

HYBRID ARCHITECTURE & KINEMATICS

PROJECT DESIGNATION: SPLIT-BRAIN // DEPLOYMENT: NATIONAL FRIGHT CENTER, JAMESTOWN

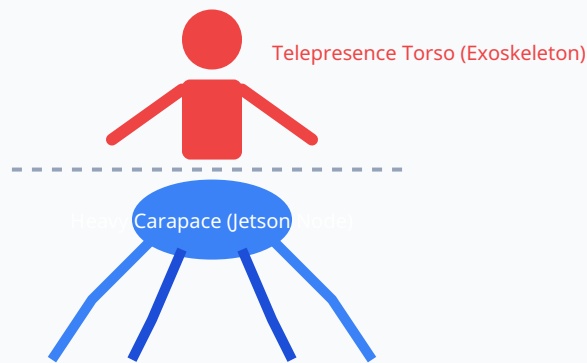
This technical blueprint details the end-to-end production pipeline for hyper-realistic, multi-legged animatronic creatures. By completely decoupling the autonomous lower-body locomotion from the human-driven upper-body performance, the unit achieves fluid, genuinely terrifying movement. Site adaptation, logistics, and facility integration within the historic Arcade Building will be managed alongside Daryl and the local engineering teams.

1. THE MECHANICAL CORE (ACTUATION & CHASSIS)

The foundation demands high-torque, compliant articulation capable of supporting significant dynamic loads without snapping or locking.

- **Continuous 360-Degree Actuation:** Secondary limbs and highly unnatural joints utilize **DYNAMIXEL PM42-010-S260-R** industrial smart actuators. These provide contactless absolute encoders for infinite 360-degree rotation with exact positional feedback, enabling deeply unsettling, non-Euclidean movements.
- **Primary Load-Bearing Joints:** Knee and hinge points utilize high-torque smart serial bus servos, daisy-chained to reduce wire clutter while feeding real-time load and temperature data back to the central compute module.
- **Rapid Prototyping (Leg Architecture):** Before machining final aluminum or titanium struts, the leg kinematics are mocked up using schedule-40 PVC pipe cut to length. Custom **PETG 3D-printed adapter sleeves** are engineered to slot over the actuator horns and friction-fit directly inside the PVC, allowing instantaneous field adjustments to leg span and clearance.
- **The Carapace Anchor:** All lithium-ion battery arrays, primary power distribution, and edge computing nodes are housed entirely within the heavy lower carapace, locking the center of gravity below the medial axis to prevent the human-mapped torso from tipping the chassis during violent lunges.

Structural Blueprint: Split-Brain Architecture



2. DIGITAL TWIN & EDGE COMPUTING

The unit does not run on pre-programmed loops; it evaluates its environment autonomously. To achieve this, the entire physical build is translated into a 1:1 digital twin.

- **NVIDIA Isaac Sim Integration:** The CAD model is imported into NVIDIA Omniverse. Utilizing reinforcement learning, the AI evolves its own gait logic, prioritizing balance and terrain navigation over millions of virtual iterations. We integrate advanced structural simulation protocols and large-scale interactive environment frameworks to ensure perfect real-time equilibrium before physical assembly begins.
- **On-Board AI Processing:** The autonomous logic is deployed locally on the rig. Primary processing is handled by an onboard **NVIDIA Jetson Orin Nano Super Developer Kit** (or the **AGX Orin 64GB** for multi-camera sensor arrays), allowing the base to compute complex gait dynamics and LiDAR parsing with zero network latency.

3. THE CONTROL ARCHITECTURE (NEURAL SPLIT)

The control mechanism physically separates the upper and lower halves to guarantee stability while maximizing expressive horror.

- **Subconscious Locomotion (Standalone AI):** The Jetson compute node handles all physics. When the operator inputs a forward vector, the AI autonomously calculates precisely how to cycle its 6-to-8 PVC/aluminum legs to achieve the movement without tipping.
- **Conscious Performance (Telepresence Exoskeleton):** The upper torso, head, and arms are driven by a human performer. To ensure 1:1 kinematic translation, the operator wears an adjustable mechanical exoskeleton paired with high-fidelity sensor gloves. This rig maps granular finger twitches, shoulder rotations, and rapid lunges directly to the creature's upper extremities.

- **Kinetic Blending:** If the human operator throws the animatronic's arms forward to strike, the lower-body AI instantly detects the extreme weight shift and fires the Dynamixel actuators to throw a leg backward, dynamically bracing the unit exactly like a living predator.

4. PRACTICAL FLESH: SKINNING THE NIGHTMARE

Concealing the robotics without restricting the 360-degree freedom requires masterful practical effects.

Creature Effects Collaboration: Glenn Hetrick & Alchemy FX Studios

This phase relies on the industry standard set by Primetime Emmy Award winner **Glenn Hetrick** (CEO, Alchemy FX Studios). His extensive background in dynamic prosthetic design ensures the skin behaves biologically. High-fidelity resin-printed anchor points are fused directly to the animatronic chassis. Multi-layered platinum silicone and foam latex musculature are bonded to these points. As the robotic joints articulate, the silicone physically stretches and glides over the sub-dermal anchors, avoiding unnatural wrinkling or mechanical pinching.

EXTERNAL REFERENCES & COMPONENT SOURCING

Alchemy FX Studios - Glenn Hetrick (Practical Flesh & Sub-dermal Anchoring)

<https://www.alchemyfxstudio.com/>

NVIDIA Jetson Orin & Isaac Sim (Edge Compute & Digital Twin)

<https://developer.nvidia.com/isaac-sim>

DYNAMIXEL Smart Actuators (360-Degree Joints)

<https://emanual.robotis.com/docs/en/dxl/>