AI-Driven MetaHuman Control: Project Overview

Executive Summary

We aim to replace Rokoko suit motion capture inputs with AI-driven models to control MetaHumans in Unreal Engine. This will reduce hardware dependency, lower costs, and enable scripted or autonomous behaviors for driving scenarios. The outcome: a flexible, scalable system that allows repeatable demonstrations and future expansion to complex actions.

Project Objectives

- Replace Rokoko inputs with AI-driven controls for MetaHuman in Unreal.

- Train modular models for specific movements: head look, brake/accelerate, hands on/off wheel, gear shifting.

- Ensure real-time performance (<2 ms latency per model).

- Enable both live responsiveness and repeatable scripted actions.

Roadmap & Milestones

- Phase 1 (2–3 weeks): Data capture and export pipeline from Rokoko → Unreal → dataset.

- Phase 2 (3–4 weeks): Train and deploy first models (Head Look + Brake/Accelerate).

- Phase 3 (4–5 weeks): Add hands on/off wheel and gear shifting models.

- Phase 4 (2 weeks): Integrate coordinator & blending inside Unreal.

- Phase 5: Deliver end-to-end demo with AI-driven driving actions (no Rokoko suit).

Risks & Mitigations

- Data quality inconsistency → Mitigation: controlled captures and clear labeling.

- Model latency risk → Mitigation: use lightweight GRU/TCN/MLP models, export to ONNX.

- Integration complexity with Unreal → Mitigation: start with HTTP/WebSocket commands before UDP streaming.

Success Criteria / KPIs

- AI models generate smooth, natural motions comparable to motion capture.

- Latency under 2 ms per model on CPU.

- Coordinator resolves conflicts and enforces priorities (e.g., brake overrides accelerate).

- MetaHuman performs basic driving actions (look, shift, brake, accelerate) autonomously.

Next Steps

- Capture clean datasets for each movement using Rokoko.

- Train the first GRU model for Head Look.

- Build Unreal Python script to integrate ONNX models with Control Rig.

- Provide weekly demos of incremental progress.