

Human-AI Integration Lab

Human Augmentation with Interactive AI + XR

"This is a busy, busy place" says Assistant Professor **Misha Sra**, director of UCSB's Human-AI Integration Lab, also known as HAL. "It's not just PhD students. I have a whole lot of undergrad students, I have masters students, I have visiting researchers like Kojiro who's here from Toyota Research. I also have faculty spending their sabbatical year here from Japan. It's a lively place."

And working diligently in all that buzz of activity for the last few years has been PhD student **Atieh Taheri**, whose lifetime of experience with spinal muscular atrophy has broadened the perspective of a lab that's focused on human-computer interaction, extended reality, and AI.

"My field of research is accessibility for people with motor impairments, motor disability," Taheri says. "People kind of similar with the situation I have."

As an example she talks about current virtual reality implementations, and how they mostly consider the

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general population while overlooking people in different situations or medical conditions.

"Whatever experience you're trying to simulate for people," she says, "you also need to consider this underrepresented group."

"This has been the challenge in Atieh's prior work," Sra explains. "When you think about gaming systems and input devices we have for computers, everything assumes that you can use your hands for the most part. If you

don't have control over your hands, accessibility features are not going to help you."

With that in mind, Taheri's first project in the lab was a gaming input system based on facial expression recognition. She built it during the Covid shutdown, conducting a remote user study with 12 other people who have muscular dystrophy or spinal muscular atrophy.

"It was one of the hardest studies I have ever seen done," Sra says. "Atieh did it, building a system that was



PhD candidate Atieh Taheri with Assistant Professor Misha Sra, director of the Human-AI Integration Lab.

New Faculty

Ziad Matni



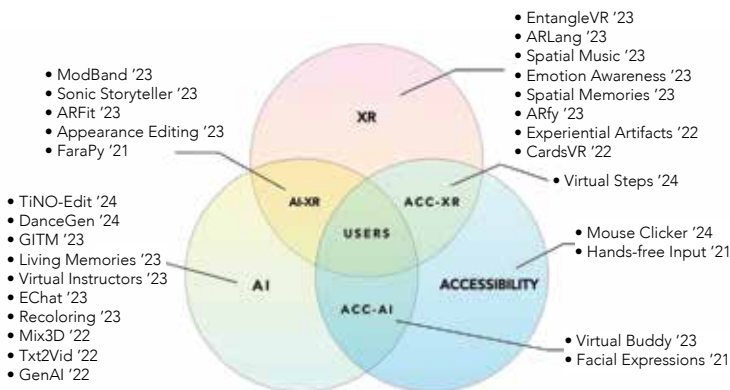
After earning his MS in EE/CE from USC, **Dr. Ziad Matni** took a short 13-year break in the tech industry before returning to academia for a PhD from Rutgers. He joined UCSB as an assistant teaching professor and now serves as director of the CS department's Early Research Scholars Program.

His own research focuses on the intersection of computer science and human behavior around information seeking and sensemaking—including the use of AI and Large Language Models in education. He loves teaching undergrads but—after recently getting nothing but blank stares from his very bright students upon mentioning the names Jobs and Wozniak—he now fantasizes about adding a history of CS course! "UCSB is the best of many worlds," he says. "It's a world class research leader in a gorgeous location. I've found the faculty to be intellectually stimulating and very approachable. The staff consistently demonstrates exceptional generosity with their time and expertise. And our students are sharp and eager to learn."

Our students are sharp and eager to learn. They really are a pleasure to teach and mentor.

usable for folks who can't necessarily rely on their hands to set up and play."

The system, which relies on AI and a web camera with speech input, is customizable by letting users with different degrees of facial and muscle control map different



Visual summary of recent work in the Human-AI Integration Lab (HAL)

facial expressions to game character motions or actions. Games downloaded from Steam that allow keyboard remapping worked well right out of the box with the system.

"We were going for Atieh to play a first-person shooter. And she did! Car racing, too. Hard games!"

Sounds difficult?

"Well I mean she's an engineer, right?" says Sra. "And that's what engineers do. They solve hard problems."

During her time in the lab, Taheri has also worked on a computer mouse modification project that provides tactile feedback for people with hand motor impairments, a virtual buddy for redefining conversational AI interactions, and Virtual Steps, a VR experience that simulates walking for lifelong wheelchair users.

"I don't know if my walking in VR is the same as real walking in physical reality, I don't know that," Taheri says. "But it's comfortable for me and it's consistent with the model I have in my mind from watching others. It's consistent with my mental model of walking."

She's quick to point out that not everyone will want to experience walking—and that's fine. Her projects are more about bringing focus to those with disabilities, about bringing awareness to designers who don't necessarily have the perspective of disability. Sra adds that disability is not necessarily a siloed condition. It's more of a continuum, with people sliding in and out of degrees of disability throughout their lives with illness, injury, and age—making these kinds of projects relevant to all of us.

As a Presidential Postdoc Fellow, Taheri will continue to expand her knowledge and expertise in accessibility research while contributing to the vibrant research community at Carnegie Mellon University.

Meanwhile, the lively work continues in the Human-AI Integration Lab as new waves of researchers innovate and expand the possibilities of human augmentation with AI and XR.