



WARLOCK-STUDIO

The Comprehensive AI Media Enhancement Suite

MASTER OPERATING MANUAL

Version 5.1.1

Architecture · Workflows · Troubleshooting · Advanced Config

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The Core Philosophy

1.1 · What is Warlock-Studio?

Warlock-Studio is not just an "app"; it is an **AI Orchestrator**.

In the world of AI, processing a single image or video involves dozens of complex steps: managing memory buffers, tiling large images to fit in VRAM, extracting frames, running neural network inference (ONNX), and re-encoding video streams.

Warlock-Studio automates this entire pipeline. It acts as a bridge between high-performance libraries (OpenCV, MoviePy, ONNX Runtime) and the user, providing a "Drag & Drop" experience for industrial-grade tasks.

1.2 · Capabilities at a Glance

- › **Upscaling:** Increasing resolution while adding detail (up to 8K+).
- › **Restoration:** Removing noise (Denoising) and fixing broken faces (GFPGAN).
- › **FluidFrames (Interpolation):** Generating new frames to make video smoother (30fps → 60fps).
- › **Smart Rendering:**
 - **Tiling Engine:** Processes images larger than your GPU memory.
 - **Auto-Fallback:** Automatically switches to CPU encoding if GPU encoding fails.
 - **Resume System:** Crashed during a 2-hour render? Warlock resumes from the exact frame.

1.3 · System Requirements Matrix

Strict adherence to these requirements ensures stability.

Component	Minimum	Recommended
OS	Windows 10 (64-bit)	Windows 11 (64-bit)
CPU	Quad-Core (i5/Ryzen 5)	8-Core+ (i7/Ryzen 7) for fast encoding
RAM	8 GB	16 GB - 32 GB (Crucial for 4K video)
GPU	Integrated (Vega/Intel HD)	NVIDIA RTX 3060 (or equivalent) with 8GB+ VRAM
Storage	HDD (Slow)	NVMe SSD (Required for high-speed frame extraction)
Libraries	Visual C++ Redist.	Latest GPU Drivers

Table 1.1: Hardware Compatibility Specification

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Anatomy of the Interface

This chapter breaks down every pixel of the GUI. Warlock-Studio uses a "**Top-Down**" workflow design.

2.1 · 1. The Input Manager (File Queue)

Located on the left/top. It has two modes:

2.1.1 A. The Drop Zone

When empty, it shows a large "Drag & Drop" area. It accepts:

- › **Images:** .jpg, .png, .bmp, .tiff, .webp
- › **Videos:** .mp4, .mkv, .avi, .mov, .webm

2.1.2 B. The Active Queue

Once files are added, it transforms into a list. Each card displays:

- › **Thumbnail:** Visual verification of the file.
- › **Meta-Info:** Resolution, Duration, FPS, File Size.
- › **Projection:** A dynamic calculation showing:

Input Res $\xrightarrow{\text{Input \%}}$ AI Input $\xrightarrow{\text{Upscale}}$ AI Output $\xrightarrow{\text{Output \%}}$ Final Res

PRO TIP: Queue Secrets

Use the **↑** button to prioritize urgent files. Use the **✕** button to remove files. Warlock processes files **sequentially** (top to bottom).

2.2 · 2. The Toolbar (Global Tools)

Floating in the top right:

- › **📖 Manual:** Opens this specific PDF document.

-  **Preferences:** Opens the `warlock_preferences` window (See Chapter 6).

2.3 · 3. The Control Panel (The Brain)

This is where you program the logic for the batch.

2.3.1 Row 1: AI Model Selection

The dropdown list contains categorized models. (See Chapter 3 for details).

2.3.2 Row 2: Contextual Action (Blending vs. Frame Gen)

This menu changes dynamically based on the AI Model selected.

- **Scenario A: Upscaling Model Selected**

- ☐ **Menu:** *AI Blending*
- ☐ **Function:** Mixes the original image with the AI result to recover natural texture/grain.
- ☐ **Values:** OFF (0%), Low (30%), Medium (50%), High (70%).

- **Scenario B: RIFE (Interpolation) Selected**

- ☐ **Menu:** *Frame Generation*
- ☐ **Function:** Determines how many new frames to create.
- ☐ **Values:** x2 (Double FPS), x4 (Quadruple FPS), Slowmotion (Increase frames but slow playback).

2.3.3 Row 3: AI Multithreading

Function: Controls how many video frames are processed in parallel.

- **OFF (1 Thread):** Safest. Essential for 4K video or low-VRAM GPUs.
- **2 Threads:** Sweet spot for 1080p video on mid-range GPUs.
- **4-8 Threads:** High VRAM usage. Only for RTX 3090/4090 processing SD content.

2.3.4 Row 4: Resolution Orchestration

- **Input Resolution %:** Downscales *before* AI.
- **Output Resolution %:** Downscales *after* AI.

2.3.5 Row 5: Hardware Limits (The Safety Valve)

- **GPU Selection:** Choose specific card or "Auto".
- **VRAM Limiter (GB): CRITICAL.** This defines the maximum tile size.

2.4 · 4. The Integrated Console (The Voice)

New in v5.1.1. It provides a live feed of the backend operations.

- **[SUCCESS]**: Task completed.
- **[INFO]**: Progress updates (e.g., "Extracting frames 45%").
- **[ERROR]**: Critical failures (e.g., "Out of Memory").
- **[FFMPEG]**: Raw encoding logs from the video engine.

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The Model Library: A Field Guide

Warlock-Studio includes a curated selection of ONNX models. Using the wrong model for the task is the #1 cause of poor results.

Model	Type	BEST Use Case	DO NOT Use When...
RealESR_Animex4	Upscale (x4)	2D Animation, Cartoons, Line Art. Removes compression artifacts perfectly.	Input is a real photograph. It will turn skin into "plastic" or "oil paint".
RealESR_Gx4	Upscale (x4)	General Purpose. Good balance for art and clean photos.	Input is extremely noisy or grainy.
BSRGANx4	Upscale (x4)	Real World Video. Adds realistic texture. Handles blur and JPEG compression well.	You need a perfectly clean, noiseless image (it generates grain).
BSRGANx2	Upscale (x2)	Same as above, but faster. Ideal for 1080p → 4K.	Same as above.
RealESRGANx4	Upscale (x4)	Text & Logos. Extremely sharp edges.	Input contains faces (might look over-sharpened).
IRCNN_M Lx1	Denoise (x1)	Cleaning. Removing noise before upscaling.	You want to increase resolution (it stays at x1).
GFPGAN	Restoration	Faces. Restores eyes/mouths in blurry photos.	Image has no faces, or faces are already high quality (it might alter identity).
RIFE RIFELite	Interpolation	Smoothing Video. Increasing frame rate.	You want to increase resolution/sharpness.

Table 3.1: Comprehensive Model Usage Matrix

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Advanced Concepts (The Engine Room)

4.1 · Tiling: How to Process 8K on a 2GB Card

CONCEPT: What is Tiling?

Neural networks require massive amounts of memory. Processing a 4K image in one go might require 12GB of VRAM.

The Solution: Warlock-Studio chops the image into smaller squares (Tiles), processes each square individually, and stitches them back together seamlessly.

The **GPU VRAM (GB)** setting controls the size of these squares.

- **High Setting (e.g., 8GB):** Large tiles. Fewer tiles to process. Faster speed.
- **Low Setting (e.g., 2GB):** Small tiles. More tiles to process. Slower, but ****impossible to crash****.

4.2 · Auto-Fallback Encoding

Video encoding is prone to driver failures. Warlock-Studio implements a "Self-Healing" mechanism.

- **Attempt 1:** The user selects a Hardware Encoder (e.g., `h264_nvenc`).
- **Failure:** The GPU driver crashes or is busy.
- **Detection:** Warlock detects the non-zero exit code from FFmpeg.
- **Attempt 2 (Auto):** The system immediately switches to `libx264` (CPU Encoder).
- **Result:** The video renders successfully (albeit slower), preventing a "wasted night" of rendering.

5 Workflows

5.1 · FluidFrames (RIFE Integration)

RIFE (Real-Time Intermediate Flow Estimation) works differently from Upscalers.

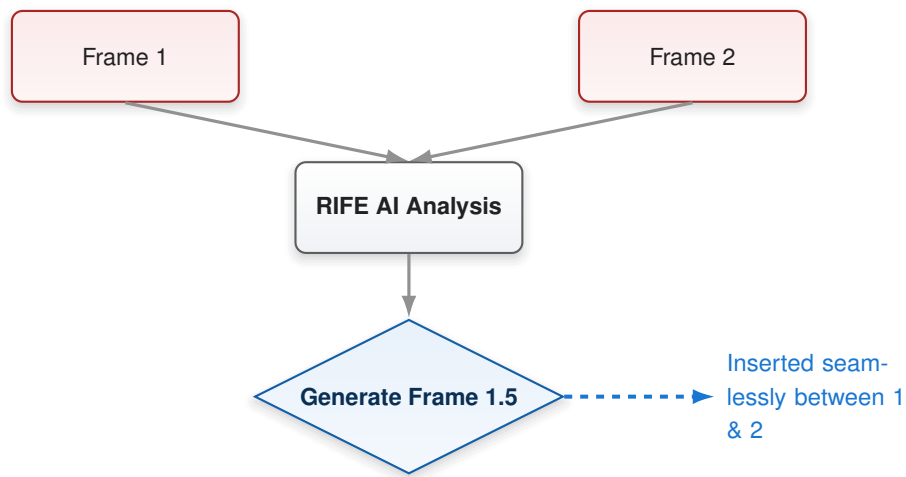
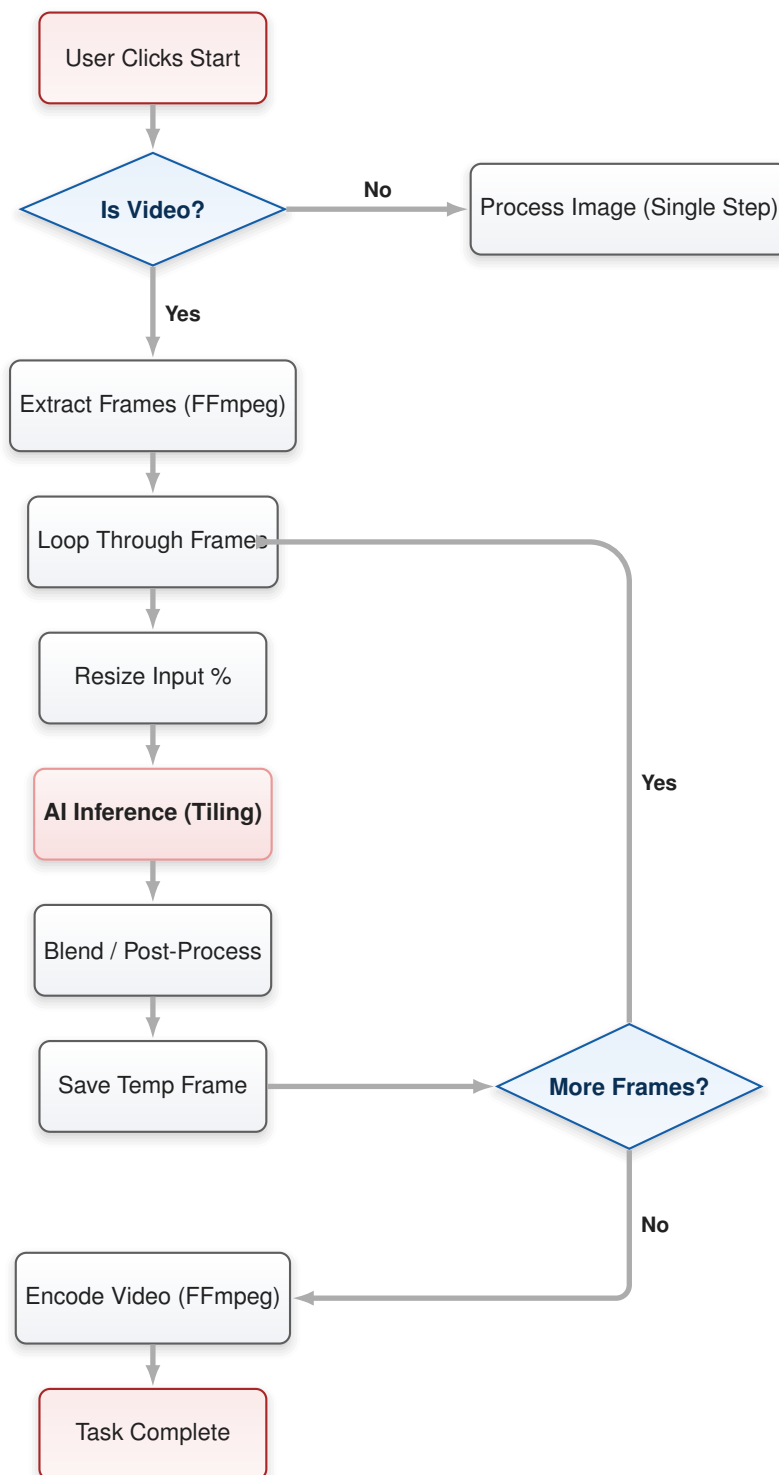


Figure 5.1: RIFE Logic: Creating frames from thin air

5.2 · The Video Upscaling Pipeline



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Preferences & Configuration

The `warlock_preferences.py` module handles persistent settings.

6.1 · General Tab

- **App Theme:** Switch between Dark, Light, or System.
- **UI Scaling:** Essential for 4K monitors (Set to 125%).
- **Window Opacity:** Aesthetic transparency.
- **Auto-Close:** Shuts down the app after the queue finishes.

6.2 · Performance Tab

- **ONNX Provider:**
 - ☐ *Auto:* Recommended.
 - ☐ *CUDA:* Forces NVIDIA acceleration.
 - ☐ *DirectML:* Forces AMD/Intel acceleration.
 - ☐ *CPU:* Debug mode (Slow).
- **Process Priority:** Increases the Windows priority of the FFmpeg subprocess.

6.3 · Integrations Tab

Allows manual definition of paths for `ffmpeg.exe` and `exiftool.exe` if the auto-detection in `Assets/` fails.

6.4 · Logs & Maintenance

- **Clean Temp Files:** A "Panic Button" to clear disk space. Deletes all `*.tmp`, `*.checkpoint`, and temporary frame folders.
- **Export Debug Zip:** Compresses all logs and config files into a ZIP to share with the developer for bug reporting.

7

Troubleshooting & Solutions

This section covers 90% of user reports.

7.1 · Crash Scenarios

SCENARIO: Crash: "Out of Memory" / "Allocation Failed"

Symptoms: The app closes instantly or the console turns red with memory errors. **Cause:** The AI is trying to create a Tile larger than available VRAM. **Solution:**

1. Set **AI Multithreading** to **OFF**.
2. Lower **GPU VRAM (GB)** setting (e.g., from 4 to 2).
3. Reduce **Input Resolution %** (e.g., to 75%).

SCENARIO: Crash: "Timeout Detection Recovery (TDR)"

Symptoms: The screen flickers, goes black for a second, and the app reports an error. **Cause:** Windows reset the GPU driver because a single tile took too long to process. **Solution:** Lower the **GPU VRAM (GB)** setting drastically (e.g., to 1 or 2). Smaller tiles process faster, preventing the timeout.

SCENARIO: Stuck: "Extracting Frames..."

Symptoms: The progress bar doesn't move for minutes. **Cause:** The input video is huge (e.g., a 2-hour movie) or stored on a slow HDD. **Solution:** Be patient. Check the "Temp" folder in your file explorer to see if PNG files are being created. Move source files to an SSD.

7.2 · Quality Issues

SCENARIO: Result: "Oily" or "Plastic" Faces

Cause: Using RealESR_Anime4 on real photos. **Solution:** Switch to RealESR_Gx4 or BSRGANx4.

SCENARIO: Result: Weird artifacts in Video Motion

Cause: RIFE Interpolation struggles with scene cuts (sudden changes in camera). **Solution:** This is a limitation of current AI tech. Try RIFE_Lite which is sometimes less aggressive.

7.3 · The Checkpoint System

CRITICAL WARNING: Do NOT delete Temp Files!

If Warlock-Studio crashes at frame 1500 of 2000:

1. Re-open the app.
2. Load the **exact same video**.
3. Choose the **exact same settings**.
4. Click Start.

The system will detect the existing frames and verify the `.checkpoint` file. It will output:
[INFO] Resuming video upscaling... and start at frame 1501.

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Credits

Development Team

Lead Developer: Ivan-Ayub97

Core Technologies Stack

We stand on the shoulders of giants.

- **UI Framework:** *CustomTkinter* (TomSchimansky)
- **AI Inference Engine:** *ONNX Runtime* (Microsoft)
- **Computer Vision:** *OpenCV*
- **Video Processing Backbone:** *FFmpeg*

Open Source Philosophy

Licensed under MIT.
Collaboration drives innovation.