Accelerating XR Adoption

Modeling, Simulation, Training - XR Technology Adoption Barriers

To promote XR adoption within the Modeling, Simulation, and Training (MS&T) community, Tech Grove has partnered with NAWCTSD, PEO STRI, PM TRASYS, and AFAMS - to identify solutions that will accelerate the adoption of XR technology for training in the classroom and the field. Below are key barriers identified as preventing wider adoption of XR solutions for training programs to solve.

This is an open call to industry and academia to self-identify technology or training methodologies by technology readiness level (TRL) that are already addressing (TRL 7-9), or have the potential to address (TRL 3-6), these barriers to adoption. Below is a self-ranking table for soluton providers to highlight their technology or service with a 25-50 word description, a URL, and Technology Readiness Level (TRL).

Entries will be considered for bringing into Tech Grove for evaluation and further in-depth discussion. We are scheduling our first review session for Sept 9th. Please reply back to techgrove@ucf.edu by 26 August so that we can select and notify candidates in order to provide a two weeks notice for possible travel.

Categories

- Matching the Static/Dynamic Visual Field Acuity of the Human Visual System
- Multi-player Integration
- Network Capability and Stability
- Navigation and Weapon Integration
- Training Techniques
- Visual Recognition / Orientation of Augmented Objects on Battlefield
- Ruggedization and Ergonomics
- Policy, Deployment, and Sustainment
- Common Development Platforms / APIs / Repositories

INNOVATION GROWS WITH US

CENTRAL FLORIDA TECH GROVE

Tech Grove is an innovation center specifically created to foster collaboration and the acceleration of novel Modeling, Simulation, Training & Human Performance solutions to our national defense partners at Team Orlando. Our invested partners include US Navy NAWCTSD, US Army PEO STRI, US Marine Corps PM TRASYS, US Air Force AFAMS, and the University of Central Florida Research Foundation.

XR TECHNOLOGY / INNOVATION RESEARCH

Issues/Concerns/Hard Problems Identified	TRL (3-9)	Company - Product/Service Name - URL Point of Contact Name, Email & Phone 25-50 Description
Matching the Static/Dynamic Visual Field Acuity of the Human Visual System		
How can we increase the limited field of view (FOV) - human eye is 135 degrees (H) and 180 degrees (V) - it's achievable, but without adding "bulk" of the hardware to the HMD?		
What solutions can provide a latency-free field-of-regard of a sensor so the operator/human as they move the sensor has a smoother experience? [covering total area that a sensing system can perceive, larger than FOV]		
What technologies are improving the effectiveness of Immersion with Mixed Reality cameras?		
What solutions are adding seamless and latency-free system visual fidelity as a user shifts their head/eyes for clearer details and can it be defined by role/user position [define by role? I.e. pilots reading instruments/controls, vs gunner operator, vs UAV operator]		
Multi-player Integration		
What is new in multi-trainee tracking/safety; scaling of solutions, limitations of size, distance, or spanning multi-locations?		
What improvements in tracking trainees across large spaces like a motion capture studio and/or live maneuver across acres of space have developed?		
What improvements in capture/retain/analysis of trainee throughput while using tracking technology have improved?		
How has inside-out tracking drift/occlusion improved?		
What has been done to mitigate tracking interference stemming from multiple HMDs in one space?		
Network Capability and Stability		
How are new technologies like 5G improving the latency of data/visuals to or from device headsets or consoles using transmission or edge computing?		
What hardware and software solutions have improved computer processing overhead and latency; edge computing/visualization? Electronic efficiency impacts power consumption, bulk and the wireless bandwidth for low latency at Point-of-Need (PON) - what is being used to lower power/computing draw?		

XR TECHNOLOGY / INNOVATION RESEARCH

Issues/Concerns/Hard Problems Identified	TRL (3-9)	Company - Product/Service Name - URL Point of Contact Name, Email & Phone 25-50 Description
Navigation and Weapon Integration		
For weapon orientation - compass heading (azimuth) and elevation angle used to generate synthetic ballistic trajectory to target - what new technologies are improving accuracy/precision fires?		
Accurate and robust Position/Navigation (Pos/Nav) - GPS accuracy is not reliable or pervasive (aka GPS denied navigation) - what new technologies are emerging to address the accuracy needed for precision LVC and STE?		
Training Techniques		
What new Instructional Design practices have evolved over time to incorporate XR devices per role/training objective to drive outcomes? Measurable outcomes?		
What has been done recently with high-precision motion tracking of hands/controllers for manipulating, or interacting with, small parts with fingers?		
What new standards for interaction with the virtual/mixed reality environment in areas such as navigation/teleportation, haptics, environment mapping/changing, and relating that realism to the user is emerging?		
Visual Recognition / Orientation of Augmented Objects on Battlefield		
Accurate Position Recognition in Training Environments – Live training environments often do not have distinctive architectural features to help AR devices calibrate their position. What is new in this area to improve the visual experience and accuracy?		
What new automated object recognition (ID material type for realistic ballistic outcome) is available? What is usable with equipment on the Network vs Edge computing with tactical devices?		
Common Development Platforms / APIs / Repositories		
There should be a common platform of digital assets from which various VR/AR application developers can leverage capability - what are the leading vendors addressing this need?		
What authoring capabilities for the Commands are there to develop new scenarios and just-in-time training experiences to meet emergent training requirements.		

XR TECHNOLOGY / INNOVATION RESEARCH

Issues/Concerns/Hard Problems Identified	TRL (3-9)	Company - Product/Service Name - URL Point of Contact Name, Email & Phone 25-50 Description
Ruggedization and Ergonomics		
Ruggedized Headsets – for truly Fieldable Devices (not classroom) - most of the current XR devices are not made for use in austere environments or sustained use. What technology is helping to ensure field use without added burdens on the wearer - poor ergonomics, heat, etc.?		
Heat Production – Current XR devices are not capable of performing for an extended duration outdoors and overheat with use - where are improvements being made in low heat or better heat dissipation of the equipment without heat transfer to the wearer?		
Hardware Compatibility with Services Issued Equipment – The current XR devices are not compatible with the standard-issue gear; what are vendors doing to improve a better fit and form of devices that attach/are embedded to current gear (helmet/visor/ruck)?		
Visibility in Sunlight/Nighttime – Live training occurs at all times. Current XR devices struggle to provide visible images in sunlight and during night-time events. What technologies are improving the visual experience while maintaining low weight, low power, and low latency?		
Weight – The devices that are made for commercial use are intended to be used in the home/classroom and then removed. Warriors would use an XR device for many hours at a time and the additional weight is significant - bulk and weight are enemies of prolonged use for field and classroom use - what improvements are there?		
Form Factor – we would like to see a better fit and form; XR devices should feel naturally light such as aviator glasses. What is new here?		
What power consumption/management technologies are emerging to overcome limiting duration of use and reducing extra bulky equipment, ergonomics (overall design) with an improved field of view?		

XR TECHNOLOGY / INNOVATION RESEARCH

Issues/Concerns/Hard Problems Identified	TRL (3-9)	Company - Product/Service Name - URL Point of Contact Name, Email & Phone 25-50 Description
Policy, Deployment, and Sustainment		
What examples of rapid approval/acceptance exist to overcome that there is no set DOD standard/policy in place for granting IA and ATO approvals for XR devices at training sites - Services have been left to develop their own guidelines. Where has there been a success in removing/reducing work by finding "universal pipelines and efficiencies" for using these technologies within unclassified, classified, mobile, and secure training environments?		
To ensure that training is effective, usable, and realistic, and to develop assessment metrics to measure critical training and performance outcomes Utilization – what tools are there for helping to determine using VR/AR at the right time for the most effective? Ensure that XR training solutions will be as effective and efficient as possible and maximize the Commands' training time and resources?		
Alternative Considerations		
What impacts of Olfaction - scent in VR/AR - are there to student learning efficacy?		
What alternatives to current Bluetooth restrictions (preventing any possible data stream being intercepted) exist to remove constraints on XR training systems being "wired" exist?		