# Setting Up Real Image Manipulation on Your Local Server

## Overview

This guide will help you set up **state-of-the-art image manipulation** capabilities on your Windows 11 machine with the new RTX 3060 12GB. You'll be able to:

- Generate photorealistic images from text prompts
- Remove/replace backgrounds with nano-precision
- Restore and colorize old black & white photos
- Fill in missing parts of images (limbs, faces, torn sections)
- Remove people/objects cleanly with perfect edges
- Inpaint and outpaint with professional quality

**Technology Stack:**

- ComfyUI (node-based workflow system)
- Flux.1-dev FP8 (2025's best image generation model)
- ControlNet suite (precise control over generation)
- Your RTX 3060 12GB (perfect for these models)

**Time to Setup:** 30-45 minutes
**Disk Space Required:** ~20-30 GB

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## Prerequisites

**Before Your GPU Arrives**

- ✅Windows 11 machine (you have this)
- ✅Open WebUI already installed (you have this)
- ✅Ollama running (you have this)
- ⏳RTX 3060 12GB (arriving in a few days)

**After GPU Installation**

1. **Install latest NVIDIA drivers**
   - Download from: https://www.nvidia.com/download/index.aspx
   - Select: GeForce RTX 30 Series → RTX 3060 → Windows 11
   - Install and restart
2. **Verify GPU is detected**

```cmd
nvidia-smi
```

You should see your RTX 3060 with 12GB VRAM listed.

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## Step 1: Install ComfyUI (Portable Version)

### Why ComfyUI?

As of November 2025, ComfyUI has become the preferred platform over AUTOMATIC1111 because:

- Better performance on modern GPUs
- Native Flux model support
- More powerful workflow system
- Better for complex image manipulation tasks

### Installation Steps

1. **Download ComfyUI Portable**
   - Go to: https://github.com/comfyanonymous/ComfyUI/releases
   - Download: `ComfyUI_windows_portable_nvidia_cu118_or_cpu.7z`
   - Size: ~2-3 GB
2. **Extract to permanent location**

```cmd
# Create AI directory
mkdir D:\AI
cd D:\AI

# Extract the 7z file here (use 7-Zip or WinRAR)
# You should have: D:\AI\ComfyUI_windows_portable\
```

3. **First Run**

```cmd
cd D:\AI\ComfyUI_windows_portable
run_nvidia_gpu.bat
```

The batch file will:

- Auto-detect your RTX 3060
- Install required dependencies
- Start ComfyUI server on `http://localhost:8188`

4. **Verify Installation**
   - Open browser to `http://localhost:8188`
   - You should see the ComfyUI interface with node workflow

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## Step 2: Download Essential Models

### Directory Structure

ComfyUI models go in specific folders:

```
D:\AI\ComfyUI_windows_portable\
├── models\
│   ├── checkpoints\       (main models go here)
│   ├── controlnet\        (ControlNet models)
│   ├── upscale_models\    (upscalers)
│   ├── vae\               (VAE models)
│   └── clip\              (CLIP models)
```

**Model 1: Flux.1-dev FP8 (Main Model) - REQUIRED**

**Why FP8 version?**

- Optimized for 12GB VRAM
- 8GB model size (vs 24GB for full precision)
- Same quality as full model
- Faster generation

**Download:**

- URL: https://huggingface.co/Kijai/flux-fp8/blob/main/flux1-dev-fp8.safetensors
- Size: ~8 GB
- Save to: `D:\AI\ComfyUI_windows_portable\models\checkpoints\`

**Model 2: Flux ControlNet Models - REQUIRED**

ControlNet gives you precise control over image generation (depth, edges, poses).

**Download these two:**

1. **ControlNet Depth** (understands 3D structure)
   - URL: https://huggingface.co/Shakker-Labs/FLUX.1-dev-ControlNet-Depth
   - Files needed:
     - `diffusion_pytorch_model.safetensors` (2.5 GB)
   - Save to: `D:\AI\ComfyUI_windows_portable\models\controlnet\`
2. **ControlNet Canny** (edge detection)
   - URL: https://huggingface.co/Shakker-Labs/FLUX.1-dev-ControlNet-Canny
   - Files needed:
     - `diffusion_pytorch_model.safetensors` (2.5 GB)
   - Save to: `D:\AI\ComfyUI_windows_portable\models\controlnet\`

**Model 3: Upscaler Models - RECOMMENDED**

For 4K/8K output from your generated images.

**Real-ESRGAN (Best for photos)**

- URL: https://github.com/xinntao/Real-ESRGAN/releases
- Download: `RealESRGAN_x4plus.pth` (64 MB)
- Save to: `D:\AI\ComfyUI_windows_portable\models\upscale_models\`

**Ultimate SD Upscale**

- URL: https://huggingface.co/uwg/upscaler/tree/main
- Download: `ESRGAN_SRx4_DF2KOST_official-ff704c30.pth`
- Save to: `D:\AI\ComfyUI_windows_portable\models\upscale_models\`

**Model 4: Face Restoration Models - For Photo Restoration**

**CodeFormer** (Best for old photos)

- URL: https://github.com/sczhou/CodeFormer/releases
- Download: `codeformer.pth`
- Save to: `D:\AI\ComfyUI_windows_portable\models\facerestore_models\`

**GFPGAN** (Backup face restoration)

- URL: https://github.com/TencentARC/GFPGAN/releases
- Download: `GFPGANv1.4.pth`
- Save to: `D:\AI\ComfyUI_windows_portable\models\facerestore_models\`

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## Step 3: Install ComfyUI Manager (Essential)

ComfyUI Manager makes installing custom nodes and workflows incredibly easy.

**Installation**

1. **Stop ComfyUI** (if running)
2. **Clone Manager**

```
cmd

cd D:\AI\ComfyUI_windows_portable\custom_nodes
git clone https://github.com/ltdrdata/ComfyUI-Manager.git
```

3. **Restart ComfyUI**

```
cmd

cd D:\AI\ComfyUI_windows_portable
run_nvidia_gpu.bat
```

4. **Verify Installation**
   - Go to `http://localhost:8188`
   - You should see a **Manager** button in the interface

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## Step 4: Install Essential Custom Nodes

These nodes add critical functionality for image manipulation.

**Via ComfyUI Manager (Easiest)**

1. Click **Manager** button in ComfyUI interface
2. Click **Install Custom Nodes**
3. Search and install these essential packs:

**REQUIRED:**

- ✅**ComfyUI_Impact_Pack** - Advanced image manipulation
- ✅**ComfyUI_Segment_Anything** - Auto-masking for object removal
- ✅**ComfyUI_ControlNet_Aux** - ControlNet preprocessors
- ✅**ComfyUI_IPAdapter_Plus** - Advanced image prompting

**RECOMMENDED:**

- ✅**ComfyUI_FaceDetailer** - Face enhancement
- ✅**ComfyUI_Essentials** - Useful utility nodes
- ✅**rgthree-comfy** - Quality of life improvements

4. **Restart ComfyUI** after installing nodes

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## Step 5: Download Ready-Made Workflows

Workflows are pre-built node graphs for specific tasks. Think of them as "recipes" for different image manipulation tasks.

**Where to Get Workflows**

**Primary Source:** OpenArt.ai

- URL: https://openart.ai/workflows
- Filter by: ComfyUI + Flux.1-dev

**Secondary Source:** CivitAI

- URL: https://civitai.com/models?modelType=Workflow
- Filter by: ComfyUI workflows

**Essential Workflows to Download**

1. **Background Removal & Replacement**
   - Search: "Flux realistic background replace"
   - Direct: https://openart.ai/workflows/flux-realistic-background-replace
   - Download the (.json) file
   - Drag into ComfyUI interface to load
2. **Old Photo Restoration & Colorization**
   - Search: "Flux old photo restoration colorization"
   - Direct: https://openart.ai/workflows/flux-old-photo-restoration-colorization
   - This workflow does:
     - Auto face detection and enhancement
     - Scratch/tear removal
     - Realistic colorization
     - Missing limb/face reconstruction
     - 4K upscaling
3. **Object Removal (People, Things)**
   - Search: "Flux inpainting removal"
   - Allows you to brush over anything and remove it cleanly
4. **Text-to-Image Generation**
   - Search: "Flux.1-dev basic workflow"
   - Simple prompt → image generation

**How to Use Workflows**

1. **Load workflow:** Drag (.json) file onto ComfyUI canvas
2. **Connect your models:** Check that paths point to your downloaded models
3. **Input your image:** Load image in the input node
4. **Adjust settings:** Modify prompts, strength, steps as needed
5. **Queue Prompt:** Click "Queue Prompt" to generate

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## Step 6: Integrate ComfyUI with Open WebUI

Now connect your ComfyUI setup to Open WebUI for seamless image generation from chat.

**Configure ComfyUI for API Access**

ComfyUI already has API enabled by default on port 8188.

**Configure Open WebUI**

1. **Access Open WebUI Admin Panel**
   - Go to: https://chat.ldmathes.cc
   - Click profile icon → **Admin Panel**
2. **Navigate to Image Settings**
   - Settings → **Images**
3. **Configure ComfyUI Integration**
   - **Image Generation Engine:** Select `ComfyUI`
   - **ComfyUI Base URL:** `http://localhost:8188`
   - **Enable Image Generation:** ✅ON
   - **Default Workflow:** Select your preferred workflow
   - **Image Size:** `1024x1024` (adjust based on preference)
   - **Steps:** `20-30` (balance speed vs quality)
4. **Test Connection**
   - Click the **Test Connection** button
   - Should show: "Connected successfully"
5. **Save Settings**

**Using Image Generation in Chat**

**Method 1: Direct Generation**

```
User: "Generate an image of a futuristic city at sunset"
Open WebUI: Uses Flux to create the image
```

**Method 2: With Ollama Enhancement**

```
User: "I want a picture of a robot in a lab"
Ollama: Creates detailed prompt
User: Clicks image generation button
Flux: Generates high-quality image
```

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## Step 7: Set Up as Windows Service (Auto-Start)

**Create Startup Batch File**

**File:** `D:\AI\start-comfyui.bat`

```batch
@echo off
cd D:\AI\ComfyUI_windows_portable
start run_nvidia_gpu.bat
```

**Using NSSM (Recommended)**

cmd

```
# Open Command Prompt as Administrator
d:\Misc\nssm.exe install ComfyUI "D:\AI\ComfyUI_windows_portable\run_nvidia_gpu.bat"
d:\Misc\nssm.exe set ComfyUI AppDirectory "D:\AI\ComfyUI_windows_portable"
d:\Misc\nssm.exe set ComfyUI AppStdout "D:\AI\comfyui-stdout.log"
d:\Misc\nssm.exe set ComfyUI AppStderr "D:\AI\comfyui-stderr.log"
d:\Misc\nssm.exe start ComfyUI
```

**Verify Service**

cmd

```
d:\Misc\nssm.exe status ComfyUI
# Should show: SERVICE_RUNNING
```

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## Step 8: Optional - Add to Cloudflare Tunnel

If you want remote access to ComfyUI interface:

**Update Cloudflare Config**

**Edit:** `C:\Users\DrDen\.cloudflared\config.yml`

yaml

```
tunnel: c2febf30-92a0-4b30-ae52-d79b7e8884f5
credentials-file: C:\Users\DrDen\.cloudflared\c2febf30-92a0-4b30-ae52-d79b7e8884f5.json
protocol: http2

ingress:
  - hostname: weatherproxy.ldmathes.cc
    service: http://localhost:5005
  - hostname: api.ldmathes.cc
    service: http://localhost:5000
  - hostname: api-edit.ldmathes.cc
    service: http://localhost:5001
  - hostname: ollama.ldmathes.cc
    service: http://localhost:11434
    originRequest:
      httpHostHeader: "localhost:11434"
  - hostname: chat.ldmathes.cc
    service: http://localhost:8080
  - hostname: comfy.ldmathes.cc
    service: http://localhost:8188
  - service: http_status:404
```

**Add DNS Record in Cloudflare**

- **Type:** CNAME
- **Name:** comfy
- **Target:** `c2febf30-92a0-4b30-ae52-d79b7e8884f5.cfargotunnel.com`
- **Proxy:** ON (orange cloud)

**Restart Tunnel**

```
cmd

net stop cloudflared
net start cloudflared
```

⚠️**Security Note:** ComfyUI has no built-in authentication. Only expose if you trust who has access, or add Cloudflare Access protection.

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## Usage Examples

**Example 1: Remove Person from Photo**

1. **Load Workflow:** "Object Removal" workflow
2. **Upload Image:** Your photo with person to remove
3. **Mask Person:** Use brush tool to paint over person
4. **Prompt:** "empty scene, no people, photorealistic"
5. **Generate:** 15-20 seconds on RTX 3060
6. **Result:** Person cleanly removed with perfect background fill

**Example 2: Replace Background**

1. **Load Workflow:** "Background Replace" workflow
2. **Upload Image:** Your subject photo
3. **Mask Background:** Auto-mask with Segment Anything, or manual
4. **New Background Prompt:** "tropical beach at sunset, golden hour, photorealistic, 8k"
5. **Generate:** 15-30 seconds
6. **Result:** Subject perfectly composited onto new background with matching lighting

**Example 3: Restore Old Photo**

1. **Load Workflow:** "Old Photo Restoration" workflow
2. **Upload Image:** Damaged B&W photo from 1920s
3. **Settings:** Auto-detect faces, fill missing areas, colorize
4. **Generate:** 30-60 seconds
5. **Result:**
   - Scratches removed
   - Tears filled in
   - Faces enhanced
   - Realistically colorized
   - Upscaled to 4K

**Example 4: Generate from Scratch**

1. **Load Workflow:** "Text-to-Image" workflow
2. **Prompt:** "A serene Japanese garden with cherry blossoms, koi pond, traditional tea house, soft morning light, photorealistic, 8k detail"
3. **Negative Prompt:** "blurry, distorted, low quality, cartoon"
4. **Steps:** 25-30
5. **CFG Scale:** 7.0
6. **Generate:** 20-40 seconds
7. **Result:** Photorealistic image matching description

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## Performance Expectations (RTX 3060 12GB)

### Generation Times

| Task | Resolution | Time | VRAM Usage |
|---|---|---|---|
| Text-to-Image | 1024x1024 | 20-40s | 10-11GB |
| Background Replace | 1024x1024 | 15-30s | 10-11GB |
| Object Removal | 1024x1024 | 15-25s | 9-10GB |
| Photo Restoration | Original size | 30-60s | 8-10GB |
| 4K Upscale | 4096x4096 | 20-40s | 11-12GB |

### Quality Settings Impact

| Setting | Speed | Quality | VRAM |
|---|---|---|---|
| Steps: 15-20 | Fast | Good | Lower |
| Steps: 25-30 | Medium | Great | Medium |
| Steps: 40-50 | Slow | Excellent | Higher |

**Recommended:** 25-30 steps for best balance

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## Troubleshooting

### Issue: Out of Memory Error

**Solution:**

1. Close other GPU applications
2. Reduce image resolution (try 768x768 instead of 1024x1024)
3. Lower batch size to 1
4. Restart ComfyUI

### Issue: Models Not Loading

**Solution:**

1. Verify model files are in correct folders
2. Check file names match exactly (case-sensitive)
3. Restart ComfyUI
4. Check `comfyui-stderr.log` for specific errors

### Issue: Slow Generation

**Solution:**

1. First generation is always slow (model loading)
2. Subsequent generations are faster
3. Reduce steps (try 20 instead of 30)
4. Use smaller resolution for testing
5. Make sure NVIDIA drivers are updated

**Issue: Poor Quality Results**

**Solution:**

1. Use more detailed prompts
2. Increase steps (25-30)
3. Use negative prompts to exclude unwanted elements
4. Try different seeds (randomization)
5. Adjust CFG scale (7-9 is usually good)

**Issue: Workflow Missing Nodes**

**Solution:**

1. Open ComfyUI Manager
2. Click "Install Missing Nodes"
3. Restart ComfyUI
4. Reload workflow

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## Advanced Features

**ControlNet Depth (Preserve Structure)**

Use when you want to maintain the exact composition of an image while changing style/content.

**Example:** Convert photo to painting while keeping same poses and layout

**IPAdapter (Image Prompting)**

Use an image as a "style reference" for generation.

**Example:** "Make my image look like this Van Gogh painting"

**Segment Anything (Auto-Masking)**

Automatically detect and mask objects without manual brushing.

**Example:** Click on person → auto-masks entire person perfectly

**Face Detailer**

Automatically enhances faces in images with better detail, fixing eyes, teeth, skin texture.

**Always use for portraits**

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## Comparison: ComfyUI vs Other Tools

| Feature | ComfyUI + Flux | Photoshop 2025 | Online AI Tools |
|---|---|---|---|
| Quality (2025) | ★★★★★ | ★★★★★ | ★★★☆☆ |
| Speed (local) | 20-40s | 10-30s | 5-15s |
| Cost | Free | $20/mo | Free tier limited |
| Privacy | Complete | Cloud sync | No privacy |
| Customization | Unlimited | Limited | Very limited |
| Offline use | ✅ Yes | ❌ No | ❌ No |
| GPU Required | Yes (12GB) | Yes/No | No |

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## Recommended Learning Path

### Day 1: Setup & Basics

1. Install ComfyUI and models
2. Run simple text-to-image workflow
3. Generate 10-20 test images
4. Learn the interface

### Day 2: Image Manipulation

1. Try background replacement
2. Practice object removal
3. Experiment with inpainting
4. Test different prompts

### Day 3: Photo Restoration

1. Load restoration workflow
2. Restore old family photos
3. Try colorization
4. Practice face enhancement

### Week 2: Advanced Techniques

1. Create custom workflows
2. Combine multiple techniques
3. Optimize for your use cases
4. Fine-tune settings

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## Community Resources

### Learning

- **ComfyUI Official Wiki:** https://github.com/comfyanonymous/ComfyUI/wiki
- **YouTube Tutorial:** Search "ComfyUI Flux tutorial 2025"
- **Reddit:** r/StableDiffusion and r/comfyui

### Workflows

- **OpenArt:** https://openart.ai/workflows
- **CivitAI:** https://civitai.com/models?modelType=Workflow
- **ComfyWorkflows:** https://comfyworkflows.com/

**Models**

- **Hugging Face:** https://huggingface.co/models
- **CivitAI:** https://civitai.com/ (requires login, has NSFW content warning)

**Support**

- **ComfyUI Discord:** https://discord.gg/comfyui
- **GitHub Issues:** https://github.com/comfyanonymous/ComfyUI/issues

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## Best Practices

**Prompt Writing**

- **Be specific:** "Golden retriever puppy playing in grass" vs "dog"
- **Add quality terms:** "photorealistic, 8k, highly detailed, professional photography"
- **Use negative prompts:** "blurry, distorted, low quality, artifacts"
- **Describe lighting:** "soft morning light, golden hour, studio lighting"

**Organization**

- **Save good workflows:** Keep a library of your best workflows
- **Name outputs clearly:** Use descriptive filenames
- **Backup regularly:** Copy `models` and `outputs` folders
- **Document settings:** Note what settings worked well

**Performance**

- **Warm up GPU:** First generation loads models (slow), then fast
- **Batch similar tasks:** Do all photos at once for efficiency
- **Monitor VRAM:** Keep task manager open to watch GPU usage
- **Update regularly:** Check for ComfyUI and model updates

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## What You'll Be Able to Do

After setup, you'll have professional-grade capabilities:

✅**Image Generation**

- Create any image from text description
- Photorealistic or artistic styles
- Complete creative control

✅**Background Manipulation**

- Remove backgrounds cleanly
- Replace with anything imaginable
- Perfect edge detection and lighting match

✅**Object Removal**

- Remove people, objects, watermarks
- Fill in seamlessly
- "Nano-banana precision" level

✅**Photo Restoration**

- Fix scratches, tears, water damage
- Reconstruct missing parts
- Enhance faces automatically
- Colorize B&W photos realistically
- Upscale to 4K/8K

✅**Advanced Editing**

- Inpainting (fill in masked areas)
- Outpainting (extend images beyond borders)
- Style transfer
- Face swapping
- Image variations

**All of this:**

- Running locally on your machine
- Completely free (after GPU purchase)
- Unlimited generations
- No subscriptions
- Full privacy
- Professional quality results

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## Final Checklist

Before you start:

- [ ] RTX 3060 12GB installed in PC
- [ ] Latest NVIDIA drivers installed
- [ ] `nvidia-smi` shows GPU correctly
- [ ] ComfyUI portable downloaded and extracted
- [ ] Flux.1-dev FP8 model downloaded (~8GB)
- [ ] ControlNet models downloaded (~5GB)
- [ ] Upscaler models downloaded (~1GB)
- [ ] ComfyUI Manager installed
- [ ] Essential custom nodes installed
- [ ] At least 3-5 workflows downloaded
- [ ] First test image generated successfully
- [ ] Integrated with Open WebUI (optional)
- [ ] Set up as Windows service (optional)

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## Conclusion

Once your RTX 3060 arrives and you complete this setup, you'll have capabilities that rival or exceed professional paid tools like Photoshop 2025, all running locally with complete privacy and unlimited usage.

**Estimated total setup time:** 30-45 minutes
**Total disk space:** ~20-30 GB
**Cost after GPU:** $0/month
**Quality level:** State-of-the-art (November 2025)

You'll be doing "nano-banana level" edits and restoring century-old photos by the end of your first day.

Welcome to the cutting edge of local AI image manipulation! 🎨🚀