

# Unity ComfyUI Bridge

A robust, node-based integration tool that connects Unity to ComfyUI at runtime. This asset allows you to generate Images, 3D Models (GLB), and Audio, or manipulate RenderTextures directly inside your game or application using the ComfyUI API.

## Features

- **Workflow Engine:** A single component that supports Text-to-Image, Image-to-Image, Inpainting, Audio Generation, and 3D Model generation.
- **Node-Based Configuration:** Configure Prompts, Seeds, Steps, and Input Images using a visual list in the Unity Inspector.
- **Runtime Queue System:** "Fire and forget" execution queue handles multiple requests sequentially without freezing the game.
- **RenderTexture Support:** Pipe your Unity Camera output directly into ComfyUI as an input image.
- **Output Types:**
  - Image (Texture2D / RawImage)
  - RenderTexture (Blits result to a target RT)
  - Audio (WAV/MP3/FLAC support)
  - Object3D (Spawns GLTF/GLB models at runtime)

## Dependencies

This asset requires the following packages installed via Unity Package Manager:

1. **Newtonsoft Json** (`com.unity.nuget.newtonsoft-json`) - For parsing API data.
2. **gltFast** (`com.unity.cloud.gltfast`) - For loading 3D models at runtime.

## Installation

1. Copy the `ComfyUI_Bridge` folder into your project's `Assets` folder.
2. Ensure you have the dependencies installed.
3. Save your ComfyUI workflows as **API Format (JSON)**.
  - *In ComfyUI: Click Settings (Gear Icon) -> Enable "Enable Dev mode Options".*
  - *Click "Save (API Format)" button.*
4. Place your `.json` workflow files into `Assets/StreamingAssets/Workflows/`.

## Core Files Structure

Ensure your plugin folder looks like this. **Do not delete ComfyDataModels.cs**.

```
ComfyUI_Bridge/  
|--- Editor/
```

```

    └── ComfyBridgeMenu.cs
    └── ComfyNodeConfigDrawer.cs
    └── ComfyWorkflowExecutorEditor.cs
└── Runtime/
    ├── ComfyDataModels.cs          <-- REQUIRED: Data structures
    ├── ComfyManager.cs             <-- REQUIRED: Connection handler
    ├── ComfyNodes.cs               <-- REQUIRED: Node configurations
    └── ComfyWorkflowExecutor.cs    <-- REQUIRED: Main execution engine
└── Samples/                      <-- Optional Examples
    ├── Scenes/
    │   └── ExampleScene.unity
    ├── Scripts/
    │   └── ComfyMultiRunExample.cs
    └── Textures/
        └── input_example.png

```

## Quick Start

### 1. One-Click Setup

In the Unity Toolbar, go to **Tools > ComfyUI Bridge > Quick Setup**.

This will automatically create a **ComfyBridge** object in your scene with the necessary `ComfyManager` and `ComfyWorkflowExecutor` components attached.

### 2. Configure the Executor

Select the **ComfyBridge** object in your scene.

- **Workflow File Name:** Enter the name of your JSON file (e.g., `text2img_api.json`).
- **Expected Output:** Select the type (Image, Audio, Object3D, etc.).
- **Output Target:** Drag your RawImage, AudioSource, or Spawn Transform into the exposed slot.

### 3. Configure Inputs

In the `ComfyWorkflowExecutor` inspector, look for **Node Configuration**.

1. Click **+** to add an input.
2. **Type:** Select the type (e.g., `TextPrompt`, `KSampler`, `ImageInput`).
3. **ID:** Enter the Node ID from your ComfyUI JSON file (e.g., "6" for prompts, "3" for sampler).
4. Fill in the values (Text, Seed, Input Texture, etc.).

*Tip: Click the small "Refresh" icon next to the ID field to auto-load default values from your JSON file.*

### 4. Run It via Code

You can trigger generation from any script using the `ComfyUIBridge` namespace.

```

using UnityEngine;
using ComfyUIBridge; // Import the namespace

public class ExampleGenerator : MonoBehaviour
{

```

```

public ComfyWorkflowExecutor executor;

public void GenerateSimple()
{
    // Simple Run (Linked to Unity Button)
    executor.Execute();
}

public void GenerateQueue()
{
    // Modify values and Queue (Fire and Forget)
    // This is safe to call multiple times rapidly.
    executor.QueueGeneration(() => {
        var promptNode = executor.inputNodes.Find(n => n.nodeID == "6");
        promptNode.textValue = "A cyberpunk city, neon lights";

        var samplerNode = executor.inputNodes.Find(n => n.nodeID == "3");
        samplerNode.randomizeSeed = true;
    });
}
}

```

## Included Samples

The `Samples` folder contains example scenes and scripts to help you get started:

- **ExampleScene:** A setup demonstrating Text-to-Image generation.
- **ComfyMultiRunExample.cs:** A script showing how to queue multiple different prompts (Red Car, Blue Car, Green Car) in sequence.

## Output Specifics

- **Audio:** Supports WAV, MP3, OGG, AIFF. If a FLAC file is received, it will be downloaded to `Application.persistentDataPath` (as Unity cannot play FLAC natively), and a path will be logged to the console.
- **3D Models:** Requires the `glTFast` package. Models are instantiated at the `Result 3D Spawn Point` transform.
- **RenderTextures:** Input RenderTextures are automatically converted to temporary Texture2D assets and uploaded to the server before generation.

## Troubleshooting

- **400 Bad Request:** Check your Console. The Manager prints the specific server error. This often happens if you send a Float to an Int field (like Steps).
- **Image not changing:** Ensure your `ImageInput` Node ID matches the "Load Image" node in your JSON.
- **Audio not playing:** Unity **does not support FLAC natively**. In your ComfyUI workflow, please ensure your "Save Audio" node is set to output **WAV, MP3, or OGG**. If FLAC is used, the file will be downloaded to disk but will not play automatically.

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