uAI Creator - Official Documentation

OpenAI, Claude, Google Gemini, DeepSeek, Ollama, LLM Studio

uAI Creator

Version: 1.0
Last Updated: 05/28/2025

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1. Introduction

1.1. What is uAI Creator?

Welcome to uAI Creator, your comprehensive AI-powered (and essential non-AI) toolkit designed to revolutionize your game development workflow directly within the Unity Editor. uAI Creator provides a suite of seamlessly integrated tools for script generation, 3D modeling from images, custom shader creation, 2D asset generation, sound design, and various utility functions.

Our goal is to empower developers of all levels to bring their creative visions to life more efficiently, creatively, and with greater ease.

1.2. Key Benefits

- **Accelerated Development:** Drastically reduce the time spent on common and complex game development tasks.

- **Enhanced Creativity:** Leverage AI to brainstorm, generate, and iterate on ideas for scripts, art, sound, and game mechanics.

- **Seamless Unity Integration:** All tools are designed as native Unity Editor windows, built with the modern Unity uiElements for a responsive and intuitive experience.

- **Flexible LLM Support:** Connect to a wide range of industry-leading cloud LLMs (OpenAI, Claude, Google Gemini, DeepSeek) or harness the power of local LLMs (Ollama, LLM Studio) for free inference and privacy.

- **Comprehensive Solution:** From code to 3D models, 2D assets, shaders, and sound, uAI Creator aims to be your go-to assistant in Unity.

- **Iterative Design:** AI assistance facilitates rapid prototyping and refinement, allowing you to explore more possibilities.

1.3. Who is this Asset For?

uAI Creator is designed for:

- **Solo Developers:** Maximize your productivity and creative output.

- **Small to Medium Indie Teams:** Streamline your workflow and fill skill gaps.

- **Prototypers & Game Jam Enthusiasts:** Rapidly create functional prototypes and game jam entries.

- **Educators & Students:** A powerful tool for learning and experimenting with game development and AI.

- **Artists & Designers:** Quickly generate placeholder or even final assets, textures, and visual effects.

- **Programmers:** Accelerate script writing, debugging, and understanding existing code.

1.4. Core Philosophy

uAI Creator is built on the principle of **AI-assisted development**, not AI replacement. We believe AI should be a powerful collaborator, augmenting your skills and freeing you up to focus

on the unique, creative aspects of your game that only a human can provide. The tools are designed to be intuitive, flexible, and to put you in control of the final output.

2. Important Information & Initial Setup

This section covers essential prerequisites, installation steps, and configuration required to get the most out of uAI Creator. Please read this section carefully.

2.1. System Requirements

- **Unity Version:** Unity 2022.LTS or newer (due to reliance on modern uiElements and other packages).

- **Operating System:** Windows, macOS, Linux

- **Internet Connection:** Required for cloud LLM access and initial asset download.

- **(For Local LLMs/Trellis 3D):** Sufficient local CPU/GPU resources. Specific requirements depend on the chosen local LLM and the complexity of Trellis 3D tasks.

2.2. Asset Installation

First, we need to install two packages. The DemoScene included in uAI Creator uses TextMeshPro Package from the Unity Package Manager for the UI text. Make sure to import it before importing this package. Also – if not done yet – import the "TMP Essential Resources", since the DemoScene uses the "LiberationSans.ttf" Font.
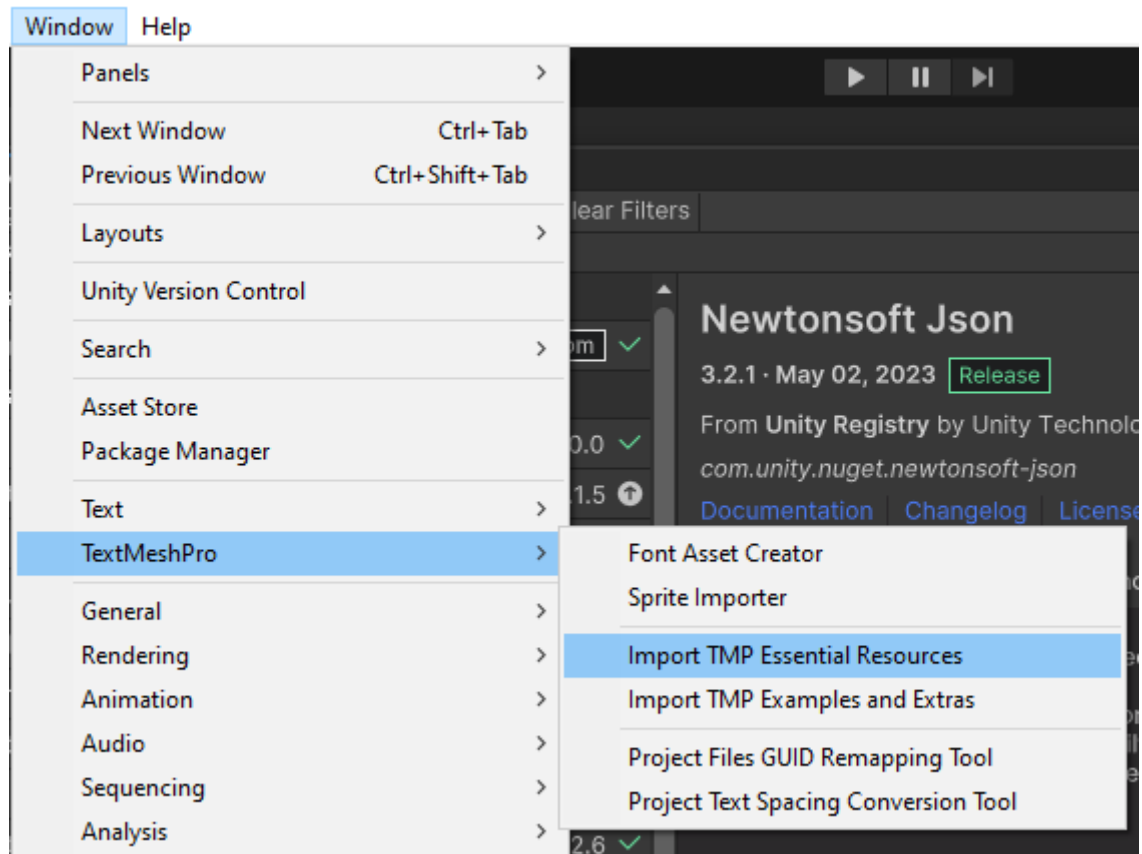
Also, you will need to install the package "com.unity.nuget.newtonsoft-json":

1. **Open Unity**

2. Go to **Window → Package Manager**

3. In the top-left dropdown, select **"Add package by name"**
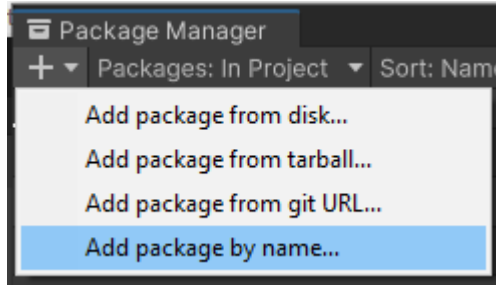
4. Search for **"Newtonsoft Json"**

5. Click **Install**

The package is named "Newtonsoft Json" (by Unity Technologies).

Installing uAI Creator:

1. Navigate to the Unity Asset Store (Window > Asset Store) or use the Package Manager if you've purchased it there.

2. Search for "uAI Creator" and purchase/download it.

3. Import the asset into your project by clicking the "Import" button in the Package Manager or Asset Store window.

4. Ensure all files are selected and click "Import" again.

5. Once imported, you can access the uAI Creator tools via the Unity top menu bar (e.g., Tools > uAI Creator > [Tool Name]).

2.3. Unity uiElements

uAI Creator utilizes Unity's modern **uiElements** (now often referred to as UI Toolkit) for its editor windows. This ensures a responsive, flexible, and contemporary user interface. No special setup is typically required as uiElements is a core part of modern Unity versions. If you encounter UI-related issues, ensure your Unity version is up-to-date and the com.unity.ui package is correctly installed.

2.4. LLM (Large Language Model) Setup

Many tools within uAI Creator rely on Large Language Models (LLMs) for their generative capabilities. You can configure access to various cloud-based or locally hosted LLMs via the **AI Creator Settings** window.

To access the settings, navigate to `Tools > uAI Creator > Settings` in the Unity top menu bar.
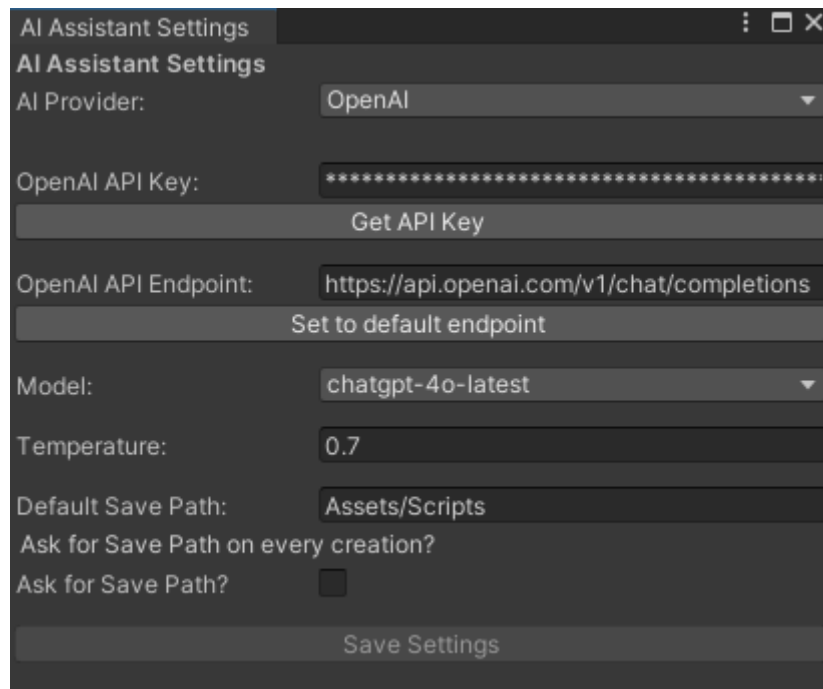
Figure 1The AI Creator Settings window with OpenAI selected.:

The Settings window allows you to:

- Select your preferred AI Provider.
- Enter API Keys for cloud services.
- Specify API Endpoints (especially for local/custom providers).
- Choose the specific LLM model to use.
- Adjust generation parameters like Temperature.
- Set default save paths for generated assets.

2.4.1. General LLM Configuration & Settings Window Overview

The **AI Creator Settings** window is your central hub for configuring LLM access.

- **AI Provider:** A dropdown list to select your LLM provider. Options include:
  - OpenAI
  - Claude (Anthropic)
  - Gemini (Google)

- o DeepSeek
- o Ollama (Local)
- o Custom (For OpenAI-compatible local servers like LMStudio)
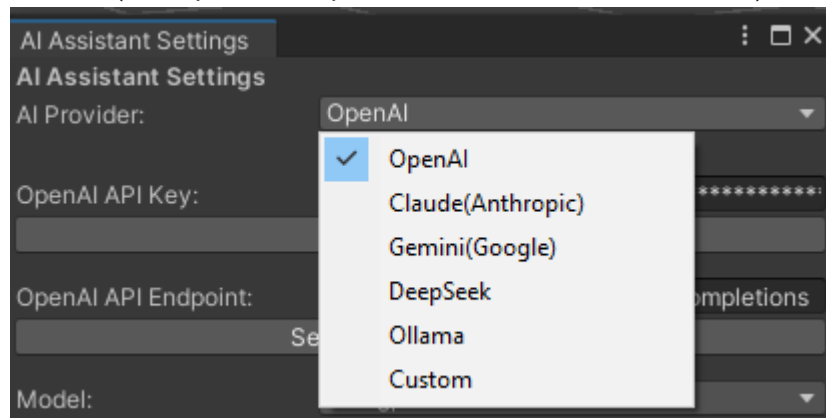
Figure 2AI Provider selection dropdown.

- **[Provider Specific] API Key:** A field to enter your API key for the selected cloud provider.
  - o The **"Get API Key"** button will open the relevant API key page for the selected cloud provider in your web browser.
- **[Provider Specific] API Endpoint:** The URL endpoint for the AI service.
  - o For cloud providers, this is usually pre-filled with the default.
  - o For Ollama and Custom providers, you'll need to ensure this points to your local server (e.g., `http://localhost:11434/api/chat` for Ollama, `http://localhost:1234/v1/chat/completions` for LMStudio via Custom).
  - o The **"Set to default endpoint"** button will revert the endpoint to the recommended default for the selected provider.
- **Model:** A dropdown to select the specific model offered by the chosen provider.
  - o The available models are dynamically updated based on the selected AI Provider.
  - o For **Ollama**, uAI Creator will attempt to fetch the list of models currently installed in your local Ollama instance. A **"Refresh Models"** button is available to update this list. If connection fails, a default list is shown.
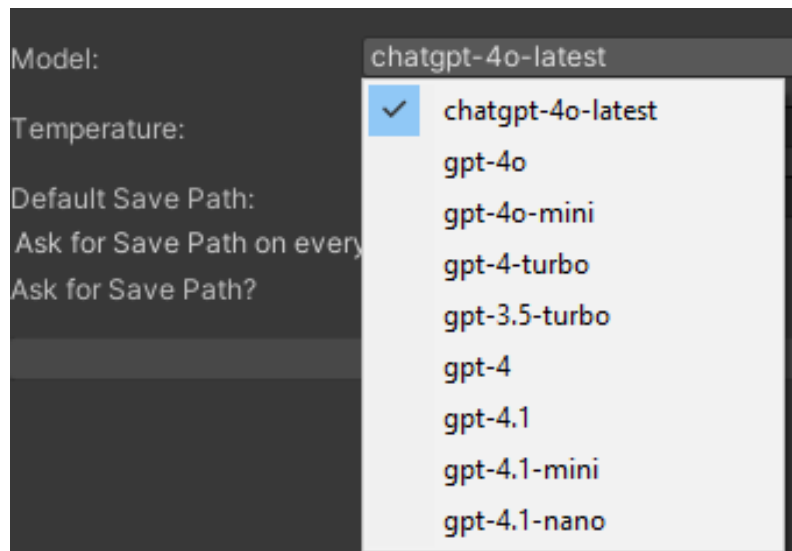
Figure 3Model selection dropdown for OpenAI.

> **Temperature:** A float value (typically 0.0 to 1.0) that controls the randomness of the AI's output. Higher values (e.g., 0.7) make the output more random and creative, while lower values (e.g., 0.2) make it more focused and deterministic.

- **Default Save Path:** The default Unity project path where generated assets (like scripts) will be saved (e.g., `Assets/Scripts`).

- **Save Settings:** Click this button to apply and save your current configuration. The button is enabled only if changes have been made.

2.4.2. Supported Cloud LLMs (OpenAI, Claude, Google Gemini, DeepSeek)

To use cloud-based LLMs:

1. Select the desired provider (e.g., OpenAI) from the "AI Provider" dropdown.
2. Enter your **API Key** obtained from the provider's website. You can use the "Get API Key" button for a quick link.
3. The **API Endpoint** is usually pre-filled. Modify it only if you have specific reasons (e.g., using a proxy or a different API version).
4. Choose your desired **Model** from the dropdown.
5. Adjust **Temperature** and other settings as needed.
6. Click **"Save Settings"**.

You are responsible for managing your API keys and any costs associated with using these cloud services. Links to pricing and usage pages are available in the Help window (`Tools > uAI Creator > Help`).

2.4.3. Supported Local LLMs (Ollama, LLM Studio via Custom)

Ollama:

1. Ensure Ollama is installed and running on your local machine. Download from https://ollama.com/.
2. Pull desired models using the Ollama CLI (e.g., `ollama pull llama3`).
3. In the uAI Creator Settings, select "Ollama" as the AI Provider.
4. The **API Endpoint** should default to Ollama's standard endpoint (e.g., `http://localhost:11434/api/cha`). Adjust if your Ollama setup is different.
5. The **Model** dropdown will attempt to list models available in your Ollama installation. You can use the **"Refresh Models"** button to update this list. If it fails to connect, a default list of common Ollama models will be shown.
6. Click **"Save Settings"**.
   (Note: Ollama typically does not require an API key for local use, so the API Key field may be hidden or ignored for this provider.)

LMStudio (or other OpenAI-compatible servers via "Custom" provider):

1. Ensure your local LLM server (e.g., LMStudio) is installed, a model is loaded, and the server is started. For LMStudio, download from https://lmstudio.ai/.
2. In the uAI Creator Settings, select "Custom" as the AI Provider.
3. Enter the correct **API Endpoint** for your local server. For LMStudio, this is typically `http://localhost:1234/v1/chat/completions`.
4. The **API Key** field can often be left blank or filled with any placeholder if your local server doesn't require authentication. Check your server's requirements.
5. For the **Model** field, the value you enter (e.g., "custom-model" or the actual model ID your server expects) might be a placeholder or a specific identifier required by your server. Refer to your local server's documentation. The actual model used is determined by what's loaded in your local server (e.g., in LMStudio).
6. Adjust **Temperature** and other settings as needed.
7. Click **"Save Settings"**.
8. Provider-specific help text for "Custom" is available within the Settings window by expanding the "Show more Custom Provider help" foldout.

2.4.4 Help Window & Useful Resources

uAI Creator includes a dedicated **Help Window** to provide quick access to documentation, support channels, and useful external links related to the supported AI services and tools.

To access the Help Window, navigate to `Tools > uAI Creator > Help` in the Unity top menu bar.
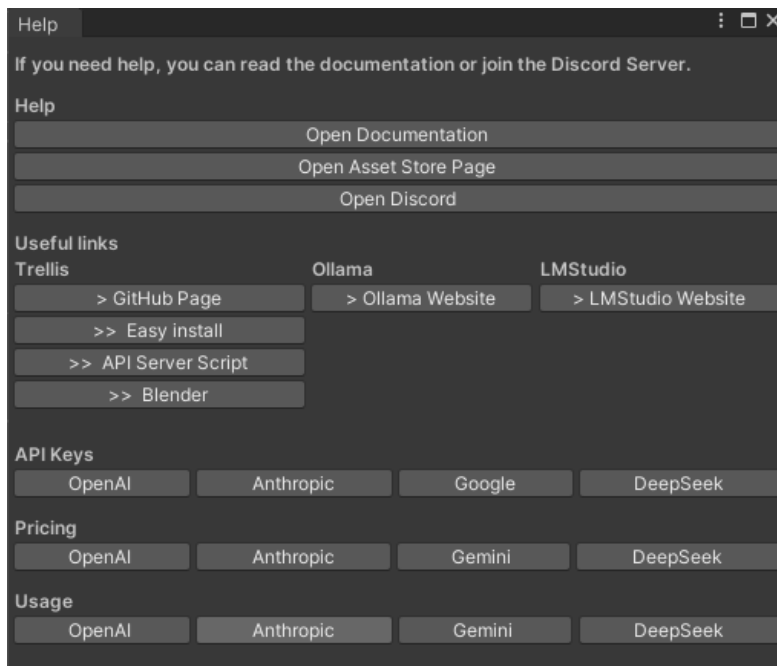
Figure 4The uAI Creator Help Window.

The Help Window provides the following:

- **Help Section:**
  - ○ **Open Documentation:** Opens this PDF manual.
  - ○ **Open Asset Store Page:** Takes you to the uAI Creator page on the Unity Asset Store.
  - ○ **Open Discord:** Joins the official uAI Creator Discord server for community support and announcements.
- **Useful Links Section:** Direct links to:
  - ○ **Trellis:**
    - ▪ GitHub Page (Official Microsoft TRELLIS repository).
    - ▪ Easy Install (A community-provided simplified installation for Trellis).
    - ▪ API Server Script: Direct download link for the uAIAPIServer.py script required to connect uAI Creator with your local Trellis installation.
    - ▪ Blender 4.2 (Blender is needed for converting GLBs to FBX)
  - ○ **Ollama:** Ollama official website.
  - ○ **LMStudio:** LMStudio official website.
- **API Keys Section & Pricing Section & Usage Section**
  - ○ OpenAI
  - ○ Anthropic (Claude)
  - ○ Google (Gemini)
  - ○ DeepSeek

This window is designed to be a convenient first stop for assistance and quick navigation to relevant resources.

2.5. Trellis 3D Specific Setup (For uAI Trellis 3D Tool)

The **uAI Trellis 3D** tool allows you to generate 3D models from images locally using the powerful TRELLIS framework. This feature requires a specific local setup:

1. **Install Trellis 3D Locally:**
   - You must have a working local installation of Trellis 3D. The official Trellis 3D project can be found on GitHub: https://github.com/microsoft/TRELLIS.
   - **Recommended Easy Installation:** For a more streamlined setup, we highly recommend using the **"Trellis Stable Projectorz"** by Igor Aherne. This community project simplifies the installation process significantly. You can find it here: https://github.com/IgorAherne/trellis-stable-projectorz. (Many thanks to Igor Aherne for this excellent resource!)
   - **Weights/Models:** The pre-trained models required by Trellis 3D might not be directly available via the links in the original Microsoft repository. You can typically find the necessary weights (e.g., for `trellis-image-large`) on Hugging Face. A common source is: https://huggingface.co/jetx/trellis-image-large. Ensure these are correctly placed according to your Trellis installation guide.

2. **Download uAI API Server Script (`uAIAPIServer.py`):**
   - uAI Creator communicates with your local Trellis installation via a Python API server script.
   - You can download this script (`uAIAPIServer.py`) from the uAI Creator asset package, our official website, or via the direct link in the Help Window (`Tools > uAI Creator > Help > Useful Links > Trellis > >> API Server Script`). The direct link is: https://asset-realm.com/trellis-api-server/.
   - This server script (`uAIAPIServer.py`) uses FastAPI to handle requests from Unity and includes the `blender_convert.py` script logic for converting GLB files to FBX with extracted textures.

3. **Python Environment & Dependencies:**
   - The `uAIAPIServer.py` script must run in the **same Python environment** where your Trellis 3D is installed and functional. This ensures it has access to all necessary Trellis libraries and dependencies.
   - Key dependencies for the API server include: `fastapi`, `uvicorn`, `python-multipart`, `imageio[ffmpeg]`, `Pillow`, `numpy`, `torch`, and any dependencies required by Trellis itself. The "Trellis Stable Projectorz" often sets up a suitable environment.
   - **Blender:** The API server also relies on a local Blender installation being accessible in your system's PATH (or you may need to specify the full path to the Blender executable within the `uAIAPIServer.py` or `blender_convert.py` if issues arise). Blender is used for converting the generated GLB model to FBX and extracting textures.

4. **Run the `uAIAPIServer.py` Script:**
   - Place the `uAIAPIServer.py` script (and ensure `blender_convert.py` is in the same directory or its path is correctly referenced if you modify the server script) in an accessible location.

- o Open your terminal or command prompt.
- o Activate the Python environment used for your Trellis 3D installation.
- o Navigate to the directory containing `uAIAPIServer.py`.
- o Run the script: `python uAIAPIServer.py`
- o By default, this server will run on `http://localhost:8000`. You can modify the host and port in the script if needed. You should see output indicating the server is running and has loaded the Trellis pipeline.

5. **Configure in uAI Trellis 3D Tool (Unity):**
    - o Open the uAI Trellis 3D tool window in Unity (`Tools > uAI Creator > Trellis 3D`).
    - o Ensure the **"API URL"** field in the tool's "Connection Test" section is set to the address where your `uAIAPIServer.py` is running (e.g., `http://localhost:8000`).
    - o Click the "Connect" button to test the connection. A success message should appear if Unity can reach the API server.

Once these steps are completed, you should be able to use the uAI Trellis 3D tool to generate models. The API server handles image preprocessing, calls the Trellis pipeline for 3D generation, renders a preview video/GIF, and converts the output to FBX format with textures for use in Unity.

2.6. General Usage Notes & Workflow Tips

- **Iterate Frequently:** AI generation is often an iterative process. Don't expect perfect results on the first try. Refine your prompts, adjust settings, and regenerate.

- **Be Specific with Prompts:** The more detailed and clear your prompts, the better the AI can understand your intent.

- **Use Reference Images:** For tools like the Asset Creator, providing reference images can significantly guide the AI towards your desired style or content.

- **Start Simple:** When learning a new tool, start with simple requests to understand its capabilities before moving to complex tasks.

- **Save Your Work:** Regularly save generated assets, scripts, and configurations.

2.7. Known Limitations & Considerations

- **AI Variability:** AI-generated content can be unpredictable. Results may vary even with the same prompt.

- **Resource Intensive:** Local LLMs and Trellis 3D can be resource-intensive. Ensure your system can handle the load.

- **Cloud LLM Costs:** Be mindful of API usage costs associated with cloud LLM providers.

- **Ethical Use:** Users are responsible for the ethical use of AI-generated content and ensuring they have the rights to any input data (like images for Trellis 3D or reference images).

3. Tool-Specific Guides

3.1. uAI Script Creator

The **uAI Script Creator** is a powerful, interactive tool designed to help you generate, modify, and understand Unity C# scripts with the assistance of AI. It features a familiar chat-style interface with conversation history on the left (or in a collapsible sidebar) and generated code "artifacts" on the right.

> To open the Script Creator, navigate to `Tools > uAI Creator > Script Creator` in the Unity top menu bar.

3.1.1. Overview of the Interface

The Script Creator window is primarily divided into two main panels:

- **Chat Panel (Left/Main):**
  - **Chat Header:**
    - **Toggle Sidebar Button (☰):** Shows/hides the Chat History sidebar.
    - **Chat Title:** Displays the name of the current chat session
    - **Upload Button:** Opens a dialog to upload existing C# scripts
    - **Clear Button:** Clears the current chat conversation
  - **Chat History Area:** Displays the conversation between you and the AI Assistant.
  - **Input Area (Bottom):**

- **Context Files Display:** Shows small buttons for any files currently uploaded as context for the *next* prompt. Each can be clicked to view its content in the artifact panel or removed.
- **Progress Indicator:** Appears when the AI is generating a response, showing a progress bar and a "Cancel" button.
- **Prompt Field:** A multi-line text field where you type your requests to the AI (e.g., "Create an inventory script," "Modify this script to add a jump function"). Press Enter to send, or Shift+Enter for a new line.
- **Send Button:** Sends the content of the prompt field to the AI.
- **Code Panel (Right):**
  - **Artifacts Scroll View:** Displays the generated code artifacts. Each artifact typically represents a distinct C# script or code snippet.
    - **Copy Button:** Copies the artifact's code to your clipboard.
    - **Create Button:** Attempts to create a new C# script file in your project using the artifact's code and inferred class name. It will prompt for a save location or use the default path (based on settings) and warn if a script with the same name exists.
    - **Close Button (×):** Hides the specific artifact from view (does not delete it from the session).
- **Chat History Sidebar**
  - **Search Field:** Allows you to filter your saved chat sessions by title or content.
  - **Sort By:** A dropdown/button to sort the chat history list (e.g., by Date Newest/Oldest, Name, Message Count).
  - **Chat History List:** Displays all saved chat sessions, typically grouped by date (e.g., "Today," "Yesterday," "May 24, 2025").
    - Each session shows its title, timestamp, and message count.
    - Clicking a session loads it into the main chat and code panels.
    - Right-clicking (or a context menu button) on a session offers options like Rename, Delete, Duplicate, and Export.
  - **+ New Chat Button:** Clears the current workspace and starts fresh
  - **Import Button:** Allows you to import a previously exported chat session
  - **Export All Button:** Exports all saved chat sessions into a single `.json` file.

3.1.2. Core Functionality & How to Use

1. **Starting a New Chat or Loading a Session:**
   - When you first open the Script Creator, it may start with a new, unsaved chat.
   - Use the **"+ New Chat"** button in the sidebar to start fresh at any time.
   - Click on any existing session in the **Chat History List** (sidebar) to load it.
2. **Interacting with the AI:**
   - Type your request into the **Prompt Field**. Be as clear and specific as possible.
     - Examples:
       - "Create a C# script for a simple player controller with movement and jump."

- "Write a function that finds all GameObjects with a specific tag."
- "Explain what this `Quaternion.Lerp` function does."
  - Click the **"Send"** button or press Enter.
  - The AI will process your request, and a progress indicator will appear. You can **"Cancel"** the generation if needed.
3. **Working with AI Responses:**
   - The AI's response will appear in the **Chat History Area**.
   - If the AI generates code, it will often be presented as:
     - **Inline Code Snippets:** Short pieces of code embedded directly in the chat message, often with a copy button.
     - **Code Artifact Buttons:** Buttons within the chat message (e.g., `Inventory.cs`) that, when clicked, will display the full code in the **Code Panel** on the right.
4. **Using Code Artifacts:**
   - When a code artifact is displayed in the Code Panel:
     - Review the generated code.
     - Use the **"Copy"** button to copy the code.
     - Use the **"Create"** button to save it as a new `.cs` file in your project. You'll be prompted for a location if "Ask for Save Path" is enabled in settings; otherwise, it uses the default path. If a script with the same class name already exists, you'll be asked if you want to overwrite it. The new/updated script will be imported by Unity.
     - Click the **"×"** (Close) button on an artifact to hide it. This does not delete the artifact from the current chat session's data.
5. **Providing Context (Uploading Scripts):**
   - If you want the AI to modify an existing script or understand the context of your project's code, click the **"Upload"** button in the chat header.
   - An **Upload Panel** will appear, allowing you to:
     - Drag a `MonoScript` file from your Project window into the **ObjectField**.
     - OR, paste raw C# code into the **TextField**.
   - Click **"Add Context"**.
   - The uploaded script(s) will appear as small buttons in the **Context Files Display** area above the prompt input. These files will be included with your *next* prompt to the AI.
   - A system message will confirm that the context has been added.
   - Clicking a context file button will display its content as a temporary artifact in the Code Panel. You can remove a context file by clicking the "×" on its button.
6. **Managing Chat Sessions:**
   - **Saving:** Chat sessions are automatically saved when you switch to another session, create a new chat, or close the window (if it's not a brand new, empty chat). The first user prompt usually becomes the default title for a new session, which can then be renamed.
   - **Renaming:** Right-click a session in the sidebar and select "Rename."

- Deleting: Right-click a session and select "Delete."
- Duplicating: Right-click a session and select "Duplicate" to create a copy.
- Exporting/Importing:
  - Use "Export All" in the sidebar to save all sessions to a JSON file.
  - Use "Import" to load sessions from a JSON file.
  - Individual sessions can also be exported via their context menu.

7. **Clearing Chat:**
   - The **"Clear"** button in the chat header will ask for confirmation and then effectively start a new chat session, clearing the current conversation and artifacts from view. If the previous chat had content, it will be saved before clearing.

3.1.3. Tips for Effective Use

- **Be Specific:** The more detailed your prompt, the better the AI can understand your requirements. Instead of "make a character," try "create a C# script for a 2D player character that can move left/right and jump using Unity's Input System."
- **Iterate:** AI might not get it perfect on the first try. Ask for modifications: "Modify the previous script to add a double jump," or "Refactor this to be more efficient."
- **Use Context:** When modifying existing code or asking for scripts that need to interact with others, use the **"Upload"** feature to provide that code as context.
- **Break Down Complex Tasks:** For very complex scripts, ask the AI to generate parts or functions individually, then combine them.
- **Review Generated Code:** Always carefully review and test code generated by AI. Understand what it does before integrating it into your project.
- **System Prompt:** The Script Creator uses a default system prompt (e.g., "You are a professional Unity programming assistant...") to guide the AI. You can see this influence in how it tries to preserve class names unless asked.

3.2. uAI Trellis 3D
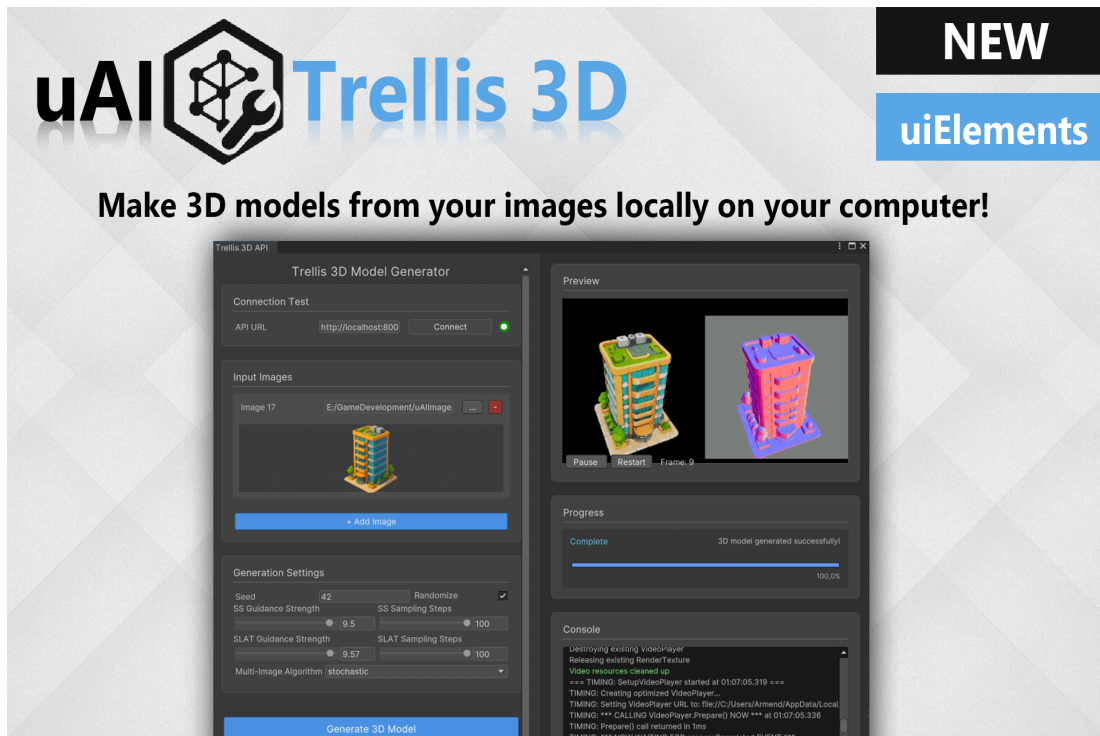
The **uAI Trellis 3D** tool empowers you to generate 3D models directly from one or more 2D images using your local Trellis 3D installation. It communicates with a Python-based API server (`uAIAPIServer.py`) that you run alongside your Trellis environment.

To open the Trellis 3D tool, navigate to `Tools > uAI Creator > Trellis 3D` in the Unity top menu bar.

Figure 5 The main interface of the uAI Trellis 3D Model Generator

Ensure you have completed the Trellis 3D specific setup detailed in Section 2.5 before using this tool.

3.2.1. Overview of the Interface

The Trellis 3D Model Generator window is divided into several key sections:
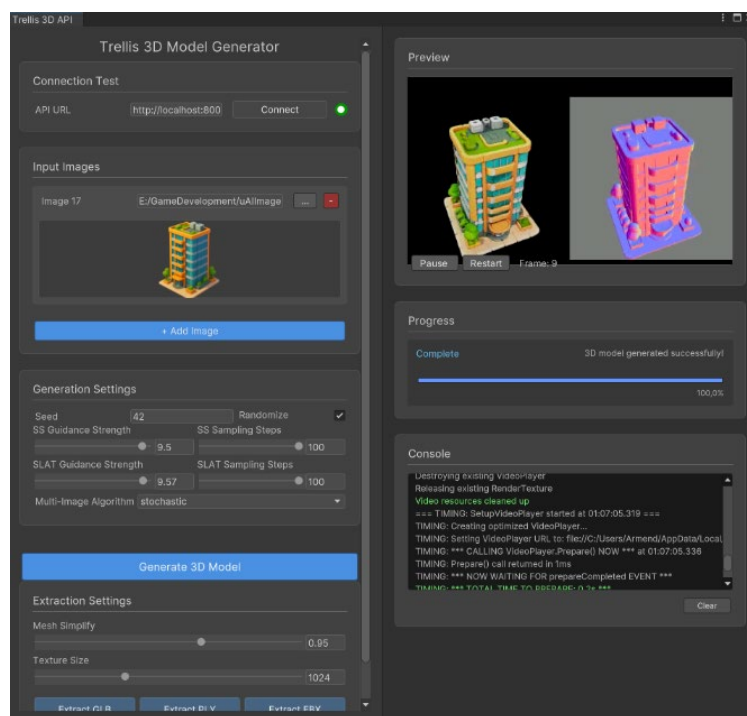
- **Connection Test:**
  - **API URL:** Text field to enter the URL of your running `uAIAPIServer.py` (default: `http://localhost:8000`).
  - **Connect Button:** You need to connect to the API server before sending the generation request
  - **Status Indicator (Dot):** Green for connected, Red for disconnected.
- **Input Images:**
  - **Image List:** A dynamic list where each row represents an input image.
    - **Image X Label:** Identifies the image number.
    - **Path Field:** Text field displaying the path to the image file.
    - **Browse Button (...):** Opens a file dialog to select an image.
    - **Remove Button (-):** Removes the image row.
    - **Image Preview Area:** Displays a thumbnail of the selected image. Shows "No image selected" or "Image not found" if the path is invalid.
  - **+ Add Image Button:** Adds a new empty image row to the list.
- **Generation Settings:** Controls for tuning the 3D model generation process:
  - **Seed:** Integer field for the random seed used by Trellis.
  - **Randomize Toggle:** If checked, a random seed will be used for each generation.
  - **SS Guidance Strength:** Slider (0.0-10.0) for Sparse Structure guidance.
  - **SS Sampling Steps:** Integer slider (1-100) for Sparse Structure sampling steps.
  - **SLAT Guidance Strength:** Slider (0.0-10.0) for SLAT (Structure-Aware Latent Transformer) guidance.
  - **SLAT Sampling Steps:** Integer slider (1-100) for SLAT sampling steps.
  - **Multi-Image Algorithm:** Dropdown (choices: "stochastic", "multidiffusion") for how multiple input images are processed.
- **Generate 3D Model Button:** Starts the 3D model generation process using the selected images and settings. This button is enabled only if connected to the server and at least one valid image is provided.
- **Extraction Settings:** Controls for the final model export:
  - **Mesh Simplify:** Slider (0.5-0.98) to control the level of mesh simplification for GLB/FBX export (e.g., 0.95 means 95% simplification).
  - **Texture Size:** Integer slider (512-2048) for the desired texture resolution (e.g., 1024 for 1024x1024).
  - **Extract GLB Button:** (Enabled after generation) Extracts the generated model as a `.glb` file.

- o **Extract PLY Button:** (Enabled after generation) Extracts the raw Gaussian Splatting data as a `.ply` file.
- o **Extract FBX Button:** (Enabled after generation) Extracts the model as an `.fbx` file with textures, converted via Blender.
- **Preview Panel (Right Side):**
  - o **Video Preview Area:** Displays a rendered video preview of the generated 3D model.

3.2.2. Workflow: Generating a 3D Model

1. **Start the API Server:** Ensure your `uAIAPIServer.py` script is running in the correct Python environment alongside your Trellis 3D installation (see Section 2.5).
2. **Connect to Server:**
   - o Open the Trellis 3D tool in Unity.
   - o Verify the **API URL** in the "Connection Test" section matches your server's address (usually `http://localhost:8000`).
   - o Click the **"Connect"** button. The status indicator should turn green, and the status label should update.
3. **Add Input Images:**
   - o Click the **"+ Add Image"** button to add image rows.
   - o For each row, click the **"..." (Browse)** button to select an image file (PNG, JPG, JPEG).
   - o A preview of the image will appear. If you have multiple images, the "Multi-Image Algorithm" setting will be used.
   - o Use the **"-" (Remove)** button to delete unwanted image rows.
4. **Configure Generation Settings:**
   - o Adjust the **Seed**, **Randomize** toggle, **Guidance Strengths**, **Sampling Steps**, and **Multi-Image Algorithm** as desired.
5. **Start Generation:**
   - o Once you have at least one valid image and are connected to the server, the **"Generate 3D Model"** button will be enabled.
   - o Click it to begin the process. The button will disable, and the "Progress" section will update.
   - o Monitor the "Progress" section and the "Console" for updates. The API server will perform several stages: preprocessing, sparse structure generation, SLAT refinement, rendering, etc.
   - o A video preview will attempt to load in the "Preview" area once the server has generated it.
6. **Model Extraction (After Generation Completes):**
   - o When the "Progress" section shows "Complete" and the status label indicates success, the "Extraction Settings" and its buttons will become enabled.
   - o Adjust **Mesh Simplify** and **Texture Size** if needed.
   - o Click one of the extract buttons:

- **Extract GLB:** Saves the model in GLB format.
- **Extract PLY:** Saves the Gaussian Splat data in PLY format (for advanced users or specific renderers).
- **Extract FBX:** Saves the model in FBX format, with textures extracted to a `textures` subfolder. This process uses Blender on the server side for conversion.
  - When saving the FBX, if you save it directly into your Unity project's `Assets` folder (or a subfolder), the tool will attempt to refresh the AssetDatabase and automatically apply recommended import settings (like `bakeAxisConversion = true`) to the imported FBX for correct orientation in Unity.
- A file save dialog will appear, allowing you to choose the location and name for the extracted file(s).

3.2.3. Opening with an Image (External Call)

The Trellis 3D tool can also be opened directly with an image pre-loaded, for example, from the uAI Asset Creator's "Make 3D Model" quick edit button. This is handled internally by the TrellisAPIEditor.`OpenWithImage(string imagePath)` method.

3.2.4. Console and Logging

The "Console" section within the tool provides valuable feedback:

- Connection attempts and status.
- Settings being sent to the server (useful for debugging).
- Server responses and session IDs.
- Progress updates during generation.
- Video loading status.
- Extraction process messages.
- Any errors encountered.

Use the "Clear" button to clear the console messages. More detailed errors from the Python server will appear in the terminal where `uAIAPIServer.py` is running.

3.2.5. Important Notes & Tips

- **Server Performance:** 3D model generation is computationally intensive. Performance depends heavily on your local hardware (CPU, GPU, RAM) and the complexity of the input images.
- **Patience:** Generation can take some time. Monitor the progress indicators.
- **API Server Errors:** If you encounter issues, check the console output in the terminal running `uAIAPIServer.py` for more detailed error messages from Trellis or Python.
- **Video Preview:** The video preview is optimized for speed. The final extracted model will have higher fidelity.

- **FBX Conversion:** The FBX conversion relies on Blender. Ensure Blender is correctly installed and accessible in your system's PATH on the machine running the API server (as detailed in Section 2.5.3).
- **Multi-Image Algorithm:** "Stochastic" and "Multidiffusion" are different approaches Trellis uses for combining information from multiple images. Experiment to see which works best for your inputs.

3.3. uAI Shader Creator

The **uAI Shader Creator** is an advanced tool that allows you to design and iterate on custom Unity shaders using natural language prompts, with a real-time preview and interactive property controls.

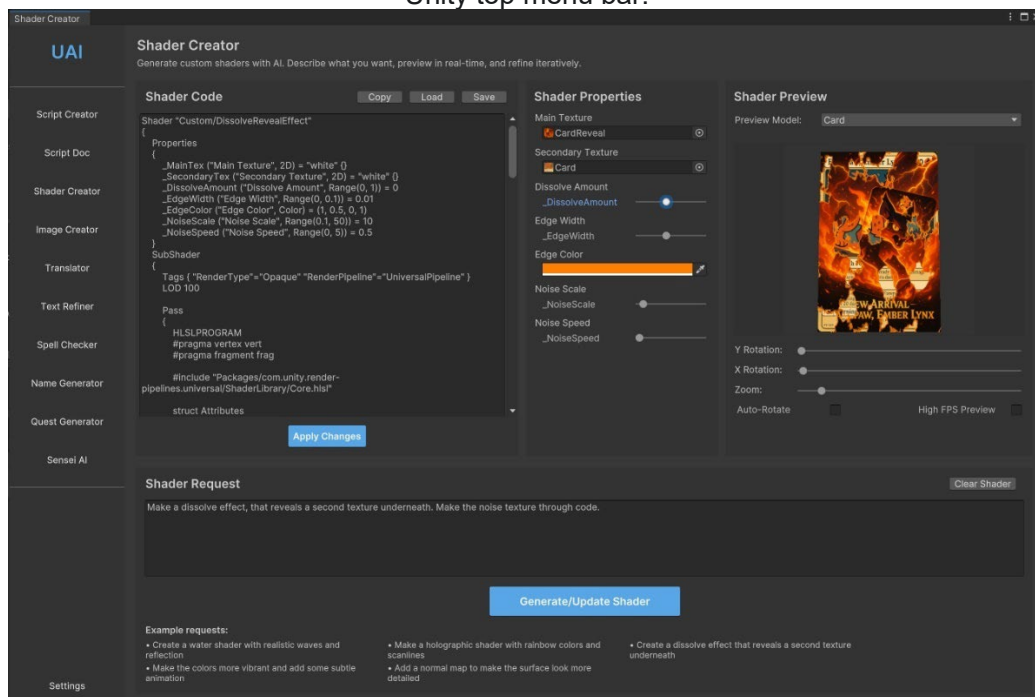To open the Shader Creator, navigate to `Tools > uAI Creator > Shader Creator` in the Unity top menu bar.

Figure 6 The main interface of the uAI Shader Creator.

3.3.1. Overview of the Interface

The Shader Creator is organized into distinct panels:

- **Sidebar (Left):** Provides navigation to other uAI Creator tools and a settings button.
- **Main Content Area:**
    - **Shader Code Panel (Left Section):**
        - Displays the generated shader code in an editable text field.
        - Buttons: "Copy" (code to clipboard), "Load" (existing shader file), "Save" (current shader code to file).
        - "Apply Changes" button: Compiles and applies any manual edits made to the shader code in the text field.
        - A progress bar and "Cancel" button appear here during AI generation.
    - **Shader Properties Panel (Middle Section):**
        - Dynamically populates with controls (sliders, color pickers, texture fields) based on the properties defined in the currently active shader.
        - Allows real-time modification of shader parameters, with changes reflected instantly in the preview.
        - Displays error messages if shader compilation fails.
    - **Shader Preview Panel (Right Section):**
        - **Preview Model Dropdown:** Select from default primitive meshes (Sphere, Cube, Card, etc.) or choose "Custom Model" to use your own 3D model.
        - **Custom Model Field:** An ObjectField to assign your custom 3D model for previewing. Only visible when "Custom Model" is selected.
        - **Live Preview Window:** Renders the selected model with the currently active shader and property settings.
        - **Controls:**
            - Y Rotation Slider
            - X Rotation Slider
            - Zoom Slider
            - Auto-Rotate Toggle
            - High FPS Preview Toggle
    - **Shader Request Panel (Bottom Section):**
        - **Shader Request Field:** A multi-line text field where you describe the shader effect you want or request modifications to an existing shader.
        - **Clear Shader Button:** Clears the current shader code, properties, and resets the preview.
        - **Generate/Update Shader Button:** Sends your request (and the current shader code if updating) to the AI for generation or modification.
        - **Example Requests:** Provides a list of sample prompts to inspire users.

3.3.2. Core Workflow

1. **Describe Your Shader:** In the "Shader Request" text field, clearly describe the visual effect you want.
   - o Example: "Create a dissolve effect that reveals a second texture underneath. Make the noise texture through code."
2. **Generate/Update:** Click the "Generate/Update Shader" button.
   - o The AI will process your request. For optimal shader code generation, especially for complex effects, **we recommend using a powerful model like Anthropic's Claude (Opus or Sonnet) if available through your LLM settings.**
   - o The generated code will appear in the "Shader Code" panel.
3. **Preview and Refine:**
   - o The shader will automatically be applied to the preview model.
   - o Use the controls in the "Shader Properties" panel to tweak parameters (colors, textures, ranges, etc.) and see the changes in real-time.
   - o Adjust the preview camera (rotation, zoom) and model as needed.
4. **Iterate:**
   - o If the shader isn't quite right, modify your description in the "Shader Request" field (e.g., "Add a speed control for the noise animation") and click "Generate/Update Shader" again. The AI will use the current shader code as a basis for modification.
   - o You can also directly edit the code in the "Shader Code" panel and click "Apply Changes."
5. **Save Your Shader:** Once satisfied, use the "Save" button in the "Shader Code" panel to save your `.shader` file. You can also "Load" existing shader files to view, modify, or use them as a starting point.

3.3.3. Key Features & Tips

- **Render Pipeline Awareness:** The system prompt sent to the AI includes information about your project's current render pipeline (Built-in, URP, HDRP) to help generate compatible shaders.
- **Real-Time Preview:** Instantly see the impact of your prompts and property adjustments.
- **Interactive Properties:** Dynamically generated UI controls for shader properties make tweaking easy and intuitive.
- **Iterative Design:** Refine shaders step-by-step with natural language, or by directly editing the code.
- **Custom Preview Models:** Test your shaders on your actual game assets by assigning a custom model.
- **For Complex Shaders:** Providing a good initial description is key. Breaking down complex effects into smaller, iterative requests can also be beneficial. Using robust LLMs like Claude is highly recommended for better quality and more complex shader generation.

3.4. uAI Asset Creator

The **uAI Asset Creator** is a powerful, integrated tool for generating a wide variety of 2D game assets directly within the Unity Editor using AI image generation. It features a robust interface for creating, managing, editing, and exporting images, complete with presets, reference image support, and inpainting capabilities.

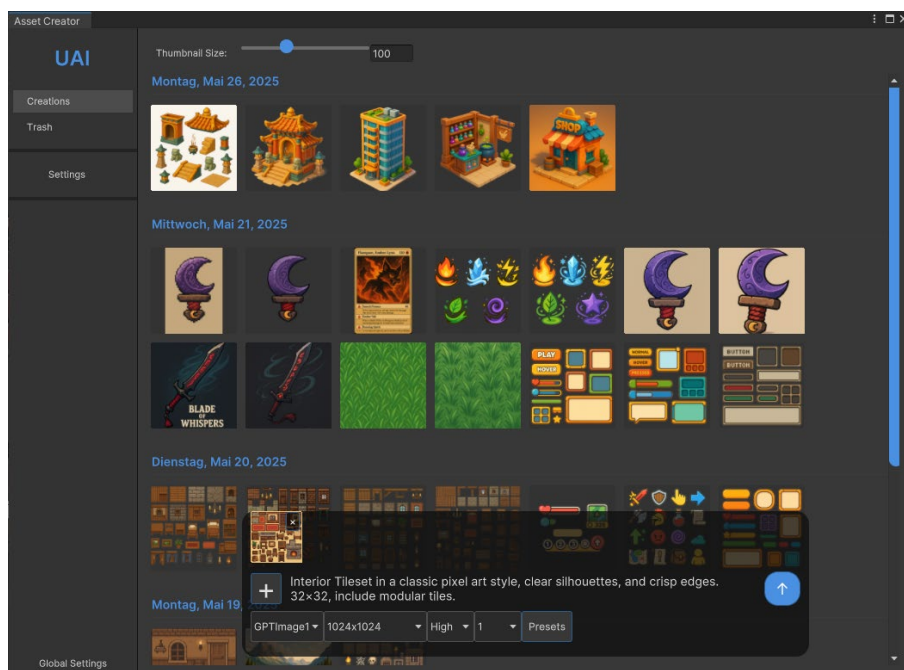To open the Asset Creator, navigate to `Tools > uAI Creator > Asset Creator` in the Unity top menu bar.

Figure 7 3.4. The uAI Asset Creator Creations Window

3.4.1. Overview of the Interface

The Asset Creator window is organized into several main panels, accessible via a sidebar:

- **Sidebar Navigation:**
  - **Creations Button:** Shows the timeline of generated assets alongside the creation tools.
  - **Trash Button:** Switches to the panel for managing deleted images.
  - **Settings Button:** Switches to the panel for configuring Asset Creator specific settings.
  - **Global Settings Button:** Opens the main uAI Creator LLM settings window (see Section 2.4).
- **Main Content Area (Dynamically changes based on selected panel):**
  - **1. Create Panel (docked at the bottom):**
    - **Prompt Field:** Multi-line text field to enter your image generation prompt.
    - **Reference Thumbnails Container:** Displays small thumbnails of added reference images (up to 4). Each thumbnail has a remove (×) button.
    - **+ (Add Reference) Button:** Opens a file dialog to select reference images (PNG, JPG, JPEG).
    - **Model Dropdown:** Selects the AI image generation model (e.g., `GPTImage1`, `DallE2`, `DallE3`).
    - **Size Dropdown:** Selects the output image resolution (options change based on selected model).
    - **Quality Dropdown:** Selects the image quality (options change based on selected model, e.g., `high`, `standard`, `hd`).
    - **Count Dropdown:** Selects the number of images to generate (1-10, DALL-E 3 is limited to 1).
    - **Presets Button:** Opens the Preset Selection overlay.
    - **Generate Button (↑):** Starts the image generation process.
  - **Preset Selection Overlay (Appears when "Presets" button is clicked):**
    - **Category Dropdown:** Select the main category of asset (e.g., Tileset, Character, UI).
    - **Sub Category Dropdown:** Select a specific asset type within the chosen category (e.g., Overworld Tileset, Hero Character).
    - **Style Dropdown:** Select an art style (e.g., Pixel Art, Cartoon, Fantasy).
    - **Apply Preset Button (Select):** Applies the constructed prompt from the preset selections to the main prompt field.
    - **Close Preset Button:** Closes the preset overlay.
  - **2. Creations Panel (Timeline View):**
    - **Thumbnail Size Slider:** Adjusts the size of the image thumbnails
    - **Timeline Scroll View:** Displays all generated images, grouped by date
      - Clicking a thumbnail opens the Image Preview panel

- Right clicking a thumbnail opens a context menu (View, Edit Prompt, Edit Image, Edit Part, Export, Delete).
  - **Load More Images Button:** Appears if not all images are loaded, allowing for pagination.
- **3. Trash Panel:**
  - **Trash Scroll View:** Displays images that have been moved to the trash, grouped by date.
    - Right clicking a thumbnail opens a context menu (Restore, Delete Permanently).
  - **Empty Trash Button:** Permanently deletes all images currently in the trash (after confirmation).
- **4. Image Preview Panel:**
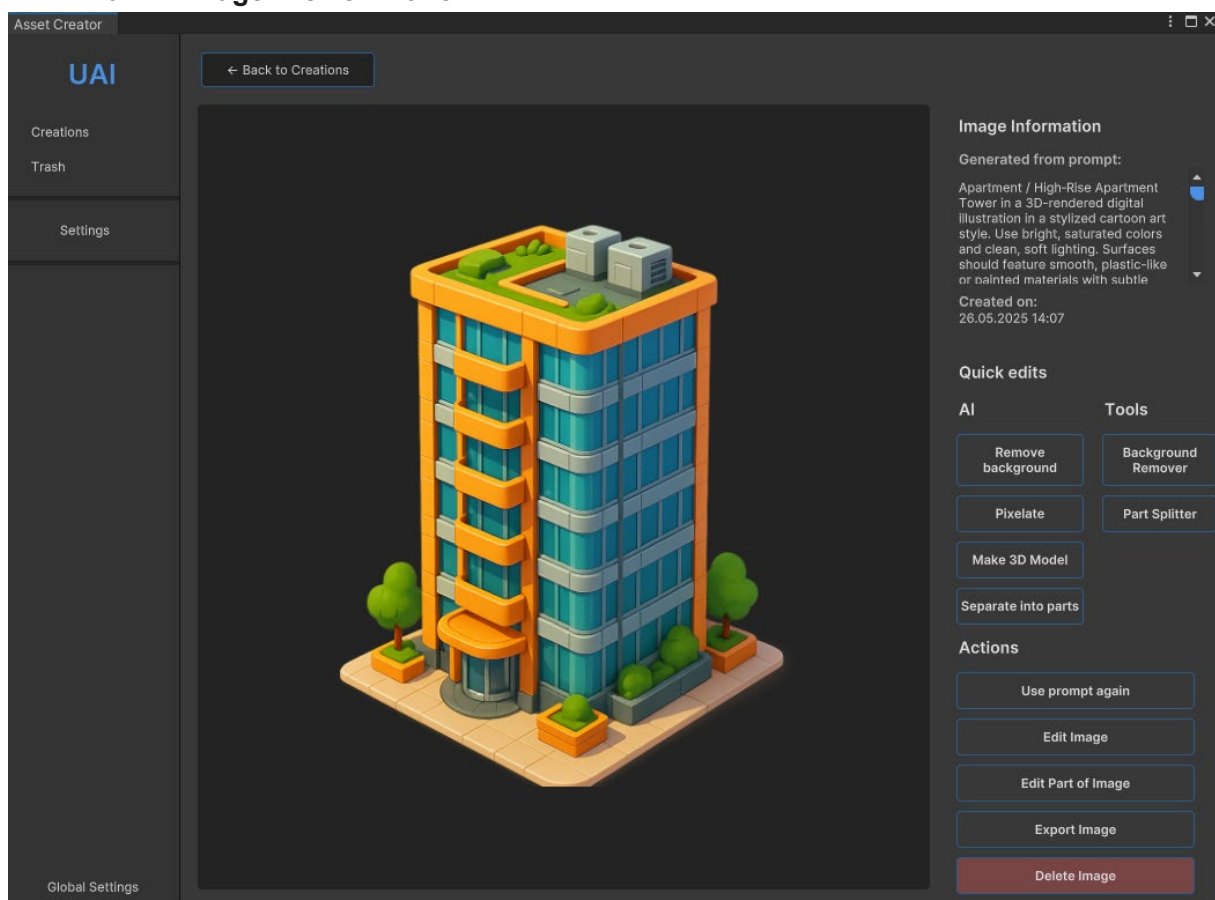
Figure 8 The Image Preview panel with quick edit options

- **Image Information Area:**
  - **Generated from prompt:** Displays the prompt used to create the image.
  - **Created on:** Displays the date and time of creation.
- **Quick Edits Section:**
  - **AI Buttons:**
    - **Remove background:** Prepares a prompt and sets the current image as a reference to generate a version with the background removed. Currently, the AI does make changes to the original image, so it is not recommended.

- **Pixelate:** Prepares a prompt and sets the current image as a reference to generate a pixel art version.
  - **Make 3D Model:** Opens the Trellis 3D tool with the current image path pre-loaded.
  - **Separate into parts:** Prepares a prompt and sets the current image as a reference to generate a version with its components separated.
- **Tools Buttons:**
  - **Background Remover:** Opens the uAI BG Remover tool with the current image pre-loaded.
  - **Part Splitter:** Opens the uAI Part Detector tool with the current image pre-loaded.
- **Actions Section:**
  - **Use prompt again:** Copies the image's prompt to the Create panel's prompt field and switches to the Create panel.
  - **Edit Image:** Copies the image's prompt and sets the image as a reference in the Create panel, then switches to it (for general edits/variations).
  - **Edit Part of Image:** Switches to the Mask Drawing panel with the current image loaded for inpainting/outpainting.
  - **Export Image:** Opens a system dialog to save the image to an external location.
  - **Delete Image:** Moves the image to the Trash panel (after confirmation).

Figure 9 Edit part of the image

- 5. **Mask Drawing Panel (Inpainting):**
  - **IMGUI Container:** The main drawing area where the image is displayed.
    - The original image is shown, and the user draws a mask on top.
  - **Brush Size Slider:** Adjusts the size of the drawing/erasing brush.
  - **Mask Prompt Field:** Text field to describe what to generate in the masked (drawn) areas.
  - **Draw Button:** Activates drawing mode (adds to the mask).
  - **Erase Button:** Activates erasing mode (removes from the mask).
  - **Clear Mask Button:** Clears the entire mask.
  - **Generate (✓) Button:** Starts generating the edited image based on the original, the mask, and the mask prompt.
  - **Cancel (×) Button:** Discards changes and returns to the Image Preview panel.
- 6. **Settings Panel:**
  - **Save Path (Project):** Text field for the default Unity project path to save generated images (e.g., `Assets/AI Generated Images`).
  - **Browse Button (Project):** Opens a folder selection dialog within the Unity project.
  - **Use External Save Path Toggle:** If checked, images will be saved to an external path instead of within the project.
  - **External Path Container (Visible if toggle is checked):**
    - **External Save Path:** Text field for the absolute external path.
    - **Browse Button (External):** Opens a system folder selection dialog.
  - **Default Model Dropdown:** Sets the default AI model for new sessions.
  - **Default Size Dropdown:** Sets the default image size.
  - **Default Quality Dropdown:** Sets the default image quality.
  - **Default Count Dropdown:** Sets the default number of images to generate.
  - **Save Settings Button:** Saves the current settings.
  - **Reset Settings Button:** Resets all settings to their defaults (after confirmation).

3.4.2. Core Functionality & Workflow

1. **Configuration (First Use):**
   - Navigate to the **Settings** panel via the sidebar.
   - Set your preferred **Save Path** (within the project or an external location).
   - Configure **Default** generation parameters (Model, Size, Quality, Count).
   - Click "Save Settings".
   - **Ensure the main uAI Creator Settings (`Tools > uAI Creator > Settings`) has OpenAI selected as the AI Provider and a valid API key, as the Asset Creator currently relies on OpenAI for image generation.**
2. **Generating New Images:**
   - Navigate to the **Create** panel.

- o **Enter a Prompt:** Type a detailed description of the image you want in the **Prompt Field**.
- o **Use Presets (Optional):**
  - ▪ Click the **"Presets"** button.
  - ▪ Select a **Category**, **Sub Category**, and **Style**.
  - ▪ Click **"Apply Preset"**. The constructed prompt will appear in the main prompt field. You can further customize it.
- o **Add Reference Images (Optional):**
  - ▪ Click the **"+" (Add Reference)** button to select up to 4 local image files. These images can guide the AI for style, content, or inpainting-like tasks. Thumbnails will appear.
- o **Select Generation Parameters:** Choose your desired **Model**, **Size**, **Quality**, and **Count**. Note that options may change based on the selected model (e.g., DALL-E 3 only generates 1 image and has specific size/quality options).
- o Click the **Generate (↑)** button.
- o A loading overlay with a progress bar will appear. Generation time depends on the model, settings, and API load.
- o Once complete, the generated images will appear in the **Creations Panel** timeline, grouped under the current date. The prompt field and reference images will be cleared.
- o **NOTE: Don't close the window while generating!**

3. **Viewing and Managing Creations:**
   - o The **Creations Panel** displays all non-trashed images
   - o If many images exist, a **"Load More Images"** button will allow you to load older images in batches.
   - o **Click** a thumbnail to open it in the **Image Preview Panel**.
   - o **Right-click** a thumbnail for a context menu with quick actions.

4. **Using the Image Preview Panel:**
   - o **Quick Edits:**
     - ▪ Buttons like "Remove background" or "Pixelate" will set up the Create panel with the current image as a reference and a modified prompt to achieve the effect.
     - ▪ "Make 3D Model" will open the uAI Trellis 3D tool (if available) with the image.
     - ▪ "Background Remover" or "Part Splitter" will open the respective dedicated tools with the image. These tools don't rely on AI!
   - o **Actions:**
     - ▪ **Use prompt again:** Re-populates the Create panel with this image's original prompt.
     - ▪ **Edit Image:** Re-populates the Create panel, setting this image as a reference (good for generating variations).
     - ▪ **Edit Part of Image:** Opens the **Mask Drawing Panel** for inpainting.

- ▪ **Export Image:** Saves a copy of the image to a location you choose outside the managed save paths.
- ▪ **Delete Image:** Moves the image to the **Trash Panel**.

5. **Editing Part of an Image (Inpainting):**
   - ○ From the Image Preview Panel, click **"Edit Part of Image"**.
   - ○ You'll be taken to the **Mask Drawing Panel**. The selected image is displayed.
   - ○ Use the **Brush Size Slider** to adjust your brush.
   - ○ Select **"Draw"** mode (default) to paint areas you want the AI to change or fill in (mask will appear semi-transparent white).
   - ○ Select **"Erase"** mode to remove parts of your mask.
   - ○ Use **"Clear Mask"** to start over.
   - ○ In the **Mask Prompt Field**, describe what the AI should generate *in the masked areas*. You can also describe changes to the overall image if the mask covers existing content.
   - ○ Click the **Generate (✓)** button.
   - ○ The newly generated image will appear in the Creations Panel.

6. **Managing Trash:**
   - ○ Navigate to the **Trash Panel**.
   - ○ View images you've deleted.
   - ○ **Right-click** an image to **"Restore"** it (moves back to Creations) or **"Delete Permanently"**.
   - ○ Use **"Empty Trash"** to permanently delete all items in the trash (requires confirmation).

3.4.3. Supported Models and Features

- **AI Models:** Currently supports only OpenAI's models (`GPTImage1`, `DallE2`, `DallE3`). The UI adapts options (like image count, available sizes, quality settings) based on the selected model's capabilities.
- **Reference Images:** Can use up to 4 reference images to guide generation. This is useful for style transfer, variations, or providing context for inpainting-like tasks.
- **Inpainting:** The Mask Drawing panel allows for precise editing by masking areas of an existing image and prompting the AI to fill/change those areas. *NOTE: The currenty GPTImage1 model has some flaws regarding masking. They use "soft masks", so the image changes a little bit also outside the mask. This is a limitation OpenAI is currently working on. That's why I have implemented it regardless of the current limitation.*
- **Presets:** A large, categorized library of prompts for common game assets (Tilesets, Characters, UI, Items, etc.) combined with various art styles (PixelArt, Cartoon, Fantasy, etc.) helps kickstart generation.
- **Image Management:** Organizes created images by date, allows for thumbnail size adjustment, pagination for large collections, and a trash/restore system.
- **Path Management:** Flexible saving options to either within the Unity project (for direct use) or to an external folder.

3.4.4. Tips for Effective Use

- **Detailed Prompts:** As with all AI image generation, the more detailed and specific your prompt, the better the results. Include style, subject, colors, composition, and any specific elements you want.
- **Experiment with Presets:** Use the presets as a starting point and then customize the prompt further.
- **Leverage Reference Images:**
  - For style transfer: Use a reference image in the style you want and describe new content.
  - For variations: Use an existing generated image as a reference and slightly modify the prompt.
- **Iterate on Edits:** If the Mask Drawing tool doesn't produce the perfect result on the first try, take the new image and edit it again.
- **Model Choice:**
  - `GPTImage1` generally produces higher quality and better prompt adherence but is more expensive.
  - `DallE3`/ `DallE2` are older versions
- **Review Save Paths:** Regularly check your save paths in Settings to ensure images are going where you expect.

3.5. uAI Part Detector

The **uAI Part Detector** is a utility tool designed to automatically detect and extract individual elements (parts) from a single source image, such as a sprite sheet, tileset, or an image containing multiple distinct objects. It's particularly useful for preparing assets for 2D game development or for separating components before attempting 3D model generation with tools like uAI Trellis 3D.

To open the Part Detector, navigate to `Tools > uAI Creator > Part Detector`
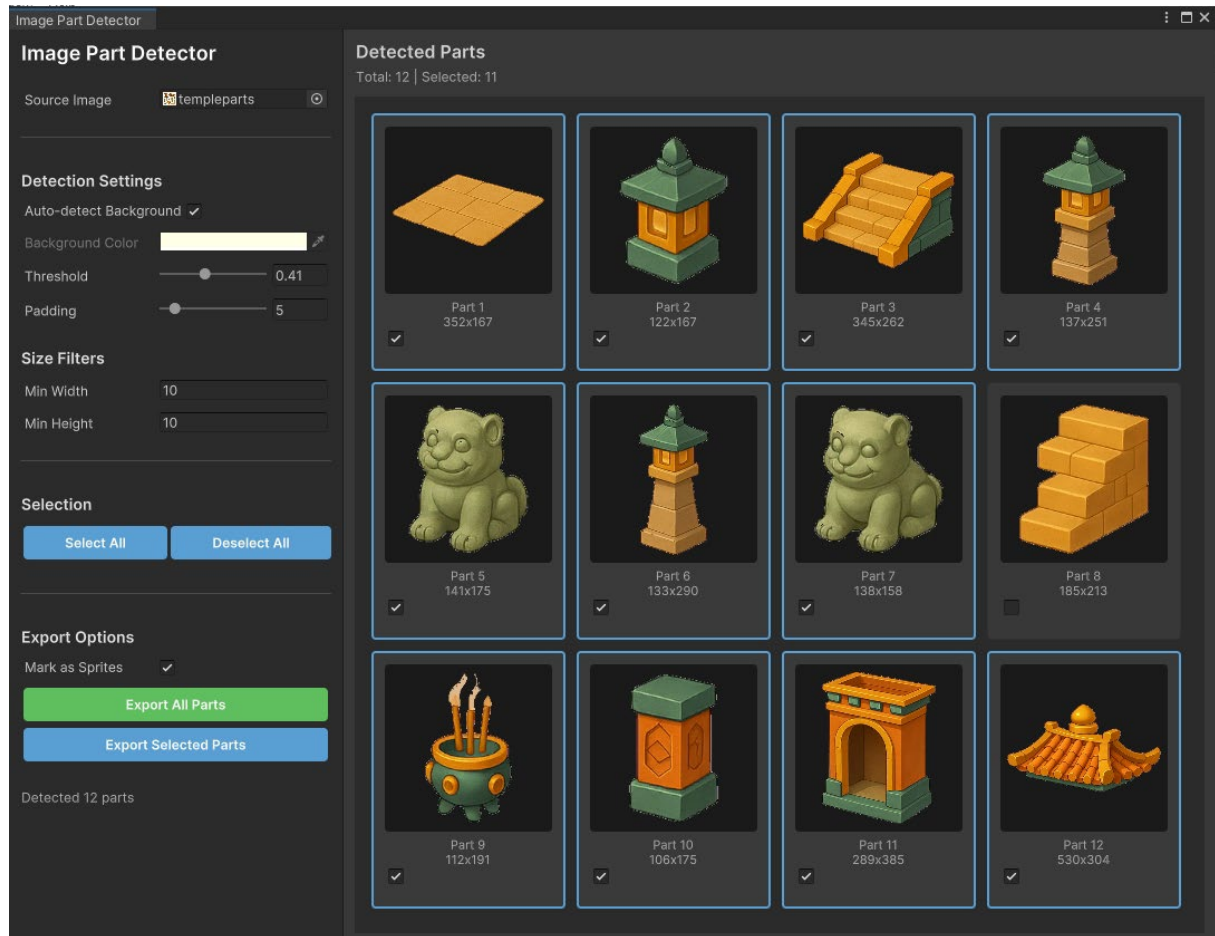
Figure 10 The main interface of the Image Part Detector

The tool can also be opened with an image pre-loaded via the "Part Splitter" button in the uAI Asset Creator's Image Preview panel.

3.5.1. Overview of the Interface

The Image Part Detector window is divided into a settings panel on the left and a detected parts preview panel on the right:

- **Left Panel (Settings & Controls):**
  - **Source Image Field:** An `ObjectField` where you can drag a `Texture2D` from your Project window or click to select one.

- - **Detection Settings:**
    - **Auto-detect Background Toggle:** If checked, the tool attempts to automatically determine the background color of the source image.
    - **Background Color Field:** Allows you to manually pick the background color
    - **Threshold Slider:** (0.0 - 1.0) Controls the sensitivity for distinguishing parts from the background color
    - **Padding Slider:** (0 - N pixels) Adds extra transparent padding around each extracted part.
  - **Size Filters:**
    - **Min Width Field:** Integer field to set the minimum width (in pixels) for a detected component to be considered a part.
    - **Min Height Field:** Integer field to set the minimum height (in pixels) for a detected component to be considered a part.
  - **Grouping mechanism:**
    - Use this if you want to group detected parts together, if their distance is smaller than the value you select here.
  - **Selection:**
    - **Select All Button:** Selects all detected parts for export.
    - **Deselect All Button:** Deselects all detected parts.
  - **Export Options:**
    - **Mark as Sprites Toggle:** If checked, exported images saved within the project's `Assets` folder will have their texture import settings automatically changed to "Sprite (2D and UI)".
    - **Export All Parts Button:** Exports all detected parts (that pass the size filters) to a chosen folder.
    - **Export Selected Parts Button:** Exports only the currently selected parts to a chosen folder.
- **Right Panel (Detected Parts Preview):**
  - **Parts Scroll View (previewContainer):** A scrollable area displaying thumbnails of all detected and filtered parts.
    - Clicking on a part preview also toggles its selection state.
    - Selected parts are highlighted

3.5.2. Core Functionality & Workflow

1. **Load Source Image:**
   - Open the Image Part Detector window.
   - Drag a `Texture2D` asset from your Unity Project window onto the **Source Image Field**, or click the field to select an image via the object picker.
   - Alternatively, if opened via the uAI Asset Creator, an image might already be loaded.
2. **Configure Detection Settings:**
   - **Background Detection:**

- If **Auto-detect Background** is checked (default), the tool will analyze the corners and edges of the image to guess the predominant background color. This color will be displayed in the **Background Color Field**.
- If your image has a complex background or the auto-detection is incorrect, uncheck this toggle and manually select the precise background color using the Background Color Field.
- **Info: The tool works best with an image, that has a simple homogen background.**

- **Threshold:** Adjust the **Threshold Slider**. A lower threshold means the tool will consider pixels as part of an object even if they are only slightly different from the background color. A higher threshold requires a more significant color difference. Experiment to find the best value for your image. The preview updates in real-time as you adjust.
- **Padding:** Adjust the **Padding Slider**. This value determines how many pixels of transparent space will be added around the bounding box of each extracted part.
- **Size Filters:** Set the **Min Width** and **Min Height**. Any detected components smaller than these dimensions will be ignored and not shown as parts. This is useful for filtering out noise or tiny artifacts.

3. **Review Detected Parts:**
   - As you adjust settings, the **Detected Parts Preview** panel on the right will update, showing thumbnails of the parts found.

4. **Select Parts for Export:**
   - By default, all newly detected parts are selected.
   - You can individually select/deselect parts by clicking their toggle checkbox or by clicking anywhere on the part preview element.
   - Use the **"Select All"** and **"Deselect All"** buttons for bulk selection.

5. **Export Parts:**
   - **Mark as Sprites:** Check this toggle if you intend to use the exported parts as sprites in Unity and want their import settings automatically configured. This only applies if you export them into your project's `Assets` folder.
   - Click **"Export All Parts"** to save all valid detected parts.
   - Click **"Export Selected Parts"** to save only the parts you have manually selected.
   - A folder selection dialog will appear. Choose a location to save the exported image files.
   - Each part will be saved as a separate PNG file (e.g., `sourceimagename_part_1.png`, `sourceimagename_part_2.png`, etc.). The tool is designed to preserve the original sRGB colors during this process.
   - If the chosen save location is within your project's `Assets` folder and "Mark as Sprites" was checked, the tool will refresh the AssetDatabase and attempt to set the Texture Importer settings for the new images to `TextureImporterType.Sprite`.

   -

3.5.3. Tips for Effective Use

- **Clean Backgrounds:** The tool works best with images that have a **relatively clean**, **uniform background color** that is **distinct** from the foreground elements.

- **Threshold Adjustment:** The **Threshold** is the most critical setting. If parts are being missed, try a lower threshold. If parts are being incorrectly merged or include too much background, try a higher threshold.

- **Padding for Sprites:** Adding a few pixels of **Padding** is often useful for sprites to prevent texture bleeding or artifacts when mipmapping or scaling.

- **Size Filters for Noise:** Use **Min Width/Height** to quickly discard small, unwanted specks or artifacts that might be detected as parts.

- **Iterative Refinement:** If initial detection isn't perfect, try adjusting the background color (if manual) or the threshold and observe how the detected parts change in the preview.

- **Use with Asset Creator:** This tool is a great companion to the uAI Asset Creator. If the AI generates a sheet of icons or tileset elements, use the Part Detector to quickly separate them.

3.6. uAI BG Remover

The **uAI Background Remover** is a versatile, non-AI tool for removing backgrounds from images using various traditional image processing algorithms. It offers interactive selection capabilities (like a Magic Wand) and fine-tuning controls to help you isolate foreground elements precisely.

To open the Background Remover, navigate to `Tools > uAI Creator > Background Remover`. It can also be opened with an image pre-loaded from the uAI Asset Creator's "Remove Background" (Tools) quick edit button.
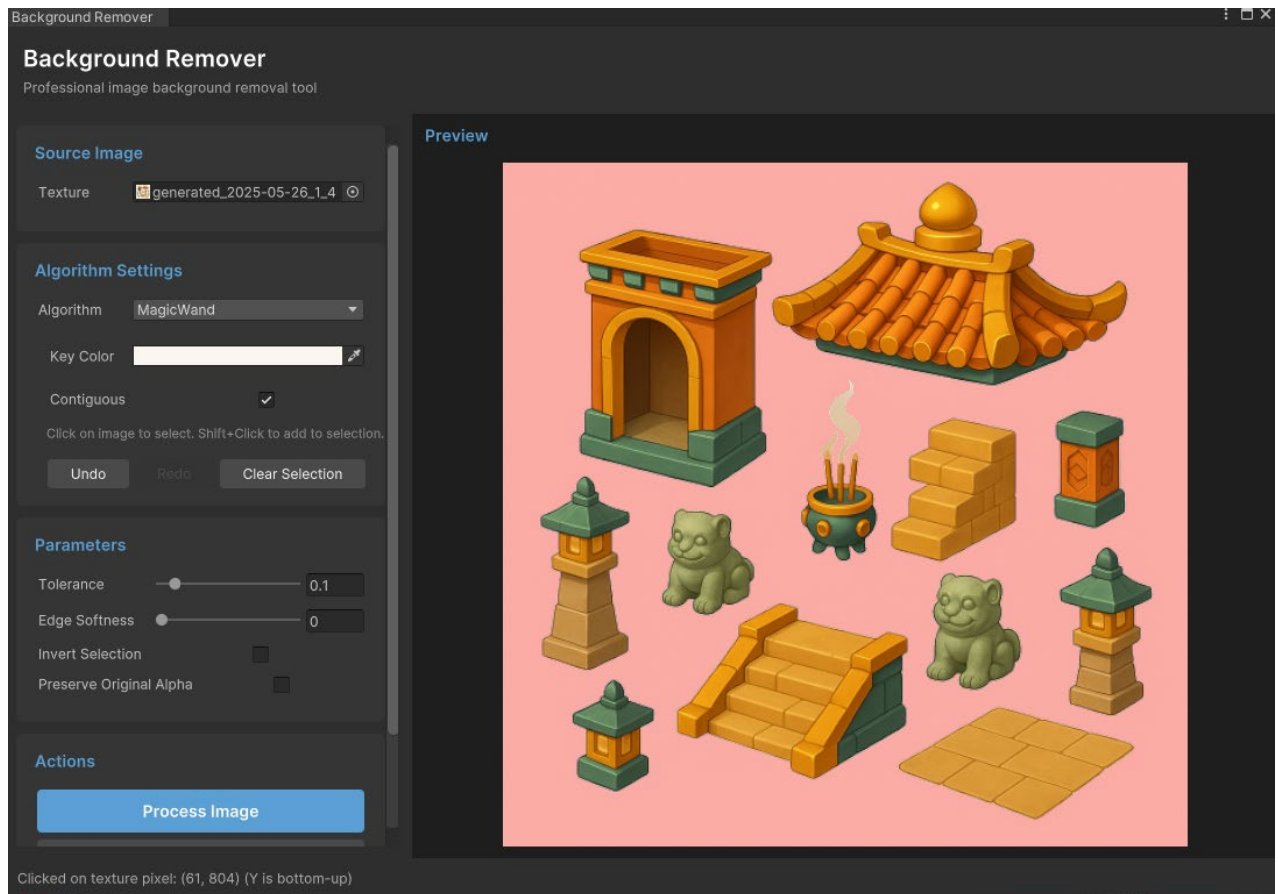
Figure 11 The main interface of the Background Remover, showing Magic Wand mode.

3.6.1. Interface and Workflow

The Background Remover window is structured with controls on the left and an image preview/interaction area on the right.

- **Controls Panel (Left):**
  - **Source Image:**
    - **Texture Field (SourceTexture):** An `ObjectField` to drag a `Texture2D` from your Project window or click to select one. When an image is loaded, it will be displayed in the Preview panel.
  - **Algorithm Settings:**
    - **Algorithm Dropdown (AlgorithmField):** Selects the background removal method. Options include:
      - `ColorKey`: Removes pixels similar to a specified "Key Color" within a tolerance.
      - `MagicWand`: Allows interactive selection. Click on the image in the Preview panel to select areas of similar color. Hold Shift+Click to add to the current selection.
      - `EdgeDetection`: Uses an edge detection algorithm (Sobel operator) to identify and potentially remove areas based on edge strength.

- - - `Threshold`: Removes pixels based on their grayscale value compared to a tolerance.
    - - `FloodFill`: Starts from image corners and removes connected pixels similar to their neighbors, effectively isolating foreground objects.
  - **Key Color Field (ColorKeyField):** (Visible for `ColorKey` and `MagicWand`) Allows you to pick or enter the target color. For `ColorKey`, this is the color to remove. For `MagicWand`, clicking on the image updates this color to the clicked pixel's color.
  - **Contiguous Toggle (AdjacentToggle):** (Visible for `MagicWand`) If checked, the Magic Wand only selects connected pixels of similar color (flood fill behavior). If unchecked, it selects all pixels in the image similar to the clicked color, regardless of connectivity.
  - **Undo Button:** Reverts the last Magic Wand selection change.
  - **Redo Button:** Re-applies a selection change that was undone.
  - **Clear Selection Button:** Deselects all currently selected pixels in Magic Wand mode.
- **Parameters:**
  - **Tolerance Slider (ToleranceSlider):** (0.0 - 1.0) Controls the sensitivity for color similarity.
    - - For `ColorKey` & `MagicWand`: How different a pixel's color can be from the Key Color and still be considered part of the selection/removal.
    - - For `EdgeDetection`: Threshold for edge strength.
    - - For `Threshold`: Grayscale threshold.
    - - For `FloodFill`: Color difference tolerance for connected pixels.
  - **Edge Softness Slider (EdgeSoftnessSlider):** (0.0 – 0.5) Smooths the transition between removed and kept pixels, creating a softer edge.
  - **Invert Selection Toggle (InvertSelectionToggle):** Reverses what is considered the background. If checked, areas normally kept will be removed, and vice-versa.
  - **Preserve Original Alpha Toggle (PreserveAlphaToggle):** If checked, the new alpha value will be the minimum of the original pixel's alpha and the calculated removal alpha. If unchecked, the calculated removal alpha directly replaces the original.
- **Preview Panel (Right):**
  - **Image Preview Area (ImageElement):** Displays the source image or the processed result.
    - - When `MagicWand` algorithm is active, clicking on this area performs a selection. A semi-transparent red/pink overlay will highlight the currently selected pixels. The overlay updates as you click or adjust tolerance.

3.6.2. Tips for Effective Use

- **Readable Textures:** Ensure your source textures have "Read/Write Enabled" in their import settings in Unity. The tool attempts to do this for you if the asset is in the project.

- **Iterate with Magic Wand:** The Magic Wand is powerful. Start with a click, adjust tolerance to see the selection change, Shift+Click to add more areas, and use Undo if needed.
- **Edge Softness:** A small amount of Edge Softness can significantly improve the quality of cutouts, reducing jagged edges.
- **Invert Selection is Your Friend:** Sometimes, it's easier to select the foreground object with Magic Wand and then use "Invert Selection" during processing to remove everything else.
- **Check Original Alpha:** If your source image has partial transparency, decide if you want to "Preserve Original Alpha" or let the tool define the new alpha entirely.

3.7. uAI PixelArt Scaler
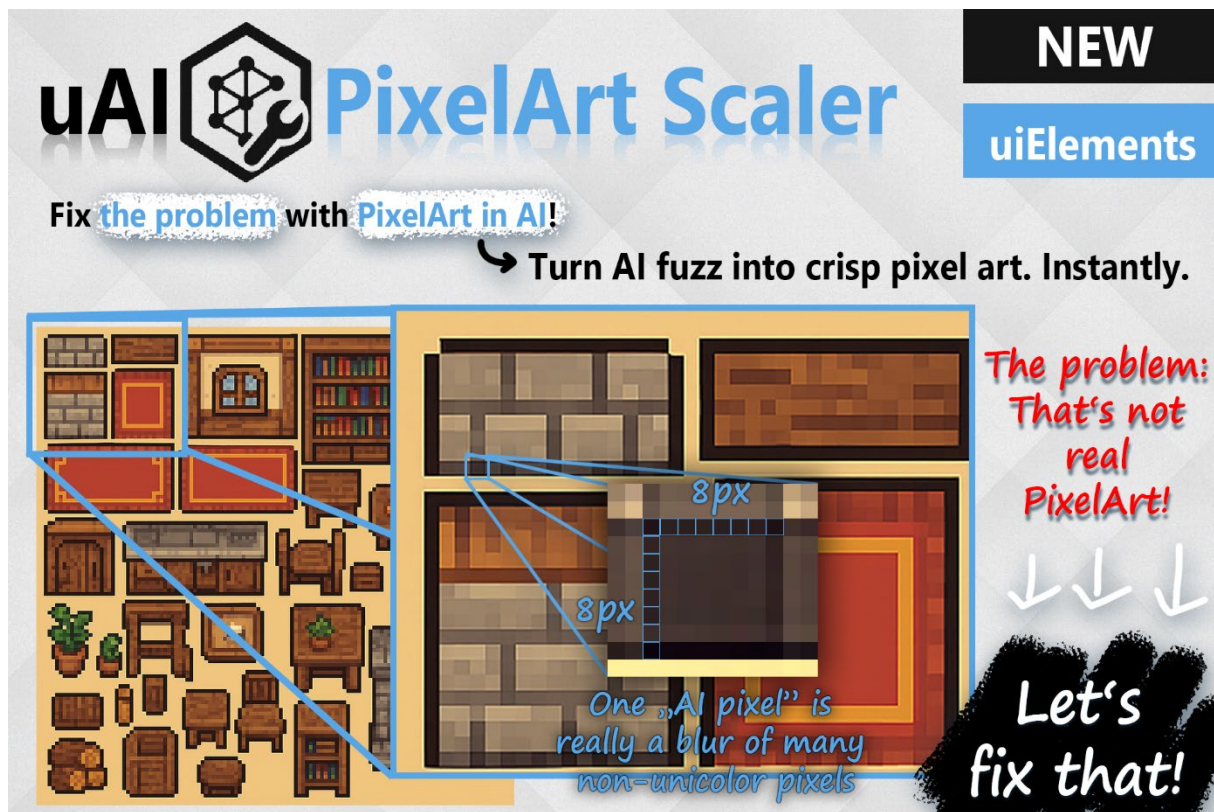
The **uAI PixelArt Scaler** is an advanced tool designed to convert "AI fuzz" or blurry scaled images into crisp, authentic pixel art. It addresses the common issue where AI-generated pixel art or upscaled low-resolution images lack sharp, unicolor pixels. The tool features pixel grid detection, various scaling algorithms (including classic pixel art scalers and k-centroid quantization), and a rich preview system.

To open the PixelArt Scaler, navigate to `Tools > uAI Creator > PixelArt Scaler`. It can also be opened with an image pre-loaded from the uAI Asset Creator's "Pixelate" (Tools) quick edit button.

Inspiration for the pixel grid detection concept was drawn from projects like Astropulse's pixeldetector (MIT License). However, the implementation in uAI PixelArt Scaler is a distinct and custom development.

(Insert Screenshot: `PixelArtScaler_promo_problem_solution.png` **- the one showing the "problem" and "Let's fix that!")**
Caption: Illustrating the problem solved by the PixelArt Scaler.

3.7.1. Overview of the Interface

The PixelArt Scaler window is a comprehensive UI Toolkit element (`PixelartScalerElement`) with controls on the left and a dynamic preview area on the right.
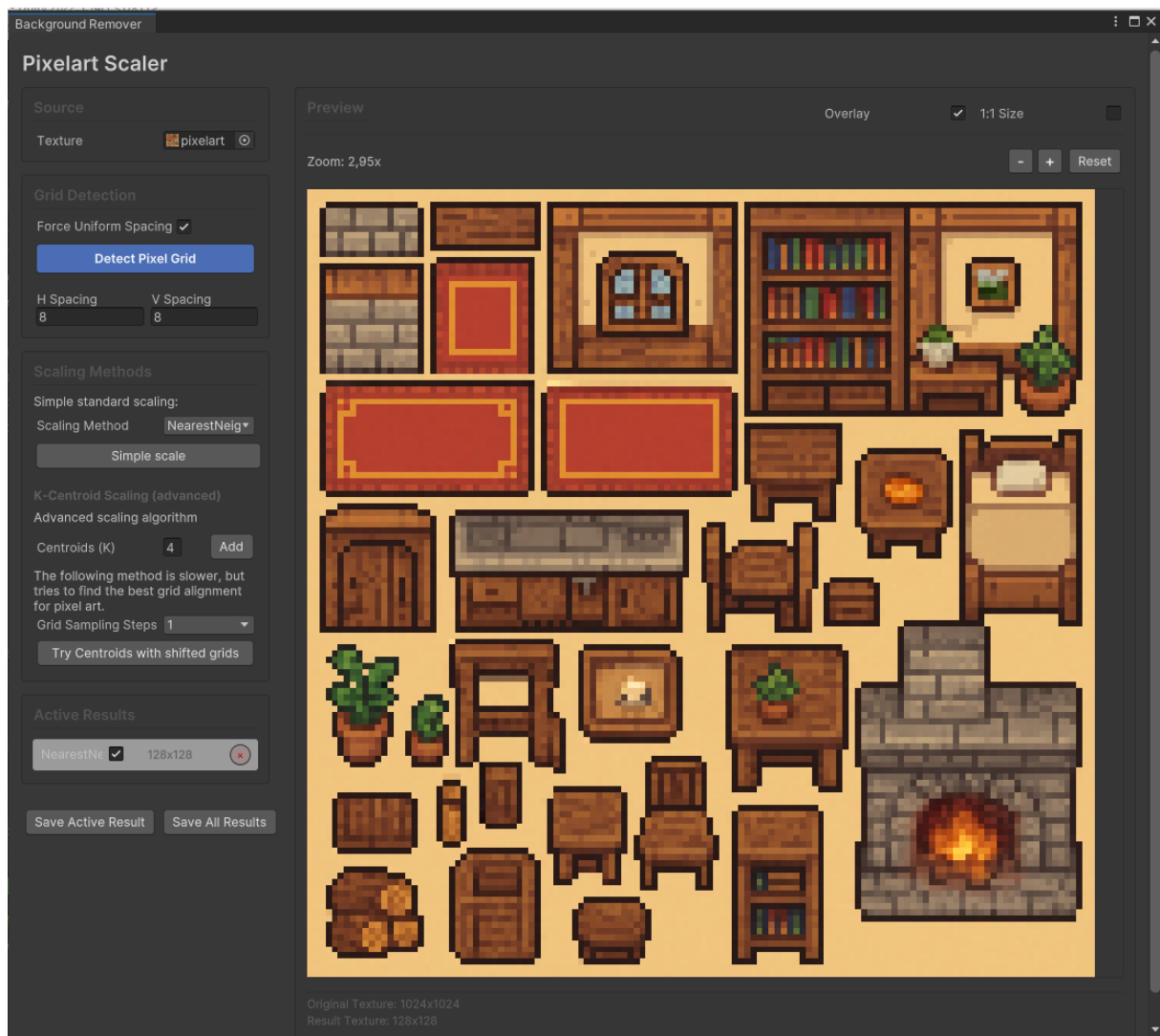
Figure 12 The main interface of the PixelArt Scaler.

- **Left Panel (Controls & Settings):**
  - **Source:**
    - **Texture Field :** An `ObjectField` to load your source `Texture2D`.
  - **Grid Detection:**
    - **Force Uniform Spacing Toggle:** If checked, assumes horizontal and vertical pixel spacing are the same during detection.
    - **Detect Pixel Grid Button:** Analyzes the source texture to automatically determine the `H Spacing` and `V Spacing` (effective pixel size).
    - **H Spacing Field:** Manually set or view the detected horizontal pixel size.
    - **V Spacing Field:** Manually set or view the detected vertical pixel size.
  - **Scaling Methods:**
    - **Simple standard scaling:**
      - **Scaling Method Dropdown:** Choose a standard pixel art scaling algorithm:
        - `NearestNeighbor`
        - `EPX` (Eric's Pixel Expansion / Scale2x variant)

- ▪ `Scale2x`
- ▪ `Eagle`
  - ▪ **Simple scale Button:** Applies the selected standard scaling method using the detected/set H/V Spacing to determine the target resolution.
- ▪ **K-Centroid Scaling (advanced):** An advanced scaling algorithm that quantizes colors to `K` centroids, effectively creating a clean pixel look.
  - ▪ **Centroids (K) Field:** Set the number of color clusters (K) for the k-centroid algorithm.
  - ▪ **Add Button:** Applies k-centroid scaling with the specified K value.
  - ▪ **Grid Sampling Steps Dropdown:** (Used with "Try Centroids with shifted grids") Determines how many steps to shift the sampling grid when trying different offsets.
  - ▪ **Try Centroids with shifted grids Button:** Applies k-centroid scaling multiple times, slightly shifting the sampling grid each time to find potentially better alignments. This can produce superior results for images where the AI pixel grid isn't perfectly aligned.
- o **Active Results:**
  - ▪ A panel listing all generated scaling results. Each result entry shows:
    - ▪ **Active Toggle & Name:** Checkbox to make the result active in the preview (multiple can be active for layered view) and its name (e.g., "NearestNeighbor," "K=4," "K=4 (S1)" for shifted grid results).
    - ▪ **Visibility Toggle:** Eye icon to show/hide this specific result in the preview without deactivating it.
    - ▪ **Size Label:** Dimensions of the result texture.
    - ▪ **Remove Button (×):** Deletes this result from the list.
- o **Bottom Controls:**
  - ▪ **Save Active Result Button:** Saves the first currently active and visible result to a PNG file.
  - ▪ **Save All Results Button:** Saves all generated results to a chosen folder, each as separate PNG

- • **Right Panel (Preview & View Controls):**
  - o **Preview Header:**
    - ▪ **Overlay Toggle:** If checked, active and visible results are layered on top of the source image (or each other) in the preview. If unchecked, only the first active and visible result is shown, replacing the source image preview.
    - ▪ **1:1 Size Toggle:** If checked, the preview attempts to display the image at its actual pixel dimensions (affected by zoom). If unchecked, it fits into a default preview size.
  - o **Zoom Controls:**
    - ▪ **Zoom Out Button (-):** Decreases zoom level.
    - ▪ **Zoom In Button (+):** Increases zoom level.
    - ▪ **Reset Button:** Resets zoom to 1.0x and pan to center.

- **Zoom Label:** Displays current zoom level (e.g., "Zoom: 1.00x").
    - **Preview:** The main area where the source image and scaled results are displayed.
        - **Pan:** Click and drag with the Left, Middle, or Right mouse button to pan the view.
        - **Zoom:** Use the mouse wheel to zoom in/out.

3.7.2. Workflow: Turning AI Fuzz into Crisp Pixel Art

1. **Load Source Image:**
    - Drag your AI-generated pixel art (or any image you want to "true pixelate") onto the **Texture Field**.
    - The image will appear in the **Preview Panel**. Ensure it's readable.
2. **Step 1: Detect Real Pixel Size (Grid Detection)**
    - Click the **"Detect Pixel Grid"** button. The tool will analyze the image and populate the **H Spacing** and **V Spacing** fields with its best guess for the "effective" pixel size in the source image.
    - If needed, you can manually adjust these spacing values.
    - Use the **"Force Uniform Spacing"** toggle if you know the source "pixels" should be square.

3. **Step 2: Scale! (Apply Scaling Methods)**
    - **Simple Standard Scaling:**
        - Select a method like `NearestNeighbor`, `EPX`, `Scale2x`, or `Eagle` from the **Scaling Method Dropdown**.
        - Click the **"Simple scale"** button. A new result will be generated and added to the "Active Results" list.
        - **Tests have indicated that the NearestNeighbor method is frequently sufficient.**
    - **K-Centroid Scaling (Advanced):**
        - Set the desired number of colors in the **Centroids (K)** field.
        - Click the **"Add"** button (next to Centroids field). This performs a k-centroid quantization based on the detected grid.
    - **K-Centroid with Shifted Grids (Most Advanced):**
        - Set the **Centroids (K)** value.
        - Choose a value from the **Grid Sampling Steps**. This controls how many different grid offsets are tested. A higher value means more results but longer processing.
        - Click the **"Try Centroids with shifted grids"** button. This will generate multiple k-centroid results, each with a slightly different sampling grid alignment.

4. **Manage and Preview Results:**

- o Each scaling operation adds an entry to the **"Active Results"** list.
- o **Activate/Deactivate:** Use the main toggle next to each result's name to make it "active." Active results are considered for display in the preview.
- o **View Controls:** Use the **Zoom** buttons, mouse wheel, and **Pan** (click-drag) to inspect the pixel details in the **Preview Panel**. Use **"1:1 Size"** and **"Reset"** as needed.
- o **Remove Results:** Click the "×" button next to any result in the "Active Results" list to remove it.

5. **Save Your Crisp Pixel Art:**
   - o **Save Active Result:** Select one primary result in the "Active Results" list (make it active and visible). Click **"Save Active Result"** and choose a location to save it as a PNG.
   - o **Save All Results:** Click **"Save All Results"**, choose a folder, and all generated results in the list will be saved as individual PNG files. This is useful if you've tried multiple K-values or shifted grids and want to compare them later.
   - o If saved within your project's `Assets` folder, the textures will be imported, and their filter mode is typically set to `Point` for crispness.

3.7.3. Tips for Best Results

- **Start with Grid Detection:** Always use **"Detect Pixel Grid"** first.
- **The nearest neighbor** method is most of the time good enough, so test this first!
- **If the nearest neighbor method does not deliver satisfying results, check the H and V Spacing values, if they are correct. Tweak them and rerun the scaling.**
- **K-Centroid:** For typical AI-generated "pixel art" that has blurry pixels, the **K-Centroid** methods (especially with **shifted grids**) are usually the most effective at producing truly crisp results.
- **Experiment with K:** The optimal number of **Centroids (K)** depends on your image. Start with a low number (e.g., 4-8) and increase if too much color detail is lost.
- **Zoom In!** Use the preview zoom extensively to inspect the pixel-level details of your results.
- **Readable Textures:** Ensure your source texture has "Read/Write Enabled" in its Unity import settings. The tool attempts to create a readable copy if necessary.

3.8. uAI Sound Creator

The **uAI Sound Creator** is a powerful, integrated tool for designing, generating, and managing sound effects (SFX), text-to-speech (TTS), and voice-changed audio directly within Unity, primarily utilizing the **ElevenLabs API**. It features a multi-panel interface built with Unity uiElements for a modern and intuitive experience.

To open the Sound Creator, navigate to `Tools > uAI Creator > Sound Creator` in the Unity top menu bar.

3.8.1. General Overview & Main Navigation

The Sound Creator window is organized into several main sections accessible via a sidebar:

- **Create Panel:** (Default active tab within the "Creations" view) This is where you generate new sounds. It's further divided into three sub-tabs:
  - **Sound Effects (SFX):** Generate SFX from text prompts.
  - **Text to Speech (TTS):** Convert text into spoken audio using various voices.
  - **Voice Changer (VC):** Transform an existing audio clip (or a live recording) using a target voice.
- **Creations Panel:** Displays a timeline of all sounds you've created, organized by date. This is the primary view when the "Creations" sidebar button is active.
- **Trash Panel:** Shows sounds you've moved to the trash, allowing for restoration or permanent deletion.
- **Audio Preview Panel:** Opens when you select a sound from the Creations or Trash panel, allowing you to listen, view details, export, or delete it.

- **Settings Panel:** Configure your ElevenLabs API key, default save paths, default voices, models, and quality settings.
- **Global Settings Button:** Opens the main uAI Creator settings window (`Tools > uAI Creator > Settings`).

A loading overlay with a progress bar appears during sound generation.

3.8.2. Create Panel (Accessed via "Creations" Sidebar Button)

This panel is where all new sound generation takes place. It has three sub-tabs:

A. Sound Effects (SFX) Tab

- **UI Elements:**
    - **Prompt Field:** Enter a text description of the sound effect you want (e.g., "Sci-Fi UI button click," "River flowing loop," "Spacious braam for movie trailer").
    - **Duration Slider:** Set the desired length of the sound effect (0.5s to 22.0s).
    - **Prompt Influence Slider:** Control how much the AI prioritizes your prompt versus creative freedom (0.0 to 1.0).
    - **Quality Dropdown:** Select the output audio format and quality (e.g., `mp3_44100_128`, `pcm_44100`).
    - **Generate Button:** Starts the generation process.

B. Text to Speech (TTS) Tab

- **UI Elements:**
    - **Prompt Field:** Enter the text you want to convert to speech.
    - **Voice Dropdown:** Select a voice from the list of available ElevenLabs voices (fetched via API).
    - **Model Dropdown:** Choose the ElevenLabs TTS model (e.g., `eleven_multilingual_v2`, `eleven_turbo_v2`).
    - **Quality Dropdown:** Select output audio format and quality.
    - **Text Normalization Toggle:** If checked, applies ElevenLabs text normalization (e.g., converting numbers to words).
    - **Generate Button:** Starts the TTS generation.

C. Voice Changer (VC) Tab

- **UI Elements:**
    - **Audio File Field:** Drag an `AudioClip` from your project or click to select one. This is the source audio to be transformed.
    - **Record Voice Button:** Click to start recording audio using your system's default microphone.
    - **Target Voice Dropdown:** Select the ElevenLabs voice to apply to the source audio.

- o **Model Dropdown:** Choose the ElevenLabs Speech-to-Speech (STS) model (e.g., `eleven_multilingual_sts_v2`).
- o **Quality Dropdown:** Select output audio format and quality.
- o **Noise Removal Toggle:** If checked, attempts to remove background noise from the source before applying the voice change.
- o **Generate VC Button:** Starts the voice change process.

3.8.3. Creations Panel

This panel, shown by default when the "Creations" sidebar button is active, displays a scrollable timeline of all sounds you've generated, grouped by date.

- **Clicking a sound item:** Opens the **Audio Preview Panel** for that sound.
- **Right-clicking a sound item:** Opens a context menu with options:
  - o **Play:** Opens in Audio Preview and plays.
  - o **Export:** Opens file dialog to save the sound externally.
  - o **Delete:** Moves the sound to the Trash.
- **Load More Sounds Button:** If there are more sounds in your save path than initially loaded (due to pagination for performance), this button appears at the bottom to load the next batch.

3.8.4. Trash Panel

Displays sounds that have been moved to trash.

- **UI Elements per Trash Item:** Similar to the Creations panel.
- **Functionality:**
  - o **Right-clicking a trash item:** Opens a context menu:
    - ▪ **Restore:** Moves the sound back to the Creations timeline.
    - ▪ **Delete Permanently:** Permanently deletes the sound file (after confirmation).
  - o **Empty Trash Button:** Permanently deletes all sounds in the trash (after confirmation).

3.8.5. Audio Preview Panel (Opens when a sound is selected)

Displays details of a selected sound and provides playback controls.

Workflow:

1. When a sound is selected, its details and waveform load.
2. Use **Play/Stop** buttons and the **Timeline Slider** for playback.
3. Use **Export** or **Delete** as needed.
   4. Click **"Back to Creations"** to return to the main timeline.

3.8.6. Settings Panel

Configure how the Sound Creator operates.

- **UI Elements:**
  - **API Key Field:** Enter your ElevenLabs API key here.
  - **Fetch Voices Button:** After entering an API key, click this to retrieve the list of available voices from ElevenLabs.
  - **Save Path Field:** Path within your Unity project where sounds will be saved (e.g., `Assets/AI Generated Sounds`).
  - **Project Browse Button:** Opens a folder picker to select the project save path.
  - **Use External Path Toggle:** If checked, sounds will be saved to an external folder instead of within the project.
  - **External Path Container:** (Visible if "Use External Path" is checked)
    - **External Path Field:** Path to an external folder.
    - **Browse Path Button:** Opens a folder picker for the external path.
  - **Default TTS Model Dropdown:** Select your preferred default TTS model.
  - **Default Voice Dropdown:** Select your preferred default voice for TTS and Voice Changer.
  - **Default Quality Dropdown:** Select your preferred default output quality for all generation types.
  - **Save Settings Button:** Saves all settings.
  - **Reset Settings Button:** Resets all settings to their defaults (after confirmation).

3.8.7. Key Features & Technical Notes

- **ElevenLabs API Integration:** All sound generation (SFX, TTS, VC) relies on the ElevenLabs API. An API key is required.
- **Local Asset Management:** Generated sounds are saved as `.mp3` and metadata is inferred from filenames (`YYYY-MM-DD_HH-MM-SS_Type_[Prompt].mp3`).
- **UI Toolkit:** The interface is built using Unity's modern uiElements, UXML, and USS.
- **Audio Playback:** Uses `UnityEditor.AudioUtil` for robust editor preview playback.
- **Microphone Recording:** Supports live audio input for the Voice Changer.
- **Pagination:** The "Creations" timeline uses pagination for efficient loading of many sound files.
- **Waveform Generation:** The preview panel attempts to generate and display a visual waveform for selected audio clips.

3.8.8. Tips for Effective Use

- **API Key First:** Ensure your ElevenLabs API Key is correctly entered in Settings and voices are fetched.
- **Experiment with Prompts:** For SFX, detailed prompts often yield better results.

- **Test Voices & Models:** Try different voices and models for TTS and VC to find what best suits your needs.
- **Manage Save Paths:** Keep your generated sounds organized by choosing appropriate save paths.
- **Check Console for Errors:** If generation fails, the Unity Console will often have more detailed error messages from the API or the tool itself.

3.9. uAI Sound Processor

The **uAI Sound Processor** is a comprehensive audio editing suite built into Unity, designed to refine and enhance your audio clips, especially those generated by AI. It offers three main modes: quick "Process Audio Clip," "Batch Process," and a detailed "Raw Audio Editor" for sample-accurate manipulations.

To open the Sound Processor, navigate to `Tools > uAI Creator > Sound Processor` in the Unity top menu bar.

3.9.1. Main Navigation & Overview

The Sound Processor window uses a sidebar for navigation between its main panels:

- **Process Clip:** Apply common audio enhancements to a single audio clip quickly.
- **Batch Process:** Apply the same set of enhancements to multiple audio clips at once.
- **Raw Edit:** A detailed audio editor for precise, sample-level editing, similar to traditional Digital Audio Workstations (DAWs).
- **Back to Creator:** A button to quickly return to the uAI Sound Creator window.

3.9.2. Process Clip Panel

This panel allows for quick application of common audio processing effects to a single selected audio clip.

- **Workflow:**
  1. **Load Source Audio:** Drag an `AudioClip` from your project into the "Source Audio" field or click to select one. Clip information (name, length, channels, frequency) will be displayed. You can play the original source using the "Play Source" and "Stop" buttons here.
  2. **Select Processing Options:**
     - Check toggles for effects like:
       - **Normalize Volume:** Adjusts the clip's amplitude to a standard level.
       - **Trim Silence:** Removes silence from the beginning and end of the clip.
       - **Apply Fades:** Adds a short fade-in and fade-out.
       - **Make Loopable:** Processes the clip to create a seamless loop using a crossfade. A slider allows you to adjust the crossfade duration.
     - Adjust sliders for:
       - **Pitch Shift:** Changes the pitch of the audio.
       - **Low-Pass Filter:** Attenuates high frequencies.
  3. **Process Clip:** Click the "Process Clip" button.
  4. **Preview & Export:**
     - The "Audio Preview" section will display a waveform of the processed clip and its new details.
     - Use the Play, Pause, Stop, and Loop controls to listen to the result. A timeline slider allows you to scrub through the audio.
     - If satisfied, click "Export Processed Audio" to save the new clip as a WAV file.

3.9.3. Batch Process Panel

This panel enables you to apply the same set of processing options to multiple audio clips simultaneously.

- **Workflow:**
  1. **Add Audio Clips:**
     - Click "Add Folder" to select a folder within your project, and all audio clips from that folder (and subfolders) will be added to the list.
     - Use "Clear" to remove all clips from the list.
  2. **Select Processing Options:** Similar to the "Process Clip" panel, select toggles and adjust sliders for Normalize, Trim Silence, Apply Fades, Make Loopable (with crossfade duration), Pitch Shift, and Low-Pass Filter.

3. **Set Output Folder:** Specify a folder within your project
(e.g., `Assets/Sounds/ProcessedBatch`) where the processed clips will be
saved. Use the "Browse" button to select it.
4. **Process Batch:** Click the "Batch Process" button.
5. **Results:** The processed clips will be saved as new WAV files in the specified
output folder. Their import settings may also be optimized based on their type
(SFX, TTS).

3.9.4. Raw Audio Editor Panel

This panel provides a detailed, sample-accurate audio editing environment, offering much finer
control over your audio.

Figure 13 The "Raw Audio Editor" panel providing advanced control.

- **Source Audio:** Load an `AudioClip` to edit.

  o **Waveform Display:** A large, zoomable, and pannable waveform view.
    - **Timeline:** Shows time markers.
    - **Selection:** Click and drag on the waveform to select a portion of the
      audio. The selected region is highlighted.
    - **Cursor:** A vertical line indicating the current playback or edit position.
  o **Edit Operations:** Buttons for common editing tasks:
    - Cut, Copy, Paste, Delete (for selected audio or at cursor).
    - Fade In, Fade Out, Silence (applied to the selected region).

- Undo, Redo.
- Select All.
- **Playback Controls:** Play, Pause, Stop, and Loop for the edited audio.
- **Zoom & Navigation:**
  - Zoom slider/mouse wheel (Ctrl+Wheel) to zoom in/out on the waveform.
  - Amplitude zoom (Alt+Wheel) to scale the vertical amplitude display.
  - Horizontal scrollbar/mouse wheel to pan across the waveform.
  - Timeline slider to quickly jump the cursor position.
- **Export Options:**
  - "Export Audio" to save the entire edited clip.
  - "Save Selection" to save only the currently selected portion of the audio.

3.9.5. Core Processing & Utilities

The Sound Processor leverages a suite of internal audio functions:

- **Normalization:** Adjusts overall volume.
- **Fades:** Applies linear fade-in and fade-out.
- **Silence Trimming:** Detects and removes leading/trailing silence based on a threshold.
- **Seamless Looping:** Uses crossfading to make audio loop smoothly.
- **Pitch Shifting:** Modifies the audio's frequency.
- **Low-Pass Filtering:** Attenuates high frequencies.
- **WAV Saving:** Includes a utility to save `AudioClip` data to `.wav` file format.

3.9.6. Tips for Effective Use

- **Start with Quick Processing:** For many AI-generated sounds, the "Process Clip" or "Batch Process" options might be sufficient to clean them up.
- **Dive into Raw Edit for Precision:** When you need fine control over cuts, fades, or want to remove specific noises, the "Raw Audio Editor" is your go-to.
- **Use Undo/Redo Liberally:** The Raw Audio Editor supports undo/redo, so don't be afraid to experiment.
- **Zoom is Your Friend:** In the Raw Editor, zoom in closely on the waveform to make precise selections and edits.
- **Save Often:** When working in the Raw Editor, export your work periodically if you're making significant changes.

3.10. uAI Generators (Utility Suite)

The **uAI Generators** suite provides a collection of AI-powered text utility tools designed to assist with various writing and content creation tasks in your game development workflow. Each generator is accessible via the main uAI sidebar (`Tools > uAI Creator > [Generator Name]`) and features a clean, intuitive interface built with Unity uiElements.
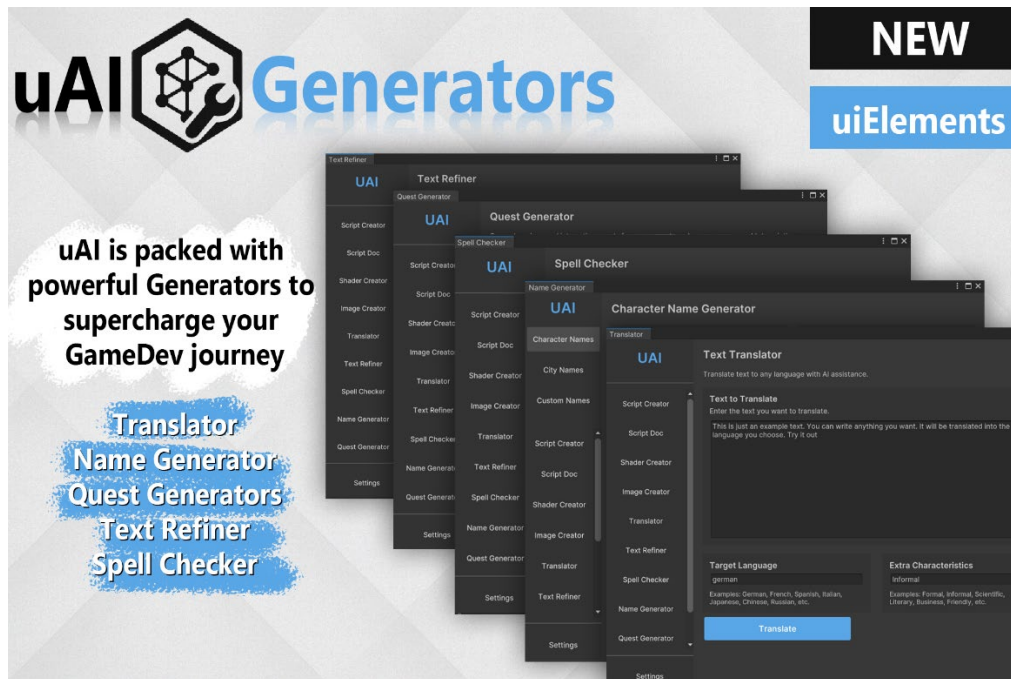

Figure 14 Overview of the uAI Generators suite

*A key feature is that all generators have a **compact design when docked** within the Unity Editor, minimizing their footprint while remaining fully functional.*
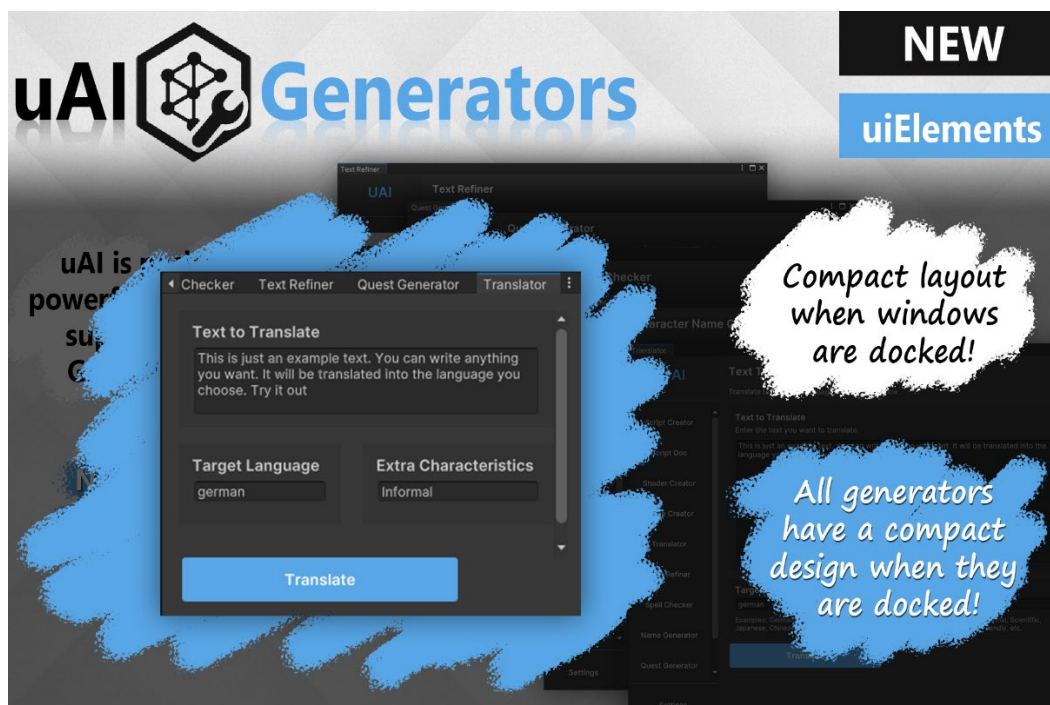

Figure 15 Example of a generator's compact layout when docke

The following generators are included:

3.10.1. Text Refiner

- **Purpose:** Improve your text with AI assistance. Paste your text and provide instructions on how you want it refined (style, tone, format, etc.).
- **Interface:**
  - **Input Text Area:** A large text field to paste the content you want to improve.
  - **Instructions Area:** A text field to describe how you want the text to be improved. Examples: "Make it sound like a pirate saying it," "Make this text more professional," "Fix grammar and spelling errors," "Rewrite in a more casual, conversational tone."
  - **Improve the Text Button:** Sends the input text and instructions to the AI for refinement. The result is typically displayed below or replaces the input.
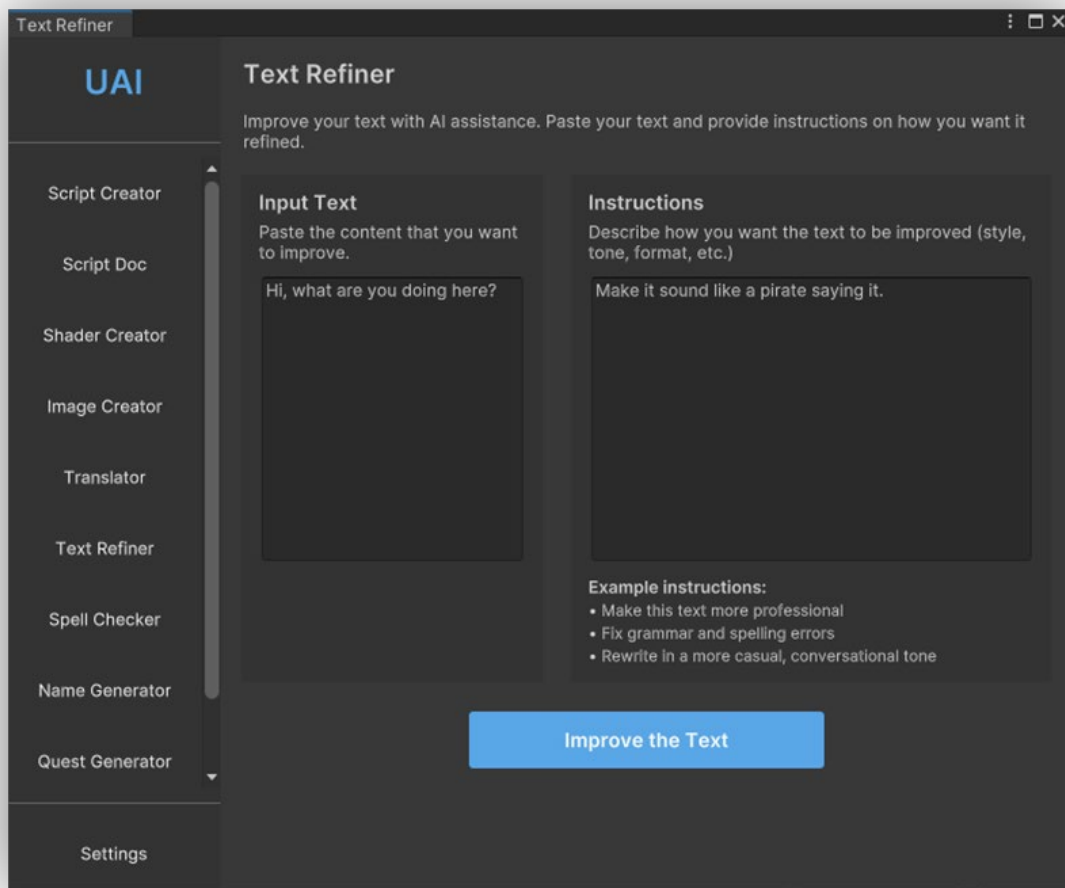

Figure 16 The Text Refiner interface

3.10.2. Translator

- **Purpose:** Translate text to any language with AI assistance.
- **Interface:**
  - **Text to Translate Area:** A large text field to enter the text you want to translate.
  - **Target Language Field:** Input the desired target language (e.g., "German," "French," "Spanish," "Japanese"). Example languages are often listed.
  - **Extra Characteristics Field:** (Optional) Provide additional context for the translation, such as desired tone or style (e.g., "Formal," "Informal," "Scientific," "Literary," "Business Friendly").
  - **Translate Button:** Sends the text, target language, and characteristics to the AI for translation. The result is typically displayed below.
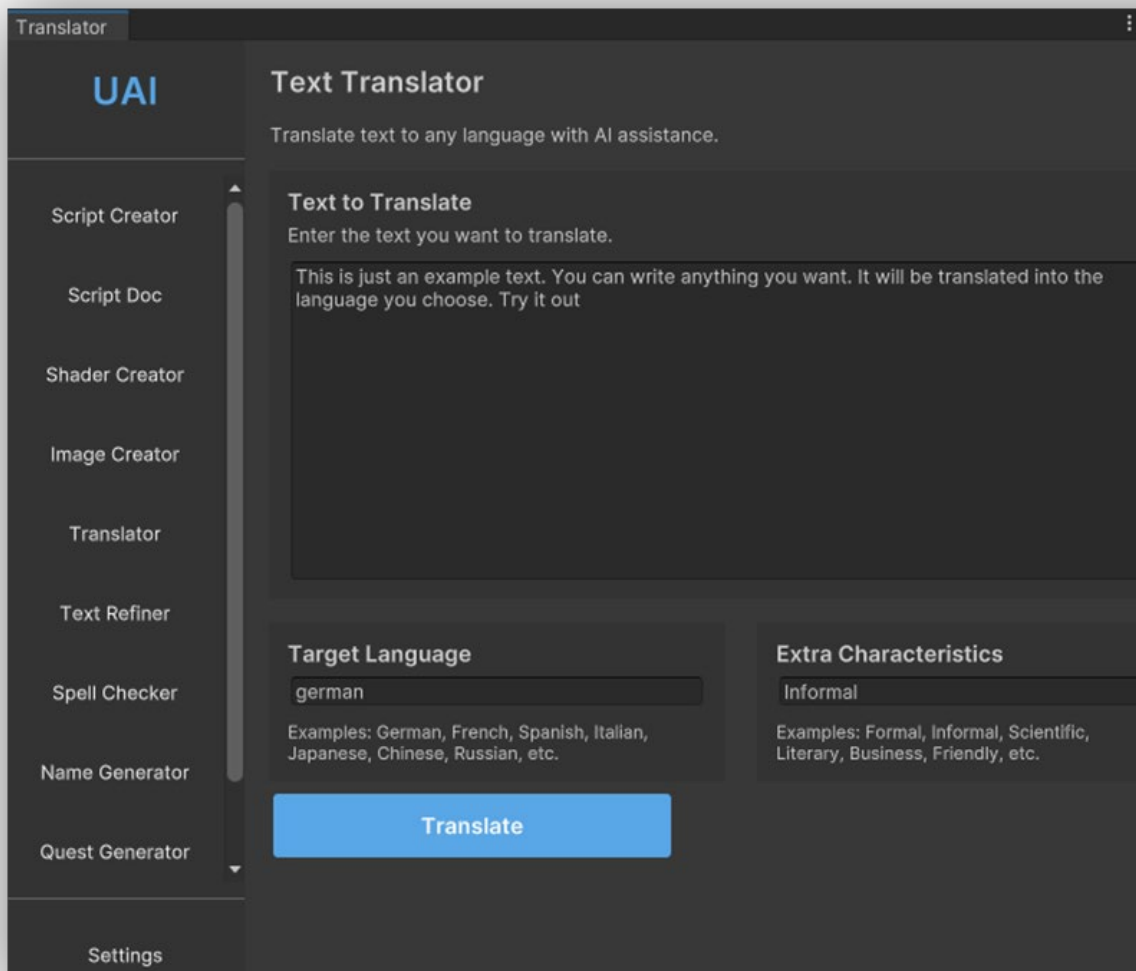

Figure 17 The Translator interface

3.10.3. Spell Checker

- **Purpose:** Check and correct spelling, grammar, and improve text styling using AI assistance.
- **Interface:**
  - **Text to Spell Check Area:** A large text field to enter the text you want to check.
  - **Check Spelling Button:** Sends the text to the AI for analysis. The AI will provide corrections and suggestions, typically displayed below or by highlighting issues
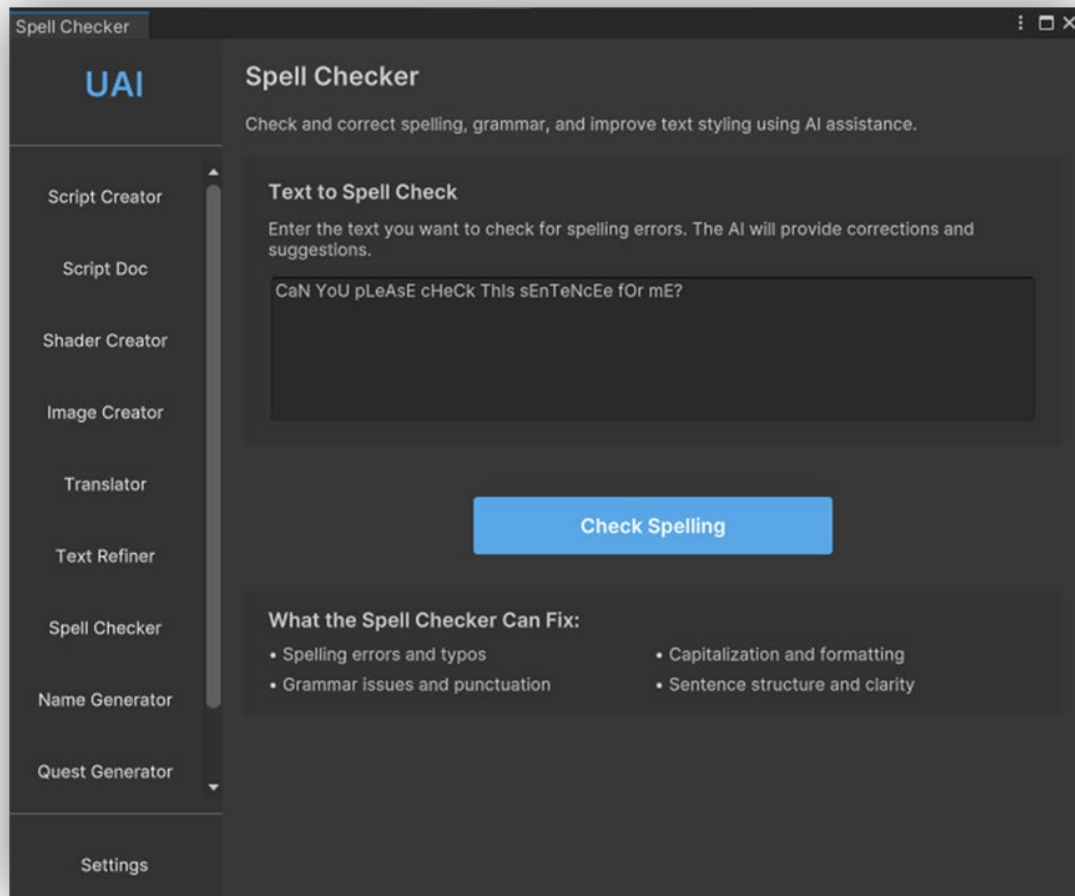

Figure 18 The Spell Checker interface

3.10.4. Name Generator

- **Purpose:** Generate names for characters, cities, or custom items based on your world's context.
- **Interface (Character Names example):**
    - **Sidebar/Tabs:** Has tabs for different name types (e.g., "Character Names," "City Names," "Custom Names").
    - **World Description Area:** A text field to describe your game world's setting, inhabitants, themes, etc. This helps the AI generate contextually appropriate names.
    - **Extra Info Area:** Provide specific details about the entity you need names for (race, profession, personality, etc.).
    - **Number of Names Slider/Field:** Specify how many name suggestions you want.
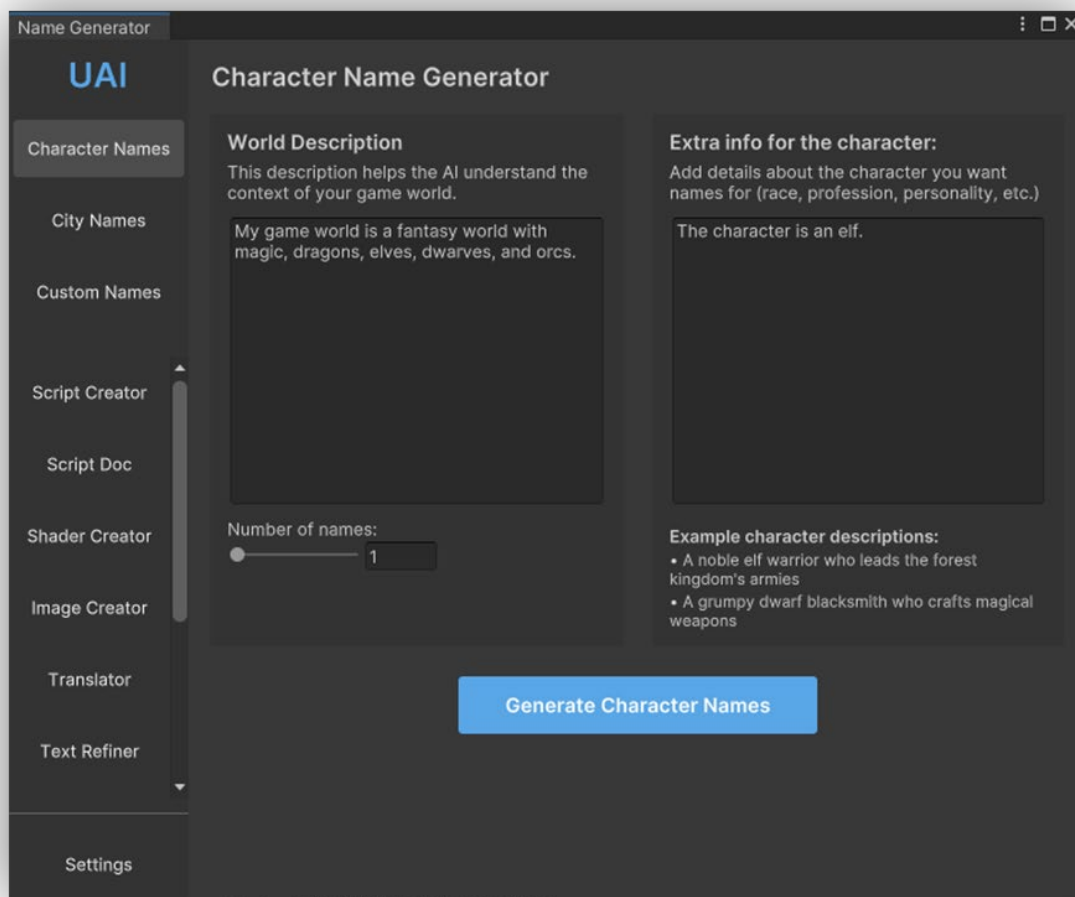   - **Generate Names Button:** Sends the descriptions and number to the AI.

Figure 19 The Character Name Generator interface

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3.10.5. Quest Generator

- **Purpose:** Generate unique and interesting quests for your game based on your game world description and specific instructions.
- **Interface:**
  - **World Description Area:** Describe your game world with details about its setting, inhabitants, magic systems, technology, etc.
  - **Quest Instructions Area:** Specify any details about the quest you want to generate (e.g., quest type, difficulty, target player level, desired objectives).
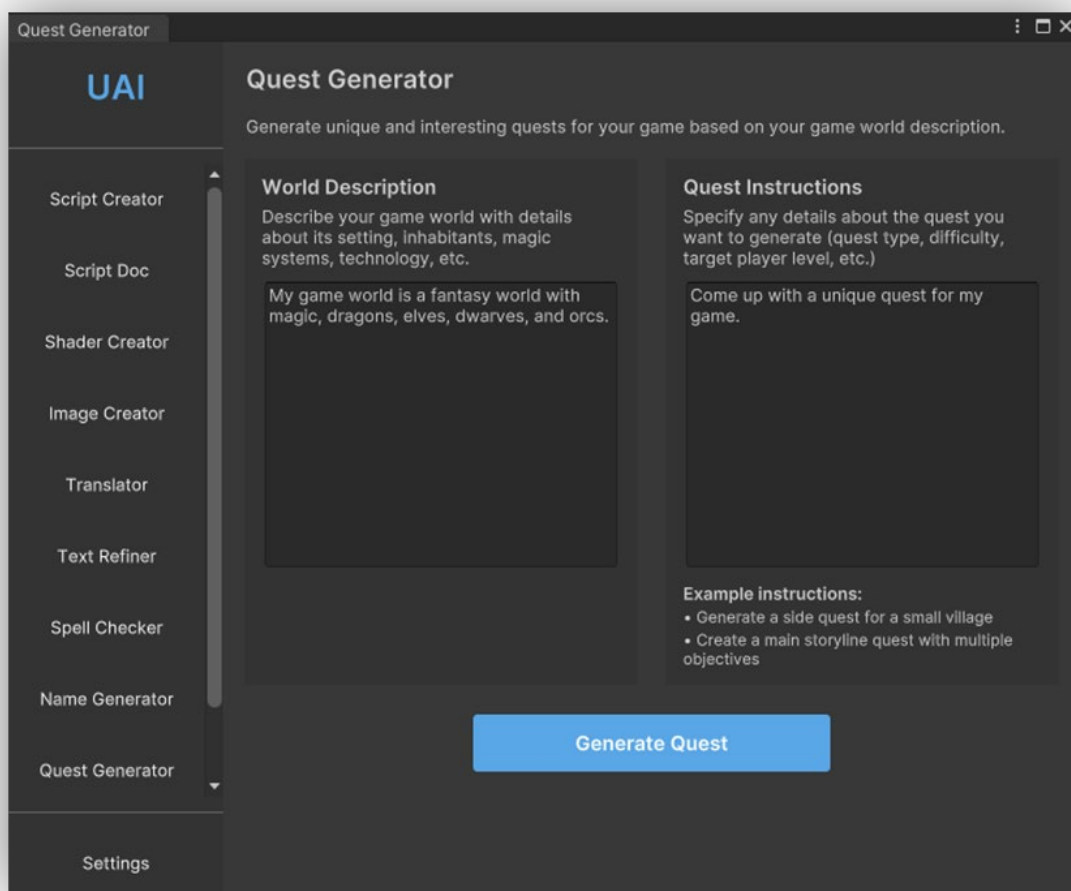 - **Generate Quest Button:** Sends the world description and quest instructions to the AI.

Figure 20 The Quest Generator interface

3.11. uAI Image Correction

The **uAI Image Correction** tool provides a comprehensive suite of color and image adjustment features directly within the Unity Editor. It's perfect for fine-tuning textures, sprites, UI elements, or any AI-generated images, allowing for quick iterations without needing external image editing software.

To open the Image Correction tool, navigate to `Tools > uAI Creator > Image Correction` in the Unity top menu bar.

Figure 21 The uAI Image Correction tool in action

3.11.1. Overview of the Interface

The Image Correction window is typically divided into two main panels: a preview area on the left and an adjustments panel on the right.

- **Preview Panel (Left):**
  - **Header Buttons:**
    - **Load Image:** Opens a file dialog to select an image (PNG, JPG, TGA, BMP) from your system.
    - **Save Image:** Saves the currently corrected image to a new PNG file.
    - **Revert:** Discards all changes and reverts the preview to the original loaded image.

- o **Image Preview Area:** Displays the image being corrected. This area also supports **drag-and-drop** for image files from your computer or Unity Project window
- **Adjustments Panel:**
  - o This panel contains various collapsible sections for different types of image adjustments. Each adjustment typically has a slider for quick changes and a float field for precise numerical input. Changes are applied to the preview in real-time.
  - o **Levels:**
    - **Black Point:** Adjusts the darkest pixels.
    - **White Point:** Adjusts the brightest pixels.
    - **Mid Point (Gamma for Levels):** Adjusts the mid-tones.
  - o **Exposure & Gamma:**
    - **Exposure:** Simulates increasing or decreasing the light exposure.
    - **Gamma:** Adjusts the overall brightness and contrast non-linearly.
  - o **Color Temperature:**
    - **Temperature:** Shifts colors along the blue-yellow axis (cooler to warmer).
    - **Tint:** Shifts colors along the green-magenta axis.
  - o **Basic Color:**
    - **Hue:** Shifts all colors around the color wheel.
    - **Saturation:** Adjusts the intensity of colors (from grayscale to vibrant).
    - **Brightness:** Adjusts the overall lightness or darkness.
    - **Contrast:** Adjusts the difference between light and dark areas.
  - o **Effects:**
    - **Grayscale Toggle:** Converts the image to grayscale.
    - **Invert Toggle:** Inverts all colors in the image.

3.11.2. Technical Notes & Order of Operations

The image adjustments are applied in a specific order internally to achieve predictable results:

1. **Levels** (Black Point, White Point, Mid Point)
2. **Exposure**
3. **Gamma**
4. **Temperature and Tint**
5. **Hue and Saturation** (via HSV conversion)
6. **Brightness**
7. **Contrast**
8. **Grayscale**
9. **Invert** (applied last)

Alpha channels from the original image are generally preserved through these operations.

3.11.3. Tips for Effective Use

- **Subtle Adjustments:** Often, small changes to multiple parameters yield better results than extreme changes to a single one.
- **Levels First:** For images with poor overall dynamic range (too dark, too bright, washed out), start by adjusting the **Levels** to set proper black, white, and mid-points.
- **Use with AI-Generated Assets:** This tool is excellent for quickly correcting colors, contrast, or brightness of images generated by AI tools without leaving Unity.
- **Revert is Your Friend:** Don't be afraid to experiment. You can always click "Revert" to go back to the original image.
- **Save Iterations:** If you're trying out different looks, save intermediate versions with different names.

4. Troubleshooting & FAQ

- **Q: I'm getting an API key error for a cloud LLM.**

  - A: Double-check your API key is correct and has been entered properly. Ensure your account with the provider is active and has sufficient credits/quota. Check for any typos or extra spaces.

- **Q: uAI Trellis 3D isn't connecting or generating models.**

  - A: Ensure Trellis 3D is correctly installed locally. Verify the APIServer Python script is running in the correct Python environment for Trellis 3D. Check that the API URL in the Unity tool matches the address of your APIServer (e.g., http://localhost:8000). Look for any error messages in the Python console running the APIServer.

- **Q: Local LLM (Ollama/LLM Studio) is not working.**

  - A: Ensure Ollama or LLM Studio is running and the model you wish to use is downloaded and loaded/served. Check the API endpoint in the uAI Creator settings matches the one provided by your local LLM server. Consult the Ollama/LLM Studio documentation for troubleshooting their local server.

- **Q: Generated content looks strange or isn't what I expected.**

  - A: AI generation requires experimentation. Try rephrasing your prompt, making it more specific. Iterate!

5. Support & Contact

If you encounter issues not covered in this documentation or have suggestions, please reach out through the following channels:

- **Unity Asset Store Page:** Use the support email or link provided on our Asset Store page.

- **Discord Server:** https://discord.gg/znYMdMJR5w

When requesting support, please provide:

- Your Unity Version.

- uAI Creator Version.

- A clear description of the issue.

- Steps to reproduce the issue.

- Any relevant screenshots or error messages from the Unity Console.

6. Changelog

Version 1.0 (Release Date: 28.05.2025)

- Initial release.