KARA

Newsletter – Issue 012

Welcome to the KARA newsletter. These newsletters will keep you informed about the research and development that the KARA project team are undertaking.

The project goal is to examine the potential of Gen AI in game development through applied R&D.

Contents

This newsletter explores how AI-infused technology can assist in creating animations for 3D characters. We will explore the process of generating lip-sync animation using GAI, specifically Nvidia's Audio2Face technology, which can be utilised as blend shape facial animation for 3D models.

Our character artist had to step out of his comfort zone and try to supervise the AI animation tools to create the character animation.
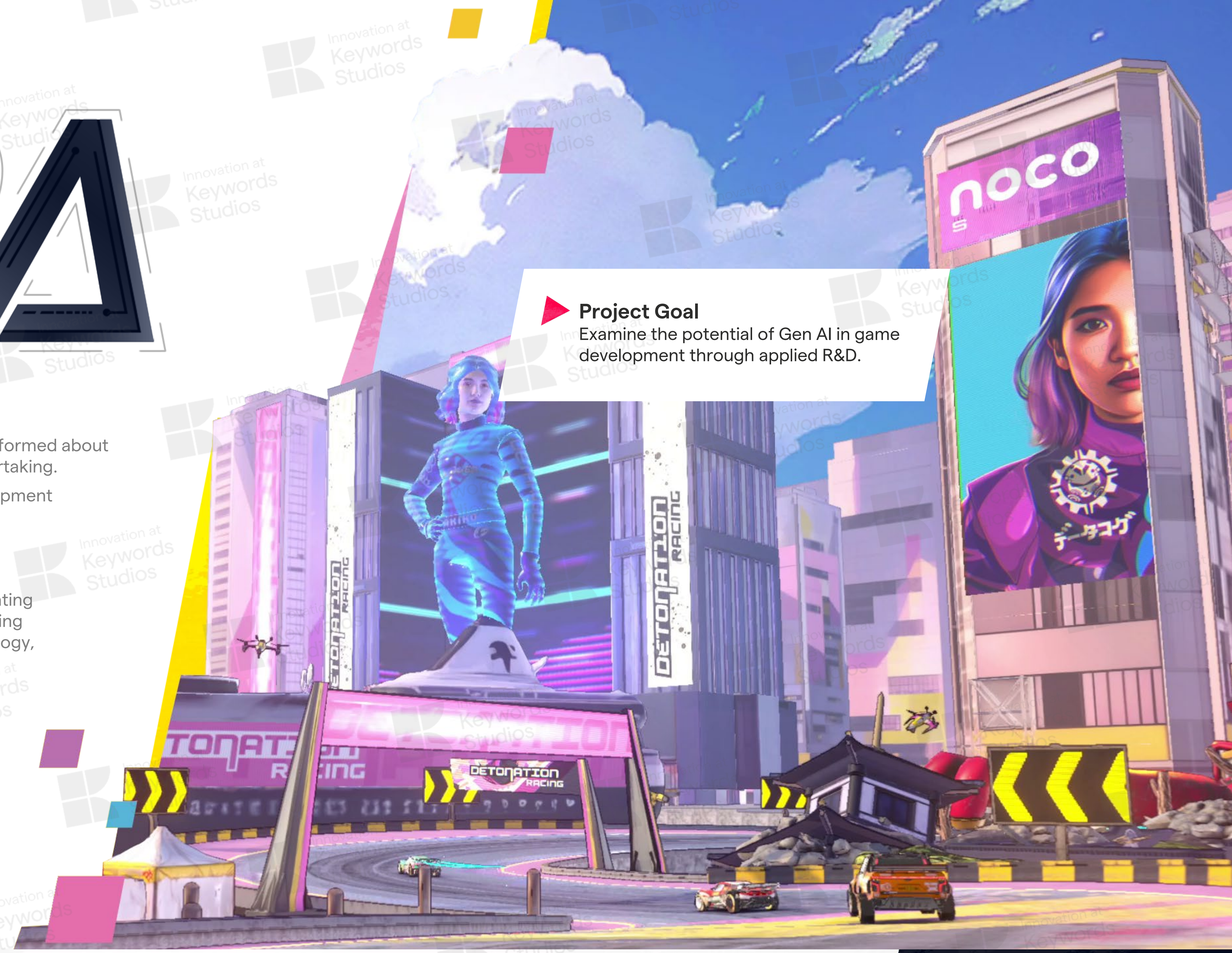
Content list:
Creating GAI assisted facial and lip-sync animation

IMPORTANT: Inclusion of tools in this newsletter does not imply their clearance for use.

▶ **Project Goal**
Examine the potential of Gen AI in game development through applied R&D.

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What is KARA?

In 2023, Project AVA took on the challenge of utilising Generative AI tools to assist in the design and development of a videogame from scratch. This applied R&D approach gave us the best insights into the true potential of AI for video game development.

The AVA team went to GDC in 2024 to report on their findings (watch the video).

KARA is the continuation of this effort. Using Electric Square's *Detonation Racing* as a case study, the team's plan is to remaster the game using pipelines infused with Generative AI tools.

The goal of KARA is to further enhance our expertise in Generative AI for game development. This includes a focus on how GAI tools can boost 3D art pipelines.

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Creating **GAI assisted** facial and lip-sync animation

Introduction

This issue explores the integration of AI into our 3D facial and lip-sync animation. We investigate how Audio2Face lip-sync helps us to speed up rigging and facial animation creation. We'll look at how it allows animators to achieve realistic expressions and accurate mouth movements that match spoken dialogue, without the manual rigging, a complex bone system or a blend shapes setup.

Our team lacked a dedicated animator, so our 3D character artist needed to step out of his comfort zone and take on the responsibility of supervising the AI infused facial animation tools to achieve the expressive results we needed.

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PIPELINE SPOTLIGHT

Creating GAI assisted
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STANDARD PIPELINE

AI INFUSED PIPELINE

In our approach to character animation for Detonation Racing, we will first examine a standard pipeline of lip-sync and facial animation. Understanding traditional workflows helps with effective comparison and informed decision-making when implementing a GAI pipeline.

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PIPELINE SPOTLIGHT

Creating GAI assisted facial and lip-sync animation

1   3D Modelling

3D modellers create character face and body meshes using software like Blender, Maya, or ZBrush. It is crucial to ensure appropriate topology flow and sufficient polygon count, especially in areas of movement, to produce high-quality animations.

2   Facial Rigging

To animate the face, a specialised rig is created using a skeleton system of bones, joints, or control points. This facial rig allows a precise control over facial movements. The rig is then applied to the mesh model through a process called skinning, enabling the face to be animated effectively.

3   Blend shapes (Morph Targets)

For more complex facial expressions, artists use blend shapes (also known as morph targets). These are predefined facial expressions such as smiling, frowning, or raising an eyebrow that can be blended to create more nuanced expressions.

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Voice Recording

Prior to creating lip-sync animation, voice acting will need to be recorded. The dialogue, script, or sounds that the character will "say" must be recorded by a voice actor.

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Animating

Animators traditionally use 3D rigs to animate characters' facial features, setting keyframes to match audio and emotions. They fine-tune in-between frames, such as creating a smile for a happy line. This process involves blend shapes or manual animation techniques, requiring significant time and skill. For instance, animating a character saying "hello" involves setting keyframes for each key moment and adjusting facial expressions accordingly.

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PIPELINE SPOTLIGHT

Creating GAI-assisted facial and lip-sync animation

NVIDIA Audio2Face

STANDARD PIPELINE

AI INFUSED PIPELINE

NVIDIA Audio2Face is an AI-powered tool that uses deep learning to generate lifelike facial animations directly from an audio clip. It allows users to create realistic facial expressions and lip-syncing based on speech, without needing to manually animate the face.

The technology works by analysing the audio, detecting emotions, and mapping those to corresponding facial movements, providing a quick and easy way to bring virtual characters to life with realistic facial performances.

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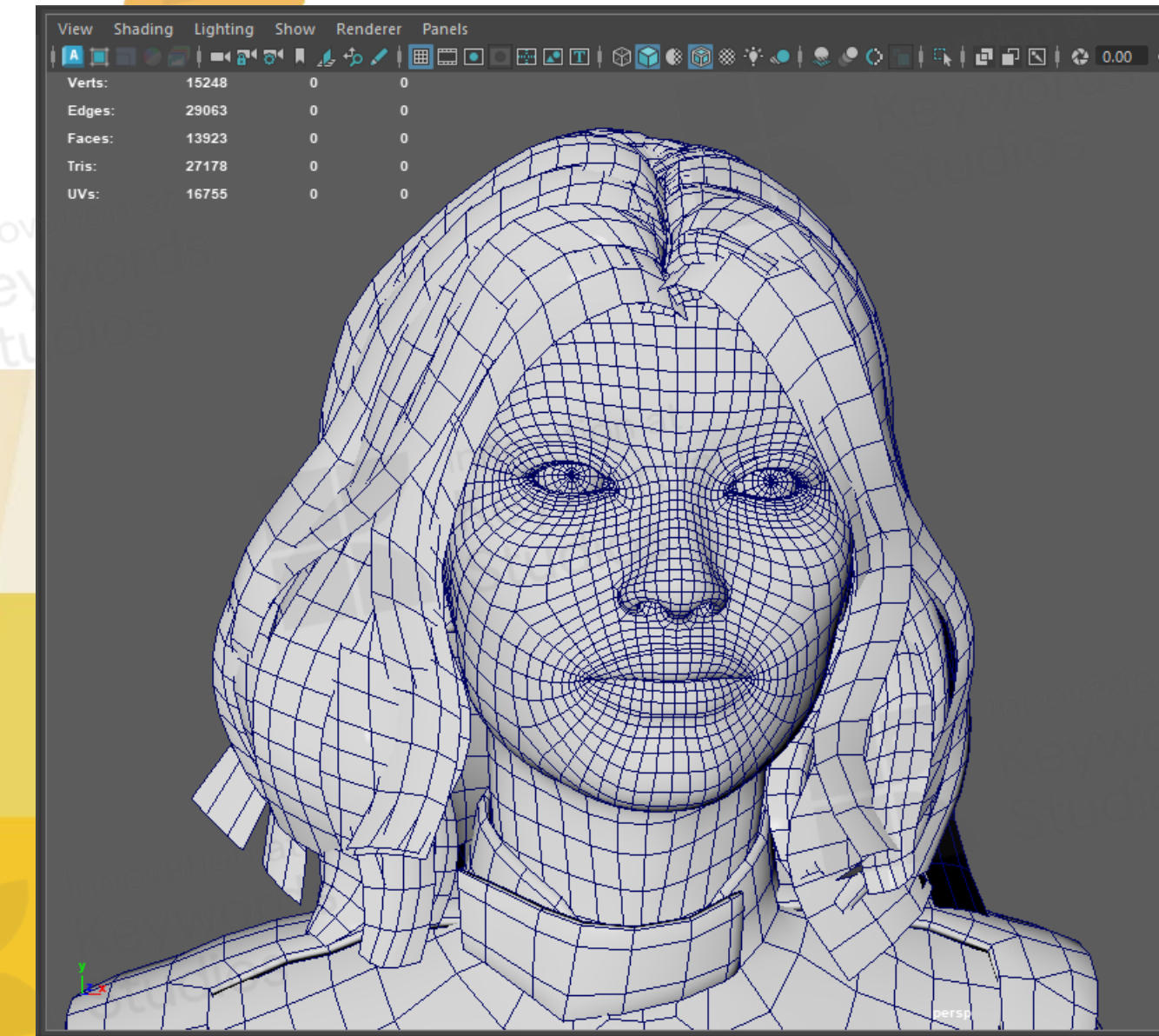
Tool used:

NVIDIA Audio2Face

AI infused pipeline

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Preparing the 3D Character model

Animators verify that the 3D model meets all requirements before export. The mesh must have clean, animation-friendly topology, with sufficient edge loops around key facial features to support expressive movement.

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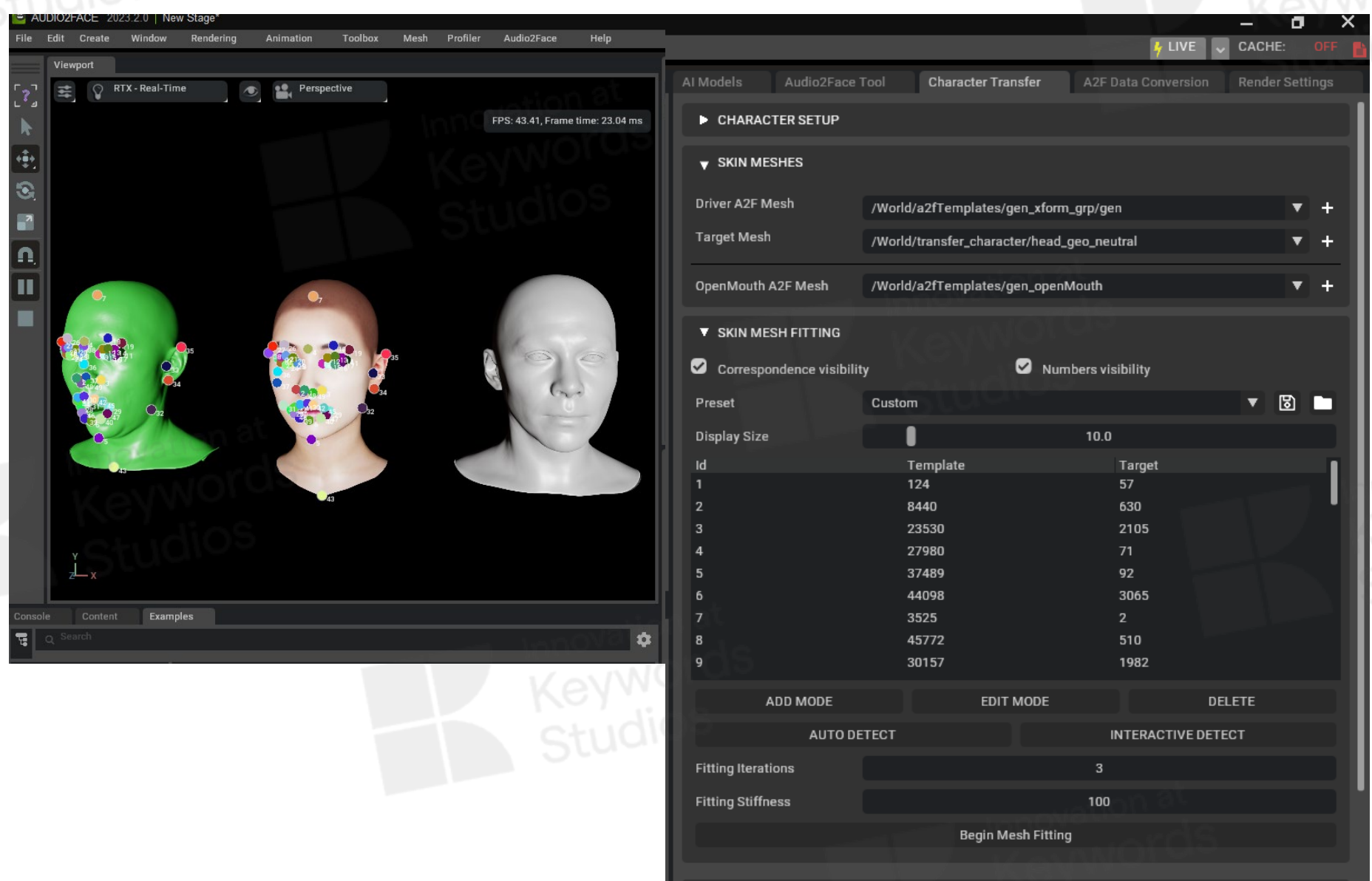### Assigning the meshes in Audio2Face character setup

The imported model is then split into key mesh groups for proper assignment in the character setup tab – E.g. Separating the upper and lower teeth, and assigning the left and right eyes individually.
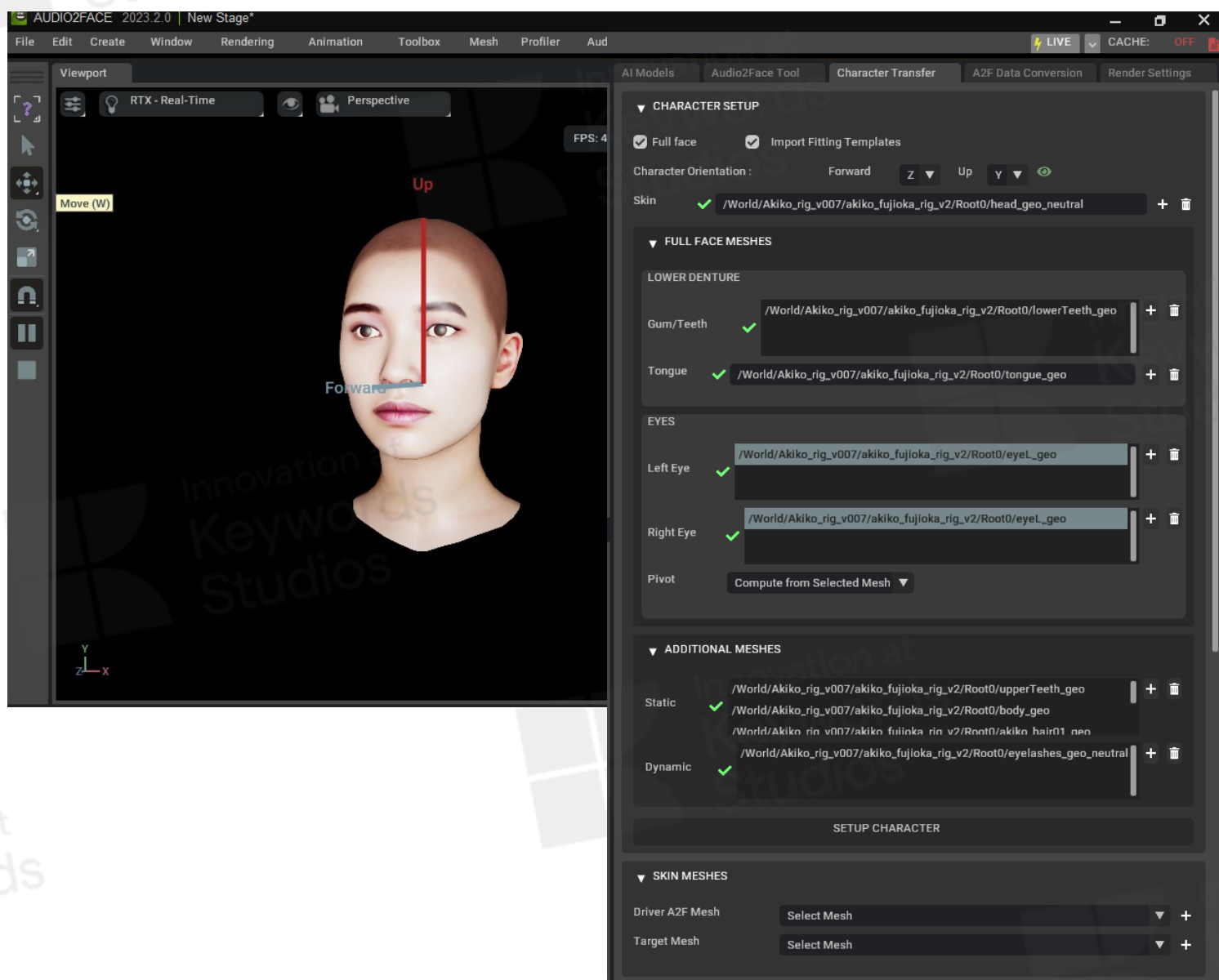
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Fitting the character's head with Audio2Face character template

Once setup is complete, Audio2Face generates a template head that closely matches your model. Animators map key points between the open-mouth reference and their own model for mesh fitting. Post-wrap is then completed, followed by final adjustments to the jaw, tongue, and dynamic elements like the eyelashes.

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Generating blend shape solve

Before generating the AI animation from the audio clip, it's important to create blend shape solve meshes. These will be used to transfer the AI animation into usable blend shape animation in third-party 3D software.
To expedite this process, templates provided by Audio2Face can be utilised.
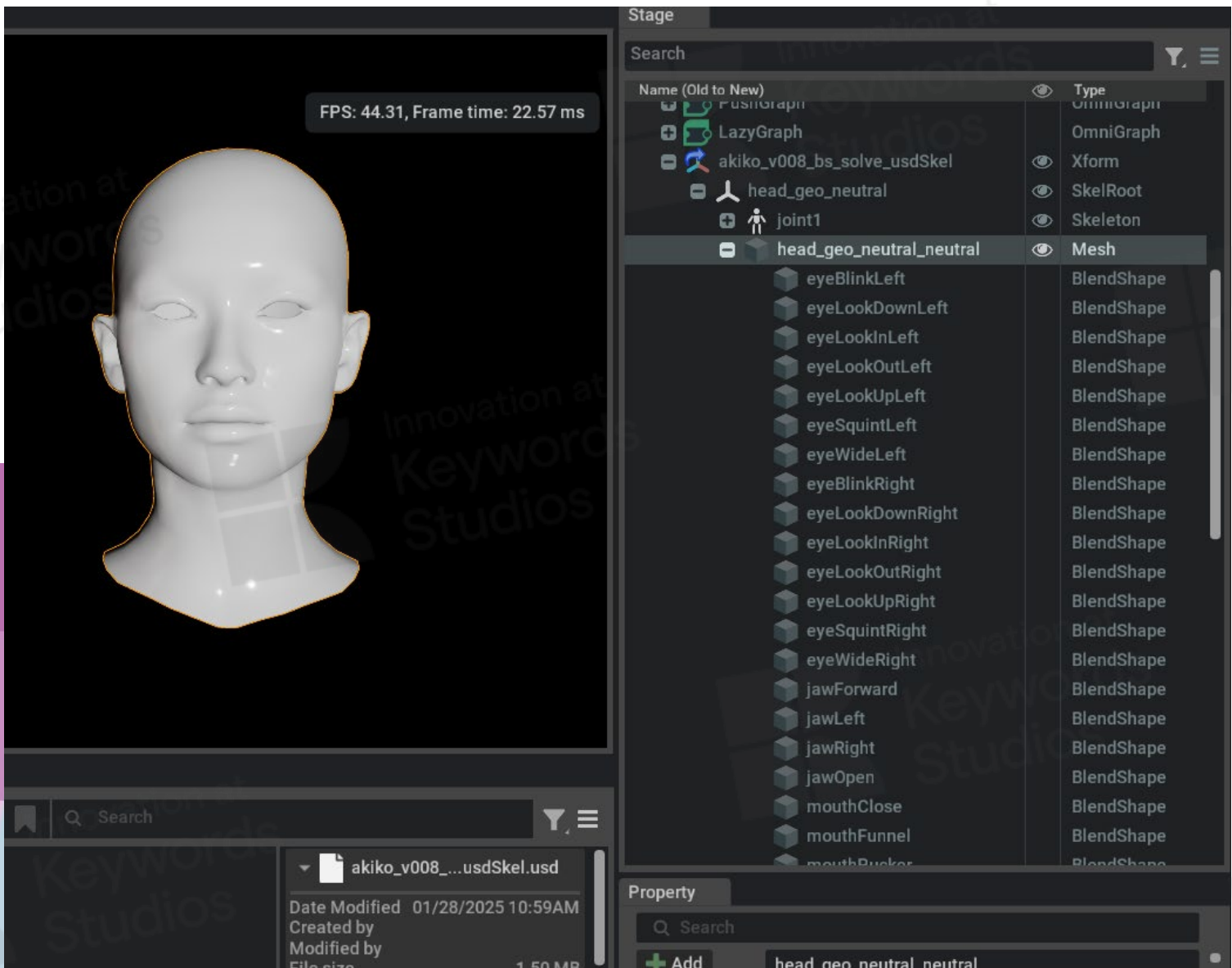
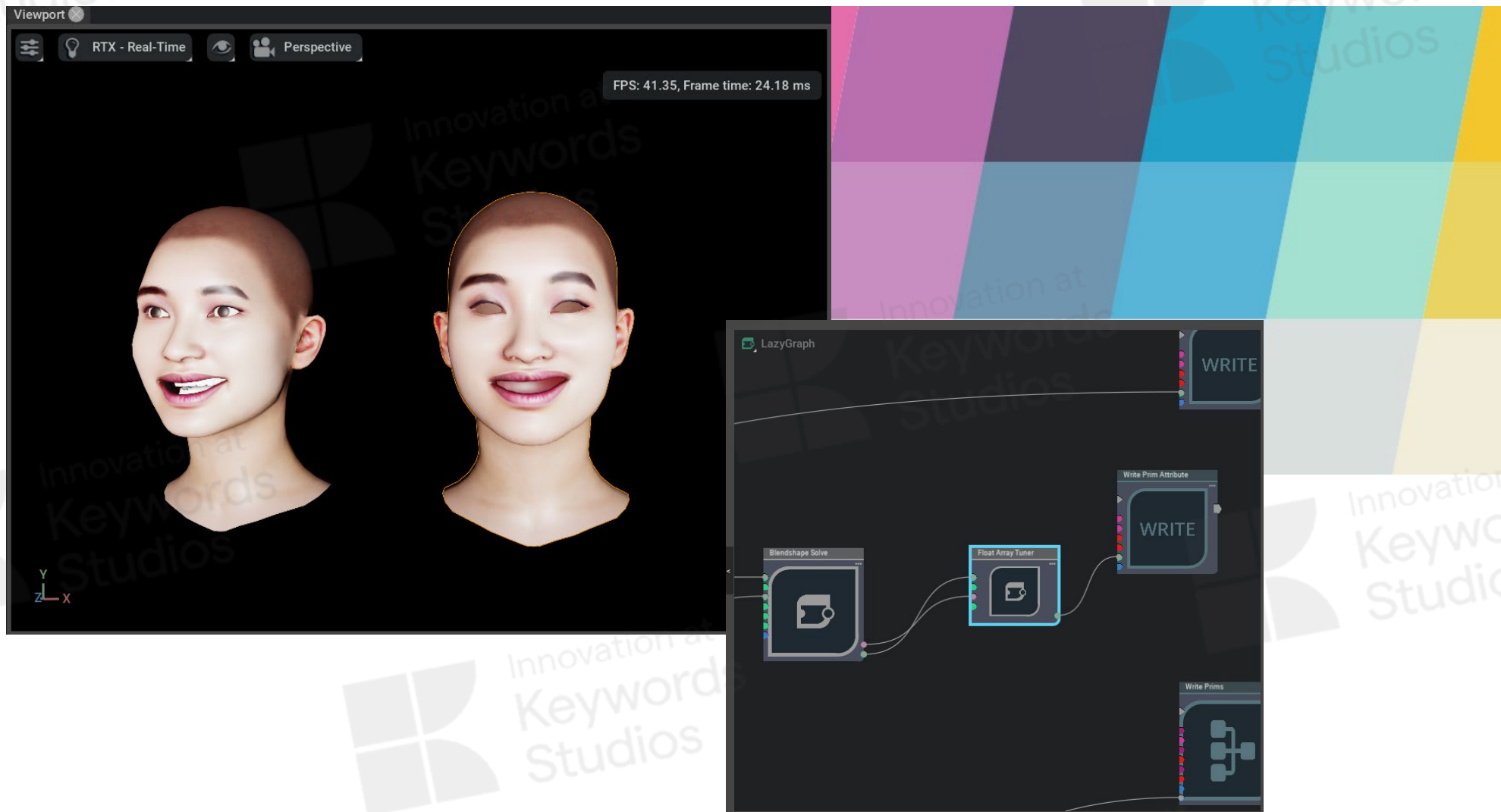### 5 /7

Activating the Audio2Face pipeline

To navigate Audio2Face's pipelines, animators will select the closed-mouth template, then configure the voice lines directory to point to the appropriate folders before selecting the desired voice line.
The voice line animation can be enhanced through parameter adjustments or by utilising Audio2Face's automatic emotion detection system, which generates emotion keyframes based on vocal intonation patterns.
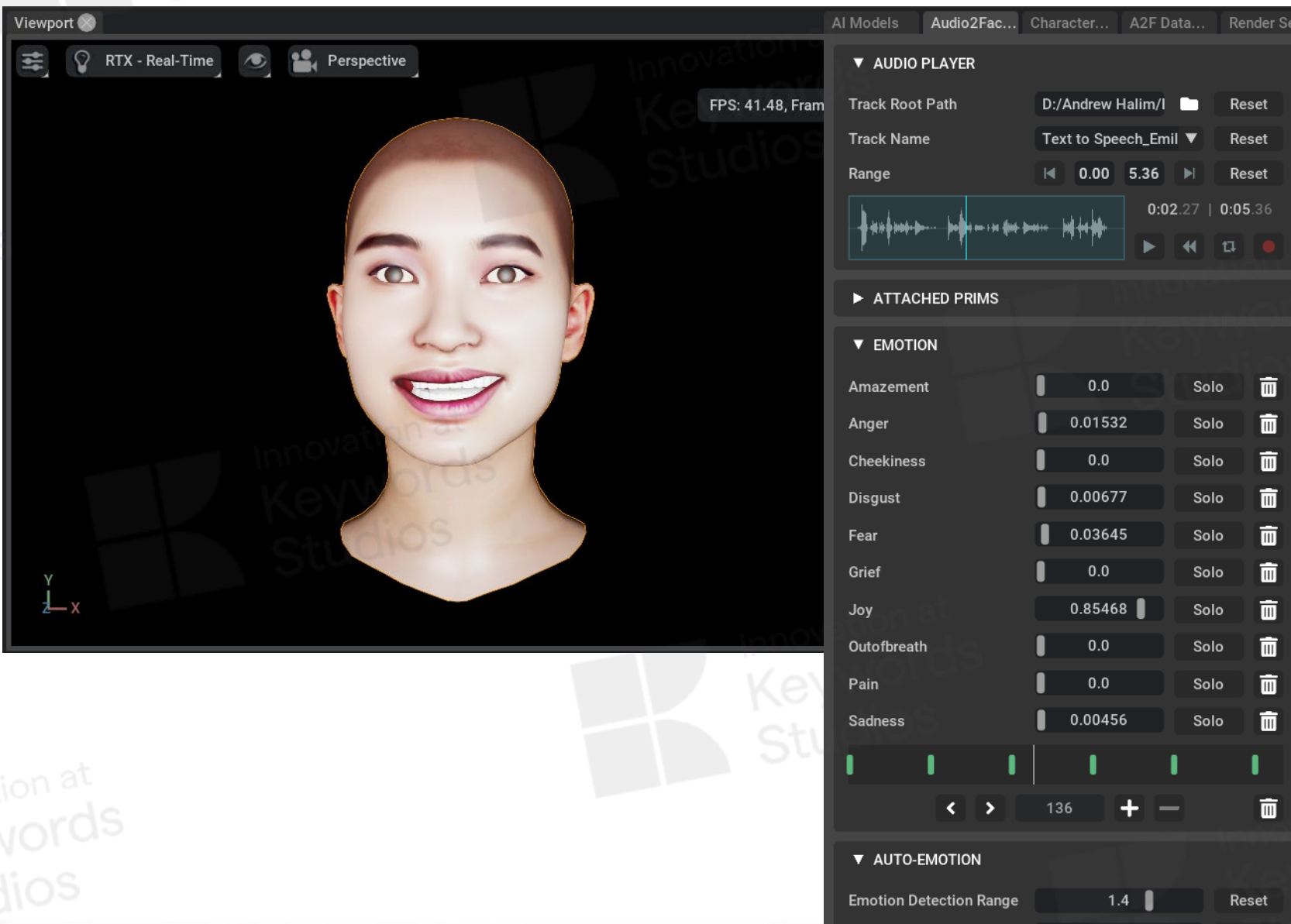
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Audio2Face data conversion

To export GAI animations to external 3D software, animators use the Audio2Face Data Conversion tab, inputting both the A2F-generated animation mesh and the blendshape solver mesh. For fine-tuning, the Blendshape Weight Tuner can be used within the Lazy Graph. During export, the tuner can be attached via the advanced export options, along with the corresponding facial bones.

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Tool used:

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Exporting the blend shapes weight

The blendshape results can be exported either as a JSON file format or mesh-included USD format. When using JSON format, the script template provided by Audio2Face must be run and edited within the external software to apply the animation.

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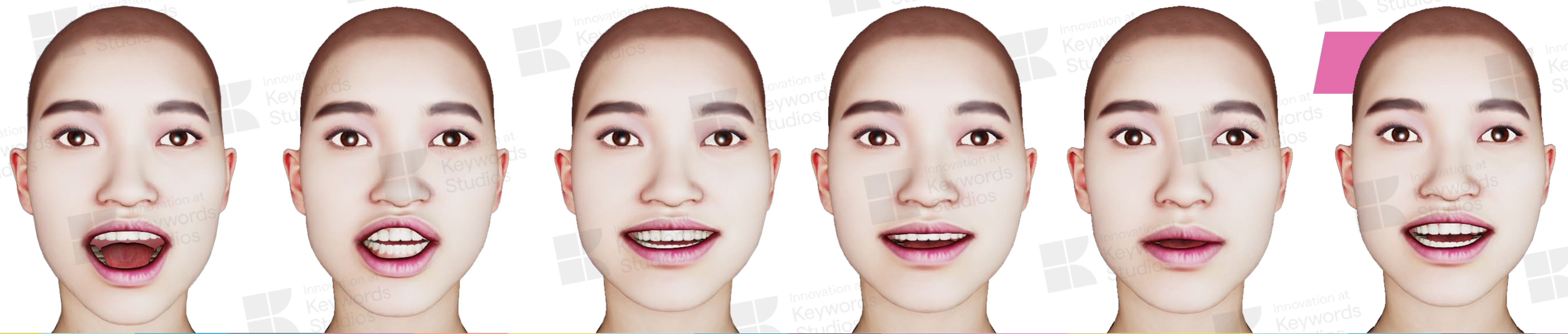
PIPELINE SPOTLIGHT
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Pipeline Conclusion

Audio2Face GAI technology rapidly generates good-quality base facial and lip-sync animations, providing animators with a solid foundation for further refinement.
This AI-infused pipeline allows artists to focus on polishing facial expressions and mouth movements, whilst significantly reducing production time.

Additionally, it offers a cost-effective alternative to traditional performance capture methods, optimising the facial animation pipeline and overall production costs.
The technology makes high-quality animations more accessible and efficient across various projects and budgets.

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