



## **International Masterclass Robotics 2017**

'Robotics for Future Presidents'

### **WEDNESDAY 25 OCTOBER**

#### **08.30 – 09.00 Breakfast & Kick-off**

Arthur de Crook, Managing Director RoboValley

Martijn Wisse, Professor of Bio-robotics at Delft University of Technology and director at TU Delft Robotics Institute

#### **09.00 – 9.30 Introduction Rounds**

#### **09.30 – 10.00 Introduction Robotics & Masterclass**

*09.30 – 09.45 Martijn Wisse (Robotics)*

*09.45 – 10.00 Arthur de Crook (Valorisation)*

#### **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 - 10.35 *Introduction by Martijn Wisse*

10.35 - 11.05 *Eric Truebenbach, Director of Corporate Development at Teradyne*

11.05 - 11.35 *Rich Walker, Shadow robot company*

11.35 - 12.00 *Case study: Pal robotics*

## **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 advance 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 *Professor Pieter Jonker, Bio-Robotics Lab of Mechanical, Maritime and Materials Engineering (3ME) TU Delft*

14.00 - 14.30 *Case study 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 – 15.30 Aseem Prakash, Chief Robotics Officer at Karma ROBOTICS

15.30 – 16.00 Case study: Heike Vallery, exoskeletons

### **16.00 – 16.15 Break**

### **16.15 – 17.15 Demonstration ExRobotics B.V.**

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

### **17.15 – 18.00 Drinks & Networking**

### **19.00 – 22.00 Expert Dinner**



## **THURSDAY 26 OCTOBER**

### **08.30 – 09.00 Breakfast & Recap**

### **9.00 – 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**

Eric Bartelsmann, Professor of Economics, VU 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 dialog 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 Gerard Smit, Chief Technology Officer IBM

11.00 – 11.30 Prof. Catholijn Jonker, Interactive Intelligence Group, Delft University of Technology

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

### **12.00 – 12.45 Lunch**

### **12.45 – 13.45 Robot Swarms**

Robot swarms consist of many simple robots that collectively performs 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 drones to autonomously navigate indoors.

### **Speakers**

12.45 – 13.15 Chris Verhoeven, Associate professor at Delft University of Technology Robotics Institute

13.15 – 13.45 Case study: Guido de Croon

### **13.45 – 14.00 Coffee break**

### **14.00 – 15.30 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 roboticise processes in your organisation.

### **Speakers**

14.00 – 14.45 Aimee van Wijnsberghe, Assistant Professor of Ethics of Technology at TU Delft Robotics Institute

### **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.

### **17.00 – 18.00 Closing drinks**