# Tron's Ultra-Realistic Game Character 3D Face Reconstruction Engine

using Monocular Depth Estimation and Hybrid CNN Deep Learning Architecture with Real-Time Post Skeletal Mesh Fusion

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Non-Fungible Token (TRC-721)   BTFS Decentralised Storage   Account Abstraction

Stage #1

Image Preprocessing Phase

Reconstruction using images set + depth map

Requires multi-angle capture and depth sensor

Modified pipeline only requires a single camera view selfie image without depth data

Coarse Screening (Computed during Acquisition)

Frame Selection

Image Quality Ranking
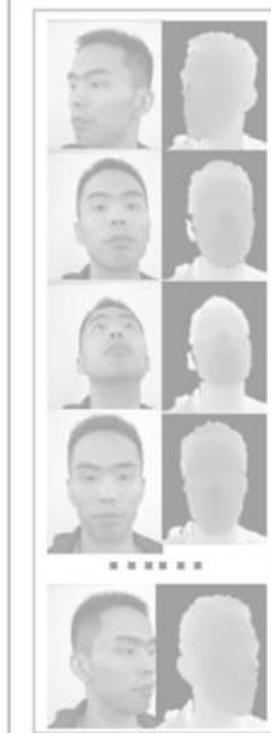
Real-Time Landmark Detection

Coarse Screening and Grouping
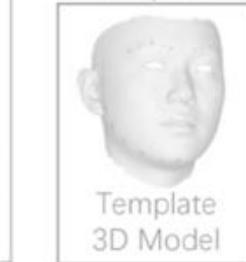
Reference

Template 3D Model

Front

Left

Right

Up

Rigidness Screening

Reference

Requires multi

Blend's Image Pre-Processing Pipeline Matlab Demo

| Input Image | Dynam ✎ ☰ ✋ ⊕ ⊖ ⌂ | Dynamic Color Correction | Remove Unnecessary Illumination |

Zoom In

Process

Stage #2

3D Face Reconstruction Pipeline

Processing other sample selfie images using Blend's face reconstruction pipeline
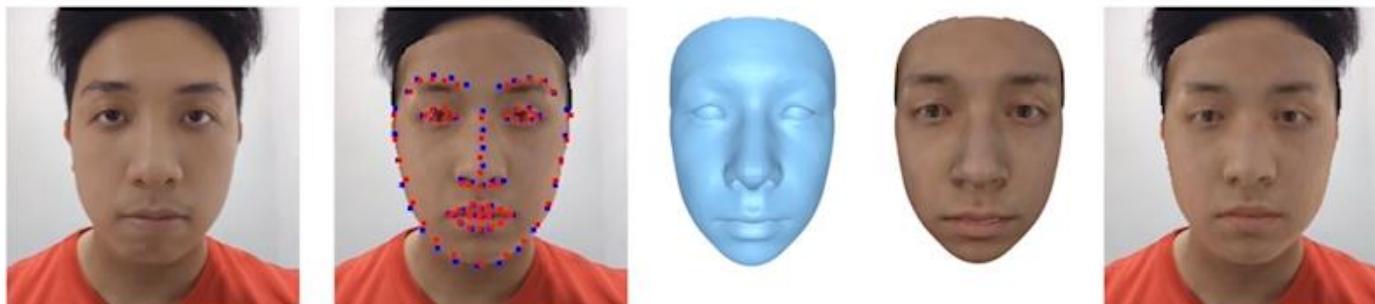
Sample 1
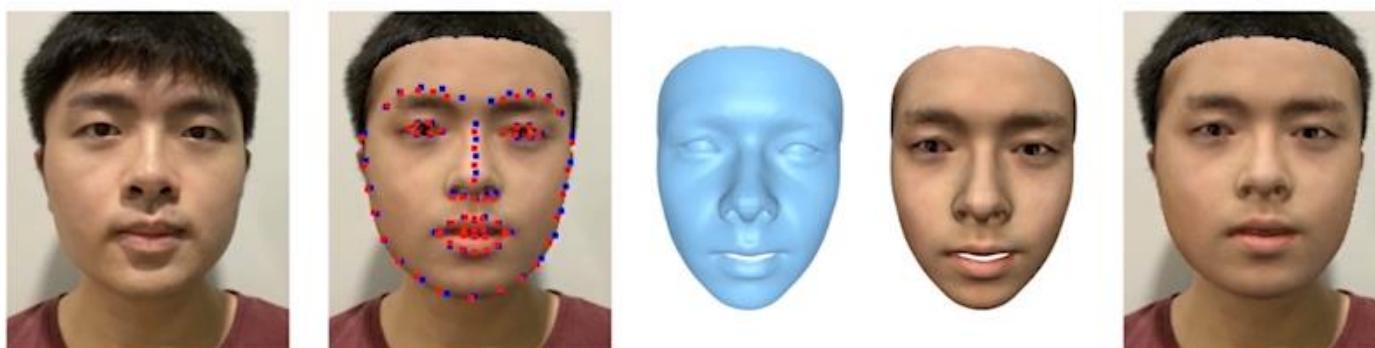
Sample 2
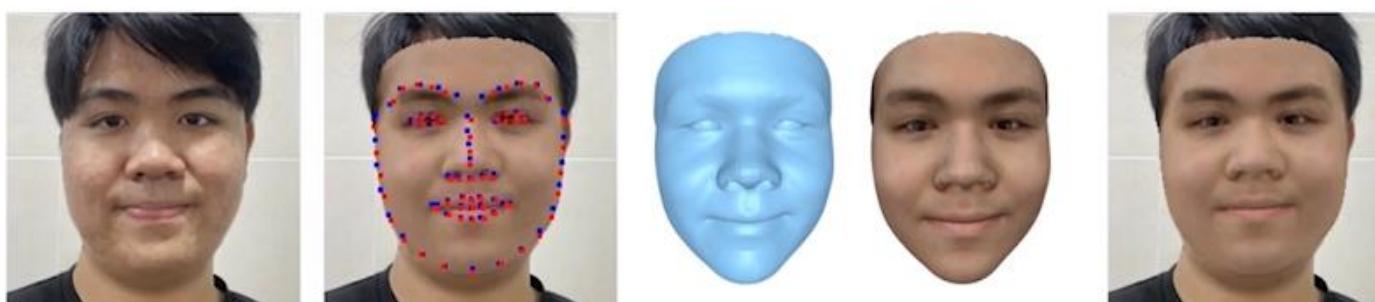
Sample 3

Modified single selfie image + depth info pipeline

extract → delight → unwrap

vs

Regional pyramid bases

A_{512} A_{2048} G_{2048}

×

x_{alb}

fit

Albedo refinement

Normal refinement
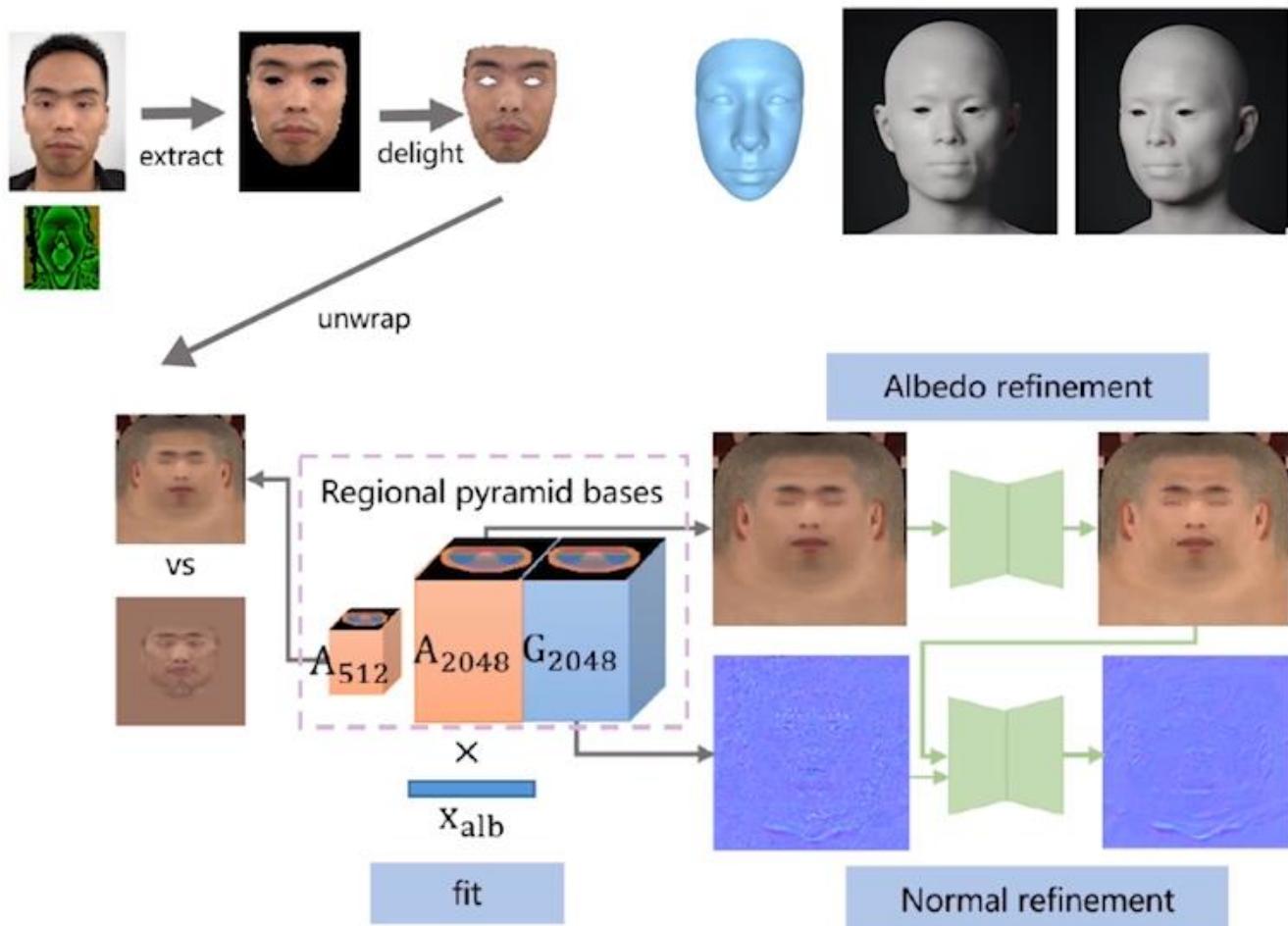
Output results with realistic texture map
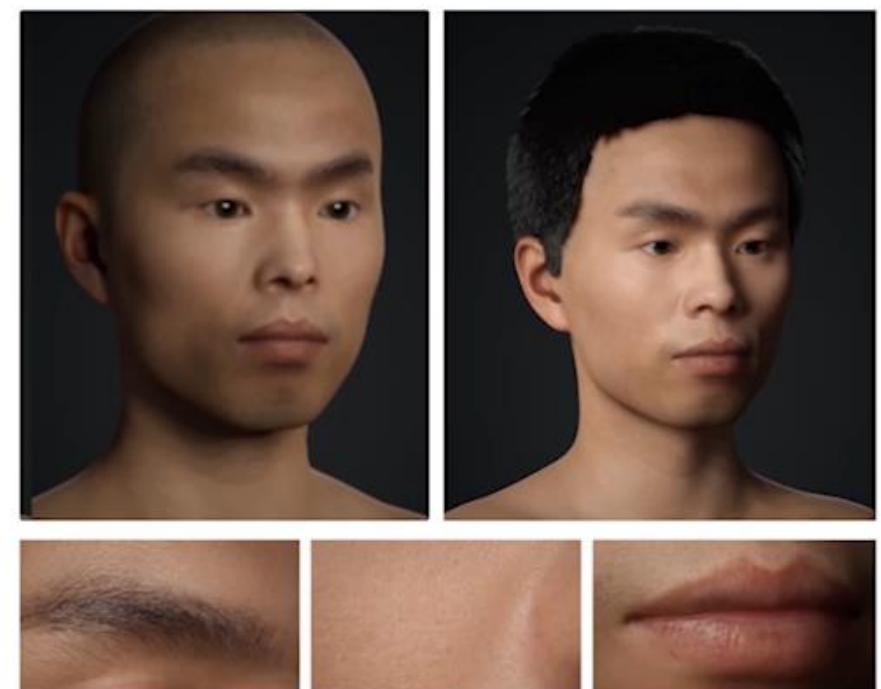
Stage #3

Post Skeletal Mesh Fusion

Compile   Diff   Find   Hide Unrelated   Class Settings   Class Defaults   Simulation   No debug object selected

Components

Add   Search

KwangPlayerCharacter (Self)
- Capsule Component (CollisionC
- CameraBoom
  - FollowCamera
- Mesh (CharacterMesh0)   Edit
  - HitCollision
  - StaticMeshFace2
- Arrow Component (Arrow)   Ed
- Character Movement (CharMov

Viewport   Construction Sc...   Event Graph

Perspective   Lit   5   10°   10   0.5

My Blueprint

Add   Search

APHS   ⊕
EventGraph
NCTIONS (35 OVEF   ⊕
ConstructionScript
TakeDamage
ACROS   ⊕

seLookUpRate — Float
veAttack — Boolean

PAGE ⌄   CLEAR

Details

Search

▼ Transform
▼ Mesh
   Location   0.0   0.000856   -97.0
   Rotation   0.0°   0.0°   270.0°
   Scale   1.0   1.0   1.0
▼ CapsuleComponent
   Scale   1.0   1.0   1.0
   Mobility   Static   Stationar   Movable

▼ Animation
   Animation Mode   Use Animation Blueprint ⌄
   Anim Class   None
   Disable Post Process...

▶ Advanced

▼ Mesh
   Skeletal Mesh Asset   KwangAlbino
   Skin Cache Usage   0 Array elements

▼ Actor Tick
   Start with Tick Enabled   ☑
   Tick Interval (secs)   0.0
   Allow Tick Before Beg...   ☐

▶ Advanced
▼ Default

Blend's UE built-in automated post skeletal mesh fusion

High-level system design overview when running Blend on-cloud
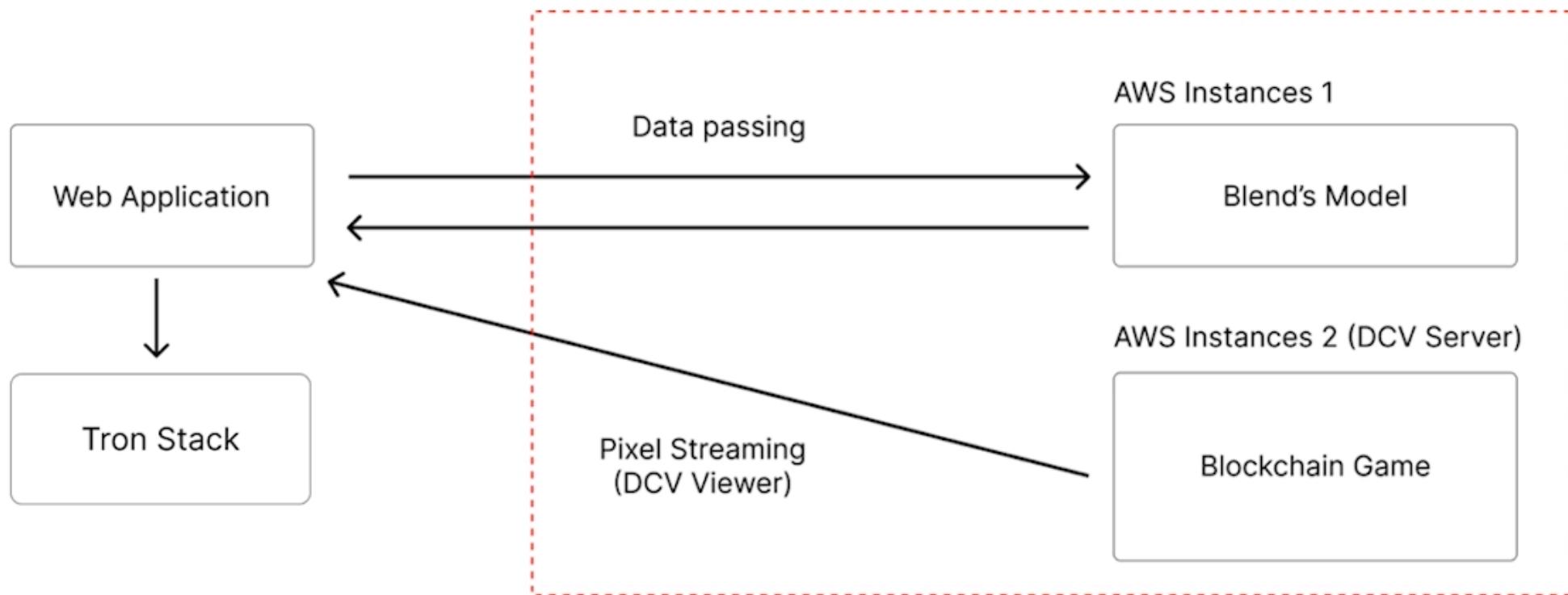
How to utilize Blend with Tron blockchain technology?

Blend's NFT Passport (TRC-721)

Blend's NFT Passport

Interoperability between different Tron blockchain games

In sample game 1

In sample game 2
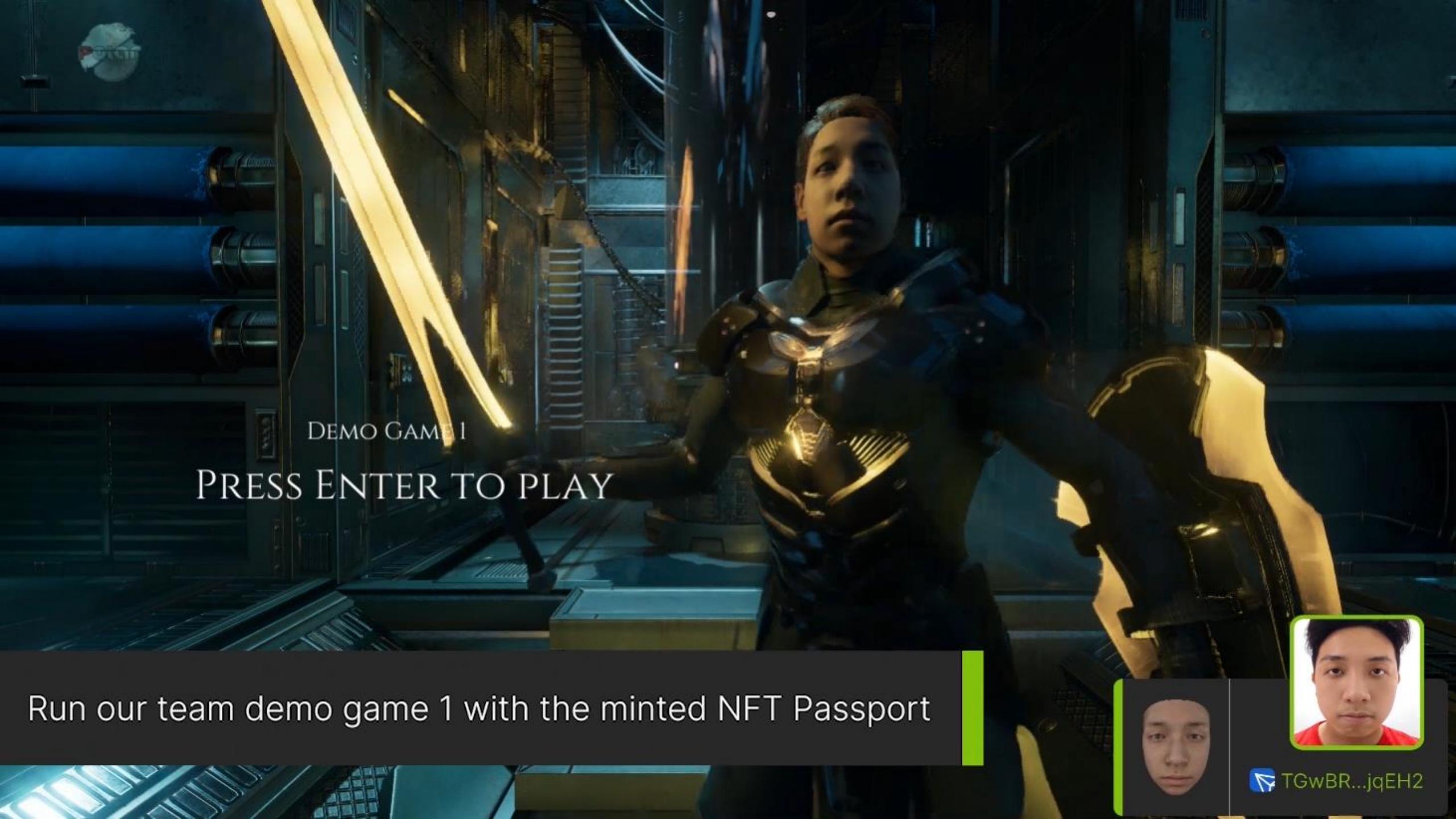
DEMO GAME 1

PRESS ENTER TO PLAY

Run our team demo game 1 with the minted NFT Passport

TGwBR...jqEH2
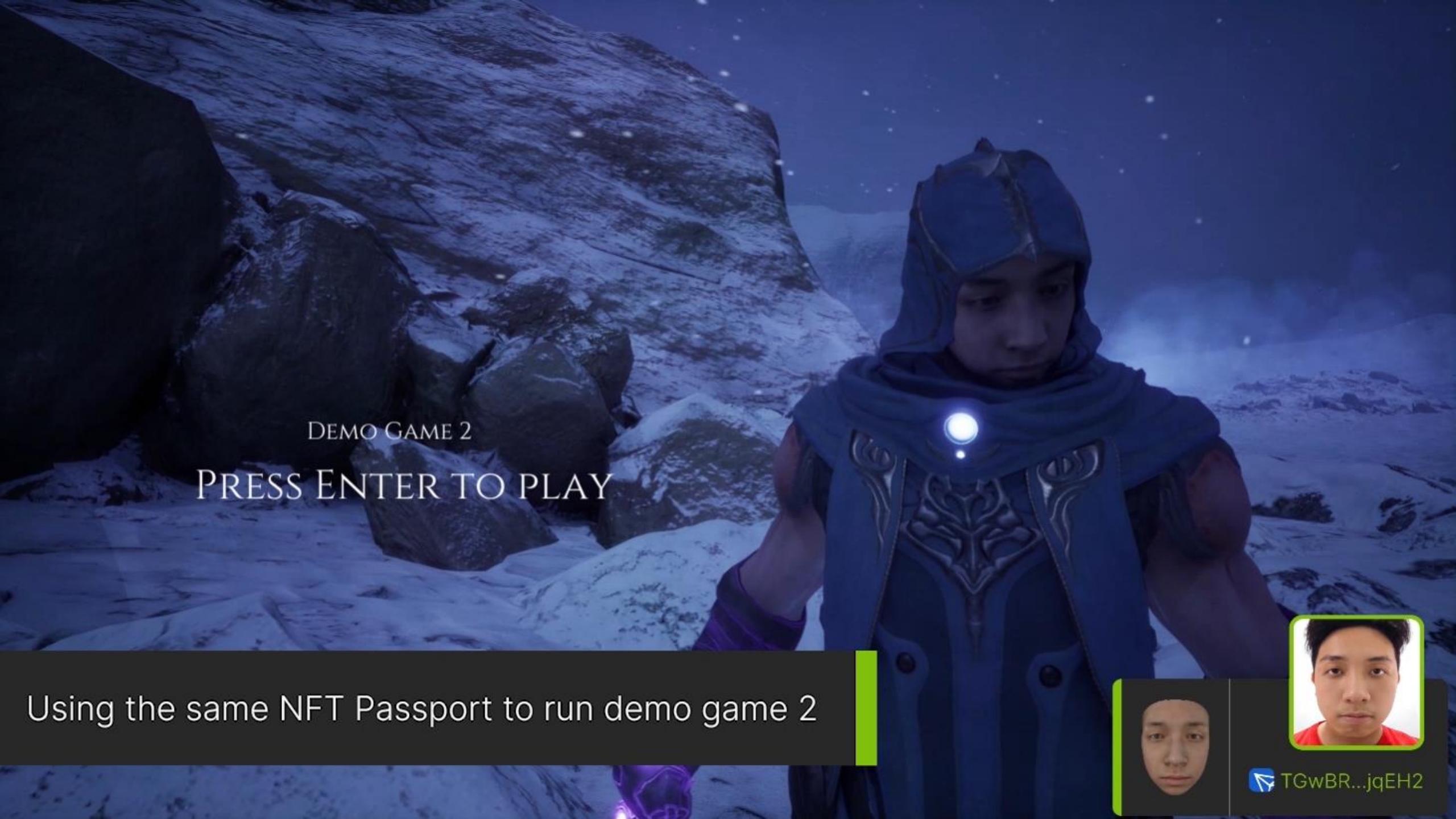
DEMO GAME 2

PRESS ENTER TO PLAY

Using the same NFT Passport to run demo game 2

TGwBR...jqEH2

Our current research & development progress

Single image preprocessing pipeline via depth estimation

Ultra-realistic 3D face mesh reconstruction via deep learning

Post-skeletal mesh fusion automation pipeline on UE

Tron stack integrations & TRC-721 passport concept

Milestone #1

Complete Head Generation

Using HiFi3DFace Algorithm

Milestone #1

Complete Head Generation

Using HiFi3DFace Algorithm

Current Progress   A. Upper Scalp Section   B. Side Face Section   C. The Junction

Milestone #2

Top Scalp Section
Hair Reconstruction

Using Neural Haircut

Milestone #2

Top Scalp Section
Hair Reconstruction

Using Neural Haircut

Facial Expression and Speech Synchronization

Combine with the user's reconstructed face

Facial Expressions

Speech and Lip Sync

Teersa: You by choice, and she, well...

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not a platform, but a toolbox that introduces innovative **AI technology** that

integrates with **Tron blockchain technology**, to help developers build a

more immersive gaming and metaverse experience in the Tron ecosystem.

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A project developed in

Tron Grand Hackathon 2023: Season 5