



# GlobalTech Alliance – Robotics Workshop 2018

26<sup>th</sup> May 2018 | UNSW Sydney, Australia



Time	Activity
08:00am – 09:00am	Registration
09:00am – 09:10am	<b>Welcome Address</b> Mr. Laurie Pearcey, Pro-Vice Chancellor (International), UNSW Sydney
09:10am – 10:00am	<b>Key Note Speech</b> Scientia Professor Toby Walsh “Era of Robots in our daily lives: Ethical, Legal and Societal Impacts”
10:05am – 10:25am	<b>Coffee break</b>
	<b>Regular Presentations: Session 1</b> Chair: Assoc. Professor Jay Katupitiya, UNSW Sydney
10:25am – 10:50am	Mr. Robert Dane, OCIUS Technology “Persistent Autonomous Unmanned Surface Vessels powered by the ocean”
10:50am – 11:15am	Prof. Gordon Cheng, TUM “AI in the real world: from neuroscience to robotic innovations”
11:15am – 11:40am	Dr. Mark Whitty, UNSW “Image processing in viticulture”
11:40am – 12:05pm	Assoc. Prof. Danping Zou, SJTU “A Brief Introduction to Robotics Research in Shanghai Jiao Tong University”
12:05pm – 12:30pm	Mr. Brian Okorn   Asst. Prof. David Held, Robotics Institute – CMU “Robots in Clutter: Learning through Motion and Interaction”
12:30pm – 12:40pm	<b>End of Program – Conclusion</b> Assoc. Professor Jay Katupitiya, UNSW Sydney
12:40pm – 01.30pm	<b>Lunch</b>

## **About the Key Note Speech & the Speaker:**

### TOPIC

Era of Robots in our daily lives: Ethical, Legal and Societal Impacts

### ABSTRACT

As more and more intelligent devices enter our lives, we are realizing that AI and Robotics will have profound ethical and societal consequences. I'll talk about some of the risks, like the transformation of warfare, as well as some of the benefits.

### SPEAKER BIO



Toby Walsh is Scientia Professor of Artificial Intelligence at UNSW, leads the Algorithmic Decision Theory group at Data61, Australia's Centre of Excellence for ICT Research, and is Guest Professor at TU Berlin. He has been elected a fellow of the Australian Academy of Science and has won the prestigious Humboldt research award as well as the NSW Premier's Prize for Excellence in Engineering and ICT. He has previously held research positions in England, Scotland, France, Germany, Italy, Ireland and Sweden.

He regularly appears in the media talking about the impact of AI and robotics. He is passionate that limits are placed on AI to ensure the public good. In the last two years, he has appeared in TV and the radio on the ABC, BBC, Channel 7, Channel 9, Channel 10, CCTV, DW, NPR, RT, SBS, and VOA, as well as on numerous radio stations. He also writes frequently for print and online media. His work has appeared in the New Scientist, American Scientist, Le Scienze, Cosmos and The Best Writing in Mathematics (Princeton University Press). His twitter account has been voted one of the top ten to follow to keep abreast of developments in AI. He has played a leading role at the UN and elsewhere on the campaign to ban lethal autonomous weapons (aka "killer robots").

## **Presentation 1: 10:25am – 10:50am**

### **TOPIC**

Persistent Autonomous Unmanned Surface Vessels powered by the ocean

### **ABSTRACT**

Ocius is building sun, wind and wave powered persistent Unmanned Surface Vessel (USV) called “Bluebottles”, named after the Australian marine animals that use their bodies to sail. These USVs are autonomous robots that use the energy of the ocean. They can navigate around the seas and cover vast areas, conducting long duration autonomous maritime surveillance missions at low cost with no one in harms way. They are connected and intelligent platforms that can carry a customer’s payloads and sensors for varying missions including anti-submarine warfare, monitoring maritime boundaries, mine counter measures and inspecting the seabed.

The design features that give Australia’s Bluebottle advantages over its USV competitors in respect to power, payload, performance and ‘advance in all conditions’ are the result of years of solar sailing and boat building experience and are protected by 6 patents and two registered designs.

In 2015, Ocius was selected by the Australian Defence Department and Thales as having the most capable USV to use in a Capability Technology Demonstrator trial for towing a ‘thin line’ array. This trial was complete by September 2017 and all OCIUS milestones and KPIs are being achieved or exceeded ahead of schedule.

Ocius was selected because its, has a meaningful speed of advance in all sea conditions, can carry a 200kg customer at 5-6knots and power that array with a continuous 50W average and peak loads of kW. OCIUS is working with UNSW on ‘fleet’ control using disseminated intelligence and machine learning to have a group of Bluebottle USVs working together in a network and will be competing in international ‘5 eyes’ war-games off NSW in Nov 18.

### **SPEAKER BIO**



Robert Dane is founder and CEO of OCIUS Technology Limited formerly SolarSailor. He grew up in Sydney, sailing and boating with his uncle and father both of whom were in the NAVY. He studied Medicine at Sydney University and was a rural doctor at Milton Ulladulla from 1986 - 1996 practicing general medicine, anaesthetics and obstetrics.

In 1996, Robert, a passionate sailor and environmentalist, witnessed the inaugural Advanced Technology Boat Race on Lake Burley Griffin and was inspired to design a ‘solarsailor’ prototype which won the race the following year. From there he formed a Company which built multiple commercial hybrid electric ferries. The first commercial ‘solarsailor’ ferry won the Australian Design Award of the Year 2001 and four SolarSailor ferries run today in HK from Sai Kung to Kai Sau Chau island 364 days/ year, 14 hours a day, saving 50% of the fuel compared to conventional vessels they replaced.

In 2008, in response to enquiries from the USA for ‘a persistent marine platform that could go to sea forever’, Robert turned the SolarSailor patented technology to Unmanned Surface Vessels (USVs) called ‘Bluebottles’, named after the Australian marine animal that lives at sea and uses its body to sail. Since then SolarSailor changed its name to OCIUS and has focused its patented technology on USVs.

## **Presentation 2: 10:50am – 11:15am**

### **TOPIC:**

AI in the real world: from neuroscience to robotic innovations

### **ABSTRACT**

In recent time, we are witnessing huge investments across many sectors of smart innovations that connect to the real world. Artificial Intelligence techniques are being applied across many areas of R&D, they are impacting our society in a big way. This presentation will give several examples of such invocations working in the real world. I will highlight over 20 years of research, in particular, that combined robotics, neuroscience and artificial intelligence. The motivation and benefits of such interdisciplinary research will be presented, ranging from industrial robots to healthcare robots.

### **SPEAKER BIO**



Prof Gordon Cheng holds the Chair of Cognitive Systems. He is Founder and Director of Institute for Cognitive Systems, Faculty of Electrical and Computer Engineering at Technical University of Munich, Munich/Germany. He is also the coordinator of the CoC for Neuro-Engineering - Center of Competence Neuro-Engineering in the Department of Electrical and Computer Engineering.

Formerly, he was the Head of the Department of Humanoid Robotics and Computational Neuroscience, ATR Computational Neuroscience Laboratories, Kyoto, Japan. He was the Group Leader for the newly initiated JST International Cooperative Research Project (ICORP), Computational Brain. He has also been designated as a Project Leader/Research Expert for National Institute of Information and Communications Technology (NICT) of Japan. He is also actively involved in a number of major European Union Projects.

Over the past ten years Gordon Cheng has been the co-inventor of approximately 20 patents and is the author of approximately 250 technical publications, proceedings, editorials and book chapters. He is Fellow of the IEEE for his "Contributions in Humanoid Robotic Systems and Neurorobotics.

**Presentation 3: 11:15am – 11:40am**

TOPIC:

Image processing in viticulture

ABSTRACT

TBC

SPEAKER BIO



Dr Mark Whitty is a Lecturer at UNSW Sydney and leads the [Smart Robotic Viticulture](#) research group. Beginning from work in autonomous robotics, he and his group have developed methods for image processing in viticulture, including shoot detection, flower counting, berry counting, yield estimation and apps for wine water stress detection.

## **Presentation 4: 11:40am – 12:05pm**

### **TOPIC:**

A Brief Introduction to Robotics Research in Shanghai Jiao Tong University

### **ABSTRACT**

In this talk, Professor Danping Zou will briefly introduce the robotics research groups in different departments in SJTU. Then he will introduce a newly established institute that focuses on AI and robotics technologies. He will also introduce an interesting UAV competition that has been hold for five years that starts from SJTU now becomes a nation-wide competition in China. He is looking forward to the participation of teams from the member universities of GlobalTech Alliance.

### **SPEAKER BIO**



Danping Zou is an associate professor of the Institute of Sensing and Navigation in Shanghai Jiao Tong University (SJTU). His research interests mainly focus on vision-based navigation technology. He developed several visual SLAM systems like CoSLAM for robot teams and StructSLAM for navigation in man-made environments and applied such vision systems to small UAVs. He received the PhD degree in Fudan University in 2010. Later he worked as a research fellow in National University of Singapore before he joined SJTU.

## **Presentation 5: 12:05pm – 12:30pm**

### **TOPIC:**

Robots in Clutter: Learning through Motion and Interaction

### **ABSTRACT**

Robots today are typically confined to operate in relatively simple, controlled environments. One reason for these limitation is that current methods for robotic perception tend to break down when faced with occlusions, viewpoint changes, poor lighting, and other challenging but common situations that occur when robots are placed in the real world. I argue that, in order to handle these variations, robots need to learn to understand how the world changes over time: how the environment can change as a result of the robot's own actions or from the actions of other agents in the environment. I will show how we can apply this idea of understanding changes to a number of robotics problems, such as object segmentation, tracking, and velocity estimation for autonomous driving as well as perception and control for various object manipulation tasks. By learning how the environment can change over time, we can enable robots to operate in the complex, cluttered environments of our daily lives.

### **SPEAKER BIO**



The speaker, Mr. Brian Okorn is a PhD student with Dr. David Held and Dr. Martial Hebert in Robotics Institute at CMU, studying perception for manipulation. Prior to joining CMU, Brian worked as a researcher at US Navy SPAWAR, developing 3D mapping and registration algorithms for unmanned ground and surface vehicles. Brian is a recipient of the NASA NSTRF Fellowship for 2017-19 in association with Johnson Space Center.



David Held is an assistant professor in the Robotics Institute at CMU, working on robotic perception for autonomous driving and object manipulation. Prior to coming to CMU, David was a post-doctoral researcher at U.C. Berkeley, and he completed his Ph.D. in Computer Science at Stanford University where he developed methods for perception for autonomous vehicles. David has also worked as an intern on Google's self-driving car team. David has a B.S. and M.S. in Mechanical Engineering at MIT. David is a recipient of the Google Faculty Research Award in 2017.