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New Grant Fuels Development of Innovative VR-Based Robotics Training Tool

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Houtan Jebelli, along with doctoral students Shayan Shayesteh and Yuming Zhang, observes a trainee interacting with a construction robot in the early prototype of the human-centric VR training environment.

A pioneering project promises to revolutionize robotics training in the construction industry. The initiative, led by CEE assistant professor Houtan Jebelli and funded by a grant from the National Science Foundation (NSF), aims to develop an advanced virtual reality (VR) training system. This system is designed to prepare the workforce for the increasing integration of robotics in construction, aligning with industry forecasts that predict a significant rise in robotic adoption in the coming decades.

The construction sector, a critical component of the U.S. economy, is currently grappling with labor shortages, stagnant productivity and safety challenges. The anticipated robotic revolution in this sector, where up to 81% of construction companies are expected to embrace robotics, calls for an innovative approach in training and workforce development, Jebelli said. This shift toward a more technologically advanced industry underscores the need for training methods that emphasize human-robot collaboration.

The focus of this innovative training tool is on creating a human-centric VR experience. It simulates real-world construction scenarios in a safe, controlled virtual setting, allowing for hands-on experience with robotic technology. This approach is designed to bridge the gap between current workforce skills and the impending needs of a rapidly evolving industry. The training emphasizes understanding the intricacies of human-robot interaction, ensuring that future construction professionals are well-equipped to work alongside advanced robotic systems.

The training system encompasses various construction activities, providing a comprehensive understanding of how robotics can be utilized in different aspects of construction work. This includes tasks such as bricklaying, welding and 3D concrete printing, all of which are

becoming increasingly automated. By offering a realistic and immersive learning environment, the training tool aims to enhance users' familiarity and comfort with these emerging technologies.

“This initiative goes beyond traditional educational methods,” Jebelli said. “It represents a significant leap forward in preparing the construction industry for a future dominated by human-robot collaboration. By focusing on human-centric training, the project ensures that technological advancements enhance human work rather than replace it. This approach is vital for the future of the construction industry, where safety, efficiency and technological proficiency are paramount.”

The introduction of this advanced VR training system is set to make a substantial impact on the construction industry. It promises to bridge the current skill gap, improve productivity and ensure safer construction practices, aligning the workforce with the imminent technological transformations in the industry, he said.

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