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Video Passthrough for Enterprise AR

An abstract geometric pattern consisting of a network of thin grey lines connecting various sized black dots. Some dots are larger than others, and some areas are filled with light grey polygons. The pattern is dense and complex, resembling a molecular structure or a data network.

Category: Market
Research

Problems this Research Would Address

- There is **limited empirical research** comparing Passthrough and See-Through AR in real-world enterprise and industrial environments.
- Common concerns about Passthrough AR—including **latency, power failure "blackouts," and depth perception**—are often cited, but validation through rigorous human-centered studies is **hard to find**.
- In the absence of evidence-based insights, enterprises may dismiss Passthrough AR where it is viable, or **worse, deploy it in high-risk scenarios** without understanding potential safety or usability trade-offs.
- This knowledge gap hinders strategic planning, workforce training, and product roadmap alignment between AR vendors, integrators, and enterprise buyers—**especially in light of hardware transitions such as HL2 and ML2 approaching end-of-life**.
- As Passthrough AR hardware becomes more advanced and accessible, **clear guidance is urgently needed** to inform safe and effective deployment in the next generation of enterprise AR solutions.

Whose problem would be addressed?

- Enterprise AR and innovation leaders will gain **clarity on which AR display modality meets accuracy, safety, and productivity standards in which enterprise environments.**
- Passthrough hardware developers will benefit from benchmark performance data to guide product decisions and identify viable enterprise use cases aligned with industry needs.
- UX designers and workforce training professionals will gain insights on how each modality impacts user focus, fatigue, and overall cognitive load during task execution.

How would this research be conducted?

1. Conduct desk research to compile current capabilities, limitations, and published performance benchmarks of leading Passthrough and See-Through AR headsets.
2. Conduct **interviews** with **enterprise AR leaders and safety officers** to understand real-world experiences with Passthrough AR devices: *Have they been evaluated? Used in pilots? Ruled out—and if so, why?*
3. Design and execute **controlled experiments** simulating representative industrial workflows (e.g., assembly, inspection, quality checks) using both AR modalities. What happens if passthrough device loses power? *Experiments will be conducted on an “**as feasible**” basis, given time and resource intensity.*
4. Collect **metrics** including **task performance** (speed, accuracy), **cognitive load**, depth perception, situational awareness, **reaction time**, and **user comfort**.
5. Perform **quantitative and qualitative analyses** to assess trade-offs, strengths, and risks of each modality in enterprise settings.

Project Deliverables

- A comprehensive research report comparing Passthrough and See-Through AR across key dimensions relevant to enterprise manufacturing and industrial environments.
- A **decision-support framework or chart to assist AR leaders in evaluating modality suitability** for various task types and risk levels.
- A summary of human-centered findings, including **insights into fatigue, awareness, trust, and error prevention** across modalities.
- Executive summary and webinar to present key takeaways for AREA members and enterprise stakeholders.

Benefits to AREA Members

- Increased awareness of how different AR display types affect **precision, safety, and user performance** in enterprise workflows.
- If members have previously ruled out Passthrough, this research will **provide empirical evidence to support or challenge** that decision. If not, it will **offer a framework** for making more informed, risk-aligned hardware decisions.
- Access to **validated performance data** and **firsthand user insights** to inform strategy, solution design, and vendor evaluations.
- A **living decision-support tool** that can be updated with future findings and support **POCs, pilot programs, and scaled deployments** across diverse use cases.
- Support AREA members in developing **fact-based decisions** for future AR deployments as hardware landscapes rapidly change with the **EoL of HL2 and ML2**.