



International Masterclass Robotics 2017

'Robotics for Future Presidents'

WEDNESDAY 25 OCTOBER

08.30 – 09.00 Breakfast & Kick-off

Welcome and opening by Bennie Mols, Science Journalist and Moderator of The 3rd Edition of The International Masterclass Robotics

09.00 – 09.30 Introduction rounds

09.30 – 10.00 Introduction Robotics & Valorisation

Speakers

09.30 – 09.45 Martijn Wisse, Professor of Bio-robotics at Delft University of Technology and Scientific Director at TU Delft Robotics Institute

09.45 – 10.00 Arthur de Crook, Managing Director at RoboValley

10.00 – 10.30 Coffee break

10.30 – 12.00 Industrial robot is waking up

The first industrial robots were robotic arms, introduced in the 1960's. It was the automotive industry that became the main driver of the development of industrial robots. In the beginning these robots were limited in flexibility and intelligence. They were ideal for doing dull, dirty and dangerous tasks.

Over the last five decades industrial robots have become more precise, stronger, faster and cleaner than humans. Gradually they have transformed the manufacturing industry as a whole. At present there is a strong trend to enable industrial robots to collaborate with people, while intelligently dealing with a variability of products and environment.

We will give an overview of the most important technological drivers of the industrial robot: better perception of the environment, cheaper sensors, better machine learning techniques, easier interaction with humans and better connectivity between robots. And last but not least: how can we build robots that are not only better, but also cheaper?

To illustrate some recent developments, we will present the user case of PAL Robotics. PAL Robotics designed TALOS with the intention of having the robot work



on physically demanding and accurate tasks performed under hostile or uncomfortable industrial settings.

Speakers

10.30 – 11.00 Martijn Wisse, Professor of Bio-robotics at Delft University of Technology and Scientific Director at TU Delft Robotics Institute

11.00 - 11.30 Richard van der Linde, Director and Founder FTNON Delft

11.30 - 12.00 Case study by PAL Robotics: TALOS

12.00 – 13.00 Lunch

13.00 – 14.30 Out in the real world

Whereas traditional industrial robots are fixed in place, robots out in the real world have to deal with largely unstructured and unpredictable environments. Since the 1990's mobile robots have started delivering hospital meals, collecting goods in warehouses, searching and rescuing after earth quakes, and even exploring places no human has gone before, like the surface of Mars. One of the most spectacular advancements is the recent development of the driverless car.

We will introduce you to the chances and challenges of the driverless car and of the WePod, a driverless bus for up to six persons that can drive between station Ede-Wageningen and Wageningen University & Research Centre. Potentially, driverless cars and buses can save lives, can save fuel consumption and can increase the transport capacity. What is the current situation in developing driverless cars and what are the remaining challenges?

We will also present the chances and challenges of developing mobile service robots. What is needed to build a successful service robot? What can you expect mobile robots to do in your own field of business?

We will introduce you to security robot SAM and to care robot LEA. SAM can detect humans, has an interface with the alarm system and communicates with security guards and alarm centres. LEA offers elderly people help with walking and supports them to lead an active life and with daily routines like taking medications on time.

We will finish with the user case of Unmanned Valley Valkenburg, a hub for drone research. Which applications are drones going to get? What is needed for drones to operate effectively and safely out in the real world? What is drone technology going to mean for your own type of business?

Speakers

13.00 - 13.30 Riender Happee, Programme Manager Automotive at Delft University of Technology

13.30 - 14.00 Pieter Jonker, Professor of Vision-based Robotics at Delft University of Technology and Co-founder of Robot Robots Company

14.00 - 14.30 Case study by Bart Remes: delftAcopter



14.30 – 16.00 Robots for people/ Co-existing with robots

We will present visions on how people can co-exist with robots in such a way that what humans and robots can do together is more and better than what each of them can do alone.

One way to improve the cooperation between humans and robots is the use of haptic technology. Haptic technology lets humans physically feel what robots want by recreating forces, vibrations and motions. The technology has a broad range of applications in robotics, from better handling of objects to medical operations and semi-autonomous cars.

Hybrid teams of robots and humans will reshape the way we do business in every sense. Via examples from Silicon Valley and the rest of the world we will show what it means to get your business robot-ready.

We will conclude the topic of robots for people with the case study of exoskeletons. Exoskeletons are not just for shipyard workers or people with limited mobility. We will show different successful applications.

Speakers

14.30 – 15.00 Aseem Prakash, World's Leading AI Business Strategist, Center for Innovating the Future

15.00 – 15.30 David Abbink, Associate Professor at the BioMechanical Engineering Department at Delft University of Technology Robotics Institute

15.30 – 16.00 Case study by Heike Vallery: exoskeletons

16.00 – 16.15 Break

16.15 – 17.15 Demonstration by ExRobotics

A demonstration of the first remotely operated, Ex certified, inspection robot. The **ExR-1 robot** is remote-controlled, self-charging and certified to operate in harsh, remote, and potentially explosive locations.

17.15 – 18.00 Drinks

19.00 – 22.00 Experts dinner



THURSDAY 26 OCTOBER

08.30 – 09.00 Breakfast & Recap

09.00 – 10.00 Social economic impact

Robots will take some jobs but also create completely new jobs. In this aspect the robotic revolution is not different from the two previous revolutions in automation: the mechanisation of agriculture and the automation of manufacturing. However, what is different is that robots not only use physical power but also brain power. And what is also different is that the changes might go much faster than in the past.

Experts from the fields of artificial intelligence, robotics and economy have very different answers on the question whether robots will destroy more jobs than they create or the other way around. An economic expert will guide us through the social and economic impacts that the rise of the robots might have.

Speaker

Bas ter Weel, Managing Director SEO Amsterdam Economics and Professor of Economics at University of Amsterdam

10.00 – 10.30 Coffee break

10.30 – 12.00 Robots for people/ As robots become really smart

Advances in artificial intelligence (making computers smarter) also transfer to robotics. Cognitive computing systems, like the IBM Watson computing platform, use techniques from artificial intelligence to process the data in an intelligent way. Examples of such techniques are machine learning, reasoning, natural language processing, speech and vision, human-computer interaction and dialogue generation.

We present the latest achievements of AI-systems in general and IBM's Watson technology in particular. How can AI play a role in structuring huge amounts of data (Big Data) and so be integrated in applications of the Internet of Things? The challenge of the Internet of Things lies mainly in doing something useful with all the collected data.

Robots are expected to work in almost every service sector within twenty years. For this to become reality, robots have to interact with humans. They should be able to perceive and understand human behaviour in real time. Although this is more difficult than moving around in the real world, robots are spectacularly improving in understanding both spoken language and body language. We will emphasize the need for designing robots in such a way that humans must always be able to interfere.



Finally, in a case study we present a robot prototype that consists of a robotic arm completely covered with sensors ('robotic skin'). The idea is that this will prevent the arm to bump into people or objects in a working environment.

Speakers

10.30 – 11.00 *Geert-Jan de Koningt, Analytics Technical Sales Manager at IBM*

11.00 – 11.30 *Catholijn Jonker, Professor of Interactive Intelligence at Delft University of Technology*

11.30 – 12.00 *Case study by Carlos Hernandez Corbato: Artificial Robot Skin*

12.00 – 12.45 Lunch

12.45 – 13.45 Robot swarms

Robot swarms consist of many simple robots that collectively perform a task. They are inspired by insect swarms in nature. Robots swarms have the advantage over single robots that they are very fault tolerant (if one robot breaks down, the swarm continues to function), that they can easily be extended with new members and that they sometimes can perform tasks that a single complex robot cannot.

Robot swarms might for example swim in the water of a harbour to measure pollution, they might do search and rescue work after a natural disaster like an earthquake or a flood, or they might form a network of mini-satellites in space that functions as a gigantic telescope.

In the case study we present a breakthrough technology that enables a swarm of drones to autonomously navigate indoors.

Speakers

12.45 – 13.15 *Chris Verhoeven, Associate Professor of Microelectronics at Delft University of Technology and Associate Director Education at TU Delft Robotics Institute*

13.15 – 13.45 *Case study by Guido de Croon: DelFly*

13.45 – 14.00 Coffee break

14.00 – 14.45 The good, the bad, the autonomous

As technology is always embedded in the larger context of a society that has its norms and values, we should ask an important ethical question: which values do we as people find important?

If we want to build robots that behave according to these values, we have to think about the system as a whole: not just designing, building and programming the robot, but also thinking about the interaction between robots and people. In order to attain



responsible innovation, societal, ethical, moral and legal requirements need to be considered already in the design phase of the robot. We will also discuss which basic ethical questions you have to ask yourself when you want to robotise processes in your organisation.

Speaker

14.00 – 14.45 Aimee van Wynsberghe, Assistant Professor of Ethics and Robots at Delft University of Technology and Co-founder of the Foundation for Responsible Robotics

14.45 – 15.00 Coffee break

15.00 – 17.00 Business impact

After being inspired on the changes robotisation brings, we conclude with an interactive session on business impact. We will also assess the opportunities and challenges for your particular businesses and provide guidelines on how to prepare your company for the upcoming robotics transformation.

Speaker

Zwanet van Lubek, Strategic Innovation Manager at Delft University of Technology

17.00 – 18.00 Closing drinks