

ANDREW RUKANGU

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EDUCATION

Ph.D., Electrical & Computer Engineering · University of Georgia	July 2026
M.S., Engineering · University of Georgia	2017
B.Sc., Mechatronic Engineering · JKUAT, Kenya	2013
Certificate, Embedded Systems Design · UT Austin (Online)	2015

TECHNICAL SKILLS

- **AI / ML:** Local LLM deployment (vLLM, Ollama), multimodal reasoning, speech I/O, image and 3D generation, and qualitative data pipelines (prompt engineering, few-shot prompting, ensemble voting, thematic and binary coding, inter-rater reliability)
- **Languages:** C#, Python, C, SQL, R, MATLAB, HTML/CSS/JS, Shell, LaTeX
- **Platforms & Frameworks:** Unity 3D, Meta Quest SDK, OpenXR, ROS, Flask/SocketIO, FastAPI, WebRTC, Nginx, Git, Linux, Android, HPC (Slurm), CI/CD (GitHub Actions), Oracle Cloud, Supabase/PostgreSQL
- **Hardware & Embedded:** PCB Design (KiCAD), ARM Cortex-M4/PIC Microcontrollers, RTOS, Analog Electronics, LabVIEW RT CDAQ, Oscilloscopes, Logic Analyzers
- **Research methods:** HCI/UX, A/B Usability Testing, Within-Subjects Experimental Design, Mixed-Methods, Network Proxemics, Qualitative Thematic Coding

AI SYSTEMS

- **Local LLM Ensemble for Qualitative Analysis:** Designed and deployed a distributed vLLM inference pipeline (6 locally hosted models, up to 671B params) on a multi-GPU HPC cluster to code 3,932 qualitative data points. Engineered the end-to-end analysis workflow - data cleaning, paraphrase normalization, few-shot prompt engineering, binary and thematic coding, and confidence-weighted ensemble voting with automatic model selection - reaching 0.76 inter-rater reliability against human coders.
- **On-Device Multimodal AI Pipeline (Drawn Together):** Involved in building a multimodal AI backend spanning 3 local Linux machines: speech- and text-to-3D model generation (Flux, Trellis), text-to-speech (Kokoro), speech-to-text (Whisper), image+prompt multimodal reasoning (Gemma 3), and a Stockfish chess agent - each served as a FastAPI microservice and exposed to remote MR clients over FRP reverse tunnels for low-latency, zero-cloud inference in the field.

ENGINEERING EXPERIENCE

XR Systems Engineer · Virtual Experiences Lab · University of Georgia

2017 - Present

- **MR Robot Simulator:** Built a networked MR robot-programming simulator (Unity, Meta Quest 3, analytical IK solver) with a physics-enabled desktop counterpart from a shared codebase. Shipped to Meta App Store. User evaluation (N=22): NPS +86 with 0% detractors, 84% normalized learning gain.
- **Multi-User MR Platform (Drawn Together):** Involved in engineering a collocated MR platform supporting over 12 simultaneous users with room-scale spatial alignment, dynamic occlusion via Quest 3 Depth API, and real-time scene synchronization via custom networking server. Maintained 72fps across hour-long sessions. Deployed to 3 field sites without internet connectivity.
- **XR Orchestration Platform:** Architected a full-stack platform (Flask, SocketIO, nginx, WebRTC SFU) with real-time multi-headset video streaming, dynamic GLTF asset delivery, and remote environment configuration. Supports concurrent management of 12+ headsets across multiple XR applications.
- **Custom VR Peripheral:** Designed and fabricated a Bluetooth-connected walking stick with strain gauge instrumentation for floor interaction in VR. Published at ACM SUI 2019.
- **Remote VR Deployment (Military Families):** Shipped VR headsets to 22 households; authored installation guides and provided live remote support, enabling non-technical users to independently operate the system.
- **IEEE VR 2020 Conference Operations:** Part of team running back-end video production (Zoom/Twitch/YouTube/OBS) and coordinated sessions for the first major conference to go fully online due to COVID-19 (2000+ attendees, 5 days).

Full-Stack Developer

2024 - Present

- Architected a decoupled web application (Astro frontend, FastAPI backend, PostgreSQL via Supabase) deployed on Oracle Cloud VPS behind Nginx reverse proxy. Built CI/CD pipeline via GitHub Actions with automated syntax testing, Conda dependency management, and zero-downtime deploys. Secured with Cloudflare edge routing, strict CORS policies, and systemd process management.

Edge XR Deployment Engineer · Georgia AI in Manufacturing · UGA

2023 - Present

- Designed an edge-computing XR stack (Raspberry Pi, local WiFi, offline-capable Quest 3) for zero-connectivity environments. Scaled to 5+ client sites and 4,800+ end-user sessions. Authored end-to-end AR deployment documentation for Meta Quest.

Instrumentation Engineer · Biomembranes Lab · University of Georgia

2015 - 2017

- Built a MATLAB image processing pipeline with gradient-based sphere tracking for automated characterization of microscopic vesicles. Implemented a LabVIEW RT CDAQ system for real-time harmonic cancellation in microscopic membrane currents.

SELECT PUBLICATIONS

12 publications, 162 citations. Full list: [Google Scholar](https://scholar.google.com/citations?user=andrewrukangu)

1. Rukangu A. et al. "MR vs. Desktop for Robot Programming." Under review, ISMAR 2026.
2. Rukangu A. et al. "Multimodal Representations of Creative Processes in Collaborative MR." Under review, Elsevier CHB.
3. Rukangu A. et al. "Drawn Together: Collocated MR Sketching." IEEE VR 2025.
4. Rukangu A. et al. "VR For Robot Control in Undergrad Engineering." ASEE 2023. [Best Paper](#).
5. Rukangu A. et al. "Virtual Family Room: bridging the long distance with VR." I/ITSEC 2020. [Best Paper](#).

AWARDS

Dean's Engineering Education Fellowship · Best Paper, I/ITSEC (2020) · Best Paper, ASEE (2023) · Best Poster, UGA ECE Expo (2023) · Outstanding TA Award (2024) · 2 XR Apps on Meta App Store