

Luis Mesias

XR Robotics Research Engineer

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SUMMARY

Research engineer focused on XR systems for teleoperation, haptics, and human-subject research. Experience building real-time Unity/C# applications, integrating robotics and sensing stacks, and translating research prototypes into study-ready tools, including VA-affiliated XR projects.

RESEARCH EXPERIENCE

Research Assistant, Human Fusions Institute

Oct 2020–Feb 2026

- Served as one of two lead engineers on a multidisciplinary avatar teleoperation system, jointly responsible for system architecture, design decisions, and long-term technical direction.
- Led operator-side VR and haptic subsystems, integrating Unity with ROS 2 for real-time teleoperation and feedback.
- Implemented low-latency stereo video streaming using WebRTC and established long-distance tunneled communication links using Husarnet; achieved sub-second closed-loop latency across distances exceeding 2,000 miles.
- Unified heterogeneous tracking and haptics systems (Meta Quest 3, Ultraleap, Polhemus, and custom electrical stimulation hardware) into a portable, field-deployable operator stack.
- Designed and implemented a serial-to-analog interface bridging robotic sensing data to a medical-grade electrical stimulator; transformed contact/pressure data into low-latency electrical haptic feedback using digital nerve stimulation.
- Designed and developed a low-profile wearable surface electrical nerve stimulation interface compatible with optical hand tracking; improved fingertip-localized sensation accuracy from 70% to 92% and reduced unintended sensation locations from 27% to 4%.
- Led human-subject stimulation studies (13 participants) achieving targeted fingertip sensation in approximately 84% of trials; contributed as lead inventor to patent WO2023244529A1 (licensed to Afference Inc.).
- Built a cross-platform open-source stimulator interfacing library (C#, Unity, Python) with strongly-typed APIs, documentation, and a simulated transport for test scenarios.
- Contributions supported an ANA Avatar XPRIZE semifinalist entry and were featured in national media outlets.

VR Software Contractor (Independent), VA Portland Health Care System

Oct 2025–Dec 2025

- Designed and delivered a Unity-based VR application for Magic Leap under contract with defined milestones and deadlines.
- Built a research-grade projection environment with switchable head-centric and world-centric modes, plus configurable rotation locking to support controlled experimental manipulation.
- Enabled extensibility via assets imported from Blender; provided documentation and knowledge transfer to support ongoing research use beyond the contract period.

Research Assistant, VA Northeast Ohio Health Care System

Aug 2020–Oct 2024

- Supported VR-based clinical research on eye-tracking diagnostics and rehabilitation, contributing to validated outcomes and dissemination through related publications.
- Developed eye-tracking VR diagnostic applications using Varjo head-mounted displays; built a Python-to-Unity bridge for high-rate head and eye tracking data ingestion.

- Designed and implemented a gamified VR rehabilitation task that improved visual convergence by approximately 40% over an 8-week intervention period in veterans with traumatic brain injury (TBI).
- Recruited and conducted IRB-approved studies involving 27 participants, including vulnerable clinical populations; collaborated with clinicians to align technical implementation with outcome measures.
- Engineered systems for robustness and reproducibility to enable adoption by external research labs; provided remote technical support and transitioned primary maintenance responsibilities to a new engineer.
- Partnered with XRtistry to translate research-grade VR applications into polished, take-home-ready Meta Quest standalone workflows; managed deployment via MDM and implemented logging plus remote data extraction.

Research Assistant, Interfaces & Interventions Research Group Aug 2020–Feb 2022

- Supported VR research initiatives focused on immersive health applications, contributing to study-ready prototypes and dissemination through targeted presentations.
- Delivered workshops introducing EMG and stimulation concepts using Backyard Brains kits, including an EMG-controlled game demonstration.

Research Assistant, Dr. Philip Feng Research Group Jan 2019–Aug 2019

- Programmed and designed wireless low-power long-range sensors; measured power output of EnOcean energy harvesters and low-power transceiver consumption.

SELECTED PROJECTS

XR Teleoperation and Wearable Haptics

Project, An Operator-centric Design of an Avatar System using Digital Nerve Stimulation Jun 2020–Feb 2026

- Designed an operator-centric VR interface enabling intuitive remote robot manipulation and locomotion across distances exceeding 2,000 miles.
- Achieved sub-second end-to-end system latency for synchronized visual and tactile feedback; engineered robustness for operation outside controlled lab networks.

Project, Design of a Haptic Interface Based on Surface Electrical Nerve Stimulation Feb 2024–Feb 2026

- Led the complete IRB process and experimental methodology for a human-subject study (5 participants) on surface electrical nerve stimulation.
- Developed a low-profile wearable haptic interface compatible with optical hand tracking; iteratively refined electrode layout and stimulation protocols.

Project, Artificial Touch Feedback Through Skin-Surface Electrical Stimulation Jun 2019–Dec 2023

- Designed and executed human-subject studies (13 participants) establishing foundational stimulation protocols; achieved targeted fingertip sensation in approximately 84% of trials.
- Contributed as lead inventor to patent WO2023244529A1, subsequently licensed to Afference Inc.

Clinical XR and Eye Tracking

Project, Vestibulo-Ocular Reflex (VOR) Diagnosis and Evaluation Using VR Aug 2020–Oct 2023

- Built eye-tracking VR diagnostic applications and supporting software infrastructure to enable reproducible deployment across collaborating labs.
- Led experimental design, data collection, and analysis for VR-based diagnostic and rehabilitation studies; provided remote support for external deployments.

Project, VRcade Home Therapy App Oct 2023–Oct 2024

- Ported Varjo-based applications to Meta Quest standalone; managed deployment and implemented remote logging and configuration for take-home therapy workflows.

Research Software Tooling and XR Platforms

Project, Open-Source Stimulator Interfacing Library	Aug 2025–Feb 2026
<ul style="list-style-type: none"> Built a cross-platform serial communication library abstracting byte-level protocols into strongly-typed APIs, with event-driven serial support and a simulated test transport. Delivered end-to-end examples (C#, Unity, Python) plus API documentation covering hardware, protocol, and software layers. 	
Project, Research-Grade VR Projection Environment (Unity / Magic Leap)	Oct 2025–Dec 2025
<ul style="list-style-type: none"> Built a Unity-based environment for Magic Leap with switchable projection modes and rotation locking for controlled experimental manipulation. Delivered researcher-focused documentation and training to enable continued extension. 	

PUBLICATIONS

- Jianfeng Zhou, Luis Mesias, Mingyu Pan, Samuel Yang, Michael Fu, Kathryn Daltorio. "Feeling through Sand Using a Hexapod Robot as a Remote Hand." *The International Journal of Robotics Research*, under preparation.
- Luis Mesias, Tyler Tevis, Michael J. Fu, Mark F. Walker. "Virtual-Reality Assessment of Impaired Convergence in Veterans with Traumatic Brain Injury." *Neurology*, under review.
- Rachel S. Jakes, Luis Mesias, Veronica J. Santos, Michael J. Fu, Dustin J. Tyler. "Design and Evaluation of a Low-profile Haptic Interface Based on Surface Electrical Nerve Stimulation." *2024 IEEE Conference on Telepresence*, 2024. doi: [10.1109/Telepresence63209.2024.10841536](https://doi.org/10.1109/Telepresence63209.2024.10841536)
- Luis Mesias, M. Akif Gormez, Dustin J. Tyler, Nathaniel S. Makowski, Emily L. Graczyk, Michael J. Fu. "Distally-referred surface electrical nerve stimulation (DR-SENS) for haptic feedback." *Journal of Neural Engineering*, 2023. doi: [10.1088/1741-2552/ad0563](https://doi.org/10.1088/1741-2552/ad0563)

PRESENTATIONS AND WORKSHOPS

Design and Evaluation of a Low-profile Haptic Interface , IEEE Conference on Telepresence	Nov 2024
An Operator-centric Design of an Avatar System using Digital Nerve Stimulation , RSS Conference	2022
E-Stim for Educators , E-Stim for Educators	2021–2025
Immersive virtual reality health games (narrative review of game design) , Metro-Health Rehabilitation Institute Journal Club	Jun 2021

TEACHING

Teaching Assistant , Introduction to Computer Game Design and Implementation	Jan 2023–May 2023
Teaching Assistant , Advanced Game Development Project	Aug 2022–Dec 2022
Teaching Assistant , Semiconductor Electronic Devices	Jan 2022–May 2022

SERVICE

Journal Reviewer , Journal of NeuroEngineering and Rehabilitation; Virtual Reality; IEEE TBioCAS	May 2023–Feb 2026
<ul style="list-style-type: none"> Reviewed 6 journal papers. 	
Conference Paper Reviewer , IEEE Telepresence; IEEE EMBC	Jan 2022–Feb 2026
<ul style="list-style-type: none"> Reviewed 2 conference papers. 	

HONORS AND AWARDS

ANA Avatar XPRIZE , Avatar XPRIZE	Jan 2020–Sep 2021
• Developed an operator-centered teleoperation system with tactile feedback; semifinalist.	
Innovation for Tomorrow Award , Innovation for Tomorrow	2017–2018
• Developed a VR mobile application to teach vectors and projectile motion.	

EDUCATION

Ph.D. Electrical Engineering , Case Western Reserve University	Aug 2020–Feb 2026
GPA: 3.82	
Bachelor of Science in Engineering in Electrical Engineering , Case Western Reserve University	Aug 2018–Aug 2020
GPA: 3.96; Honors: Summa Cum Laude; Minor: Biomedical Engineering	
Associate of Arts , Hillsborough Community College	Jan 2016–May 2018
GPA: 3.95; Honors Institute	

SKILLS

Programming: C#, Dart, Java, Python, R, C++, MATLAB, Swift, Assembly
Tools: Unity, ROS 2, .NET Standard 2.0, Flutter, Android, iOS, Arduino, Android Studio, Simulink, MongoDB, Firebase, Xcode, Azure
Research and Engineering: Haptics, eye tracking, human-subject research, experimental design, statistical analysis, IRB experience, systems integration, networking, serial communication, protocol engineering