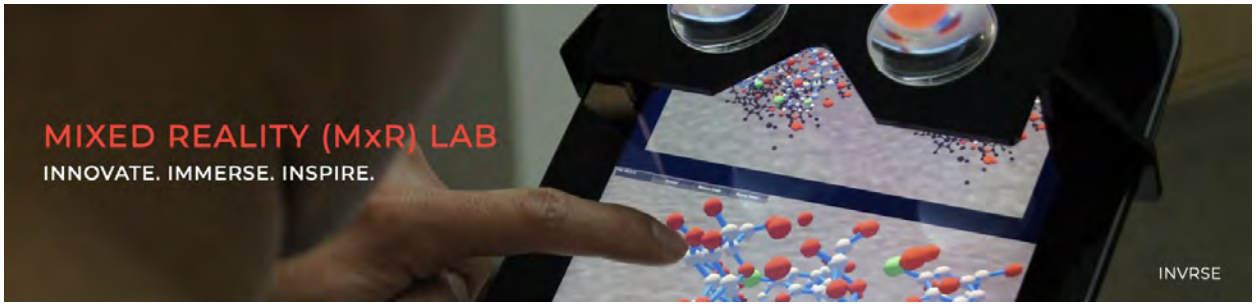


The Mixed Reality (MxR) Lab at the University of Southern California's Institute for Creative Technologies was established in 2008 with the intent of exploring human-machine interaction and developing hardware and software solutions for mixed, virtual and augmented reality (VR, AR). MxR's research and development efforts and the release of their open source HMD designs have directly inspired the large wave of industry-lead VR efforts, including the development of high-end HMD technologies like the Oculus Rift, as well as more accessible, scalable VR technologies like Google Cardboard.

The MxR Lab's focus is now shifting from the hardware to the other imperative piece of the immersive puzzle – the experience. MxR's goals include establishing a framework and a language necessary for creating impactful immersive experiences; discovering how virtual and synthetic environments can be optimized and made more effective; and continuing to build new tools and platforms to help enable and empower others to reach their full potential. With its connections with industry, academia and government, the MxR Lab facilitates important conversations in order to educate others about what these mediums can do, both now and in the future.

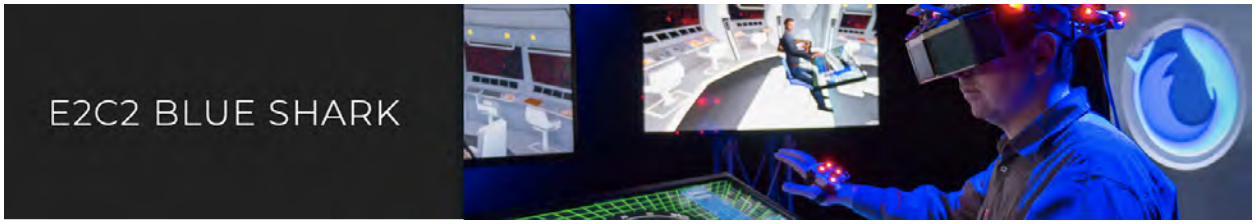
SELECT PROJECTS

The MxR Lab builds tools and techniques for training and transformation. We look at evolving conversations around sectors like education and health, analyze industry trends and bottlenecks, and observe how users engage with new technologies and the experiences and the mediums that emerge from these systems.

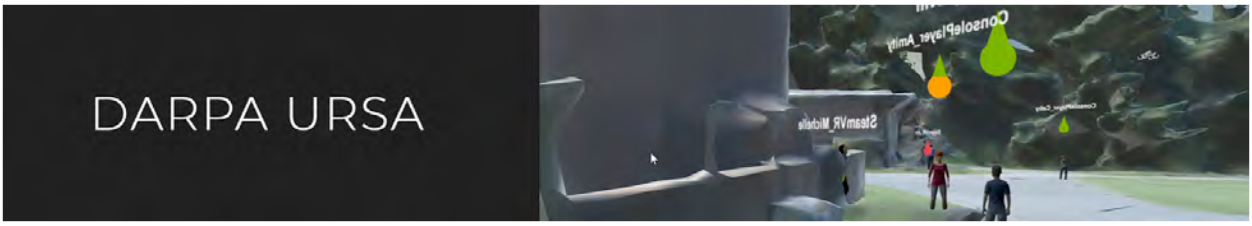
Below are just a handful of these research projects and initiatives.

How do we increase the capacity to access crucial visual information, no matter the location or what technological capabilities exist at the point of need? **VAST**, or **Visual Abstraction for Synthetic Training environments**, looks to tackle this very issue by attempting to isolate an abstraction technique in order to appropriately translate the repository of photorealistic assets that the Synthetic Training Environment (STE) will house and implement. The hope is to discover the Abstraction Guidelines necessary to optimize these assets for broader distribution and to increase engagement for a number of existing training exercises and scenarios. Identifying an abstraction technique for photorealistic and high-fidelity visual assets will also help to inform the various systems with which STE will need to interface (e.g. IVAS) and could assist in establishing a pipeline between STE's visual asset repository and the various hardware and software ecosystems that will need to connect, work with, and display these assets.

SCOPE, or **Scenario data Collection and Optimization for Performance Evaluation**, is a networked-multiplayer system that advances the assessment of trainees' sense-and-decision-making activities in immersive training environments. This pulls focus beyond simple outcomes and checklists and introduces new data types that will provide deeper and more meaningful insight into trainee performance. SCOPE will allow immersive training systems, like the Synthetic Training Environment (STE) to capture, access, and integrate audio and video streams, radio and intercom traffic, images of the trainee, interaction device events, eye-tracking data, head movement, and even physiological measures. SCOPE's specialized infrastructure collects, correlates, and indexes this treasure trove of information, creating the foundation for humans and machines to assess trainees' sense-making and decision-making processes.



The **Enhanced Environment for Communication and Collaboration**, also known as **Blue Shark**, was developed to demonstrate how virtual and augmented reality technologies could enhance the mission of the US Navy. Funded by the Office of Naval Research, Blue Shark fielded a series of technology demonstrations showcasing a virtual human assistant, a mixed reality helmsman station, gesture control of robots, and a low cost immersive tablet display for distributed instruction, among many other innovations. These demos served to prototype new ideas of human-computer interaction and human-human collaboration for future naval operations. This project was successfully transitioned to **Naval Information Warfare Systems Command** (formerly known as SPAWAR) and formed the basis of the **Battlespace Exploitation of Mixed Reality (BEMR) Lab**.



Created in partnership with **SRI** and funded under the **DARPA Urban Reconnaissance through Supervised Autonomy** program, this immersive, networked, multi-user platform connects roleplayers on laptops, in virtual reality, and in augmented reality with a complex scenario involving interactions with autonomous drones. Roleplayers are able to act out scenarios of insurgent behaviors within a civilian population in a 3D terrain model photogramatically captured from a real world location. This platform enables real-time data collection and evaluation of human-drone interactions in a high fidelity virtual environment, without exposing human role players to risk of injury and reducing system development and evaluation costs.

INVRSE is a low-cost platform for mobile-based hardware that integrates casual immersive experiences seamlessly into 2D touch-screen based media. The hardware components of INVRSE includes a simple INVRSE lens assembly that slides onto the top portion of your tablet. This, along with INVRSE software enables you to experience content in virtual or augmented reality as well as traditional media formats like text, photos, or video. What results is a cutting-edge content ecosystem that is accessible, scalable, and cost effective. The goal of INVRSE is to leverage all the great things that immersive media can do while eliminating the logistical limitations and user hurdles that come with it.

THE TEAM

JESSICA BRILLHART | DIRECTOR
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Jessica Brillhart is the Director of the Mixed Reality Lab (MxR Lab) at USC Institute for Creative Technologies. Prior to her appointment, she was the Principle Filmmaker for VR at Google and spearheaded efforts in exploring the technology and language of the mediums of virtual reality and augmented reality. Her work at Google spans many products, including but not limited to the development of Google's Jump live-action VR capture ecosystem as well as preliminary work on user experience and interface design for Google Glass. Brillhart received her degree in Film and Television Production from New York University's Tisch School of the Arts. She is a recipient of *MIT Technology Review*'s 35 Under 35 in 2017 and the Advanced Imaging Society's Distinguished Leadership Award in 2019. Brillhart has presented keynotes at SXSW, Google IO, Oculus Connect, FMX, Sonar+D, Fast Company's Innovation Festival, and the Aspen Ideas Festival. Brillhart has worked as an advisor for Sundance New Frontiers, the Independent Film Project (IFP), and Electric South; and has been a judge for such organizations as World Press Photo, ADC Young Guns, and the Tribeca Film Festival. Known for her pioneering work in the immersive space, Brillhart has made a wide range of award-winning experiences and platforms, collaborating with partners such as Bose, NASA's Jet Propulsion Laboratory, Elvis Presley Enterprises, the Philharmonia Orchestra in London, Frank Gehry, the Montreal Canadiens, Yo-Yo Ma, Google's Artists and Machine Intelligence team, and (unofficially) the Weather Channel. Her work continues to explore the experiential potential of emergent technologies, the stories these technologies and mediums can tell, and the language that helps us tell them.

DAVID NELSON | SENIOR PRODUCER
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David Nelson is the Senior Producer of the Mixed Reality (MxR) Lab, the seminal virtual, augmented and mixed-reality research lab at the University of Southern California's Institute for Creative Technologies. He has overseen a broad range of Immersive research projects for clients ranging from the Army Research Lab, Sony Pictures, 20th Century Fox, the National Science Foundation, the Museum of Natural History and the Office of Naval Research amongst others. Nelson is leading an ICT effort in collaboration with the SHARP Academy at Ft. Leavenworth to produce an interactive simulation training SARCs and VAs. Nelson has worked in collaboration with USC's School of Cinematic Arts, leading a research effort on the emerging 'Language of Immersion' and its impact on the future of storytelling. From 2016 to present, Nelson continues to serve as Lead Faculty

Advisor at Sony Pictures Entertainment for the Summer Innovation Program and has also served as the Advisor to the premier 20th Century Fox Innovation Lab program as well. He is an award-winning Director/Producer/Writer, creating content in the arenas of feature films: Like Mike 2, (20th Century Fox), Let It Shine, (Disney Channel Original Movies), documentaries (HBO's Naked States trilogy), Music Videos and commercials. He is a recipient of a Hugo Award for Excellence in Television Documentary and is a member of the Director's Guild of America.

DR. DAVID KRUM | ASSOCIATE DIRECTOR FOR MIXED REALITY TECHNOLOGY
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Dr. David Krum is the Senior Research Scientist within the Mixed Reality (MxR) Lab and a researcher in the fields of human-computer interaction, virtual reality, 3D interaction, and wearable computing. His work combines an engineering approach of building technical artifacts with a scientific approach of experimentation and user evaluation. Before joining ICT, Dr. Krum was a researcher in visualization and user interface design at the Bosch Research and Technology Center. He also worked at Motorola as a software engineer. Dr. Krum graduated from the California Institute of Technology with a B.S. in engineering and applied science. He earned his M.S. in computer science at the University of Alabama in Huntsville and his Ph.D. in computer science is from the Georgia Institute of Technology, focusing on wearable computers and spatial cognition. Dr. Krum is a member of the Institute of Electrical and Electronics Engineers (IEEE) and the Association for Computing Machinery (ACM). Over his research career, he has received Best Poster, Best Demo, and Best Paper Awards from the IEEE Virtual Reality Conference.

RHYS YAHATA | LEAD PROGRAMMER

Rhys Yahata is the lead programmer for the Mixed Reality (MxR) Lab. He has worked on various ICT projects such as the Enhanced Environment for Communication and Collaboration (E2C2), Early Synthetic Prototyping (ESP), Restoring Active Memory (RAM) Replay, One World Terrain (OWT), Open Medical Gesture (OpenMG), Team Assessment and Learner Knowledge Observational Network (TALK-ON), and the Synthetic Training Environment (STE). Mr. Yahata also contributed to the MxR Lab's research efforts in the field of redirected walking. He graduated from the University of Southern California Viterbi School of Engineering with a B.S. in Computer Engineering and Computer Science. Over his engineering career, he has received Best Poster and Best Demo awards from the IEEE Virtual Reality and ACM SIGGRAPH Conferences.

FOR MORE INFORMATION, PLEASE CONTACT

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