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Recognition of Professional Achievement
For nearly a century, the IEEE Awards program has paid tribute to technical professionals whose exceptional achievements and outstanding contributions have made a lasting impact on technology, society and the engineering profession.

That tradition of public recognition continues today. In the 21st century, IEEE Awards are valued as among the highest honors a technical professional can receive. They are an esteemed symbol of the admiration of one’s peers—the most prized form of prestige—bestowed upon individuals whose accomplishments have enhanced the global economy while improving the quality of daily life.

Legacy of Innovation
IEEE Awards recognize and encourage important contributions to technology, science and the profession. They honor achievements in education, industry, research and service, and they encompass the breadth of the many IEEE technical interest areas from computer science, electrical engineering, information technologies and microelectronics, to optoelectronics, radar technologies, signal processing and beyond. Each award has its own unique mission and criteria, and offers the opportunity to honor distinguished colleagues, inspiring teachers and corporate leaders.

Through the Awards program, the IEEE, and the societies that preceded it, also have played an important role in encouraging innovation. Individuals honored with IEEE Awards join a remarkable group of such well-known pioneers as Bell, Edison, Marconi, Noyce and Grove—among many others. These individuals, in turn, provide inspiration and personal role models for aspiring professionals.

IEEE Awards Selection Process
Nominations for IEEE awards and recognitions are initiated by the members and others, then reviewed by a panel of peers—professionals who are especially knowledgeable in a particular field. Their recommendations are, in turn, submitted to the IEEE Awards Board for further review prior to final approval by the IEEE Board of Directors. The awards fall into seven categories:

- Medals
- Honorary Memberships
- Service Awards
- Corporate Recognitions
- Technical Field Awards
- Prize Paper Awards
- Scholarship Awards
The IEEE Robotics and Automation Award

The IEEE Robotics and Automation Award was established in 2002 by the IEEE Board of Directors, and is presented for contributions in the field of robotics and automation. It includes but is not limited to: manufacturing automation; robotics and automation in unstructured environments; sensor design; integration and fusion; robot design; modeling; planning and control; methodologies for robotics and automation, and the quality of the nomination.

Sponsored by the IEEE Robotics & Automation Society, the award consists of a bronze medal, certificate, and honorarium.

For additional information on IEEE Technical Field Awards and Medals, to view complete lists of past recipients, or to nominate a colleague or associate for IEEE Technical Field Awards and Medals, please visit: www.ieee.org/awards

Past Recipients
2016 – Raffaello D’Andrea
2015 – Rodney A. Brooks
2014 – Shigeo Hirose
2013 – Ruzena Bajcsy
2012 – Bernard Roth
2011 – Hirochika Inoue
2010 – Toshio Fukuda
2009 – Antal Bejczy
2008 – Paul G. Backes
Eric T. Baumgartner
Larry H. Matthies
2007 – Gerd Hirzinger
2006 – George A. Bekey
2005 – Seiuemon Inaba
2004 – Joseph F. Engelberger
Oussama Khatib’s seminal work on robot planning and control has radically changed the basis of manipulation, interaction, locomotion, and other aspects of system design critical to the development of human-friendly robots. Khatib developed the artificial potential field concept for reactive control of robots, which became a fundamental framework for real-time obstacle avoidance. His pioneering contribution of control in operational space rather than joint space has been integral to advances in whole-body motion and force control, and in humanoid robotics. His group created macro-mini actuation for greater safety in medical robotics and in applications where humans work in close proximity to robots. Khatib’s recent work on a robotics-based approach to human motor control and human motion understanding is providing substantial benefits to restoring movement and improving human performance. His work on learning human skills and mapping to robot-compliant strategies is becoming fundamental to increasing the autonomous capabilities of robots in performing complex tasks and cooperating with people.

An IEEE Fellow, Khatib is a professor with the Department of Computer Science at Stanford University, Stanford, CA, USA.
The IEEE Kiyo Tomiyasu Award

The IEEE Kiyo Tomiyasu Award was established in 2001 by the IEEE Board of Directors, and is presented to recognize outstanding early to mid-career contributions to technologies holding the promise of innovative applications.

Sponsored by Dr. Kiyo Tomiyasu, the IEEE Geoscience and Remote Sensing Society, and the IEEE Microwave Theory and Techniques Society, the award consists of a bronze medal, certificate, and honorarium.

For additional information on IEEE Technical Field Awards and Medals, to view complete lists of past recipients, or to nominate a colleague or associate for IEEE Technical Field Awards and Medals, please visit: www.ieee.org/awards

Past Recipients
2016 – Yonina Eldar
2015 – Kaustav Banerjee
Vivek Subramanian
2014 – George Chrisikos
2013 – Carlos Artemio Coello
2012 – Mung Chiang
2011 – Moe Z. Win
2010 – Tsu-Jae King Liu
2009 – Shih-Fu Chang
2008 – George V. Eleftheriades
2007 – Alberto Moreira
2006 – Muhammad A. Alam
2005 – Chai K. Toh
2004 – David B. Fogel
2003 – Keshab K. Parhi
2002 – Casimer Decusatis
Emilio Frazzoli is a driving force in developing planning and control algorithms for the safe and reliable operation of autonomous vehicles in real-world environments. Frazzoli has created control software that allows autonomous cars to generate only trajectories that satisfy all “hard rules” (such as “do not hit pedestrians”) while satisfying as many “soft rules” (“if possible, stay in left lane”) as possible. His Rapidly-exploring Random Trees (RRT) algorithm is considered the state-of-the-art in motion planning. One of his projects helped gain understanding of the impact of autonomous cars on urban mobility. This project featured the first vehicle authorized to drive autonomously on public roads in Singapore using “rules of the road” planning and the first analysis of the social and economic impact of autonomous cars on a city.

An IEEE Senior Member, Frazzoli is a professor with ETH Zürich, Switzerland, and the Chief Scientist of nuTonomy, Inc., Cambridge, MA, USA.
IEEE Fellows
Elevated as of January 2017

IEEE Fellow is the highest grade of Institute membership, conferred only by election by the Board of Directors. Candidates must be senior members with at least five years of IEEE membership. The nominator is responsible for preparation of the formal nomination form; identification of five to eight IEEE Fellows, capable of assessing the candidate's contributions, who agree to serve as references; identification of an IEEE Society or Council whose evaluating committee will assess the candidate's technical qualifications and contributions. All material is sent to the Fellow Committee, which must review all nominations and assessments, and prepare a ranked list. The total number of Fellow recommendations each year cannot exceed 0.1% of IEEE membership, exclusive of Students and Affiliates.

Congratulations to the
IEEE Robotics and Automation Society
2017 Fellow Class

Calin Belta - Boston University, USA
“For contributions to automated control synthesis and robot motion planning and control”

Zi-xing Cai - Central South University, China
“For contributions to evolutionary optimization and intelligent robotics”

Andrea Caiti - University of Pisa, Italy
“For contributions to geo-acoustic inversion and autonomous underwater vehicles”

Jose Carmena - University of California-Berkeley, USA
“For contributions to the neural basis of motor skill learning and neuroprosthetic systems”

Gordon Cheng - Technical University Munich, Germany
“For contributions in humanoid robotic systems and neurorobotics”

Pablo Estevez - University of Chile, Chile
“For contributions to feature selection and visualization of large data sets”

Mariapia Fanti - Polytechnic of Bari, Italy
“For contributions to modeling and control of discrete event systems”
Michael Gard - The Charles Machine Works, USA
“For contributions to instrumentation-and-measurement technology for petroleum exploration, computed tomography, and underground construction”

Alessandro Giua - Aix-Marseille Universite, France
“For contributions to discrete event and hybrid systems”

Uwe Hanebeck - Karlsruhe Institute of Technology, Germany
“For contributions to nonlinear estimation and control”

K Kyriakopoulos - National Technical University of Athens, Greece
“For contributions to robot motion planning and control of multirobot systems”

Bengt Lennartson - Chalmers University of Technology, Sweden
“For contributions to hybrid and discrete event systems for automation and sustainable production”

Jingshan Li - University of Wisconsin-Madison, USA
“For contributions to manufacturing system automation”

Li Li - Tsinghua University, China
“For contributions to intelligent transportation systems and vehicles”

Robert Mahony - The Australian National University, Australia
“For contributions to control aspects of aerial robotics”

Jose Del R Millan - Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland
“For contributions to brain-controlled robots”

Giuseppe Oriolo - Sapienza University of Rome, Italy
“For contributions to motion planning and control methods in complex robotic systems”

Kristin Pettersen - Norwegian University of Science and Technology, Norway
“For contributions to control of marine vessels and snake robots”

Ram Duvvuru Sriram - National Institute of Standards and Technology, USA
“For leadership in developing computational tools for healthcare enterprises”

Hong Tan - Purdue University, USA
“For contributions to wearable haptics”

Xiaobo Tan - Michigan State University, USA
“For contributions to modeling and control of smart materials and underwater robots”

Ching-chih Tsai - National Chung Hsing University, Taiwan
“For contributions to intelligent adaptive learning control for industrial systems and machinery”

A. Frank Van Der Stappen - Utrecht University, The Netherlands
“For contributions to the algorithmic foundations of robotics and automation”
IEEE RAS Pioneer Award

Paolo Dario

For pioneering the emerging area of BioRobotics, the science and engineering of integrating robotics with biology and medicine

Paolo Dario is Professor of Biomedical Robotics, Director of the BioRobotics Institute and Director of the PhD Program in BioRobotics at the Scuola Superiore Sant'Anna, Pisa, Italy. He received his Dr Eng Degree in Mechanical Engineering from the University of Pisa and has been and is visiting researcher, professor and fellow at various universities and scientific institutions in Europe, USA, the Middle East and Asia. His current research interests are in the field of bio-robotics and bionics, and include surgical robotics, micro/nano devices for endoscopy, bio-inspired devices and systems, and assistive and companion robots. Paolo Dario is the author of 400+ journal publications (Scopus), his H-Index is 57 (Scopus), and in March 2015 he was identified by the IEEE Robotics and Automation Magazine as the second most influential scientist in robotics worldwide according to degree centrality and bibliometric criteria. He is co-author of 50+ international patents and co-founder of 5 start-up companies. Paolo Dario has been the coordinator of many large national and European projects. He served as Editor-in-Chief, Associate Editor and member of the Editorial Board of many international journals in biomedical engineering and in robotics. He is Founding Editorial Board Member of the Journal “Science Robotics” and Associate Editor of the IEEE Transactions on Biomedical Engineering. Paolo Dario is an IEEE Fellow and a Fellow of the European Society on Medical and Biological Engineering. Paolo Dario has been the General Chair and the Program Chair of several IEEE Conferences in Robotics and BioRobotics. He served as President of the IEEE Robotics and Automation Society and received several prizes and Awards, including the 1996 Joseph Engelberger Award and the 2014 IEEE RAS George Saridis Leadership Award.
Vijay Kumar is a Professor and the Nemirovsky Family Dean of Penn Engineering with appointments in the Departments of Mechanical Engineering and Applied Mechanics, Computer and Information Science, and Electrical and Systems Engineering at the University of Pennsylvania.

Dr. Kumar received his Bachelor of Technology degree from the Indian Institute of Technology, Kanpur and his Ph.D. from The Ohio State University in 1987. He is a Fellow of the American Society of Mechanical Engineers (2003), a Fellow of the Institute of Electrical and Electronic Engineers (2005) and a member of the National Academy of Engineering (2013). He has served on the editorial boards of the IEEE Transactions on Robotics and Automation, IEEE Transactions on Automation Science and Engineering, ASME Journal of Mechanical Design, the ASME Journal of Mechanisms and Robotics and the Springer Tract in Advanced Robotics (STAR). He currently serves as Editor of the ASME Journal of Mechanisms and Robotics and as Advisory Board Member of the AAAS Science Robotics Journal.

He is the recipient of the 1991 National Science Foundation Presidential Young Investigator award, the 1996 Lindback Award for Distinguished Teaching (University of Pennsylvania), the 2012 ASME Mechanisms and Robotics Award, the 2012 IEEE Robotics and Automation Society Distinguished Service Award, a 2012 World Technology Network (wtn.net) award, a 2013 Popular Mechanics Breakthrough Award, and the 2014 Engelberger Robotics Award. He has won best paper awards at DARS 2002, ICRA 2004, ICRA 2011, RSS 2011, RSS 2013, ICRA 2014, and BICT 2015, and has advised doctoral students who have won Best Student Paper Awards at ICRA 2008, RSS 2009, and DARS 2010.
Peter B. Luh received his B.S. in Electrical Engineering from National Taiwan University in 1973, M.S. in Aeronautics and Astronautics from M.I.T. in 1977, and Ph.D. in Applied Mathematics from Harvard University in 1980. Since then, he has been with the Department of Electrical and Computer Engineering, University of Connecticut, and is the SNET Professor of Communications & Information Technologies. He was the Head of the Department from 2006 to 2009. He is also a member of the Chair Professors Group, Center for Intelligent and Networked Systems (CFINS) in the Department of Automation, Tsinghua University, Beijing, China. His research interests include Intelligent Manufacturing Systems; Energy Efficient and Safe Buildings; Smart Power Systems and Microgrids; and mathematical optimization of large-scale mixed-integer problems, and decision-making under uncertain, distributed, or antagonistic environments.

Professionally, Professor Luh is a Life Fellow of IEEE, and a member of IEEE TAB Periodicals Committee 2011-12, 2014-present). He was the Vice President for Publication Activities for IEEE Robotics and Automation Society (2008-2011), the Founding Editor-in-Chief of the IEEE Transactions on Automation Science and Engineering (2003-2007), and an Editor-in-Chief of IEEE Transactions on Robotics and Automation (1999-2003). He was the Founding Chair of the Steering Committee of IEEE Conference on Automation Science and Engineering (2006-2011), and continues as a member till now. He also served two terms on the RAS Administrative Committee (1992-1997), was the Senior Advisor to RAS President David Orin on Automation, and the Chair of the Ad Hoc Committee on Automation (2012-13). He received 1996 King-Sun Fu Memorial Best Transactions Paper Award of IEEE Transactions on Robotics and Automation; 2003 RAS Distinguished Service Award; and the 2013 RAS Pioneer Award for his pioneering contributions to the development of near-optimal and efficient planning, scheduling, and coordination methodologies for manufacturing and power systems.
Nancy M. Amato is Regents Professor and Unocal Professor in the Department of Computer Science and Engineering at Texas A&M where she co-directs the Parasol Lab. She received undergraduate degrees in Mathematical Sciences and Economics from Stanford University, and M.S. and Ph.D. degrees in Computer Science from UC Berkeley and the University of Illinois at Urbana-Champaign. Her main areas of research focus are motion planning and robotics, computational biology and geometry, and parallel and distributed computing. She was Program Chair for IEEE ICRA 2015 and RSS 2016, was Editor-in-Chief of the IEEE/RSJ IROS CPRB (2011-2013), and served on the editorial boards of the IEEE TPDS and IEEE TRO. She serves as an elected member of the CRA Board of Directors (2014-2020), and served as elected member of the IEEE Robotics and Automation Society (RAS) AdCom (2009-2014). She has served as the Chair of the IEEE RAS Electronic Products and Services Board since 2012. She is co-Chair of the CRA's Committee on the Status of Women in Computing Research (CRA-W) and was co-Chair of the NCWIT Academic Alliance (2009-2011). She was an AT&T Bell Laboratories PhD Scholar, received an NSF CAREER Award, is an ACM Distinguished Speaker, and was a Distinguished Lecturer for the IEEE RAS. She received the 2014 CRA Haberman Award, the inaugural 2014 NCWIT Harrold and Notkin Research and Graduate Mentoring Award, the 2013 IEEE Hewlett-Packard/Harriet B. Rigas Award, and a Texas A&M university-level teaching award. She is a AAAS Fellow, an ACM Fellow, and an IEEE Fellow.
Conor Walsh is the John L. Loeb Associate Professor of Engineering and Applied Sciences at the Harvard John A. Paulson School of Engineering & Applied Sciences and a Core Faculty Member at the Wyss Institute at Harvard University. He founded and directs the Harvard Biodesign Lab, which brings together researchers from the engineering, industrial design, apparel, clinical and business communities to develop new disruptive robotic technologies for augmenting and restoring human performance. This research includes new approaches to the design, manufacture and control of next generation wearable robotic devices and characterizing their performance through biomechanical and physiological studies so as to further the scientific understanding of how humans interact with such machines. Example application areas include enhancing the mobility of healthy individuals, restoring the mobility of patients with gait deficits and assisting those with upper extremity weakness to perform activities of daily living.

He is also passionate about educating future innovators and he has established the Harvard Medical Device Innovation Initiative that provides students with the opportunity to collaborate with clinicians in Boston and emerging regions such as India and Peru. In addition, his research group is also dedicated to STEM education and have launched the Soft Robotics Toolkit that is an open source resource to promote and disseminate materials for soft robotics. Conor received his undergraduate degree from Trinity College in Dublin, Ireland, and M.S. and Ph.D. degrees in Mechanical Engineering from MIT.
2017 Early Career Award in Robotics & Automation

Academic

Sertac Karaman

For contributions to motion planning and control algorithms for robots and autonomous vehicles

Sertac Karaman is an Associate Professor of Aeronautics and Astronautics at the Massachusetts Institute of Technology (since Fall 2012). He has obtained B.S. degrees in mechanical engineering and in computer engineering from the Istanbul Technical University, Turkey, in 2007; an S.M. degree in mechanical engineering from MIT in 2009; and a Ph.D. degree in electrical engineering and computer science also from MIT in 2012. His research interests lie in the broad areas of robotics and control theory. In particular, he studies the applications of probability theory, stochastic processes, stochastic geometry, formal methods, and optimization for the design and analysis of high-performance cyber-physical systems. The application areas of his research include driverless cars, unmanned aerial vehicles, distributed aerial surveillance systems, air traffic control, certification and verification of control systems software, and many others. He is the recipient of an Office of Naval Research Young Investigator Award in 2017, Army Research Office Young Investigator Award in 2015, National Science Foundation Faculty Career Development (CAREER) Award in 2014, AIAA Wright Brothers Graduate Award in 2012, and an NVIDIA Fellowship in 2011.
Inaba Technical Award for Innovation Leading to Production

For outstanding contributions to the application of robotics in the power distribution industry - HiBot Corporation

**Paulo Debenest**

Paulo Debenest is a co-founder and robot creator at HiBot. His research interests include non-conventional design of robotic mechanisms, search & rescue, and hazardous robotics applications. Some of his projects were awarded the Edison Gold Award (2015) and the World Economic Forum’s indication of Technology Pioneer (2015).

**Michele Guarnieri**

Michele Guarnieri is a co-founder and director at HiBot. His research interests include the development of robot control system and non-conventional design of robotic mechanisms, search & rescue, and hazardous robotics applications. Some of his projects were awarded with the Robot Award from Japanese Ministry of Economy (2010), the Edison Gold Award (2015) and the World Economic Forum’s indication of Technology Pioneer (2015).

**Shigeo Hirose**

Shigeo Hirose is the cofounder, Chairman & Executive Director CTO of HiBot Corporation, professor emeritus of Tokyo Institute of Technology. His research interest is in the creative design of robotic mechanisms.
IEEE Robotics and Automation Award
for Product Innovation

Clearpath Robotics

In recognition of the Jackal Unmanned Ground Vehicle (UGV):
A small 4-wheeled all-terrain robot with multiple payload
capacity and open source software

RAS Most Active
Technical Committee Award

Technical Committee on Cognitive Robotics

2016 Co-Chairs:
Giulio Sandini, Matthias Scheutz,
Shingo Shimoda and David Vernon
RAS Chapter of the Year Award

IEEE RAS Tunisia Chapter

Co-Chairs:
Nizar Rokbani and Adel Alimi

RAS Awards

Nominate a Colleague for an RAS Award!

Deadline: 1 August 2017

Nominations can be submitted on-line or by email
Please see the RAS website for more details

www.ieee-ras.org
IEEE/IFR Invention and Entrepreneurship Award

This award is cosponsored by IEEE Robotics and Automation Society and the International Federation of Robotics. The purpose of the IERA award is to highlight and honor the achievements of the inventors with value creating ideas and entrepreneurs who propel those ideas into world-class products.

Finalists

ANYdrive – a modular joint actuator for advanced interacting robots
Marco Hutter, ANYbotics AG, Switzerland
ANYdrive is a highly integrated modular joint unit featuring precise, low impedance force control and high impact robustness making it the perfect building block for robots interacting with their environment.

hunova - an easy to use and intuitive medical device
Jody Saglia, Movendo Technology s.r.l., Italy
hunova is a medical device developed to bring the robotic rehabilitation into the daily practice of the Clinician. hunova is designed to provide accurate and repeatable rehabilitation in conjunction with the objective measurement of lower limbs, trunks and vestibular system.

Sensing flexibility: 3D force and 6-axis force/torque sensors for industrial robotic applications
György Cserey, OptoForce Ltd, Hungary
The OptoForce solution includes a set of multi-axial force sensors based on a unique, optical principle. OptoForce uses LEDs and photodiodes mounted on a standard PCB and moulds three silicone layers above them. The sensor can measure the force and the direction of the impact.

Chairless Chair®
Sven Liebermeister, noonee AG, Germany
The Chairless Chair® allows the user to sit anytime and anywhere without need for chair.

Relay autonomous delivery robot
Steve Cousins, Savioke, USA
Relay is the first fully-autonomous delivery robot that works alongside people in busy, indoor environments such as logistics facilities, hotels, high-rise apartments, and eldercare.
RAS Publication Awards

King-Sun Fu Memorial IEEE Transactions on Robotics Best Paper Award
To recognize the best paper of the IEEE Transactions on Robotics (T-RO) published in the previous calendar year.

“Rapidly Exploring Random Cycles: Persistent Estimation of Spatiotemporal Fields With Multiple Sensing Robots”

Xiaodong Lan and Mac Schwager

*IEEE Transactions on Robotics;* vol. 32, no. 5, pp. 1230-1244, October 2016

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IEEE Robotics & Automation Magazine Best Paper Award
To recognize the best paper of the IEEE Robotics & Automation Magazine (RAM) published in the previous calendar year.

“Practice Makes Perfect-An Optimization Based Approach to Controlling Agile Motions for a Quadruped Robot”

Christian Gehring, Stelian Coros, Marco Hutter, C. Dario Bellicoso, Huub Heijnen, Remo Diethelm, Michael Bloesch, Péter Fankhauser, Jemin Hwangbo, Markus A. Hoepflinger, and Roland Siegwart

NEW RAS Award!

IEEE Robotics and Automation Letters
Best Paper Award
To recognize the best paper of the IEEE Robotics and Automation Letters (RA-L) published in the previous calendar year.

Two Recipients this Year!

"Compliant Aerial Manipulators: Toward a New Generation of Aerial Robotic Workers"
T. Bartelds, A. Capra, S. Hamaza, S. Stramigioli and M. Fumagalli
IEEE Robotics and Automation Letters
vol. 1, no. 1, pp. 477-483, January 2016

"Model-Less Hybrid Position/Force Control: A Minimalist Approach for Continuum Manipulators in Unknown, Constrained Environments"
Michael. C. Yip and David B. Camarillo
IEEE Robotics and Automation Letters
vol. 1, no. 2, pp. 844-851, July 2016
2016 IEEE Transactions on Automation Science and Engineering Best Paper Award

To be presented at the 2017 IEEE International Conference on Automation Science and Engineering (IEEE-CASE), 20-23 August 2017 in Xi’an, China

2016 Googol T-ASE Best New Application Paper Award

To be presented at the 2017 IEEE International Conference on Automation Science and Engineering (IEEE-CASE), 20-23 August 2017 in Xi’an, China
IEEE Robotics & Automation Society
Special Recognition

RAS recognizes the following Administrative Committee (AdCom) Members whose terms ended in 2016. Their dedication and hard work is greatly appreciated.

Administrative Committee Members

Serving 2014-2016
Toshio Fukuda
Seth Hutchinson *
Dong-Soo Kwon *
Bradley Nelson
Hong Qiao *
Hong Zhang

*re-elected for 2017-2018

Special Thanks and Recognition

IEEE Transactions on Automation Science and Engineering (T-ASE)
Editor-in-Chief from 2011-2016

Ken Goldberg
ICRA 2017 Awards

Creating a world class technical program for ICRA requires the contributions of many. With the following awards, IEEE RAS recognizes individuals who provided outstanding contributions to the Conference Editorial Board, which is responsible for reviewing the submissions to ICRA.

Best Associate Editor Award

♦ Pierre-Brice Wieber, INRIA Rhône-Alpes, France
♦ Yonghuai Liu, Aberystwyth University, United Kingdom

Best Reviewer Award

♦ Jeannette Bohg, Max-Planck Institute for Intelligent Systems, Germany
♦ Cristina Garcia Cifuentes, Max-Planck Institute for Intelligent Systems, Germany
♦ Emmanuel Vander Poorten, Katholieke Universiteit Leuven, Belgium
♦ Changhyun Choi, Massachusetts Institute of Technology, USA
The ICRA awards are presented to one of the selected finalists listed below for each category. In the event of multiple winners, the prize is shared.

IEEE ICRA Best Paper Award in Automation Finalists

- **A Distributed Approach to Automated Manufacturing Systems with Complex Structures Using Petri Nets**
  Yan Yang, Hesuan Hu, Yang Liu

- **UAV-Based Crop and Weed Classification for Smart Farming**
  Philipp Lottes, Raghav Khanna, Johannes Pfeifer, Roland Siegwart, Cyrill Stachniss

- **NimbRo Picking: Versatile Part Handling for Warehouse Automation**
  Max Schwarz, Anton Milan, Christian Lenz, Aura Munoz, Arul Selvam Periyasamy, Michael Schreiber, Sebastian Schüller, Sven Behnke

- **Planning and Executing Optimal Non-Entangling Paths for Tethered Underwater Vehicles**
  Seth McCammon, Geoffrey Hollinger

- **Peduncle Detection of Sweet Pepper for Autonomous Crop Harvesting - Combined Colour and 3D Information**
  Inkyu Sa, Christopher Lehner, Andrew English, Christopher Steven McCool, Feras Dayoub, Ben Upcroft, Tristan Perez
IEEE ICRA Best Paper Award in Cognitive Robotics Finalists
(sponsored by KROS)

♦ Deep Visual Foresight for Planning Robot Motion
  Chelsea Finn, Sergey Levine
♦ Deep Multimodal Embedding: Manipulating Novel Objects with Point-Clouds, Language and Trajectories
  Jaeyong Sung, Ian Lenz, Ashutosh Saxena
♦ Learning to Represent Haptic Feedback for Partially-Observable Tasks
  Jaeyong Sung, Kenneth Salisbury, Ashutosh Saxena
IEEE ICRA Best Paper Award on Human-Robot Interaction (HRI) Finalists (sponsored by ABB)

- **Simulating Gait Assistance of a Hip Exoskeleton: Case Studies for Ankle Pathologies**
  Bokman Lim, SeungYong Hyung, Jusuk Lee, Uikyum Kim, Keehong Seo, Junwon Jang, Youngbo Shim

- **Mobile Robot Companion for Walking Training of Stroke Patients in Clinical Post-Stroke Rehabilitation**
  Horst-Michael Gross, Sibylle Meyer, Andrea Scheidig, Markus Eisenbach, Steffen Mueller, Thanh Quang Trinh, Tim Wengefeld, Andreas Bley, Christian Martin, Christa Fricke

- **Estimating Unknown Object Dynamics in Human-Robot Manipulation Tasks**
  Denis Cehajic, Pablo Budde genannt Dohmann, Sandra Hirche

- **Development of a Block Machine for Volleyball Attack Training**
  Kosuke Sato, Keita Watanabe, Shuichi Mizuno, Masayoshi Manabe, Hiroaki Yano, Hiroo Iwata

- **Hierarchical Cascade Controller for Assistance Modulation in a Soft Wearable Arm Exoskeleton**
  Binh Khanh Dinh, Michele Xiloyannis, Chris Wilson Antuvan, Leonardo Cappello, Lorenzo Masia
IEEE ICRA Best Paper Award in Medical Robotics Finalists (sponsored by Intuitive Surgical, Inc)

- Magnetically Actuated Soft Capsule Endoscope for Fine-Needle Aspiration Biopsy
  Donghoon Son, Mustafa Doga Dogan, Metin Sitti
- Preliminary Results on Energy Efficient 3D Prosthetic Walking with a Powered Compliant Transfemoral Prosthesis
  Zhao Huihua, Eric Ambrose, Aaron Ames
- A Rolling-Diaphragm Hydrostatic Transmission for Remote MR-Guided Needle Insertion
  Natalie Burkhard, Samuel Frishman, Alexander Gruebele, John Peter Whitney, Roger E. Goldman, Bruce Daniel, Mark Cutkosky
- First Demonstration of Simultaneous Localization and Propulsion of a Magnetic Capsule in a Lumen using a Single Rotating Magnet
  Katie Popek, Tucker Hermans, Jake Abbott
- Efficient Proximity Queries for Continuum Robots on Parallel Computing Hardware
  Konrad Leibrandt, Guang-Zhong Yang
IEEE ICRA Best Paper Award on Multi-Robot Systems Finalists (sponsored by Amazon Robotics)

- Distributed Data Gathering with Buffer Constraints and Intermittent Communication
  Meng Guo, Michael M. Zavlanos

- The Robotarium: A Remotely Accessible Swarm Robotics Research Testbed
  Daniel Pickem, Paul Glotfelter, Li Wang, Mark Mote, Aaron Ames, Eric Feron, Magnus Egerstedt

- Decentralized Non-communicating Multi-agent Collision Avoidance with Deep Reinforcement Learning
  Yufan Chen, Miao Liu, Michael Everett, Jonathan Patrick How

- Decentralized Matroid Optimization for Topology Constraints in Multi-Robot Allocation Problems
  Ryan Williams, Andrea Gasparri, Giovanni Ulivi

- Formations for Resilient Robot Teams
  Luis Guerrero-Bonilla, Amanda Prorok, Vijay Kumar
IEEE ICRA Best Paper Award
in Robot Manipulation Finalists
(sponsored by Ben Wegbreit)

- Optimal, Sampling-Based Manipulation Planning
  Philipp Sebastian Schmitt, Werner Neubauer,
  Wendelin Feiten, Kai M. Wurm, Georg v. Wichert,
  Wolfram Burgard
- Design of a Simplified Compliant Anthropomorphic Robot Hand
  Tuomas Wiste, Michael Goldfarb
- Integrating Motion and Hierarchical Fingertip Grasp Planning
  Joshua Alexander Haustein, Kaiyu Hang,
  Danica Kragic
- Analyzing Achievable Stiffness Control Bounds of Robotic Hands with Compliantly Coupled Finger Joints
  Prashant Rao, Gray Thomas, Luis Sentis,
  Ashish Deshpande
- A Two-Fingered Robot Gripper with Large Object Reorientation Range
  Walter Bircher, Aaron Dollar, Nicolas Rojas
IEEE ICRA Best Paper Award in Robot Vision Finalists (sponsored by Ben Wegbreit)

- Probabilistic Data Association for Semantic SLAM
  Sean Bowman, Nikolay Atanasov, Kostas Daniilidis, George J. Pappas
- A Comparative Analysis of Tightly-Coupled Monocular, Binocular, and Stereo VINS
  Mrinal Kanti Paul, Kejian Wu, Joel A. Hesch, Esha Nerurkar, Stergios Roumeliotis
- SE3-Nets: Learning Rigid Body Motion using Deep Neural Networks
  Arunkumar Byravan, Dieter Fox
- Probabilistic Articulated Real-Time Tracking for Robot Manipulation
  Cristina Garcia Cifuentes, Jan Issac, Manuel Wüthrich, Stefan Schaal, Jeannette Bohg
- Self-supervised Learning of Dense Visual Descriptors
  Tanner Schmidt, Richard Newcombe, Dieter Fox
IEEE ICRA Best Paper Award in Service Robotics Finalists (sponsored by KUKA)

- Improving Octree-Based Occupancy Maps using Environment Sparsity with Application to Aerial Robot Navigation
  Jing Chen, Shaojie Shen
- Feasibility Study of IoRT Platform ``Big Sensor Box''
  Ryo Kurazume, Yoonseok Pyo, Kazuto Nakashima, Tokuo Tsuji, Akihiro Kawamura
- Autonomous Robotic System using Non-Destructive Evaluation methods for Bridge Deck Inspection
  Tuan Le, Gibb Spencer, Nhan Pham, Hung La, Falk Logan, Berendsen Tony
- High-Precision Microinjection of Microbeads into C. Elegans Trapped in a Suction Microchannel
  Masahiro Nakajima, Yuki Ayamura, Masaru Takeuchi, Naoki Hisamoto, Strahil Pastuhov, Yasuhisa Hasegawa, Toshio Fukuda, Qiang Huang
IEEE ICRA Best Student Paper Award Finalists

- **Data-Driven Design of Implicit Force Control for Industrial Robots**
  Matteo Parigi-Polverini, Simone Formentin, Le Anh Dao, Paolo Rocco

- **Motion Planning with Movement Primitives for Cooperative Aerial Transportation in Obstacle Environment**
  Hyoin Kim, Hyeonbeom Lee, Seungwon Choi, Yung-Kyun Noh, H. Jin Kim

- **1-Actuator 3-DoF Parts Feeding Using Hybrid Joint Mechanism with Twisted Axis Layout**
  Ryohei Sakashita, Mitsuru Higashimori

- **Robust Policy Search with Applications to Safe Vehicle Navigation**
  Matthew Sheckells, Gowtham Garimella, Marin Kobilarov

- **Autonomous Robotic Stone Stacking with Online Next Best Object Target Pose Planning**
  Fadri Furrer, Martin Wermelinger, Hironori Yoshida, Fabio Gramazio, Matthias Daniel Kohler, Roland Siegwart, Marco Hutter
IEEE ICRA Best Conference Paper Award Finalists

- The Robotarium: A Remotely Accessible Swarm Robotics Research Testbed
  Daniel Pickem, Paul Glotfelter, Li Wang, Mark Mote, Aaron Ames, Eric Feron, Magnus Egerstedt

- Design, Development and Experimental Assessment of a Robotic End-Effector for Non-Standard Concrete Applications
  Nitish Kumar, Norman Hack, Kathrin Doerfler, Alexander Nikolaus Walzer, Gonzalo Javier Rey, Fabio Gramazio, Matthias Daniel Kohler, Jonas Buchli

- Information Theoretic MPC for Model-Based Reinforcement Learning
  Grady Williams, Nolan Wagener, Brian Goldfain, Paul Drews, James Rehg, Byron Boots, Evangelos Theodorou

- Probabilistic Data Association for Semantic SLAM
  Sean Bowman, Nikolay Atanasov, Kostas Daniilidis, George J. Pappas

- Estimating Unknown Object Dynamics in Human-Robot Manipulation Tasks
  Denis Cehajic, Pablo Budde genannt Dohmann, Sandra Hirche
ICRA Robot Challenges

The Robot Challenges took place on 30-31 May 2017.

DJI RoboMasters Mobile Manipulation Challenge

Description: This is a ground robot challenge that examines the application and competence of technologies that include positioning, object grasping, force control, target identification, and system stability. Teams are challenged to develop a lightweight mobile manipulator that can autonomously pick, transport and stack building blocks, and will compete on the bases of completion time and assembly height, while meeting the specified weight and size constraints on the robot.

Finalists:
- AlphaTower - National University of Singapore, Singapore
- Bixi - Energy Research Institute @ NTU, Singapore
- CUApes - The Chinese University of Hong Kong, China (Hong Kong)
- Duxing - Xi'an Jiaotong University, China
- homer@UniKoblenz, University of Koblenz-Landau, Germany
- IIC-HITsz - Harbin Institute of Technology, Shenzhen, China
- MYTEAM - Monash University Malaysia, Malaysia
- Neptune - The University of Louisville, USA
- REAPER - University of Science and Technology of China, China
- RobotPilots - Shenzhen University, China
- T-DT - Northeastern University, China
- The Weaver Robo - National Institute of Technology Karnataka, India
- WHU Kylin Team - Wuhan University, China
Humanitarian Robotics and Automation Technology Challenge

**Description:** To promote the use of robotics and automation technologies towards improving the quality of life for humanity through the reliable and robust detection and classification of landmines.

**Basis for Judging:** Teams are evaluated based on a weighted scoring metric that takes into account the number of successful/unsuccessful landmine detections, number of "explosions" caused by undetected/detected landmines, number of robot collisions, amount of area swept, and coverage time.

**Finalists:**
- Team Dhruva, India
- Team NUS, National University of Singapore, Singapore
- Team RCMakers, Turkey

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Soft Material Robot Challenge

Participants demonstrate their robots actuated using soft materials. The challenge includes two categories:
- **Soft component technologies showcase:** Develop, demonstrate and document a new actuator, sensor or other component technology that advances the field of soft robotics. The entries will be judged for significance, originality, functionality and quality of documentation.
- **Soft robots speed challenge:** Aims to pick the fastest robot on land completely driven by soft actuators.
Mobile Microrobotics Challenge

Microrobots, on the order of the diameter of a human hair, face off in tests of autonomy, accuracy, and assembly. Teams can participate in up to three events:

**Autonomous Mobility & Accuracy Challenge:** Microrobots must navigate within a grid of waypoints, fabricated or superimposed on the substrate. Teams are given a list of waypoints to hit (targets), and waypoints to avoid (obstacles). The objective is to hit the most targets while avoiding the most obstacles, while moving as rapidly as possible.

**Microassembly Challenge:** Microrobots must assemble a planar shape out of multiple microscale components located in a confined starting region. This task simulates anticipated applications of microassembly for medical or micromanufacturing applications.

**MMC Showcase & Poster Session:** Teams have the opportunity to showcase and demonstrate any advanced capabilities and/or functionality of their microrobot system.

**Finalists:**
- Team Micro Robot Lab, King Mongkut’s University of Technology Thonburi (KMUTT), Thailand
- Team NGS, University of Louisville, USA
- Team NOMAD, C2N-CNRS, Univ. Paris-Sud, France
- Team UVT, Valahia University of Targoviste, Romania
See You Next Year!!!

IEEE International Conference on Robotics and Automation

21 - 25 May 2018
Brisbane, Australia
www.icra2018.org