




Warlock-Studio

Technical Documentation and User Guide









Software Version: 5.0 (NEO-Refactor)

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November 22, 2025

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 1. 1

Introduction to Warlock-Studio v5.0

Welcome to Warlock-Studio v5.0 — a major evolutionary leap in AI-powered media enhancement. This version introduces a robust **Modular Architecture** and the new **NEO Engine**, optimizing stability, hardware diagnostics, and processing efficiency. It provides advanced tools for super-resolution, artifact removal, and frame generation through an intuitive interface that now includes an **Integrated Console** and native **Drag & Drop** support.

 2. 1

Quick Start Guide

Accelerated Media Enhancement Procedure

Follow these steps to process your media using the new v5.0 workflow.

1. **Load Files (Drag & Drop):** You can now simply **drag and drop** your image or video files directly onto the application window. Alternatively, click the **"Select Files"** button.
2. **AI Model Selection:** In the **"AI model"** dropdown menu, select an inference model.
 - For photorealistic images, **BSRGANx4** is recommended for texture reconstruction.
 - For animation/cartoons, **RealESR_Animex4** preserves sharp edges.
 - For video, **RealESR_Gx4** balances speed and quality.
 - For increasing framerate, use **RIFE** models (note: Blending controls will hide automatically).
3. **Verify Hardware (NEO Engine):** Click the **Gear Icon (⚙️)** to open Preferences. Check the **Hardware Diagnostics** to see the **"Recommended Tiles"** and **"Safe VRAM Limit"** calculated specifically for your PC.
4. **Adjust Settings:** Set the **"GPU VRAM (GB)"** based on the recommendation. For a quick test, set **"Input resolution"** to 75%.
5. **Start Processing:** Click **"Make Magic"**. You can now monitor real-time progress and logs via the new **Integrated Console** at the bottom of the window.

 3. 1

Installation and Modular Architecture

▶ 3.1 📥 Installation Process & Path Change

Warlock-Studio uses a self-contained offline installer.

⚠️ Critical: Installation Directory Change

In version 5.0, the default installation directory has been migrated from Program Files to:

```
%userprofile%\%\Documents\Warlock-Studio
```

Reason: This change prevents "Permission Denied" errors on Windows systems with strict UAC. It ensures the application has full read/write access to generate the `warlock_config.json`, write real-time logs, and manage video checkpoints without requiring constant Administrator privileges.

1. **Obtaining the Executable:** Download the 'Warlock-Studio-Setup.exe' (Full Installer) from the official repositories.
2. **Run the Installer:** Run the setup. It will automatically default to your Documents folder.
3. **Launch:** Open Warlock-Studio via the Desktop shortcut.

▶ 3.2 🖥️ System Requirements

Component	Technical Specification
Operating System	Windows 11 or Windows 10 (64-bit architecture required).
RAM	8 GB (minimum), 16 GB (recommended).
Graphics Card (GPU)	Mandatory Requirement: GPU with DirectX 12 support. NVIDIA: CUDA support (Maxwell or newer). AMD/Intel: DirectML support. 4+ GB of VRAM is recommended.
Storage	2 GB of free disk space. SSD strongly recommended for video I/O.

Table 1: Requirements for v5.0. The NEO Engine will verify these upon launch.

▶ 3.3 🧩 Modular File Architecture (v5.0)

Version 5.0 abandons the single-script structure. The application is now composed of specialized modules to improve stability and maintainability.

- `Warlock-Studio.py` (**Core Orchestrator**): Manages the main GUI event loop and spawns multiprocessing tasks for AI inference.
- `warlock_preferences.py` (**State Manager**): Houses the **NEO Engine** for hardware telemetry, the `ConfigManager` for JSON persistence, and the OTA Update Manager.
- `console.py` (**I/O Manager**): Controls the new **Integrated Console**, redirecting stdout and stderr streams to the GUI for real-time debugging.
- `drag_drop.py` (**Event Wrapper**): Implements the `DnDCTk` class to handle native OS Drag & Drop events.
- **Assets:** Includes `ffmpeg.exe`, `exiftool.exe`, and the AI Models ('.onnx') in the AI-onnx directory.

4. 1

Detailed Analysis of Inference Models

In v5.0, the interface adapts to your model selection. Selecting a **RIFE** model will automatically hide "Blending" controls and reveal "Frame Generation" options. Selecting an **Upscaling** model does the reverse.

► 4.1 🗪 Model Comparison Matrix

Model	Function	Scale	VRAM	Use Case
🔥 Denoising				
IRCNN_Mx1	Denoise	x1	4.0	Moderate noise reduction (JPEG artifacts).
IRCNN_Lx1	Denoise	x1	4.0	Intensive noise reduction for degraded images.
High-Fidelity Upscaling				
BSRGANx4	Upscale	x4	0.6	Photorealistic texture synthesis. Best for portraits/nature.
RealESRGANx4	Upscale	x4	0.6	General-purpose robust reconstruction.
⚡ High-Speed Upscaling				
RealESR_Gx4	Upscale	x4	2.2	Fastest model. Optimized for video.
RealESR_Animex4	Upscale	x4	2.2	Optimized for Anime/Cartoons (clean lines).
👤 Facial Restoration				
GFPGAN	Restore	x1	1.8	Face reconstruction. v5.0 enforces Float32 precision for stability.
🎞️ Frame Interpolation (FluidFrames)				
RIFE	Interpolate	N/A	~1.5	Generates intermediate frames (x2, x4, x8).
RIFE_Lite	Interpolate	N/A	~1.2	Faster variant for lower-end GPUs.

Table 2: Technical guide for AI models. VRAM values are base estimates.

5. 1

Performance Optimization and NEO Engine

▶ 5.1 🛠️ The NEO Engine

🔧 Automatic Hardware Heuristics

Warlock-Studio v5.0 introduces the **NEO Engine** (located in `warlock_preferences.py`). This system scans your CPU, RAM, and GPU capabilities in real-time to generate **Smart Recommendations**.

- **Safe VRAM Limit:** The engine calculates a safe buffer using the formula: $\max(0.5, \text{Physical VRAM} - 1.5 \text{ GB})$.
- **Recommended Tiles:** It suggests the optimal `tiles_resolution` to maximize speed while preventing Out-Of-Memory (OOM) crashes.
- **Thread Concurrency:** It analyzes your CPU topology (physical vs. logical cores) to suggest safe multithreading levels for video processing.

▶ 5.2 ⚙️ Critical Parameters

- **Input Resolution %:** Setting this to **75%** drastically reduces load with minimal quality loss.
- **AI Multithreading:** (Video only) Processes multiple frames in parallel. Use the NEO Engine's recommendation to avoid system freezing.
- **Keep Frames:** Enable this (`selected_keep_frames = True`) if you plan to experiment with different video encoding codecs later.

📖 6. 1

Diagnostics and Troubleshooting

⚠️ Integrated Console

Use the new ****Integrated Console**** at the bottom of the app window to view real-time error logs, warnings, and processing status. You can search, copy, and save these logs.

🚫 Error: "FFmpeg encoding failed..." / Fallback Active

Diagnosis: The selected hardware codec (e.g., `hevc_nvenc`) failed due to driver issues or resource locking. **v5.0 Solution:** The system now features an **Automatic Fallback**. If the GPU encoder fails, it automatically switches to the CPU-based `libx264` encoder to ensure the video is finished. Check the console for yellow warnings indicating this switch.

🧱 Error: "Out of memory" / OOM Recovery

Diagnosis: VRAM exhaustion during tiling. **v5.0 Solution:** The application detects this exception and triggers **Recursive Dynamic Tiling**. It automatically halves the tile resolution (e.g., 100% → 50%) and retries the frame. You do not need to restart the process manually.

🐛 Error: "Failed to load model" (ONNX)

Diagnosis: Issue initializing the execution provider. **Solution:** v5.0 implements a strict priority chain: CUDA → DirectML → CPU. Ensure your GPU drivers are up to date. If using an older NVIDIA card, the system may default to DirectML or CPU.

Error: "NaN" (Not a Number)

Diagnosis: GPU Driver Timeout (TDR). **Solution:** Restart the process without deleting the temp frames folder. The app will resume from the last successful frame.

7. 1

Software Architecture Analysis (v5.0)

▶ 7.1 Modular Inference Engine

Warlock-Studio v5.0 utilizes a robust **ONNX Runtime** backend managed by the `create_onnx_session` factory in the core orchestrator. It enforces strict integer typing for device IDs to ensure compatibility with rigid DirectML backends.

▶ 7.2 Lossless Intermediate Pipeline

In v5.0, the video extraction pipeline (`extract_video_frames`) strictly enforces the use of **.PNG** containers for temporary frames. This eliminates the generation loss previously caused by JPEG artifacts before the image entered the neural network.

▶ 7.3 Architecture Diagram (Modular)

Updated component-level architecture illustrating the new modular design and the interaction between the GUI, the NEO Engine, and the Core Orchestrator.

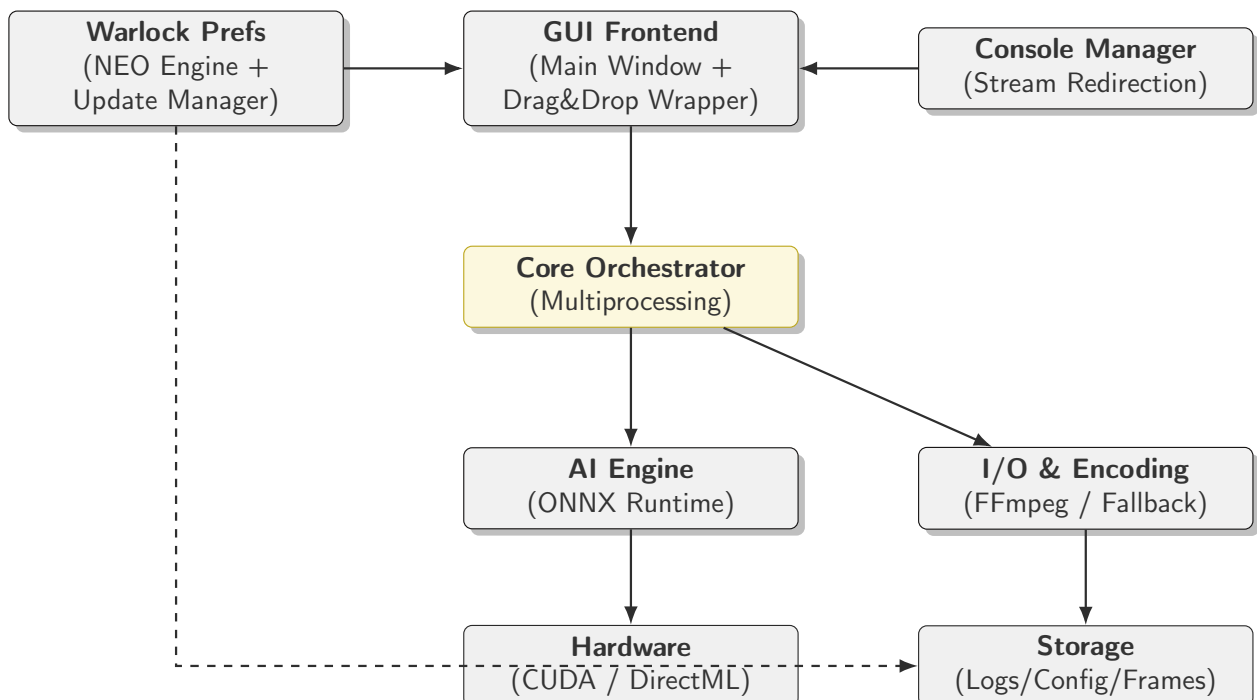


Figure 1: Warlock-Studio v5.0 Modular Component Architecture.

 8. 1

Glossary

NEO Engine

The new heuristic subsystem in v5.0 responsible for hardware scanning, diagnostics, and configuration recommendation.

Modular Architecture

A software design technique that splits the code into separate, independent modules ('console', 'preferences', 'core') to improve maintainability.

ONNX Runtime

The cross-platform engine used to run the AI models. v5.0 enforces strict device ID typing.

OOM Recovery





(Out Of Memory) An automatic mechanism that reduces tile size when VRAM is exhausted to prevent crashes.

DirectML

(Direct Machine Learning) API used for GPU acceleration on AMD and Intel cards.

 9. 1

Support and Community

-  **Manual:** Click the **Book Icon** in the app header to open this PDF document.
-  **Reporting Issues:** Report bugs on GitHub. Please attach the `error_log.txt` file located in your Documents folder.
-  **Updates:** Use the internal **Update Manager** (Gear Icon → Check Updates) to download the latest version directly.
-  **Contact:** For non-bug related inquiries: negroayub97@gmail.com.

Thank you for using Warlock-Studio v5.0.