



IEEE International Conference on Robotics and Automation
June 2021

IEEE ICRA 2021 Award List



ICRA 2021 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.

Outstanding Associate Editor Award

- **Patrick Wensing** - University of Notre Dame, USA
- **Raffaella Carloni** - University of Groningen, Netherlands
- **Shengyong Chen** - Tianjin University of Technology, China
- **Luca Carlone** - Massachusetts Institute of Technology, USA

ICRA 2021 Awards

Outstanding Reviewer Award

- **Mathias Lechner** - Institute of Science and Technology Austria, Austria
- **Hadas Kress-Gazit** - Cornell University, USA
- **Zhang Yinlong** - Shenyang Institute of Automation, Chinese Academy of Sciences, China
- **Justin Yim** - University of California, Berkeley, USA

IEEE ICRA 2021 Awards Committee

- **Jason Gu** – Dalhousie University, Canada
- **Hong Qiao** – Institute of Automation, CAS
- **Hong Zhang** – Southern University of Science and Technology

ICRA 2021 Awards

**IEEE ICRA Best Paper Award in Automation
- Award Committee -**

**Nina Mahmoudian, Todd Murphy,
and Panagiotis Artemiadis**

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Automation - Finalists

- **Fabric Defect Detection Using Tactile Information**
Xingming Long, Bin Fang, Yifan Zhang, GuoYi Luo and Fuchun Sun
- **A General-Purpose Anomalous Scenario Synthesizer for Rotary Equipment**
Yip Fun Yeung, Ali Alshehri, Lois Wampler, Furokawa Mikio and Hirano Takayuki,
Kamal Youcef-Toumi
- **Robust Trajectory Optimization Over Uncertain Terrain with Stochastic Complementarity**
Luke Drnach and Ye Zhao
- **Automated Fabrication of the High-Fidelity Cellular Micro-Scaffold through Proportion-Corrective Control of the Photocuring Process**
Xin Li, Huaping Wang, Qing Shi, JiaXin Liu, Zhanhua Xin, Xinyi Dong, Qiang Huang
and Toshio Fukuda

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Automation

... and the Winner is ...

Automated Fabrication of the High-Fidelity Cellular Micro-Scaffold through Proportion-Corrective Control of the Photocuring Process

Xin Li, Huaping Wang, Qing Shi, JiaXin Liu, Zhanhua Xin, Xinyi Dong, Qiang Huang and Toshio Fukuda

“An essential and challenging use case solved and evaluated convincingly. This work brings to light the artisanal field that can gain a lot in terms of safety and worker’s health preservation through the use of collaborative robots. Simulation is used to design advanced control architectures, including virtual walls around the cutting-tool as well as adaptive damping that would account for the operator know-how and level of expertise.”

ICRA 2021 Awards

**IEEE ICRA Best Paper Award in Cognitive Robotics
- Award Committee -**

**Taskin Padir, Chris Atkeson, Maria Gini,
Serena Ivaldi and Shaojie Shen**

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Cognitive Robotics - Finalists

(Sponsored by KROS)

- **Learning Task Space Actions for Bipedal Locomotion**
Helei Duan, Jeremy Dao, Kevin Green, Taylor Apgar, Alan Fern and Jonathan Hurst
- **Learning Sampling Distributions Using Local 3D Workspace Decompositions for Motion Planning in High Dimensions**
Constantinos Chamzas, Zachary Kingston, Carlos Quintero-Peña, Anshumali Shrivastava and Lydia Kavraki
- **Auto-Tuned Sim-To-Real Transfer**
Yuqing Du, Olivia Watkins, Trevor Darrell, Pieter Abbeel and Deepak Pathak
- **How to Select and Use Tools? : Active Perception of Target Objects Using Multimodal Deep Learning**
Namiko Saito, Tetsuya Ogata, Satoshi Funabashi, Hiroki Mori and Shigeki Sugano

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Cognitive Robotics

... and the Winner is ...

How to Select and Use Tools? : Active Perception of Target Objects Using Multimodal Deep Learning

Namiko Saito, Tetsuya Ogata, Satoshi Funabashi, Hiroki Mori and
Shigeki Sugano

“Robots benefit from being able to select and use appropriate tools. This paper contributes to the advancement of robotics by focusing on tool-object-action relations. The proposed deep neural network model generates motions for tool selection and use. Results demonstrated for a relatively complex ingredient handling task have broader applications in robotics. The approach that relies on active perception and multimodal information fusion is an impactful contribution to cognitive robotics.”

ICRA 2021 Awards

**IEEE ICRA Best Paper Award on Human-Robot Interaction (HRI)
- Award Committee -**

Honghai Liu, Fuchun Sun and Kaspar Althoefer

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Human-Robot Interaction (HRI) - Finalists (sponsored by ABB)

- **Can I Pour into It? Robot Imagining Open Containability Affordance of Previously Unseen Objects Via Physical Simulations**
Hongtao Wu and Gregory Chirikjian
- **Collision Detection, Identification, and Localization on the DLR SARA Robot with Sensing Redundancy**
Maged Iskandar, Oliver Eiberger, Alin Albu-Schäffer, Alessandro De Luca and Alexander Dietrich
- **Automated Acquisition of Structured, Semantic Models of Manipulation Activities from Human VR Demonstration**
Andrei Haidu and Michael Beetz
- **Reactive Human-To-Robot Handovers of Arbitrary Objects**
Wei Yang, Chris Paxton, Arsalan Mousavian, Yu-Wei Chao, Maya Cakmak and Dieter Fox

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Human-Robot Interaction (HRI)

... and the Winner is ...

Reactive Human-To-Robot Handovers of Arbitrary Objects

Wei Yang, Chris Paxton, Arsalan Mousavian, Yu-Wei Chao, Maya Cakmak and Dieter Fox

“This paper presents a method combining realtime motion planning and grasp selection for object handover task from a human to a robot, with effective evaluation on a user study on 26 diverse household objects. The incremental contribution has been made for human robot interaction. Be great if the cost function of best grasp selection somehow involves robotic manipulation metric, eg., form closure.

ICRA 2021 Awards

**IEEE ICRA Best Paper Award on Mechanisms and Design
- Award Committee -**

Yunhui Liu, Tim C. Lueth, Sadao Kawamura and Jian S. Dai

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Mechanisms and Design - Finalists (sponsored by Moog)

- **Soft Hybrid Aerial Vehicle Via Bistable Mechanism**
Xuan Li, Jessica McWilliams, Minchen Li, Cynthia Sung and Chenfanfu Jiang
- **A Versatile Inverse Kinematics Formulation for Retargeting Motions Onto Robots with Kinematic Loops**
Christian Schumacher, Espen Knoop and Moritz Bächer
- **Multi-Point Orientation Control of Discretely-Magnetized Continuum Manipulators**
Michiel Richter, Venkatasubramanian Kalpathy Venkiteswaran and Sarthak Misra
- **Surface Robots based on S-Isothermic Surfaces**
Noriyasu Iwamoto, Atsushi Nishikawa and Hiroaki Arai

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Mechanisms and Design

... and the Winner is ...

Soft Hybrid Aerial Vehicle Via Bistable Mechanism

Xuan Li, Jessica McWilliams, Minchen Li, Cynthia Sung and Chenfanfu Jiang

"This paper presents a novel morphing hybrid aerial vehicle with folding wings that exhibits both a quadrotor and a fixed wing mode without requiring any extra actuation by leveraging the motion of a bistable mechanism at the center of the aircraft. A topology optimization method is developed to optimize the bistable mechanism and the folding wing. This work is an important contribution to design of hybrid aerial vehicles."

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Medical Robotics - Award Committee -

Kaspar Althoefer, Hadi Sadati, Helge Wurdemann and Ka-Wai Kwok

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Medical Robotics – Finalists

(Sponsored by Intuitive Surgical, Inc)

- **Relational Graph Learning on Visual and Kinematics Embeddings for Accurate Gesture Recognition in Robotic Surgery**
Yonghao Long, Jie Ying Wu, Bo Lu, Yueming Jin, Mathias Unberath, Yunhui Liu, Pheng Ann Heng and Qi Dou
- **Integrated Voluntary-Reactive Control of a Human-SuperLimb Hybrid System for Hemiplegic Patient Support**
Hanjun Song and Harry Asada
- **Autonomous Robotic Suction to Clear the Surgical Field for Hemostasis Using Image-Based Blood Flow Detection**
Florian Richter, Shihao Shen, Fei Liu, Jingbin Huang, Emily Funk, Ryan Orosco and Michael C. Yip
- **A Fluidic Soft Robot for Needle Guidance and Motion Compensation in Intratympanic Steroid Injections**
Lukas Lindenroth, Sophia Bano, Agostino Stilli, Joseph G. Manjaly and Danail Stoyanov

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Medical Robotics

... and the Winner is ...

Relational Graph Learning on Visual and Kinematics Embeddings for Accurate Gesture Recognition in Robotic Surgery

Yonghao Long, Jie Ying Wu, Bo Lu, Yueming Jin, Mathias Unberath, Yunhui Liu, Pheng Ann Heng and Qi Dou

“This paper presents a novel online multi-modal graph learning method to dynamically integrate complementary information in video and kinematics data from robotic systems, to achieve accurate surgical gesture recognition. The proposed method is validated on collected in-house dVRK datasets, shedding light on the general efficacy of their approach.”

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Multi-Robot Systems - Award Committee -

Lorenzo Sabattini, Amanda Prorok, Angela Schoellig and Yen-Chen Liu

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Multi-Robot Systems - Finalists

(sponsored by Amazon Robotics)

- **Optimal Sequential Stochastic Deployment of Multiple Passenger Robots**
Chris (Yu Hsuan) Lee, Graeme Best and Geoffrey Hollinger
- **Self-Organized Evasive Fountain Maneuvers with a Bioinspired Underwater Robot Collective**
Florian Berlinger, Paula Wulkop and Radhika Nagpal
- **Learning Multi-Arm Manipulation through Collaborative Teleoperation**
Albert Tung, Josiah Wong, Ajay Uday Mandlekar, Roberto Martín-Martín, Yuke Zhu, Li Fei-Fei and Silvio Savarese
- **Vision-Based Self-Assembly for Modular Multirotor Structures**
Yehonathan Litman, Neeraj Gandhi, Linh Thi Xuan Phan, and David Saldaña

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Multi-Robot Systems

... and the Winner is ...

Optimal Sequential Stochastic Deployment of Multiple Passenger Robots

Chris (Yu Hsuan) Lee, Graeme Best and Geoffrey Hollinger

“The paper presents rigorous results (well validated experimentally) and visionary ideas: the innovative idea of marsupial robots is very promising for the multi-robot systems community”

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Robot Manipulation - Award Committee -

Eric Diller, Nathan Lepora and Michael Tolley

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Robot Manipulation - Finalists

- **StRETch: A Soft to Resistive Elastic Tactile Hand**
Carolyn Matl, Josephine Koe and Ruzena Bajcsy
- **A Parallelized Iterative Algorithm for Real-Time Simulation of Long Flexible Cable Manipulation**
Jeongmin Lee, Minji Lee, Jaemin Yoon and Dongjun Lee
- **KPAM 2.0: Feedback Control for Category-Level Robotic Manipulation**
Wei Gao and Russ Tedrake
- **Policy Blending and Recombination for Multimodal Contact-Rich Tasks**
Tetsuya Narita and Oliver Kroemer

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Robot Manipulation

... and the Winner is ...

StRETch: A Soft to Resistive Elastic Tactile Hand

Carolyn Matl, Josephine Koe and Ruzena Bajcsy

“The committee was particularly impressed by the high level of novelty in this work with unique applications for tactile manipulation of soft objects. Both the paper and presentation provided a clear description of the problem solved, methods and contribution suitable for the general ICRA audience. Significant experimental validations made for a compelling record of the contribution.”

ICRA 2021 Awards

**IEEE ICRA Best Paper Award in Robot Vision
- Award Committee -**

**Zhijun Li, Jana Kosecka, Xiaodong Zhang, Xiangli Nie
Jianqiang Li and Zhiyong Li**

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Robot Vision - Finalists

- **CodeVIO: Visual-Inertial Odometry with Learned Optimizable Dense Depth**
Xingxing Zuo, Nathaniel Merrill, Wei Li, Yong Liu, Marc Pollefeys and Guoquan (Paul) Huang
- **Interval-Based Visual-LiDAR Sensor Fusion**
Raphael Voges and Bernardo Wagner
- **OmniDet: Surround View Cameras Based Multi-Task Visual Perception Network for Autonomous Driving**
Varun Ravi Kumar, Senthil Yogamani, Hazem Rashed, Ganesh Sistu, Christian Witt, Isabelle Leang, Stefan Milz and Patrick Mäder
- **VIODE: A Simulated Dataset to Address the Challenges of Visual-Inertial Odometry in Dynamic Environments**
Koji Minoda, Fabian Wüest, Valentin Schilling, Dario Floreano and Takehisa Yairi

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Robotic Vision

... and the Winner is ...

Interval-Based Visual-LiDAR Sensor Fusion

Raphael Voges and Bernardo Wagner

“The paper proposes to use interval analysis to propagate the error from the input sources to the fused information in a straightforward way. To show the applicability of our approach, the paper uses the fused information for dead reckoning. An evaluation using real data shows that the proposed approach localizes the robot in a guaranteed way.”

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Service Robotics - Award Committee -

Mark Minor, Bill Smart, and Yogesh Girdhar

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Service Robotics - Finalists

(sponsored by KUKA)

- **Tactile SLAM: Real-time Inference of Shape and Pose from Planar Pushing**
Sudharshan Suresh, Maria Bauza, Kuan-Ting Yu, Joshua Mangelson,
Alberto Rodriguez and Michael Kaess
- **Robotic Guide Dog: Leading a Human with Leash-Guided Hybrid Physical Interaction**
Anxing Xiao, Wenzhe Tong, Lizhi Yang, Jun Zeng, Zhongyu Li and Koushil Sreenath
- **Compact Flat Fabric Pneumatic Artificial Muscle (ffPAM) for Soft Wearable Robotic Devices**
Woojong Kim, Hyunkyu Park and Jung Kim
- **BADGR: An Autonomous Self-Supervised Learning-Based Navigation System**
Gregory Kahn, Pieter Abbeel and Sergey Levine

ICRA 2021 Awards

IEEE ICRA Best Paper Award in Service Robotics

... and the Winner is ...

Compact Flat Fabric Pneumatic Artificial Muscle (ffPAM) for Soft Wearable Robotic Devices

Woojong Kim, Hyunkyu Park and Jung Kim

“This paper presents design and evaluation of a novel flat fabric pneumatic artificial muscle with embedded sensing. Experimental results clearly demonstrate that the innovative ffPAM is durable, compact, and has great potential to advance broader application of wearable service robots.”

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Unmanned Aerial Vehicles - Award Committee -

Lydia Tapia, Marco Morales, Jose Martinez-Carranza,
Tsz-Chiu Au, and Vikas Sindhwani

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Unmanned Aerial Vehicles - Finalists

(sponsored by Cooperative Research Centre for Trusted Autonomous Systems)

- **Pylot: A Modular Platform for Exploring Latency-Accuracy Tradeoffs in Autonomous Vehicles**
Ionel Gog, Sukrit Kalra, Peter Schafhalter, Matthew A. Wright, Joseph E. Gonzalez and Ion Stoica
- **Motor and Perception Constrained NMPC for Torque-Controlled Generic Aerial Vehicles**
Martin Jacquet and Antonio Franchi
- **Aerial Manipulator Pushing a Movable Structure Using a DOB-Based Robust Controller**
Dongjae Lee, Hoseong Seo, Inkyu Jang, Seung Jae Lee and H. Jin Kim
- **Dynamically Feasible Task Space Planning for Underactuated Aerial Manipulators**
Jake Welde, James Paulos and Vijay Kumar

ICRA 2021 Awards

IEEE ICRA Best Paper Award on Unmanned Aerial Vehicles

... and the Winner is ...

Aerial Manipulator Pushing a Movable Structure Using a DOB-Based Robust Controller

Dongjae Lee, Hoseong Seo, Inkyu Jang, Seung Jae Lee and H. Jin Kim

“This paper provides a robust control approach that maintains UAV stability through manipulator contact forces during pushing. It contributes control design along with convincing experimental validation on manipulated objects of unknown size and dynamics. The approach provides practical utility for unmanned aerial manipulation with contact forces..”



ICRA 2021 Awards

IEEE ICRA Best Student Paper Award - Award Committee -

Yu Sun, Dongheui Lee and Nikolaos Papanikolopoulos

ICRA 2021 Awards

IEEE ICRA Best Student Paper Award - Finalists

- **Unified Multi-Modal Landmark Tracking for Tightly Coupled Lidar-Visual-Inertial Odometry**
David Wisth, Marco Camurri, Sandipan Das and Maurice Fallon
- **Unsupervised Learning of Lidar Features for Use in a Probabilistic Trajectory Estimator**
David Juny Yoon, Haowei Zhang, Mona Gridseth, Hugues Thomas and Timothy Barfoot
- **Planning with Attitude**
Brian E. Jackson, Kevin Tracy and Zachary Manchester
- **Cascaded Filtering Using the Sigma Point Transformation**
Mohammed Shalaby, Charles Champagne Cossette, Jerome Le Ny and James Richard Forbes

ICRA 2021 Awards

IEEE ICRA Best Student Paper Award

... and the Winner is ...

Unsupervised Learning of Lidar Features for Use in a Probabilistic Trajectory Estimator

David Juny Yoon, Haowei Zhang, Mona Gridseth, Hugues Thomas and Timothy Barfoot

“The paper presents an unsupervised parameter learning approach in the context of Gaussian variational inference. The approach is innovative and sound. It has been well evaluated using open benchmark datasets. The paper has a broad impact on autonomous navigation. .”

ICRA 2021 Awards

IEEE ICRA Best Conference Paper Award - Award Committee -

Richard Voyles, Katherine Kuchenbecker,
Yasuhisa Hasegawa and Robin Murphy

ICRA 2021 Awards

IEEE ICRA Best Conference Paper Award - Finalists

- **An Artin Braid Group Representation of Knitting Machine State with Applications to Validation and Optimization of Fabrication Plans**
Jenny Lin and James McCann
- **Extrinsic Contact Sensing with Relative-Motion Tracking from Distributed Tactile Measurements**
Daolin Ma, Siyuan Dong, Alberto Rodriguez
- **Distributed Coordinated Path Following Using Guiding Vector Fields**
Weijia Yao, Hector Garcia de Marina, Zhiyong Sun and Ming Cao
- **Sim-To-Real Learning of All Common Bipedal Gaits Via Periodic Reward Composition**
Jonah Siekmann, Yesh Godse, Alan Fern and Jonathan Hurst

ICRA 2021 Awards

IEEE ICRA Best Conference Paper Award

... and the Winner is ...

Extrinsic Contact Sensing with Relative-Motion Tracking from Distributed Tactile Measurements

Daolin Ma, Siyuan Dong, Alberto Rodriguez

“The paper makes a notable contribution to the important and re-emerging field of tactile perception by solving the problem of contact localization between an unknown object held by an imprecise grasp and the unknown environment with which it is in contact. This paper represents an excellent theory-to-practice exercise as the novel proposal of using extrinsic tactile array data to infer contact is verified with a new tactile sensor and real robotic manipulation in a simplified, but realistic environment. The authors also provide a robust and honest discussion of results, both positive and negative, for reader evaluation.”



Thank You for Attending!



See you next year in
Philadelphia, USA!

23-27 May 2022

www.icra2022.org