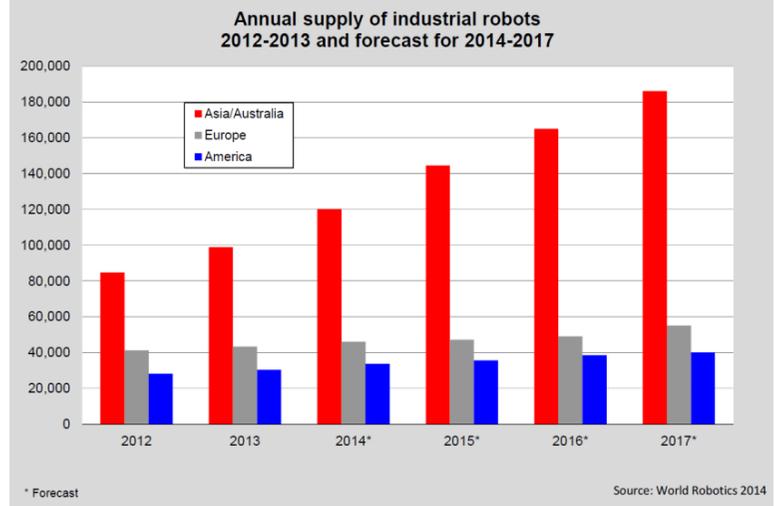
- IFR Annual Report on Service Robotics

“*Perception* was the dominating factor separating the winners from the rest of the field in the amazon picking challenge”.

- Henrik Christensen

"If we were only able to provide the visual capabilities of a 2-year old child, robots would quickly get a lot better."

- Rodney Brooks



Sources:

1. <http://www.ifr.org/robots-create-jobs/>
2. <http://www.therobotreport.com/news/amazon-challenges-robotics-hot-topic-perception>
3. http://www.robotics.org/content-detail.cfm/Industrial-Robotics-Industry-Insights/Intelligent-Robots-A-Feast-for-the-Senses/content_id/5530

roboception

Roboception GmbH, Munich

-confidential-

Deep learning solves it all!

But what about robustness?

- Main focus of perception research shifts towards deep learning as the universal tool
- Deep learning techniques require a large amount of training data which are in many cases not available. Furthermore, the mode of operation and limitations of a deep learning approach can be hard to understand”
- Robotics is about systems with physics, they can cause harm to people
- Ensure safety, robustness, reliability and dependability of robotic systems especially in real-life scenarios

Key questions

- Assess the state of the art in perception, deep learning and cognition
- Which are major challenges and potential step changes i.e. what is required from perception to increase robustness and interfaces to deep learning and cognition?
- Do you see any application(s) in which a meaningful combination of deep learning and model-based perception can create a breakthrough?
- Where do you see the largest gaps between academia and industry?

Statements

- „Robotics requires metric information. If we find approaches that do not need this constraint, we could apply deep learning much wider“
- „Deep learning is mostly used for segmentation“
- „Domain knowledge is required“
- „Measurements are costly“
- „Perception is a lifelong answering process“
- „Use travel time to compute perception“
- „Perception includes action“
- „Deep learning for transferring informal knowledge“
- „Collect data in the application to improve the system as deployment time is crucial“
- „Are behavior trees a good approach for logistics“