



Rio Harper

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Featured Project

CINEWAVE: A 6-DoF Robotic Cinema Arm · Honors Capstone (Jan. 2026 – Present)

DIY from scratch Sub-\$2,500, 1m-reach cinema robot for indie filmmakers, proving that professional motion control can be democratized outside \$40K/day rentals with full cinema capabilities. Read more @ rioharper.com/cinewave

- **Mechanical:** Capstan differential wrist on harmonic-drive shoulder and elbow; 100+ SOLIDWORKS parts; 6 BLDC motors with absolute encoders; pultruded carbon-fiber 500mm arm links; PA6-CF 3D-printed housings
- **Electrical:** Moteus controllers over CAN-FD on Raspberry Pi 5 with <2ms round-trip latency; 1500W PSU
- **Controls:** PID tuning with gravity feedforward compensation; Xbox controller teleoperation.
- **Software:** Python Keyframe editor with bridge to motor controllers; MediaPipe interactive segmentation for live-video subject tracking; Unreal Engine 5 digital twin with Control Rig IK driving the arm in real time.

Experience

Human Robot Interaction Engineer & Researcher (Dec. 2023 - Present)

Designed and built a 3D-printed humanoid with 30+ servos, computer vision, and Raspberry Pi control; deployed in studies with 250+ participants Co-authored a published paper on teleoperated robotic arms and operator embodiment (HICSS 2025) • Second paper in writing • Validated the TARX scale for measuring affective robot-operator relationships.

MITACS Fulbright Canada Researcher @ University of Alberta (May 2025 – Aug 2025)

Selected for the MITACS Globalink research fellowship • Designed an upper-limb stroke rehabilitation robot with 100+ custom SOLIDWORKS parts • Authored an 80-page technical report on the robot's mechanical design, kinematic analysis, and therapy integration — used as the handoff document for continued work

Independent AI Engineer (June 2020 - Present)

Author and of VocalForge, an open-source voice-dataset curation and cleaning tool (Python, PyTorch) with 130+ stars
Babylon.js 3D LLM app — web-based tool that generates Minecraft structures in real time from user text prompts.
Write tutorials and publish in depth AI-model deployment content for positive AI-human communication research

Awards & Recognition

BEA Best of Fest, 2026: Selected from 2,500+ entries
Presented by Roger Deakins, CBE, ASC, BSC.

MITACS Globalink Research Fellowship, 2025.

Renée Crown University Honors Program, 2022–2026.

Education

Syracuse University (Spring 2026)

Major: Bachelor of Science 3.95 GPA

S.I. Newhouse School of Public Communications

Visual Communications, cinematography focus

Minor: Computer Science

Skills

Mechatronics & Hardware: Moteus CAN-FD, Harmonic Drives, Capstan Drives, BLDC, Stepper Motors, 3D printing

Raspberry Pi, Jetson Family, Embedded Systems, PID Tuning

CAD & Simulation: SOLIDWORKS, Fusion 360, Blender

Unreal Engine 5 (Digital Twins, Control Rig, Live Link

Sequencer), Babylon.JS & Three.JS

Software: Python, C++, C#, JavaScript, React, WebSocket

Computer Vision: OpenCV, MediaPipe (segmentation

models, head/arm tracking), live-video pipelines Nvidia

Omniverse Tracking Models & Creating Synthetic Data

Creative: Cinematography, Premiere Pro, DaVinci Resolve