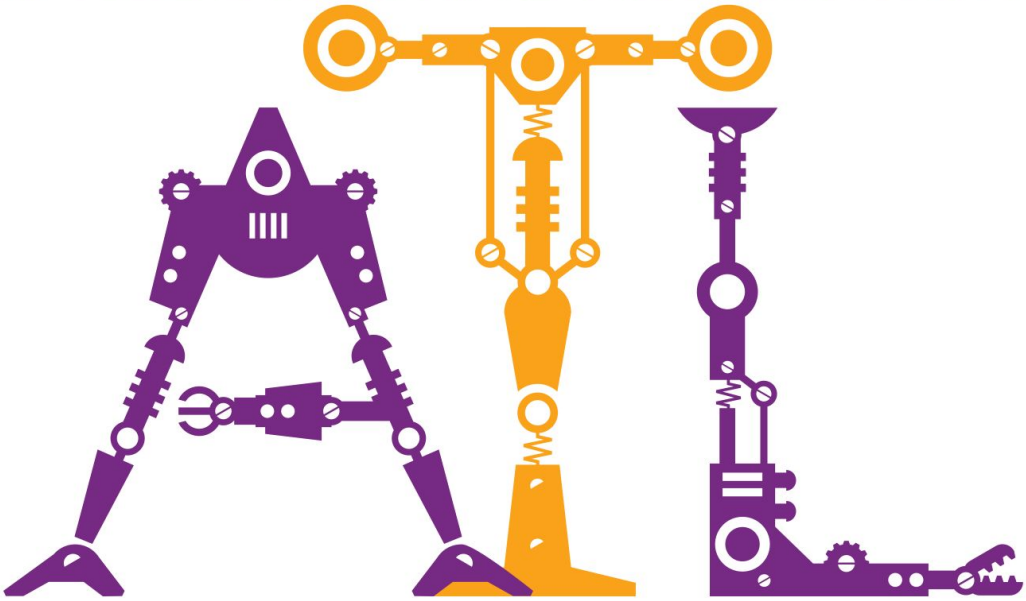
ICRA™

IEEE INTERNATIONAL CONFERENCE ON ROBOTICS AND AUTOMATION



ATLANTA 2025

WELCOME KIT - ICRA 2025

IEEE Technical Committee on Surgical Robotics

IEEE IEEE Robotics & Automation Society SURGICAL ROBOTICS Technical Committee

Table of Content

Announcements

This is a living page, that will be updated during the conference to highlight awards, room changes, and more.

To keep up to date with the latest news, you can also follow the Technical Committee on Surgical on LinkedIn:

https://www.linkedin.com/groups/12438565/

Conference Venue

Dates: 18th May - 23rd May 2025

Location: Georgia World Congress Centre (GWCC) - Atlanta

Conference Venue - Building A

This building is for:

- Plenary Sessions
- Technical Sessions
- Exhibitions

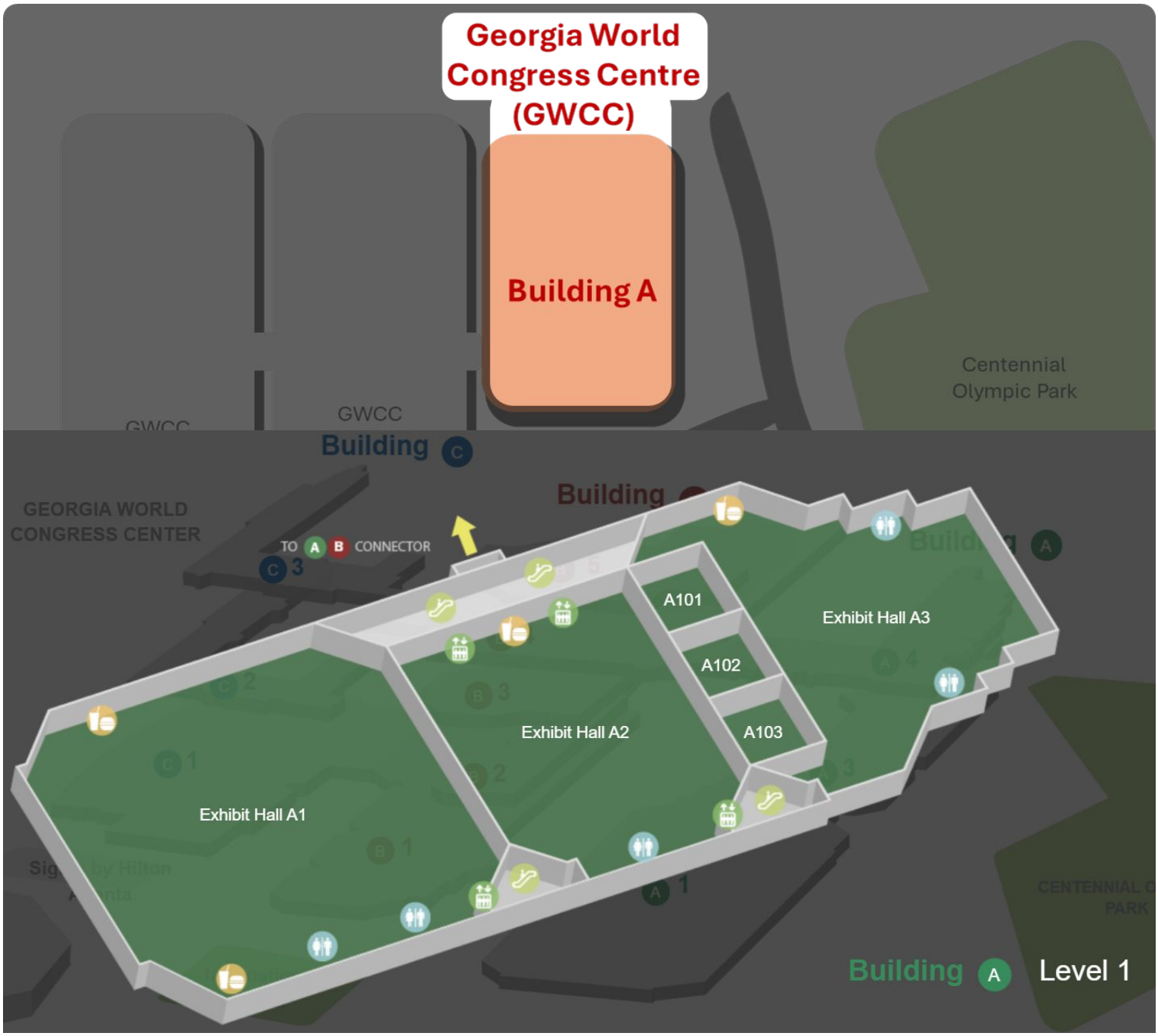
Conference Venue - Building A

Many RAS events will be held here:

- TEAB x SAC dinner
- Lunch with Leaders
- Young Professionals Luncheon
- SAC and YRP Social Hour

Floor Plan

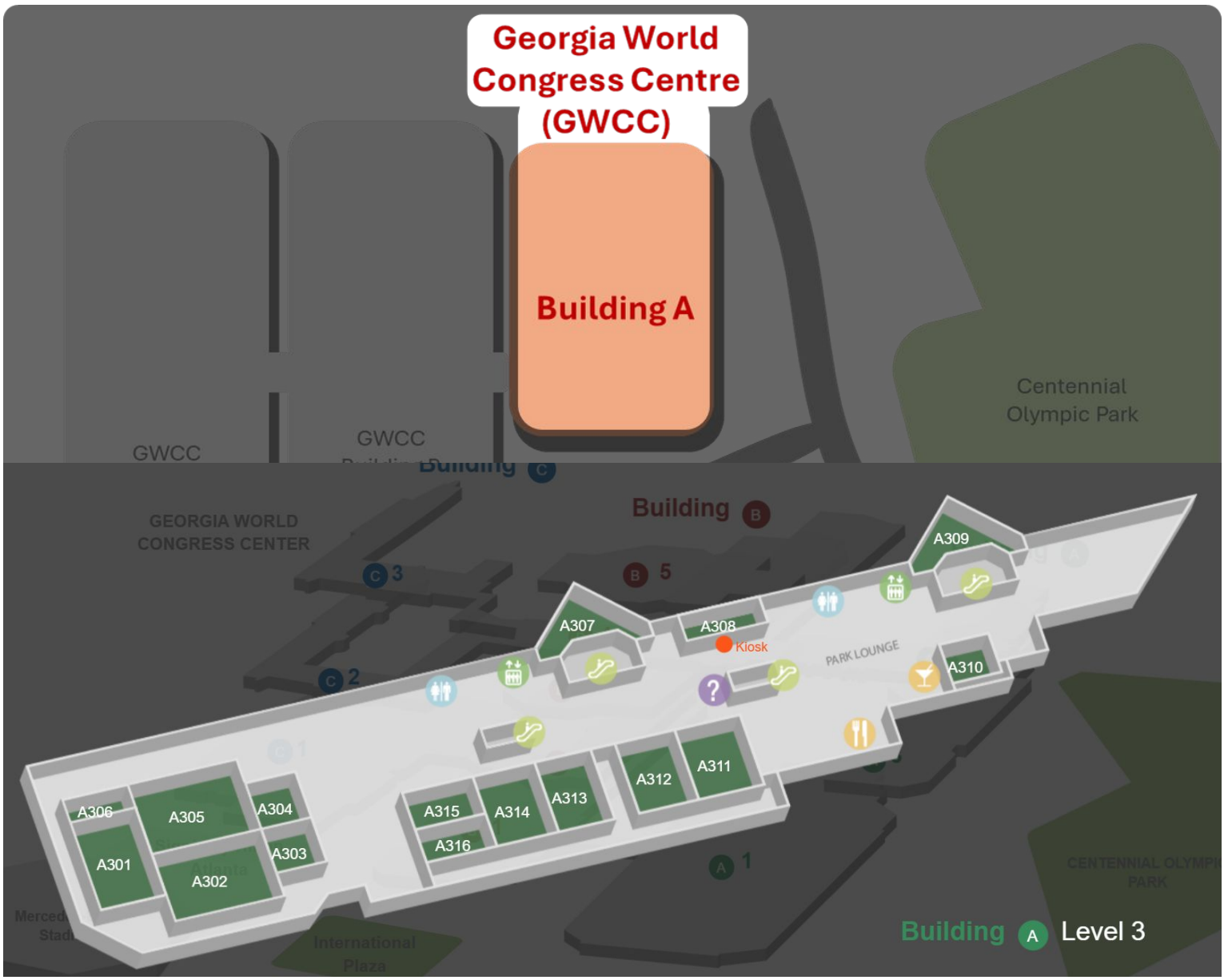
GWCC Building A: Level 1



https://www.gwcca.org/interactive-floor-plans

Floor Plan

GWCC Building A: Level 3



https://www.gwcca.org/interactive-floor-plans

Floor Plan

GWCC Building A: Level 4

https://www.gwcca.org/interactive-floor-plans

Schedule at a Glance

MONDAY		TUESDAY	WEDNESDAY Community Building Day	THURSDAY	FRIDAY
Workshops & Tutorials Full Day: 8:30 AM-5:30 PM Morning: 8:30 AM-12:30 PM Afternoon: 1:30 PM-5:30 PM	8:30AM		Technical Sessions Keynote Session	Technical Sessions Keynote Session	Workshops & Tutorials Full Day: 8:30 AM-5:30 PM Morning: 8:30 AM-12:30 PM Afternoon: 1:30 PM-5:30 PM
	9:00AM	Opening Session			
	9:30AM	Morning Break	Morning Break	Morning Break	
	9:55AM	Technical Sessions Keynote Session	Technical Sessions Keynote Session	Technical Sessions Keynote Session	
	11:05AM	Break	Break	Break	
	11:15AM	Technical Sessions Keynote Session	Technical Sessions Keynote Session	Technical Sessions Keynote Session	
	12:15PM	Lunch	Lunch	Awards Lunch	
	1:45PM	Plenary Session	Plenary Session	Plenary Session	
	2:45PM	Afternoon Break	Afternoon Break	Afternoon Break	
	3:15PM	Technical Sessions Keynote Session	Technical Sessions Keynote Session	Technical Sessions Keynote Session	
	4:25PM	Break	Break	Break	
	4:35PM	Technical Sessions Keynote Session	Technical Sessions Keynote Session	Technical Sessions Keynote Session	
		RAS Town Hall 5:45 PM - 6:45 PM			
Welcome Reception 6:00 PM - 7:30 PM			Affinity Group Events	Farewell Reception Block Party! 6:30 PM - 9:00 PM	

Monday 19th May 2025

Keynotes

No surgical-related keynote this day.

Workshops

★ [Full day] The Evolving Landscape of Surgical Robotics: Towards AI-Powered Unconventional Instruments and Technologies in the Operating Theatre
Room: International Ballroom E (Omni Hotel)

★ [Full day] ROBOT-ASSISTED ENDOVASCULAR INTERVENTIONS: Challenges and Opportunities
Room: 303

Oral and Poster Sessions

No surgical-related poster presentation this day.

Events & Awards

★ [08:00 AM - 5:00 PM] Undergraduate Research Outreach Workshops Room: International Ballroom B (Omni Hotel)

★ [9:00 AM - 3:30 PM] Technical Tours Room: Various

★ [6:00 PM - 7:30 PM] Welcome Reception Room: Hall A1/A2

Monday 19th May 2025

Workshop

The Evolving Landscape of Surgical Robotics: Towards AI-Powered Unconventional Instruments and Technologies in the Operating Theatre

Location: International Ballroom E (Omni Hotel)

Time: 8:30 AM - 5:30 PM

Website: https://sites.google.com/view/icra2025-workshop-clsr

Abstract: Robotic surgery is entering an exciting new era where robots are no longer simply mechanical tools under the direct control of a surgeon, but rather fully-fledged cyber-physical systems capable of collaborating with doctors to carry out complex procedures.
Within this evolving landscape, unconventional surgical instruments such as lasers, radiofrequency, and ultrasound probes are taking an increasingly prominent role, promising to deliver unprecedented surgical precision and minimal patient trauma.

This workshop aims to bring together researchers from academia, industry, and the clinical world to discuss the unique opportunities and challenges presented by the introduction of unconventional instruments in robotic surgery. The main focus will be on the role of machine learning and AI in the modeling and control of these instruments, as well as the need for novel robotic designs to accommodate them, highlighting how these technologies can be integrated with surgical robotics to enhance precision, adaptability, and surgical outcomes.

The workshop will feature invited talks, panel discussions, a rising star session, an unconventional surgical instrument demo session, and poster sessions. Findings and conclusions will be summarized into a white paper, which will be released on arXiv and submitted to a reputable journal for publication.

Monday 19th May 2025

Workshop

ROBOT-ASSISTED ENDOVASCULAR INTERVENTIONS: Challenges and Opportunities

Location: 303

Time: 8:30 AM - 5:30 PM

Website: https://robomed.gatech.edu/ICRA2025-WS-RAEI/

Abstract: Vascular diseases are leading causes of ischemic heart disease and stroke and lead to significant global mortality. Endovascular interventions, such as neuroendovascular and cardiovascular interventions are a minimally invasive approach that provides the benefit of faster recovery, less general anesthesia, reduced blood loss, and lower mortality compared to open surgery. This approach now includes advanced procedures like complex aneurysm repair, stent placement for peripheral artery disease, valve replacement, and novel therapy delivery beyond traditional cardiac ablation, angioplasty, and stenting.
Despite its advantages, endovascular intervention face limitations such as excessive radiation exposure, lack of 3D mapping and haptic feedback. Robotically steerable catheter and guidewire technologies have emerged as a promising solution, enhancing precision, stability, reducing radiation doses, and improving access to complex anatomies.

The workshop aims to explore clinical opportunities, technical requirements, and regulatory challenges for robot-assisted endovascular interventions. It seeks to unite researchers, engineers, and clinicians from academia and industry to discuss and identify new applications and barriers in this field. The workshop's goal is to foster collaboration between academia and industry to address and overcome the technical, clinical, regulatory, and translational challenges for practical clinical implementation of robotic endovascular interventions.

Tuesday 20th May 2025

Keynotes

★ [09:55 AM - 11:05 AM] **Rehabilitation & Physically Assistive Systems** Room: Sidney Marcus Auditorium

★ [04:35 PM - 5:35 PM] **Human Robot Interaction** Room: Sidney Marcus Auditorium

Workshops

No surgical robotic related workshop this day.

Oral and Poster Sessions

★ [09:30 AM - 05:05 PM] Specific oral and poster sessions and rooms can be found here.

Events & Awards

★ [12:15 PM - 1:45 PM] Lunch with Leaders Room: International Ballroom F (Omni Hotel)

★ [12:30 PM - 1:30 PM] Young Professionals Luncheon Room: International Ballroom E (Omni Hotel)

★ [1:45 PM - 2:45 PM] Plenary Session: Dr. Allison Okamura Room: Hall A3 (Level 1)

★ [1:45 PM - 6:00 PM] Robot Ethics Forum Room: 310

★ [5:45 PM - 6:45 PM] IEEE RAS Town Hall Room: Sidney Marcus Auditorium

★ [7:00 PM - 9:00 PM] SAC and Young Reviewers Program (YRP) Social Hour Room: International Ballroom F (Omni Hotel)

Tuesday 20th May 2025

Plenary Session

Rewired: The Interplay of Robots and Society

Speaker: Dr. Allison Okamura, Richard W. Weiland Professor of Engineering at Standford Unviersity

Location: Hall A3 (Level 1)

Time: 1:45PM - 2:45PM

Speaker Bio: Dr. Allison Okamura is the Richard W. Weiland Professor of Engineering at Stanford University in the mechanical engineering department and has a courtesy appointment in computer science. She is a founding member of the Stanford Robotics Center, a deputy director of the Wu Tsai Neurosciences Institute, and a Science Fellow of the Hoover Institution. Dr. Okamura has more than thirty years of years of experience in research, teaching, and development of human-centered robotics, including medical robots, soft robots, and wearable robots. She directs the Collaborative Haptics and Robotics in Medicine (CHARM) Laboratory at Stanford, which develops principles and tools needed to realize advanced robotic and human-machine systems capable of haptic (touch) interaction. She has led research projects sponsored by the National Science Foundation, the National Institutes of Health, the Department of Defense, the Department of Energy, and the FBI. Dr. Okamura has also been on the advisory board of companies developing robots for environments ranging from surgical operating rooms to warehouses. She is a Fellow of the Institute of Electrical and Electronics Engineers (IEEE) and has been recognized for her leadership through numerous awards, including the 2020 IEEE Engineering in Medicine and Biology Society Technical Achievement Award, 2019 IEEE Robotics and Automation Society Distinguished Service Award, and 2016 Duca Family University Fellow in Undergraduate Education. Dr. Okamura contributed to several iterations of the US Robotics Roadmap, a report that outlines the future of robotics in the United States, including societal drivers, research needs, and challenges. She leads the robotics focus area of the Stanford Emerging Technology Review (SETR), an initiative aiming to elucidate technology breakthroughs and their policy implications. She is also a member of the World Economic Forum's Global Future Council on Autonomous Systems.

Abstract: Coming Soon

Tuesday 20th May 2025

Oral and Poster Sessions

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_1.html

TuLB1R - **Late Breaking Results 1 -** Poster Session

Time: 09:30 AM - 09:55 AM
Room: T25

- ★ Paper TuLB1R.6 ***From Observation to Correction: EEG-fNIRS Microstate Transitions in Surgical Skill Acquisition***
- ★ Paper TuLB1R.9 ***Data-Efficient Fine-Tuning for Ultrasound Needle Tracking with Motion Prefix and Tunable Register***
- ★ Paper TuLB1R.29 ***Robotic Assistant for Image-Guided Treatment of Ankle Joint Dislocations***

TuBT8 - **Medical Robots 1 -** Regular Session - Oral Session

Time: 09:55 AM - 10:30 AM
Room: 311

- ★ Paper TuAT8.1 ***Accounting for Hysteresis in the Forward Kinematics of Nonlinearly-Routed Tendon-Driven Continuum Robots Via a Learned Deep Decoder Network***
- ★ Paper TuAT8.2 ***Graph-Based Spatial Reasoning for Tracking Landmarks in Dynamic Laparoscopic Environments***
- ★ Paper TuAT8.3 ***A Robust Deep Reinforcement Learning Framework for Image-Based Autonomous Guidewire Navigation***
- ★ Paper TuAT8.4 ***CTS: A Consistency-Based Medical Image Segmentation Model***
- ★ Paper TuAT8.5 ***An Adversarial Learning Framework for Reliable Myoelectric Force Estimation under Fatigue***
- ★ Paper TuAT8.6 ***An Origami-Inspired Endoscopic Capsule with Tactile Perception for Early Tissue Anomaly Detection***
- ★ Paper TuAT8.7 ***Exploring the Limitations and Implications of the JIGSAWS Dataset for Robot-Assisted Surgery***

Tuesday 20th May 2025

Oral and Poster Sessions

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_1.html

TuAT15 - Surgical Robotics: Continuum Robotics - Regular Session - Oral Session

Time: 09:55 AM - 10:30 AM
Room: 403

- ★ Paper TuAT15.1 ***Workspace Expansion of Magnetic Soft Continuum Robot Using Movable Opposite Magnet***
- ★ Paper TuAT15.2 ***Sim4EndoR: A Reinforcement Learning Centered Simulation Platform for Task Automation of Endovascular Robotics***
- ★ Paper TuAT15.3 ***Design and Implementation of a Snake Robot for Cranial Surgery***
- ★ Paper TuAT15.4 ***Single-Fiber Optical Frequency Domain Reflectometry(OFDR) Shape Sensing of Continuum Manipulators with Planar Bending***
- ★ Paper TuAT15.5 ***Learning-Based Tip Contact Force Estimation for FBG-Embedded Continuum Robots***
- ★ Paper TuAT15.6 ***Three-Dimension Tip Force Perception and Axial Contact Location Identification for Flexible Endoscopy Using Tissue-Compliant Soft Distal Attachment Cap Sensors***
- ★ Paper TuAT15.7 ***MPC Design of a Continuum Robot for Pulmonary Interventional Surgery Using Koopman Operators***

Tuesday 20th May 2025

Oral and Poster Sessions

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_1.html

TuAT17 - Prosthetics and Physically Assistive Devices - Regular Session - Oral Session

Time: 10:15 AM - 10:20 AM
Room: 405

★ *Paper TuAT17.5* ***On Chain Driven, Adaptive, Underactuated Fingers for the Development of Affordable, Robust Humanlike Prosthetic Hands***

TuBT8 - **Medical Robots 2 -** Regular Session - Oral Session

Time: 11:15 AM - 11:35 AM
Room: 311

★ Paper TuBT8.1 ***A Cylindrical Halbach Array Magnetic Actuation System for Longitudinal Robot Actuation across 2D Workplane***
★ Paper TuBT8.2 ***Towards Autonomous Verification: Integrating Cognitive AI and Semantic Digital Twins in Medical Robotics***
★ Paper TuBT8.3 ***SC-Former: A Segmentation Convolution Transformer for Lung Surgery Robots***
★ Paper TuBT8.4 ***Passive Bilateral Surgical Teleoperation with RCM and Spatial Constraints in the Presence of Time Delays***

TuLB2R - **Late Breaking Results 2 -** Poster Session

Time: 2:45 PM - 3:15 PM
Room: T25

★ Paper TuLB2R.19 ***Design and Control of a Bench-Top Left Ventricular Simulator Reproducing Physiological Pressure-Volume Dynamics***
★ *Paper TuLB2R.25* ***Shape Memory Alloy Based Implantable Device for Heart Failure***

Tuesday 20th May 2025

Oral and Poster Sessions

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_1.html

TuBT8 - **Medical Robots 3 -** Regular Session - Oral Session

Time: 03:15 PM - 03:50 PM
Room: 311

- ★ Paper TuCT8.1 ***In Vivo Feasibility Study: Evaluating Autonomous Data-Driven Robotic Needle Trajectory Correction in MRI-Guided Transperineal Procedures***
- ★ Paper TuCT8.2 ***Pre-Surgical Planner for Robot-Assisted Vitreoretinal Surgery: Integrating Eye Posture, Robot Position and Insertion Point***
- ★ Paper TuCT8.3 ***Suture Thread Modeling Using Control Barrier Functions for Autonomous Surgery***
- ★ Paper TuCT8.4 ***Robotic Colonoscopy: Can High Fidelity Simulation Optimize Robot Design and Validation?***
- ★ Paper TuCT8.5 ***Robotic Tissue Manipulation in Endoscopic Submucosal Dissection Via Visual Feedback***
- ★ Paper TuCT8.6 ***Learning Based Estimation of Tool-Tissue Interaction Forces for Stationary and Moving Environments***
- ★ Paper TuCT8.7 ***RASEC: Rescaling Acquisition Strategy with Energy Constraints under Fusion Kernel for Active Incision Recommendation in Tracheotomy (I)***

Tuesday 20th May 2025

Oral and Poster Sessions

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TuCT19 - **Medical Robot Systems -** Regular Session - Oral Session

Time: 03:15 PM - 03:50 PM
Room: 407

- ★ Paper TuCT19.1 ***Design and Modeling of a Compact Spooling Mechanism for the COAST Guidewire Robot***
- ★ Paper TuCT19.2 ***Motion-Guided Dual-Camera Tracker for Endoscope Tracking and Motion Analysis in a Mechanical Gastric Simulator***
- ★ Paper TuCT19.3 ***A System for Endoscopic Submucosal Dissection Featuring Concentric Push-Pull Manipulators***
- ★ Paper TuCT19.4 ***Quantitative Evaluation of Curved BioPrinted Constructs of an in Situ Robotic System towards Treatment of Volumetric Muscle Loss***
- ★ Paper TuCT19.5 ***Design and Hysteresis Compensation of a Telerobotic System for Transesophageal Echocardiography***
- ★ Paper TuCT19.6 *A* ***Magnetic Capsule Robot with an Exoskeleton to Withstand Esophageal Pressure and Delivery Drug in Stomach***
- ★ Paper TuCT19.7 ***MINRob: A Large Force-Outputting Miniature Robot Based on a Triple-Magnet System***

TuCT24 - **Novel Sensors -** Regular Session - Oral Session

Time: 03:15 PM - 03:40 PM
Room: 401

- ★ Paper TuCT24.5 ***Geometry-Aware Volumetric Data Stitching Using Local Surface Mapping and Robot Optical Coherence Tomography***

Tuesday 20th May 2025

Oral and Poster Sessions

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_1.html

TuDT11 - Human-Robot Interaction 2 - Regular Session - Oral Session

Time: 04:40 PM - 04:45 PM
Room: 314

★ Paper TuDT11.2 ***Development of Contactless Delivery Service Robot with Modular Working Platform in Isolation Wards***

TuDT6 - **Perception for Medical Robots -** Regular Session

Time: 04:35 PM - 05:05 PM
Room: 307

★ Paper TuDT6.1 ***REMOTE: Real-Time Ego-Motion Tracking for Various Endoscopes Via Multimodal Visual Feature Learning***

★ Paper TuDT6.2 ***Intraoperative Trocar-Based Eyeball Rotation Estimation Using Only 2D Microscope Images***

★ Paper TuDT6.3 ***Toward Zero-Shot Learning for Visual Dehazing of Urological Surgical Robots***

★ Paper TuDT6.4 ***Sim2Real within 5 Minutes: Efficient Domain Transfer with Stylized Gaussian Splatting for Endoscopic Images***

★ Paper TuDT6.5 ***Advancing Dense Endoscopic Reconstruction with Gaussian Splatting-Driven Surface Normal-Aware Tracking and Mapping***

★ Paper TuDT6.6 ***HFUS-NeRF: Hybrid Representation for Fast Ultrasound Reconstruction in Robotic Ultrasound System***

Tuesday 20th May 2025

Oral and Poster Session

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_1.html

TuDT15 - **Surgical Robotics: Planning -** Regular Session - Oral Session

Time: 04:35 PM - 05:05 PM
Room: 403

- ★ Paper TuDT15.1 ***Image-Guided Surgical Planning for Percutaneous Nephrolithotomy Using CTRs: A Phantom-Based Study***
- ★ Paper TuDT15.2 ***Vision-Based Automatic Control of a Surgical Robot for Posterior Segment Ophthalmic Surgery (I)***
- ★ Paper TuDT15.3 ***ETSM: Automating Dissection Trajectory Suggestion and Confidence Map-Based Safety Margin Prediction for Robot-Assisted Endoscopic Submucosal Dissection***
- ★ Paper TuDT15.**4** ***Partial-To-Full Registration Based on Gradient-SDF for Computer-Assisted Orthopedic Surgery***
- ★ Paper TuDT15.5 *S**ampling-Based Model Predictive Control for Volumetric Ablation in Robotic Laser Surgery***
- ★ Paper TuDT15.6 ***SuFIA-BC: Generating High Quality Demonstration Data for Visuomotor Policy Learning in Surgical Subtasks***

Tuesday 20th May 2025

Oral Session Awards

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_1.html

TuAT1 - **Awards Finalists 1 -** Regular Session - Oral Session

Time: 09:55 AM - 10:30 AM
Room: 302

TuBT1 - **Awards Finalists 2 -** Regular Session - Oral Session

Time: 11:15 AM - 11:45 AM
Room: 302

TuCT1 - **Awards Finalists 3 -** Regular Session - Oral Session

Time: 03:15 PM - 03:45 PM
Room: 301

TuDT1 - **Awards Finalists 4 -** Regular Session - Oral Session

Time: 04:35 PM - 05:05 PM
Room: 302

Wednesday 21st May 2025

Keynotes

- ★ [08:30 AM - 09:30 AM] **Soft Robotics** Room: Sidney Marcus Auditorium
- ★ [11:35 AM - 12:15 PM] **Bio-inspired Robotics** Room: Sidney Marcus Auditorium
- ★ [04:35 PM - 05:55 PM] **Planning** Room: Sidney Marcus Auditorium

Workshops

No surgical robotic related workshop this day.

Oral and Poster Sessions

- ★ [09:30 AM - 05:15 PM] Specific oral and poster sessions and rooms can be found here.

Events & Awards

- ★ [09:00 AM - 1:00 PM] Queer in Robotics: Building a Community and Generating Inclusive Guidelines Room: 310
- ★ [09:00 AM - 5:00 PM] Community Building Day Room:
- ★ [9:30 AM - 12:15 PM} Harnessing Learning Data, Foundation Models and Open Source: How African Scientists are Advancing Robotics Research Room: 401
- ★ [11:30 AM - 1:30 PM] RAS WiE Lunch Room: International Ballroom D (Omni Hotel)
- ★ [12:00 PM - 2:00 PM] Standards Networking Prize Competition and Introduction Luncheon Room: International Ballroom D (Omni Hotel)
- ★ [1:00 PM - 5:00 PM] ICRA Expo Room: Hall A1/A2
- ★ [1:45 PM - 2:45 PM] Plenary Session: Dr. Tessa Lau Room: Hall A3 (Level 1)
- ★ [3:00 PM - 5:00 PM] Black in Robotics and Blacks in Technology Social Room: 310
- ★ [3:00 PM - 5:00 PM] LatinXin AI & Robotics Room: 401
- ★ [6:30 PM - 8:30 PM] Community Building Day Dinner Room: International Ballroom E&F (Omni Hotel)

Wednesday 21st May 2025

Plenary Session

Topic - Coming Soon

Speaker: Dr. Tessa Lau, CEO & Co-Founder, Dusty Robotics

Location: Hall A3 (Level 1)

Time: 1:45PM - 2:45PM

Speaker Bio: Dr. Tessa Lau is an award-winning roboticist who is the founder and CEO of Dusty Robotics. Dusty is revolutionizing the construction industry as the best solution to ensure design integrity in the field through automated layout and a streamlined BIM-to field process. Prior to Dusty Robotics, Dr. Lau was co-founder, CTO, and Chief Robot Whisperer at Savioke (Relay) Robotics, where she automated hotel delivery and orchestrated the global distribution and management of consumer-facing robots. Dr. Lau got her start in robotics at Willow Garage, the legendary research lab and technology incubator known as one of the most influential forces in modern robotics. Willow Garage was responsible for the creation of an open-source robot operating system that's still being used by academics, engineers, and hobbyists around the world today. Dr. Lau is a frequent speaker at business, technology, and construction conferences and has received numerous awards, including 2023 Construction Dive's Up and Coming Women in Construction, Silicon Valley Business Journal's Women of Influence, SVR's Innovation Award, and the Award for Excellence from the Association of Computer Machinery. Currently living in Silicon Valley, Dr. Lau holds a PhD in Computer Science from the University of Washington.

Abstract: Coming Soon

Wednesday 19th May 2025

Oral and Posters Session

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https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_2.html

WeAT3 - Mechanism Design 1 - Regular Session - Oral Session

Time: 08:40 AM - 08:45 AM
Room: 303

★ Paper WeAT3.3 ***Design and Evaluation of High-Performance Motion-Decoupled Cable Transmission Modules***

WeAT4 - Mechanism Design 1 - Regular Session

Time: 08:55 AM - 09:00 AM
Room: 304

★ Paper WeAT4.6 ***Think Step by Step: Chain-Of-Gesture Prompting for Error Detection in Robotic Surgical Videos***

WeBT1 - Awards Finalist 6 - Regular Session - Oral Session

Time: 10:10 AM - 10:30 AM
Room: 302

★ Paper WeBT1.4 ***Image-Based Compliance Control for Robotic Steering of a Ferromagnetic Guidewire***
★ Paper WeBT1.5 ***AutoPeel: Adhesion-Aware Safe Peeling Trajectory Optimization for Robotic Wound Care***
★ Paper WeBT1.7 ***Stable Tracking of Eye Gaze Direction During Ophthalmic Surgery***

WeBT11 - Micro/Nano Robots - Regular Session - Oral Session

Time: 10:15 AM - 10:20 AM
Room: 314

★ Paper WeBT11.5 ***Real-Time 3D MPI-Based Navigation Scheme for Microrobots with Flexible Field Free Point Trajectories and Virtual FFP Intuitive Manipulation***

Wednesday 19th May 2025

Oral and Posters Sessions

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_2.html

WeBT14 - Tracking and Prediction 3 - Regular Session - Oral Session

Time: 10:05 AM - 10:10 AM
Room: 402

★ Paper WeBT14.3 ***Tracking Everything in Robotic-Assisted Surgery***

WeBT15 - Surgical Robotics: Laparoscopy - Regular Session - Oral Session

Time: 09:55 AM - 10:30 AM
Room: 403

★ Paper WeBT15.1 ***Hypergraph-Transformer (HGT) for Interaction Event Prediction in Laparoscopic and Robotic Surgery***
★ Paper WeBT15.2 ***Robotic Flexible Magnetic Retractor for Dynamic Tissue Manipulation in Endoscopic Submucosal Dissection***
★ Paper WeBT15.3 ***Leveraging Surgical Activity Grammar for Primary Intention Prediction in Laparoscopy Procedures***
★ Paper WeBT15.4 ***SLAM Assisted 3D Tracking System for Laparoscopic Surgery***
★ Paper WeBT15.5 ***SurgPose: Generalisable Surgical Instrument Pose Estimation Using Zero-Shot Learning and Stereo Vision***
★ Paper WeBT15.6 ***Design and Effectiveness of Virtual Monitors and AR-Based Endoscope Control for Robotically Assisted Laparoscopic Surgery***
★ Paper WeBT15.7 ***MEDiC: Autonomous Surgical Robotic Assistance to Maximizing Exposure for Dissection and Cautery***

WeBT16 - Deformable Object Manipulation - Regular Session - Oral Session

Time: 10:00 AM - 10:05 AM
Room: 404

★ Paper WeBT16.2 ***Autonomous Bimanual Manipulation of Deformable Objects Using Deep Reinforcement Learning Guided Adaptive Control***

Wednesday 19th May 2025

Oral and Poster Sessions

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_2.html

WeBT22 - Learning Based Planning for Manipulation 2 - Regular Session - Oral Session

Time: 09:55 AM - 10:00 AM
Room: 411

★ Paper WeBT22.1 ***Movement Primitive Diffusion: Learning Gentle Robotic Manipulation of Deformable Objects***

WeDT13 - Manipulation and Locomotion Using Magnetic Fields - Regular Session - Oral Session

Time: 03:25 PM -03:40 PM
Room: 316

★ Paper WeDT13.3 ***Ensemble Control of a 2-DOF Parallel Link Arm in a Capsule Robot Using Oscillating External Magnetic Fields***

★ Paper WeDT13.4 ***Deep Reinforcement Learning-Based Semi-Autonomous Control for Magnetic Micro-Robot Navigation with Immersive Manipulation***

★ Paper WeDT13.5 ***OMASTAR Optimal Magnetic Actuation System Arrangement***

Wednesday 19th May 2025

Oral and Poster Sessions

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_2.html

WeDT18 - Surgical Robotics: Steerable Catheters/Needles 1 - Regular Session - Oral Session

Time: 03:15 PM - 03:45 PM
Room: 406

- ★ Paper WeDT18.1 ***Towards a Tendon-Assisted Magnetically Steered (TAMS) Robotic Stylet for Brachytherapy***
- ★ Paper WeDT18.2 ***VascularPilot3D: Toward a 3D Fully Autonomous Navigation for Endovascular Robotics***
- ★ Paper WeDT18.3 ***Weakly-Supervised Learning Via Multi-Lateral Decoder Branching for Tool Segmentation in Robot-Assisted Cardiovascular Catheterization***
- ★ Paper WeDT18.4 ***Towards Evaluating the User Comfort and Experience of a Novel Steerable Drilling Robotic System in Pedicle Screw Fixation Procedures: A User Study***
- ★ Paper WeDT18.5 ***Minimally Invasive Endotracheal Inside-Out Flexible Needle Driving System towards Microendoscope-Guided Robotic Tracheostomy***
- ★ Paper WeDT18.6 ***Comparison of Classical, Neural Network and Hybrid Models for Hysteretic Single-Tendon Catheter Kinematics***

WeET8 - Representation Learning 4 - Regular Session - Oral Session

Time: 04:35 PM - 05:15 PM
Room: 311

- ★ Paper WeET8.1 ***FedEFM: Federated Endovascular Foundation Model with Unseen Data***

Wednesday 19th May 2025

Oral and Poster Session

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_2.html

WeET15 - Surgical Robotics: Systems - Regular Session - Oral Session

Time: 04:35 PM - 05:15 PM
Room: 403

- ★ Paper WeET15.1 ***Autonomous Continuous Capsulorhexis Based on a Force-Vision-Guided Robot System***
- ★ Paper WeET15.2 ***Ultrasound-Guided Robotic Blood Drawing and in Vivo Studies on Submillimetre Vessels of Rats***
- ★ Paper WeET15.3 ***Sensory Glove-Based Surgical Robot User Interface***
- ★ Paper WeET15.4 ***Self-Deformable Magnetic Miniature Robot for Traction Assistance in Endoscopic Submucosal Dissection***
- ★ Paper WeET15.5 ***Variable-Stiffness Nasotracheal Intubation Robot with Passive Buffering: A Modular Platform in Mannequin Studies***
- ★ Paper WeET15.6 *SurgPose:* ***A Dataset for Articulated Robotic Surgical Tool Pose Estimation and Tracking***
- ★ Paper WeET15.7 ***On High Performance Control of Concentric Tube Continuum Robots through Parsimonious Calibration***

WeET16 - Deformable Objects - Regular Session - Oral Session

Time: 04:35 PM - 05:15 PM
Room: 404

- ★ Paper WeET16.2 ***Real-Time Deformation-Aware Control for Autonomous Robotic Subretinal Injection Based on OCT Guidance***
- ★ Paper WeET16.4 ***Deformable Gaussian Splatting for Efficient and High-Fidelity Reconstruction of Surgical Scenes***

Wednesday 19th May 2025

Oral and Poster Session

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_2.html

WeET18 - Surgical Robotics: Steerable Catheters/Needles 2 - Regular Session - Oral Session

Time: 04:35 PM - 05:15 PM
Room: 406

- ★ Paper WeET18.1 ***Hysteresis Compensation of Tendon-Sheath Mechanism Using Nonlinear Programming Based on Preisach Model***
- ★ Paper WeET18.2 ***Resolution Optimal Motion Planning for Medical Needle Steering from Airway Walls in the Lung***
- ★ Paper WeET18.3 ***Self-Sufficient 5-DoF Discrete Global Localization for Magnetically-Actuated Endoscope in Bronchoscopy***
- ★ Paper WeET18.5 ***Semi-Autonomous 2.5D Control of Untethered Magnetic Suture Needle***
- ★ Paper WeET18.6 ***Steerable Tape-Spring Needle for Autonomous Sharp Turns through Tissue***
- ★ Paper WeET18.7 ***Shape Control of Concentric Tube Robots Via Approximate Follow-The-Leader Motion***
- ★ Paper WeET18.8 ***Model-Based Parameter Selection for a Steerable Continuum Robot — Applications to Bronchoalveolar Lavage (BAL)***

Wednesday 21st May 2025

Oral Session Awards

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_1.html

WeAT1 - **Awards Finalists 5 -** Regular Session - Oral Session

Time: 08:30 AM - 09:00 AM
Room: 302

WeBT1 - **Awards Finalists 6 -** Regular Session - Oral Session

Time: 09:55 AM - 10:30 AM
Room: 302

WeCT1 - **Awards Finalists 7 -** Regular Session - Oral Session

Time: 1:15 AM - 11:40 AM
Room: 302

Thursday 22nd May 2025

Keynotes

★ [08:30 AM - 09:30 AM] **Manipulation** Room: Sidney Marcus Auditorium

★ [11:15 AM - 12:15 PM] **Safety & Formal Methods** Room: Sidney Marcus Auditorium

★ [03:15 PM - 04: 25 PM] **Multi-robot Systems** Room: Sidney Marcus Auditorium

Workshops

No surgical robotic related workshop this day

Oral and Poster Sessions

[08:30 AM - 05:15 PM] Specific oral and poster sessions and rooms can be found here.

Events & Awards

★ [9:30 AM - 12:15 PM] Undergraduate Robotics Education Programme: Structures, Platforms, and Approaches Room: 401

★ [11:00 AM - 12:15 PM] Science Communication Crash Course Room: 310

★ [12:15 PM - 1:45 PM] RAS Awards Ceremony and ICRA 2025 Awards Ceremony Room:

★ [1:45 PM - 2:45 PM] Plenary Session: Prof. Raffaello D'Andrea Room: Hall A3 (Level 1)

★ [3:00 PM - 4:00 PM] Robot Parade Room: Hall A1/A2

★ [6:30 PM - 9:00 PM] Farewell Reception Room: Block Party - Marietta Street

Thursday 22nd May 2025

Plenary Session

Models are dead, long live models!

Speaker: Prof. Raffaello (Raff) D'Andrea, Professor of dynamic systems and control, ETH Zurich

Location: Hall A3 (Level 1)

Time: 1:45PM - 2:45PM

Speaker Bio: Raffaello (Raff) D'Andrea is a professor, engineer, artist, and entrepreneur. He earned his PhD from Caltech and began his career at Cornell, where he co-founded the Systems Engineering program and led the Robot Soccer Team to four RoboCup world championships. In 2003, he co-founded Kiva Systems, which revolutionized warehouse automation before its acquisition by Amazon, later rebranded as Amazon Robotics. In 2008, Raff joined ETH Zurich, where his research team develops pioneering robotics platforms, including Cubli, the Flying Machine Arena, and CyberRunner. In 2014, he co-founded Verity, a company specializing in AI-powered, drone-enabled inventory tracking systems and mobile intelligence. Verity's technology is now deployed in over 100 warehouses worldwide with clients such as IKEA, Maersk, and UPS. Raff's artistic contributions include drone choreographies for Cirque du Soleil, Céline Dion and Metallica, with his works featured at the Venice Biennale and in the National Gallery of Canada. Raff is a member of the National Academy of Engineering, the National Inventors Hall of Fame, and the Logistics Hall of Fame. He has received the Engelberger Robotics Award and the IEEE Robotics and Automation Award and is named as an inventor on over 100 patents.

Abstract: Mathematical models are indispensable for system design. Until recently, one could argue that this was also true for robot control design. Recent advances in AI are calling this basic assumption into question. In this talk, I will present my first-hand experiences in model-based control design, ranging from soccer playing robots to fleets of autonomous mobile robots in warehouses – on the ground and in the air — to acrobatic flying robots. I will conclude by introducing CyberRunner, an opensource ML platform developed at ETH based on the popular "Labyrinth" dexterity game in which a ball is guided through a maze and must avoid traps. CyberRunner learns through experience and can beat any human with only 1 hour of training and without any priors.

Thursday 22nd May 2025

Oral and Poster Session

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_3.html

ThAT3 - **Point Cloud Registration -** Regular Session - Oral Session

Time: 08:30 AM - 09:00 AM
Room: 303

★ Paper ThAT3.3 ***GERA: Geometric Embedding for Efficient Point Registration Analysis***

ThAT15 - **Continuum Robots 1 -** Regular Session - Oral Session

Time: 08:30 AM - 09:00 AM
Room: 403

★ Paper ThAT15.3 ***A Simple Dynamics Model for Cable Driven Continuum Robots with Actuator Coupling***

★ Paper ThAT15.6 ***Accelerated Quasi-Static FEM for Real-Time Modeling of Continuum Robots with Multiple Contacts and Large Deformation***

ThLB1R - **Late Breaking Results 5 -** Poster Session

Time: 09:30 AM - 09:55 AM
Room: T25

★ Paper ThLB1R.2 ***Robotic Tissue Manipulation in Endoscopic Submucosal Dissection: Late Breaking Results***

★ Paper ThLB1R.14 ***Enhanced Diagnostic Imaging Via Robotic Arc Ultrasound Scanning and 3d Reconstruction***

★ Paper ThLB1R.19 ***Data-Driven Prediction Model of Soft-Tissue Surface Deformation During Robotic Palpation***

★ Paper ThLB1R.24 ***Human-Centered User Interface Design for Eye Imaging Medical Robot***

★ Paper ThLB1R.28 ***Dual-Arm Teleoperated Robotic Microsurgery System with Real-Time Volumetric OCT Image Feedback***

Thursday 22nd May 2025

Oral and Poster Session

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_3.html

ThBT3 - **Pose Estimation -** Regular Session - Oral Session

Time: 09:55 AM - 10:30 AM
Room: 303

★ Paper ThBT3.7 ***Virtual Frame Rotation: A Novel Two-Stage Pose Estimation Scheme of Permanent Magnet Marker for Medical Applications***

ThCT15 - **Continuum Robots 2 -** Regular Session - Oral Session

Time: 11:15 AM - 11:45 AM
Room: 403

★ Paper ThCT15.4 ***On the Benefits of Hysteresis in Tendon Driven Continuum Robots***

ThLB2R - **Late Breaking Results 6 -** Poster Session

Time: 02:45 PM - 03:15 PM
Room: T25

★ Paper ThLB2R.6 ***Analyzing the Limitations of Imitation Learning for Autonomous Surgical Robot Environments***
★ Paper ThLB2R.12 ***Vision-Language Action Models for Autonomous Liver Ultrasound: A Comparative Study of π0 and Transformer-Based Policies***
★ Paper ThLB2R.24 ***Towards Mobile Robotic Optical Coherence Tomography for Practical Clinical Imaging***
★ Paper ThLB2R.29 ***Autonomous Robotic Assistant for Knee Replacement Surgery***

Thursday 22nd May 2025

Oral and Poster Session

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_3.html

ThDT18 - **Imaging, Scanning, Localization -** Regular Session - Oral Session

Time: 3:55 PM - 3:50 PM
Room: 406

- ★ Paper ThDT18.1 ***Autonomous Robotic Ultrasound Approach for Fetoscope Tracking by Fusing Optical and 2D Ultrasound Data***
- ★ Paper ThDT18.2 ***Guiding the Last Centimeter: Novel Anatomy-Aware Probe Servoing for Standardized Imaging Plane Navigation in Robotic Lung Ultrasound (I)***
- ★ Paper ThDT18.3 ***Automatic Robotic-Assisted Diffuse Reflectance Spectroscopy Scanning System***
- ★ Paper ThDT18.4 ***Robust and Accurate Multi-View 2D/3D Image Registration with Differentiable X-Ray Rendering and Dual Cross-View Constraints***
- ★ **Paper ThDT18.5** ***Robust Robotic Breast Ultrasound Scanning and Real-Time Lesion Localization***
- ★ Paper ThDT18.6 ***Hybrid Deep Reinforcement Learning for Radio Tracer Localisation in Robotic-Assisted Radioguided Surgery***
- ★ Paper ThDT18.7 ***Improving Probe Localization for Freehand 3D Ultrasound Using Lightweight Cameras***

ThET1 - **Visual Perception and Learning -** Regular Session - Oral Session

Time: 04:35 PM - 5:15 PM
Room: 302

- ★ Paper ThET1.5 ***Polyp-Gen: Realistic and Diverse Polyp Image Generation for Endoscopic Dataset Expansion***

Thursday 22nd May 2025

Oral and Poster Session

https://ras.papercept.net/conferences/conferences/ICRA25/program/ICRA25_ContentListWeb_3.html

ThET3 - **Robotics and Automation in Life Science and Rescue Applications -** Regular Session - Oral Session

Time: 04:35 PM - 05:15 PM
Room: 303

★ Paper ThET3.5 ***Introducing Collaborative Robots As a First Step towards Autonomous Reprocessing of Medical Equipment***

ThET6 - **Perception for Manipulation 4 -** Regular Session - Oral Session

Time: 04:35 PM - 05:15 PM
Room: 307

★ Paper ThET6.7 ***SEDMamba: Enhancing Selective State Space Modelling with Bottleneck Mechanism and Fine-To-Coarse Temporal Fusion for Efficient Error Detection in Robot-Assisted Surgery***

ThET15 - **Datasets and Benchmarking -** Regular Session - Oral Session

Time: 04:35 PM - 05:15 PM
Room: 403

★ Paper ThET15.1 ***Syn-Mediverse: A Multimodal Synthetic Dataset for Intelligent Scene Understanding of Healthcare Facilities***

Friday 23nd May 2025

Keynotes

No surgical-related keynote this day.

Workshops

★ [Full day] Ubiquitous Medical Robotics: Lessons Learned, Vision Beyond
Room: 303

★ [Full day] 3rd Robot-Assisted Medical Imaging. ICRA-RAMI
Room: 407

Oral and Poster Sessions

No surgical-related poster presentation this day.

Events & Awards

No surgical robotics related events and awards this day

Friday 23nd May 2025

Workshop

Ubiquitous Medical Robotics: Lessons Learned, Vision Beyond

Location: 303

Time: 8:30 AM - 5:30 PM

Website: https://sites.google.com/view/umedbot/home

Abstract: In the past decade, research into medical robotics has surged, with thousands of academic papers published each year, and the field gaining ever-increasing attention. Despite this growing ubiquity in academic discourse, translation into real-world products remains relatively slow, with few breakthroughs reaching the clinical stage. Observing the last 10 years and looking ahead to the next, we are left with a series of critical questions: What capabilities of medical robots are still missing? What are the realistic expectations for medical robots—should they all be fully autonomous? And which emerging techniques in the next decade can potentially bridge the gap between research and clinical application? Furthermore, how can we enhance the awareness and cognitive abilities of medical robots to improve their performance in real-world surgeries?

This workshop will bring together leading medical robotics researchers and clinicians, fostering an interdisciplinary dialogue aimed at addressing these pressing issues. Together, we will explore the latest advancements, discuss key challenges, and investigate the role of both automation and human oversight in future medical robotics systems. By combining diverse expertise, we hope to find pathways towards practical, safe, and effective solutions for the next generation of medical robots.

Friday 23nd May 2025

Workshop

3rd Robot-Assisted Medical Imaging. ICRA-RAMI

Location: 407

Time: 8:30 AM - 5:30 PM

Website: https://sites.google.com/view/rami-icra-2025-workshop/home

Abstract: Medical imaging plays a vital role in modern clinical practice, providing valuable information to physicians for diagnosis, image-guided surgeries, and more. Due to the high precision and reproducibility of robotic techniques, the involvement of robots can help overcome some limitations in conventional imaging methods, such as intra- and inter-operator variations. With the rise of machine learning, the development of autonomous imaging systems has gained increasing attention.

To create intelligent systems that work robustly in unknown environments, fundamental research is continuously emerging, exploring novel approaches such as visual servoing, shared control, object segmentation, scene understanding, and learning from experts' experiences.

The goal of this workshop is to bring together active research groups and clinicians to share the latest technological achievements in robot-assisted medical imaging. By gathering world-class technical and clinical researchers, the workshop will also address remaining challenges beyond technical developments, including ethical issues and clinical acceptance.