Highlights of the 1st IEEE Conference on Telepresence
Tiago H. Falk, Paolo Fiorini, David Magnoni, Robert Mueller,
Ferat Sahin, and Adrian Stoica (listed alphabetically)

The 1st 2024 IEEE Conference on Telepresence (TELEPRESENCE 2024) – the first edition of the flagship conference of the IEEE Future Directions Initiative on Telepresence – was held from November 16-17, 2024. TELEPRESENCE 2024 was a hybrid event with the in-person component located at Caltech, in Pasadena, California. It was organized by several SMCS members, including Paolo Fiorini, Adrian Stoica, and Ferat Sahin, as general co-chairs; Tiago H. Falk and Tom Gedeon as Program co-chairs; and Robert Mueller as chair of the Telepresence Competition.

The conference was a huge hit and attracted ~90 people to California and remotely. It provided a stimulating forum for educators, researchers, and practitioners to learn, share knowledge, report recent innovations and developments, and exchange ideas and advances in all aspects of telepresence systems and applications, telerobotics, human-machine interfaces, and autonomy. The Telepresence 2024 Conference featured the presentation of 38 peer-reviewed regular and short papers (appearing in IEEE Xplore), and four abstracts, which were published in the conference proceedings.

Fig. 1: Audience at IEEE TELEPRESENCE 2024

All 42 technical contributions were presented orally at the conference, across six in-person sessions, two remote sessions, and one hybrid late-breaking abstracts session, organized around the following themes:

- Session 1 - Teleoperation Systems and Robots
- Session 2 – User Interface Design and Human-in-the-Loop Control
- Session 3 - Haptic Interfaces
- Session 4 – Brain-computer interfaces and user experience in Telepresence
- Session 5 - Infrastructure and Systems
- Session 6 - Mixed Reality
- Online session 1 – Human-robot/ machine interaction
- Online session 2 - Autonomy and Intelligent Systems
- (Hybrid) Late Breaking Abstracts

In addition to the technical program, TELEPRESENCE 2024 also featured a panel of experts on the topic of *Telepresence and Opportunities in Solving Problems in Healthcare and Social Challenges.* The panel was moderated by Adrian Stoica and Ferat Sahin and had as panelists several SMCS members, including Dr. Yaoping Hu (University of Calgary), Leila Takayama (Robust.AI and Hoku Labs), Paolo Fiorini (University of Verona), Gunter Niemeyer (Caltech), and Tiago H. Falk (INRS).

Moreover, nine invited/keynote speakers gave talks addressing emerging trends in telepresence. Seven speakers were in-person and two were remote. Speakers and talk titles included:

- Oussama Khatib (Stanford Univ): Deep-Sea Robotics Exploration: OceanOneK

- John Blitch (Blitz Solutions): Pinning Donkey Tails: Ethical Accountability in High Dynamic Tele-Tactical Operations
- Allison Okamura (Stanford Univ): Haptics Anywhere: Enabling Mobile Telepresence
- Saeid Nahavandi (Swinburne University): Haptically Enabled Robotics Systems (remote)
- Holly Yanco (Univ Maryland Lowell): Designing Effective Telepresence for Human-Robot Interaction
- Magnus Egerstedt (UC Irvine): Assured Autonomy, Self-Driving Cars, and the Robotarium
- Neal Lii (DLR, German Aerospace Agency): Scalable Autonomy: The many different ways of using robots to realize telepresence in space and on Earth
- Jeng Yen (JPL): Telerobotics Operation on Mars Surface in the Last Two Decades
- Ming Hou (DRDC): AI, Autonomy, and Digital Reality: Frontier of Symbiotic Telepresence Technologies for Successful Teleoperations (remote)
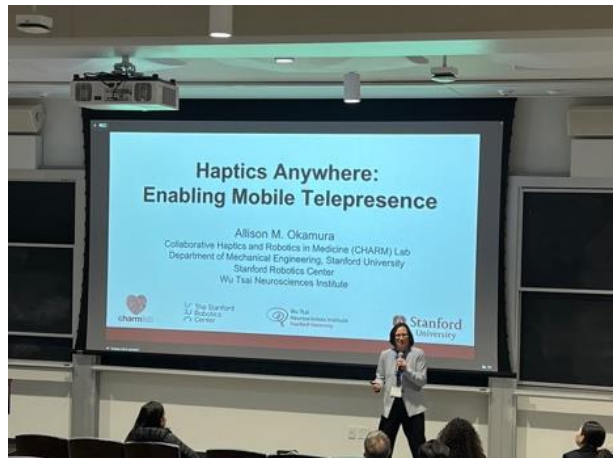

Fig. 2: A sample of some keynotes given at TELEPRESENCE 2024.

At the end of the first day, a banquet was held with Robert Mueller (NASA) as an invited speaker talking about the Telepresence competition (more details to follow). The banquet was well attended and saw many SMCS members present!

Fig. 3: TELEPRESENCE 2024 banquet with many SMCS members present

TELEPRESENCE 2024 also hosted the 2024 IEEE Telepresence Competition, which took place at Peterman Hill, in Lucerne Valley, California, on November 15, 2024. The competition focused on demonstrating telepresence capabilities aiding robotic vehicles navigate difficult high desert terrain, going uphill and downhill on slopes with rocks, sand, and other natural obstacles. Teams controlled Helelani (or "Heavenly Travels"), a 700-pound planetary rover equipped with a suite of instruments and imaging systems that can be controlled remotely. Helelani was provided by the Pacific International Space Center for Explorations Systems (PISCES, Hawaii).
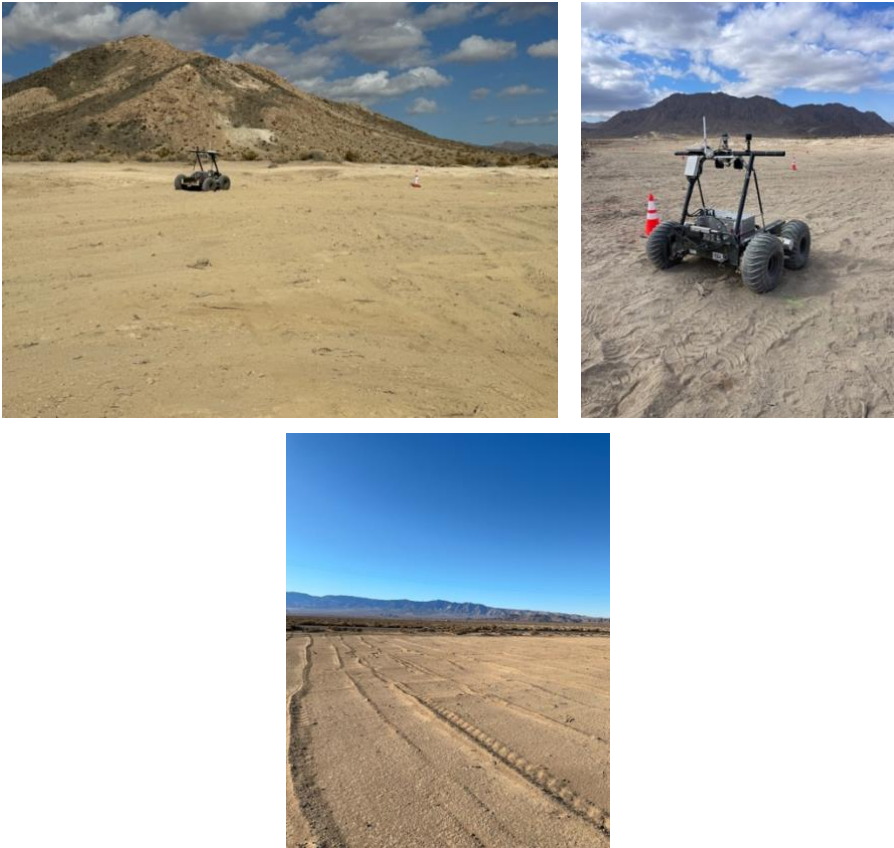

Fig. 4: Views of the Lucerne Valley desert where the Telepresence Competition took place and Helelani being teleoperated by one of the competing teams.

Despite some challenges, such as 40 mph winds that blew our exhibitor tent away, the competition was a great success! SMCS members Yaoping Hu, Yutao He, and Tiago Falk not only helped with judging the competition, but also (literally) with holding down the tent!

Fig. 5: Strong winds blew down the exhibitor tent, luckily before attendees arrived

A total of seven teams competed, coming from Chile (1 team), Australia (2 teams), and the USA (4 teams, three of which were remotely located). The $5,000 IEEE Telepresence Competition Prize was awarded to the Western Australia Remote Operations (WARO32) team, tele-operating from Perth, Australia with a time of 20 minutes and 10 seconds without any penalties. Several exhibitors were also present showcasing their telepresence robots. The event also featured live music, food trucks, and saw nearly 300 people come by, including several elementary, middle, and high school students from neighbouring cities. The IEEE Telepresence Competition Chair, Robert Mueller, was interviewed by NPR, who did a piece on the 'Robopalooza.' The NPR interview can be heard here: https://www.npr.org/2024/12/05/nx-s1-5082442/at-a-desert-festival-for-space-robots-engineers-envision-a-busy-future-in-space. More details about the Competition can be found at https://robopalooza.space

The Telepresence Conference 2025 has already been announced and will take place in Leiden, Netherlands, from September 8-10, 2025. The general co-chair will be SMCS member Jan van Erp. The IEEE Telepresence Competition will also take place in 2025 and organization is already underway.
Hope to see many of you in Leiden next year!