Project: FW-HTF-R: Fostering Learning and Adaptability of Future Manufacturing Workers with Intelligent Extended Reality (IXR) (2128743)

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Total Budget: $2,000,000.00

Northeastern University

Work Domain: Production-inspection work in precision manufacturing that requires complex reasoning and problem-solving

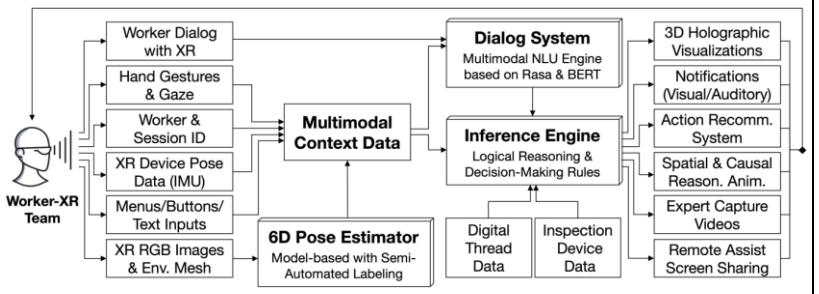
Societal Problems : 2.4 million unfilled U.S. manufacturing jobs by 2030 with a projected cost of $2.5 trillion, due to the retirement of skilled workforce, introduction of advanced technologies, and inability to attract younger cohorts to the industry

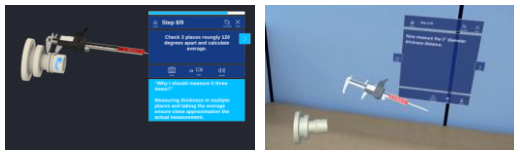
Future Work

- Our interviews with industry partners reveal that manufacturers seek to enhance, augment, and improve worker performance/safety rather than reduce headcount yet increasingly seek workers with some education beyond high school to facilitate the automation of tasks.
- Our analysis of 160M online job postings provided the Burning Glass Technologies' proprietary databased show manufacturers are changing the composition of skills they seek in new hires. Whereas only 30% of manufacturing job postings required a four-year degree or higher in 2010, upwards of 35% did so in 2021.

Future Technology

Build AI capabilities, such as computer vision, dialog systems, and inference engines, into XR to enable personalized and intuitive "teaming" with manufacturing workers to support their complex spatial and causal reasoning, learning, and transfer of skills to new tasks.





Storyboard XR App

Future Worker

Theoretical Framework

- Evidence of complex reasoning in science
- Embodied cognition

Procedure

All conditions include a pre-test, watching a brief animated video of the function and role of the gages, instructional intervention (i.e., experimental manipulation), a post-test, and a delayed test.

Learning and Engagement Measures

- Geometric Dimensioning & Tolerancing (GD&T)
- Attitude and Efficacy
- Presence and Engagement

Control	Group A	Group B
Lecture-based instruction (before task)	Just-in-time, paper instruction* (during task)	Just-in-time instruction with IXR (during task)