10-12 Dicembre 2020

I-RIM

Istituto di Robotica e Macchine Intelligenti

I-RIM 3D 2020 Conference

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ABB

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Conferenza I-RIM 2020 - Programma

10 Dicembre 2020

10:00 | Opening

Workshop

10:10 Human-Robot Collaboration: from Industrial to Service Applications	10:10 Socio-Physical Interaction Skills for Cooperative Human-Robot Systems in Agile Production	10:10 Task and Motion Planning for Effective Human-Robot Collaboration	10:10 Complex Robotic Manipulation Tasks

12:00 | Tavola rotonda "L'Umanità è già stata su Marte?"

PAUSA

Plenaria
14:00 | Jamie Paik

Workshop

15:00 Two Decades of Rehabilitation and Assistive Robotics: Lessons learned and Future Challenges	15:00 Human-Robot Collaboration: from Industrial to Service Applications	15:00 Socio-Physical Interaction Skills for Cooperative Human-Robot Systems in Agile Production	15:00 Introducing ABB Wizard Easy Programming, the Easiest Way to Program your Robots	15:00 Safety in Human-Robot Collaboration: an Open Issue	15:00 From 3D to 4D Printing: a Solution to Unaddressed Medical Needs	15:00 Human-Centric Robotics. Focusing on Robotics for Assistance and Collaboration with Humans	15:00 Human Factors in the Design and Control of Robots: What are we Missing?

PAUSA

Plenaria
21:00 | Oussama Khatib

I-RIM

11 Dicembre 2020

10:00 | Cecile Huet - "The role of AI and Robotics in HE with focus on Cluster 4: Digital, Industry and Space"

Plenaria | **10:20 | Brad Nelson - "Microrobotics and Nanomedicine: Future Directions in Medical Robotics"**

Conferenza

11:15 Autonomous Robots and Systems I	11:15 Dynamics, Control and Learning I	11:15 Humanoids, Exoskeletons, and Rehab Robots I	11:15 Human-Robot Interaction, Teleoperation, and Virtual Reality I

12:15 | Tavola rotonda "La robotica come fattore abilitante per l'innovazione industriale - Tecnologie, idee e scenari

PAUSA

14:00 | Tavola rotonda "Ricerca e Robotica"

PAUSA

Conferenza

15:30 Autonomous Robots and Systems II	15:30 Dynamics, Control and Learning II	15:30 Humanoids, Exoskeletons, and Rehab Robots II	15:30 Human-Robot Interaction, Teleoperation, and Virtual Reality II
16:30 Industry 4.0 I	16:30 Dynamics, Control and Learning III	16:30 Humanoids, Exoskeletons, and Rehab Robots III	16:30 Human-Robot Interaction, Teleoperation, and Virtual Reality III

17:30 | Tavola rotonda "Robotica e Intelligenza Artificiale per l'innovazione clinica":

12 Dicembre 2020

Plenaria | **10:00 | Barbara Webb - "Insect-Inspiration for Robot Navigation"**

Conferenza | Workshop

11:00 Design, Mechanisms, Actuators, Soft and Bio-Inspired Robots I	11:00 Dynamics, Control and Learning IV	11:00 Medical, Cellular, Micro and Nano Robots	11:00 Grasping, Haptics and End-effectors I	11:00 Ethics in Robotics and Intelligent Machines
12:00 Design, Mechanisms, Actuators, Soft and Bio-Inspired Robots II	12:00 Localization, Mapping and Navigation I	12:00 Biorobotics and Medical Systems	12:00 Grasping, Haptics and End-effectors II	12:00 Ethics in Robotics and Intelligent Machines

PAUSA

Conferenza | Workshop

14:30 Industry 4.0 II	14:30 Localization, Mapping and Navigation II	14:30 Humanoids, Exoskeletons, and Rehab Robots IV	14:30 Perception, Action, and Cognition I	14:30 Ethics in Robotics and Intelligent Machines
15:00 Industry 4.0 III	15:00 Swarms and Multi-Robots	15:00 Humanoids, Exoskeletons, and Rehab Robots V	15:00 Perception, Action, and Cognition II	15:00 Ethics in Robotics and Intelligent Machines

16:00 | Cerimonia Award e Arrivederci a I-RIM 2021

Plenarie

Jamie Paik

Jamie Paik is director and founder of Reconfigurable Robotics Lab (RRL) of Swiss Federal Institute of Technology (EPFL) and a core member of Swiss National Centers of Competence in Research (NCCR) Robotics consortium. RRL's research leverages expertise in multi-material fabrication and smart material actuation toward unique robotic platforms. At Harvard University's Microrobotics Laboratory, she started developing unconventional robots that push the physical limits of material and mechanisms. Her latest research effort is in soft robotics and self-morphing Robogami (robotic origami). Robogamis transforms autonomously its planar shape to 2D or 3D by folding in predefined patterns and sequences, just like the paper art, origami. Soft material robots and robogamis are designed to be interactive with the users and their environments through both innate and active reconfigurations. Such characteristics of the RRL's robots have direct applications in medical, automobile, space, and wearable robots. While this novel technology has been published in multiple academic journals such as in Soft Robotics Journal, IEEE Transactions in Robotics, Nature, and Science, RRL's spin-off, Foldaway-Haptics, has pushed the boundaries of the industrial applications of these robots as seen in TED conference 2019. The latest robogami is part of Mercedez's 2020 concept car, Avatar, presented during CES 2020.

RECONFIGURABLE ROBOTS FOR SOFTER INTERACTIONS

ABSTRACT - The ultimate goal of any interactive robotics system is to have a cohesive solution to improve the human-machine interface. For such an interface, it is critical to realize a versatile and adaptable multi-degrees of freedom robot design. While the findings in soft robotics have broadened the application of robotics, they are still limited to specific scenarios. The next challenge is in pushing the boundaries of multi-disciplinary science interceptions simultaneously: materials, mechatronics, energy, control, and design. Such efforts will lead to robust solutions in design methodology, novel actuators, and a comprehensive fabrication and integration method of the core robotic components. This talk will highlight the recent progress in soft- material robots and origami robots that aim at achieving comprehensive solutions toward diverse "softer" human-robot applications.

Oussama Khatib

Oussama Khatib received his PhD from Sup'Aero, Toulouse, France, in 1980. He is Professor of Computer Science and Director of the Robotics Laboratory at Stanford University. His research in robotics focuses on novel control architectures, algorithms, sensing, and human-friendly designs for advanced capabilities in complex environments. With an emphasis on enabling robots to interact cooperatively and safely with humans and the physical world, these studies bring understanding of human movement for therapy, athletic training, and performance enhancement. This work on understanding human cognitive task representation and physical skills is enabling transfer for increased robot autonomy. With these core capabilities, we are exploring applications in healthcare and wellness, industry and service, farms and smart cities, and dangerous and unreachable settings – deep in oceans, mines, and space. Professor Khatib is a Fellow of IEEE, Co-Editor of the Springer Tracts in Advanced Robotics (STAR) series, and the Springer Handbook of Robotics. He is the President of the International Foundation of Robotics Research (IFRR). He is recipient of the IEEE RAS Pioneer Award, the George Saridis Leadership Award, the Distinguished Service Award, the Japan Robot Association (JARA) Award, the Rudolf Kalman Award, and the IEEE Technical Field Award. Professor Khatib is a member of the National Academy of Engineering, NAE.

Brad Nelson

Brad Nelson has been the Professor of Robotics and Intelligent Systems at ETH Zürich since 2002. He has over thirty-five years of experience in the field of robotics and has received a number of awards in the fields of robotics, nanotechnology, and biomedicine. He serves on the advisory boards of a number of academic departments and research institutes across North America, Europe, and Asia and is on the editorial boards of several academic journals. Prof. Nelson is the Department Head of Mechanical and Process Engineering at ETH and has been the Chairman of the ETH Electron Microscopy Center and a member of the Research Council of the Swiss National Science Foundation. He also serves on boards of three Swiss companies and is a member of the Swiss Academy of Engineering (SATW). Before moving to Europe, Prof. Nelson worked as an engineer at Honeywell and Motorola and served as a United States Peace Corps Volunteer in Botswana, Africa. He has also been a professor at the University of Minnesota and the University of Illinois at Chicago.

MICROROBOTICS AND NANOMEDICINE: FUTURE DIRECTIONS IN MEDICAL ROBOTICS

ABSTRACT - While the futuristic vision of micro and nanorobotics is of intelligent machines that navigate throughout our bodies searching for and destroying disease, we have a long way to go to get there. Progress is being made, though, and the past decade has seen impressive advances in the fabrication, powering, and control of tiny motile devices. Much of our work focuses on creating systems for controlling micro and nanorobots as well as pursuing applications of these devices. As systems such as these enter clinical trials, and as commercial applications of this new technology are realized, radically new therapies and uses will result that have yet to be envisioned.

Barbara Webb

Barbara Webb completed a BSc in Psychology at the University of Sydney then a PhD in Artificial Intelligence at the University of Edinburgh, during which she established a novel methodology of using embodied robot models to evaluation biological hypotheses of behavioural control, with a particular focus on insect sensorimotor systems. She has held lectureships at the University of Nottingham and University of Stirling before returning to a faculty position in the School of Informatics at Edinburgh in 2003. She was appointed to a personal chair as Professor of Biorobotics in 2010. Since that time the focus of her research has moved towards more complex insect behavioural capabilities, such as learning and navigation, implemented in neural models and tested on robot platforms.

INSECT-INSPIRATION FOR ROBOT NAVIGATION

ABSTRACT - Many insects have excellent navigational skills, covering distances, conditions and terrains that are still a challenge for robotics. The primary sense they use is vision, both to obtain self-motion information for odometry, and to establish visual memories of their surroundings to guide homing and route following. Insect vision is relatively low resolution, but exploits a combination of sensory tuning and behavioural strategies to solve complex problems. Prof. Barbara Webb will provide an overview of her current understanding of the key mechanisms in the insect brain that support their navigational skills, and how she and her team have modelled these using terrestrial and flying robots.

Tavole rotonde

L'Umanità è già stata su Marte? Ecco perché dobbiamo pensare a una macchina sapiens, robot+uomo, non robot vs uomo

Massimo Sideri (moderatore)
Editorialista Corriere della Sera, Responsabile editoriale Corriere Innovazione
Barbara Mazzolai
Direttrice del Centro di Micro-BioRobotica - Istituto Italiano di Tecnologia
Domenico Prattichizzo
Professore di Robotica e Automazione - Università di Siena, Ricercatore - Istituto Italiano di Tecnologia
Valentina Sumini
Ricercatrice e Architetto - MIT Media Lab
Massimiano Bucchi
Professore di Sociologia della Sci. e di Com., Scienza e Tecnica – Università degli Studi di Trento

La robotica come fattore abilitante per l'innovazione industriale - Tecnologie, idee e scenari evolutivi

Franco Canna (moderatore)
Giornalista, Direttore di Innovation Post
Giorgio Metta
Direttore Scientifico - IIT
Arturo Baroncelli
Consigliere – SIRI
Michele Pedretti
Local Business Line Manager CSSR Robotics & Discrete Automation – ABB

Alessio Cocchi
Sales Development Manager Italy – Universal Robots
Gianluigi Viscardi
Presidente di Cosberg e del Consorzio Intellimech
Enrico Silani
Chief of Entrepreneur - e-Novia
Alberto Pellero
Director Strategy & Marketing – KUKA Roboter Italia

Ricerca e Robotica

Gaetano Manfredi
Ministro dell'Università e della Ricerca
Bruno Siciliano
Professore di Automatica - Università di Napoli Federico II
Antonio Bicchi
Professore di Robotica - Università di Pisa, Ricercatore - Istituto Italiano di Tecnologia
Angelika Peer
Professore di Robotica - Libera Università di Bolzano
Paolo Rocco
Professore di Automatica - Politecnico di Milano
Paolo Fiorini
Professore di Sistemi di elaborazione delle informazioni - Università di Verona
Giulia Campodonico
Ufficio Progetti - Istituto Italiano di Tecnologia

Robotica e Intelligenza Artificiale per l'innovazione clinica: esperienze e prospettive

Nicola Miglino (moderatore)
Direttore responsabile Nutrientiesupplementi.it, Vicepresidente Unamsi (Unione nazionale medico-scientifica d'informazione)
Claudio Rossetti (moderatore)
Responsabile Ufficio Comunicazione e Relazioni Esterne - Istituto Italiano di Tecnologia
Eugenio Guglielmelli
Prorettore alla ricerca - Campus Bio-Medico di Roma
Aldo Massimo Bocciardi
Direttore del Reparto di Urologia - Ospedale Niguarda di Milano
Franca Melfi
Professore di Chirurgia Toracica – Università di Pisa

Mauro Ferrari
Professore di Chirurgia Toracica – Università di Pisa
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Arianna Menciassi
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Robert Alexander
IBM Design Coach