KEYNOTES

Computational Sustainability

Prof. Carla Gomes, Cornell University

Abstract: Computational sustainability is a new interdisciplinary research field with the overarching goal of developing computational models, methods, and tools to help manage the balance between environmental, economic, and societal needs for a sustainable future. I will provide examples of computational sustainability problems, ranging from wildlife conservation and biodiversity, to poverty mitigation, to materials discovery for renewable energy materials. I will also highlight cross-cutting computational themes and challenges at the intersection of constraint reasoning, optimization, machine learning, citizen science, and crowd-sourcing.

Brief Bio: Carla Gomes is a Professor of Computer Science at Cornell University. Gomes obtained a Ph.D. in computer science in the area of artificial intelligence and operations research from the University of Edinburgh. Her research area is Artificial Intelligence, with a focus on *large-scale automated and constraint reasoning, optimization, and machine learning*. More recently, Gomes has become deeply immersed in research in the new field of Computational Sustainability. From 2007-2013 Gomes led an NSF Expeditions-in-Computing in Computational Sustainability. Gomes and collaborators have successfully pioneered and nucleated the new field of Computational Sustainability. Gomes is currently the lead PI of a new NSF Expeditions-in-Computing that established CompSustNet, a large-scale national and international research network, to further expand the field and Computational Sustainability. Gomes is a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI) and a Fellow of American Association for the Advancement of Science (AAAS).

Sustainability and the Internet of Everything

Prof. António Câmara, New University of Lisbon

Abstract: The World may be divided conceptually into a Real World and the Data World. In the last two decades, most efforts have been directed towards the transformation of the Real-World activities into Data World representations.

The Real World of physical things has been approached by what is called the Internet of Things (IoT) . The idea is that things can become smarter by adding sensors, processors, and/or actuators. Connected devices make it easier to track products from the factory to the customer, ensuring that goods are in the right place at the right time improving the efficiency of just-in-time production. In addition, by enabling devices to communicate energy usage can be monitored, and maintenance needs identified reducing costs and expanding their lifespan. Thus, IoT has been heralded as a major driver for sustainability.

However, IoT should be considered as only one component in a new Internet of Everything (IoE) which is being designed to further improve sustainability. IoE will greatly benefit from new computing platforms being developed that rely on:

- Augmented Reality (AR), which will be enough to add intelligence to most objects and their environments reducing the need for adding sensors and other electronic devices. AR and Artificial Intelligence (AI) will enable the creation of bridges between the Real and Data Worlds. They will also enable new search and transactions models;
- Printed Electronics (PE), which will greatly reduce the cost and energy consumption of smart devices, and may reduce the need for network computing when appropriate;
- Distributed models ranging from the InterPlanetary Filing System (IPFS) and the Universal Sharing System (USS).

ARIA intends to be such a computing platform for IoE. Applications to vertical and consumer markets will be presented for illustrative purposes.

Brief Bio: António Câmara is a Professor at New University of Lisbon (UNL) and a serial entrepreneur. António Câmara has a BS in Civil Engineering by IST (1977), and a PhD in Environmental Systems Engineering by Virginia Tech (1982). He was a Post-Doc at MIT (1983), and a Visiting Professor at Virginia Tech (1988), Cornell University (1988-89) and MIT (1998-99).

António Câmara has more than 200 publications, including the book Environmental Systems, published by Oxford University Press in 2002. He supervised 32 PhD students (UNL) and was a co-advisor of PhD students at Georgia Tech, Virginia Tech, MIT, Free University of Amsterdam and Pompeu Fabra University.

He started the YDreams Group in 2000. The Group includes: YDreams Global, a virtual reality company listed in Toronto and Frankfurt; Azorean, a maker of aquatic drones, listed in Euronext Paris; and Ynvisible, a printed electronics company, that will be listed in Toronto and Frankfurt in November 2017. YDreams Group has developed over 1000 projects in thirty countries for more than 50 Fortune 500 companies. António Câmara is also a founder of Aromni, a disruptive augmented reality company, which started operations in 2016.

He received the Apple Europe Ideas Award in 1987, Pessoa Award in 2006, and an EU Entrepreneur of the Year Award in 2008, among twenty other national and international awards.