

# **Image Generation using Stable Diffusion & Comfy UI**

## **A Project Report**

submitted in partial fulfillment of the requirements

of

**AICTE Internship on AI: Transformative Learning**  
with

TechSaksham – A joint CSR initiative of Microsoft & SAP

by

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## ACKNOWLEDGEMENT

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We would like to take this opportunity to express our deep sense of gratitude to all individuals who helped us directly or indirectly during this thesis work.

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ABSTRACT

This project explores image generation using Stable Diffusion and Comfy UI, a cutting-edge AI model for generating high-quality images from text prompts. The objective is to understand and implement Stable Diffusion, a deep learning-based model, through Comfy UI, an intuitive workflow-based interface that simplifies the execution of AI models.

Key Aspects Covered:

- Understanding Stable Diffusion and how it generates images.
- Implementing the model using Comfy UI for a user-friendly experience.
- Experimenting with different prompts and model parameters to analyse the output quality.
- Evaluating the results and potential improvements in image generation techniques.

The project highlights the capabilities of AI-generated art and its applications in various fields, such as design, entertainment, and creative media. The results demonstrate how Stable Diffusion can be used efficiently through Comfy UI to create stunning visuals with minimal computational resources.

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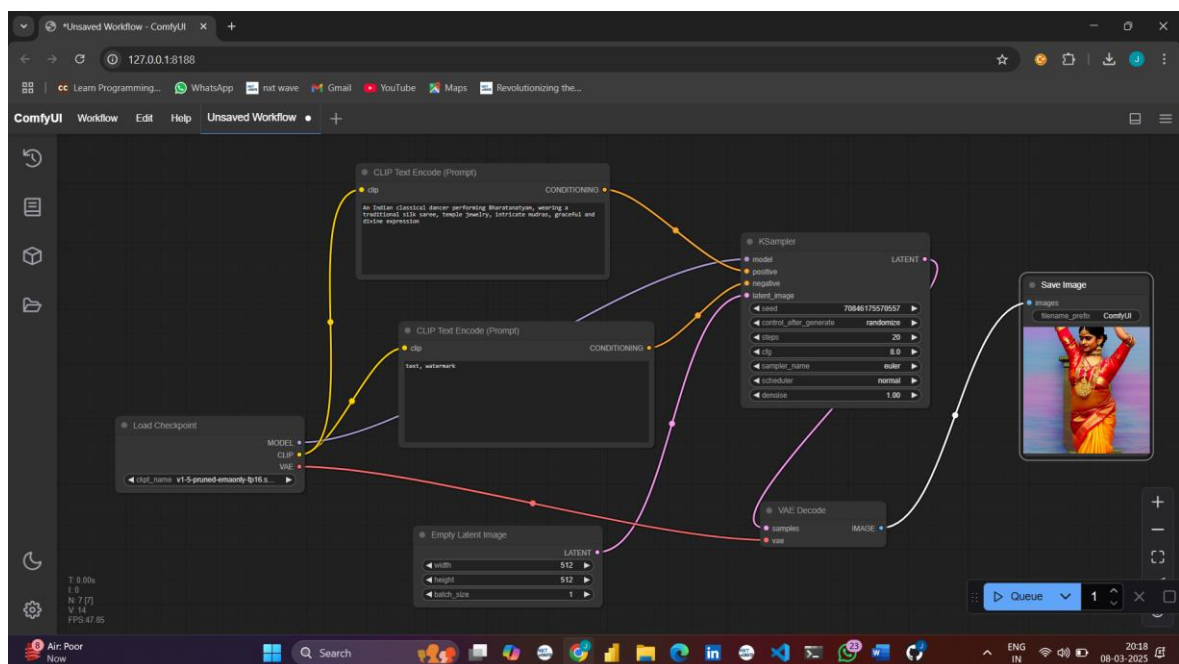
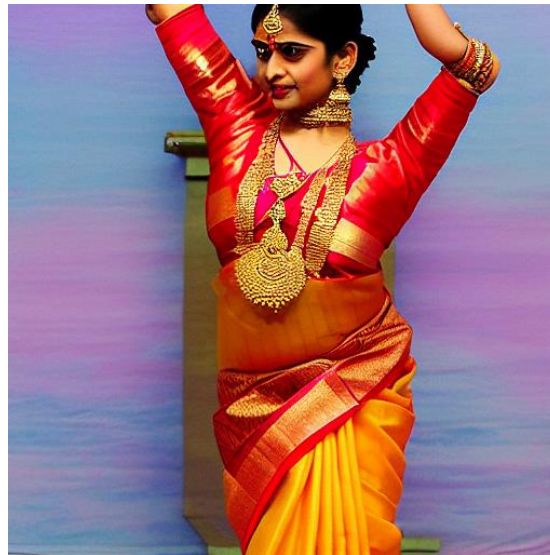
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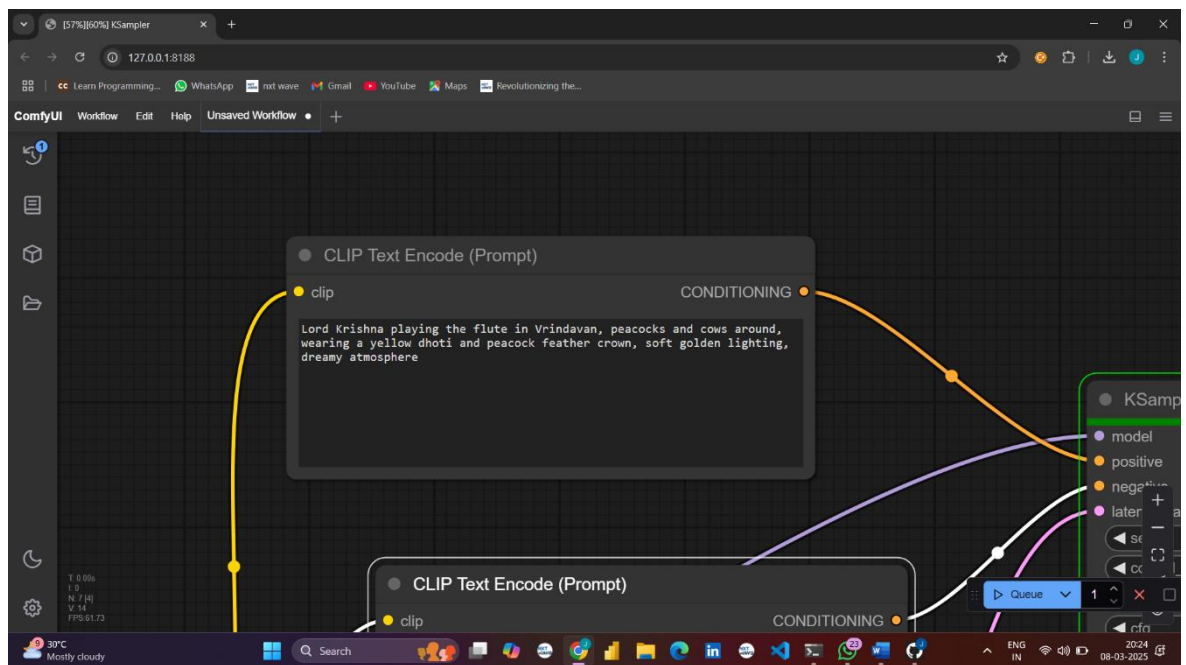
## Figure 1

An Indian classical dancer performing Bharatanatyam, wearing a traditional silk saree, temple jewelry, intricate mudras, graceful and divine expression



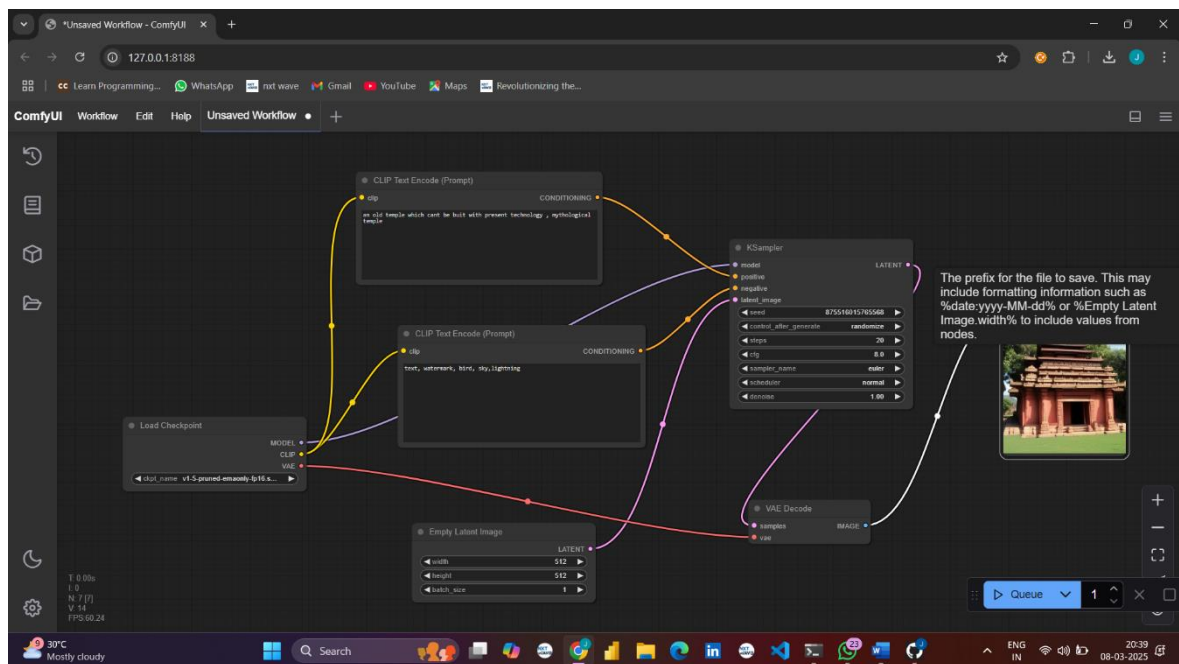
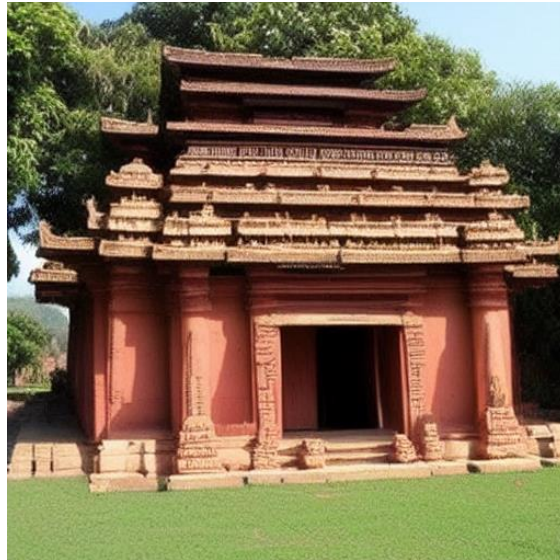
## Figure 2

Lord Krishna playing the flute in Vrindavan, peacocks and cows around, wearing a yellow dhoti and peacock feather crown, soft golden lighting, dreamy atmosphere



## Figure 3

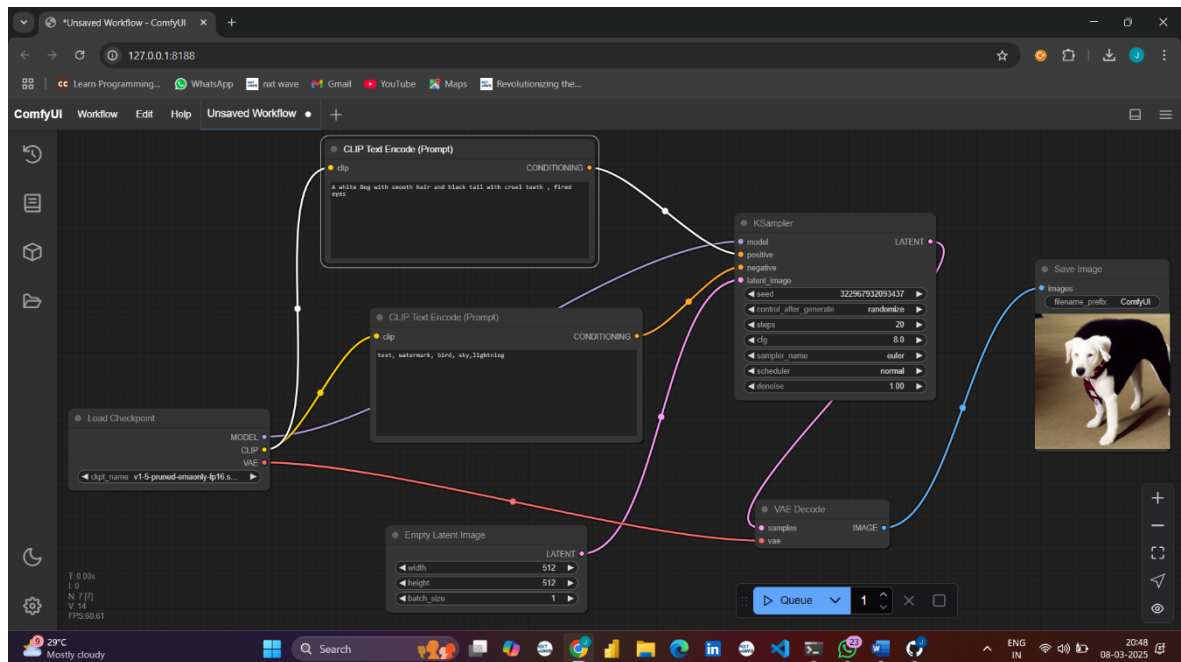
an old temple which cannot be built with present technology, mythological temple





## Figure 4

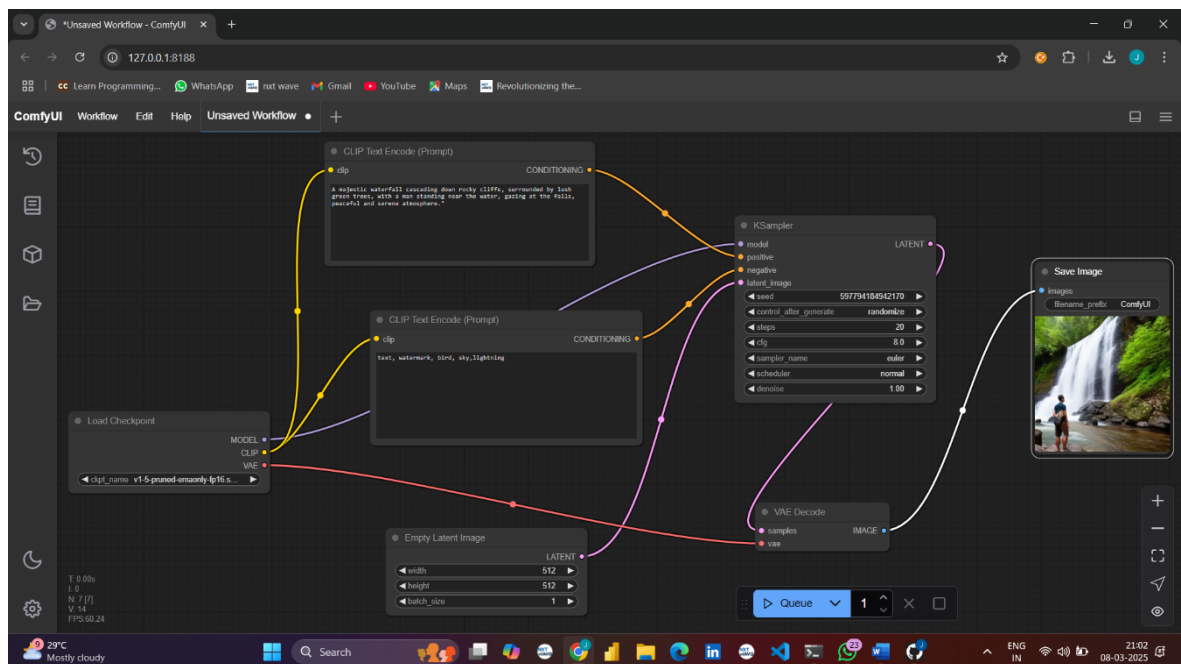
A white Dog with smooth hair and black tail with cruel teeth , fired eyes





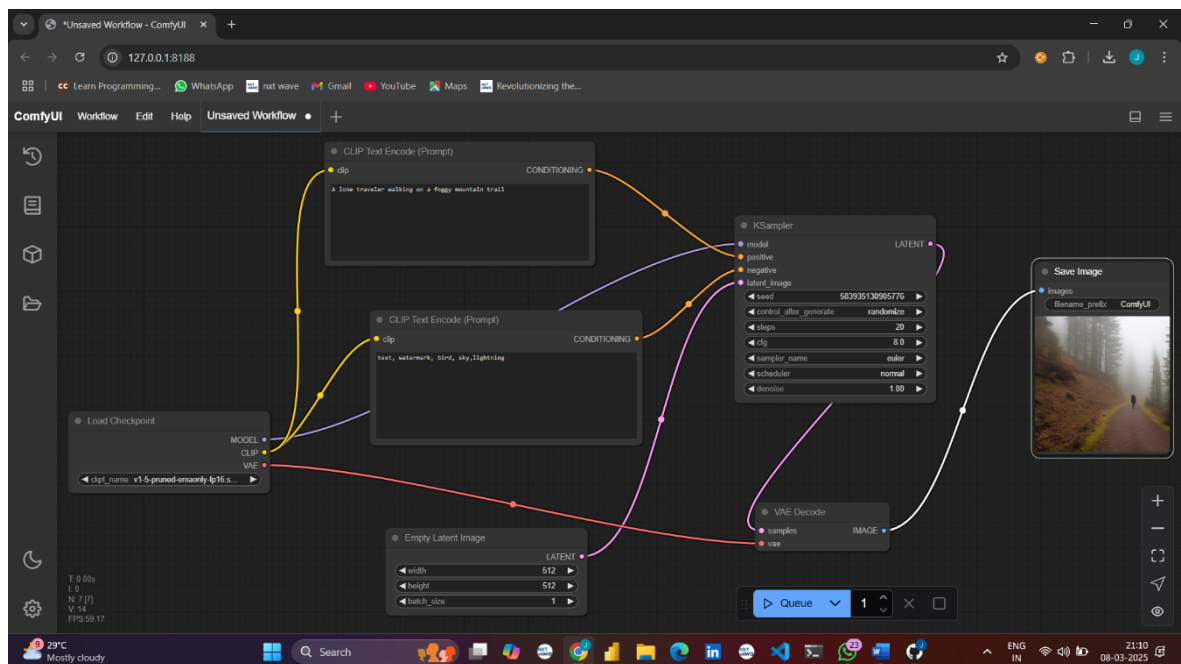
## Figure 5

A majestic waterfall cascading down rocky cliffs, surrounded by lush green trees, with a man standing near the water, gazing at the falls, peaceful and serene atmosphere.



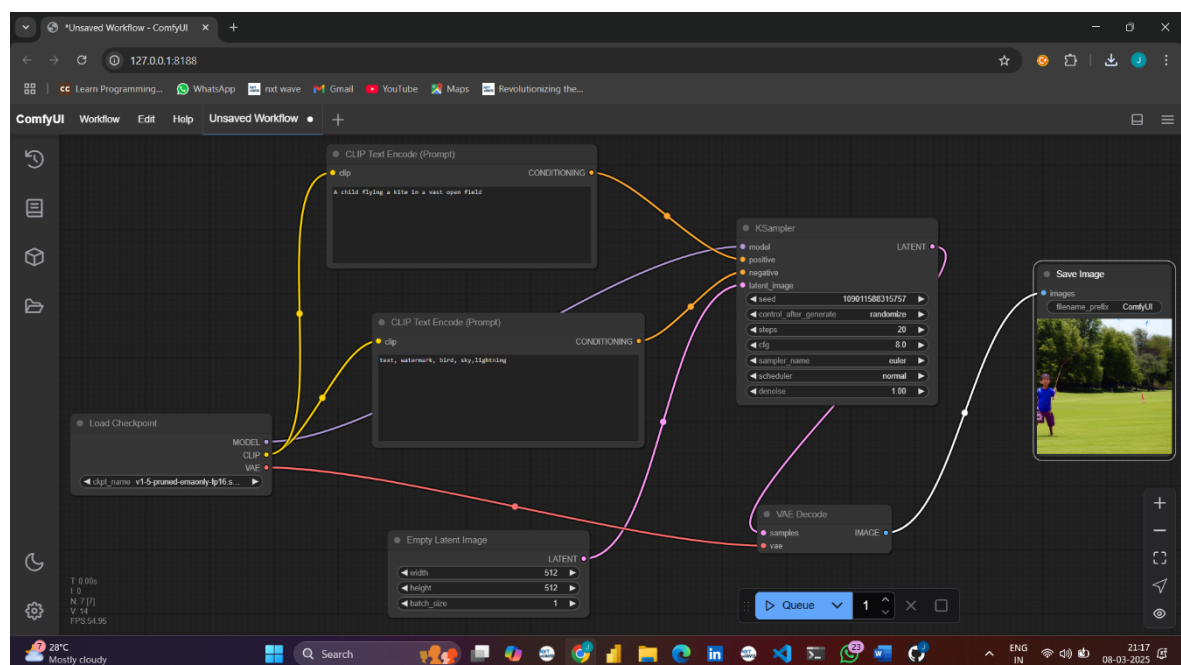
## Figure 6

A lone traveler walking on a foggy mountain trail



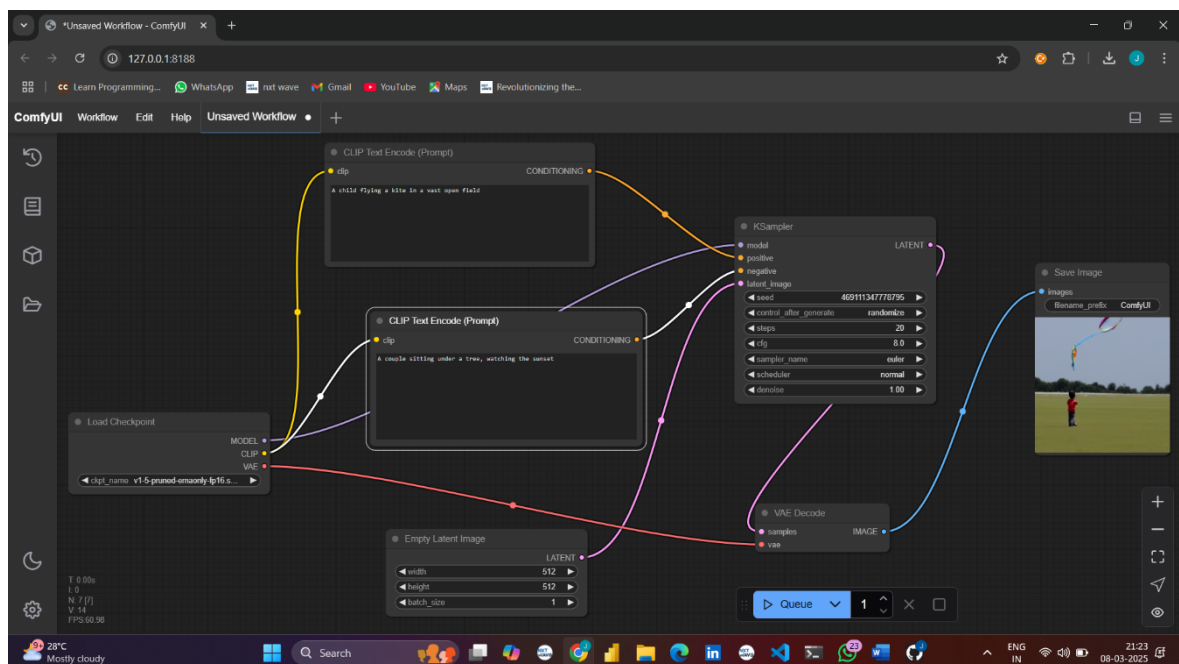
## Figure 7

A child flying a kite in a vast open field



## Figure 8

A couple sitting under a tree, watching the sunset



# CHAPTER 1

## Introduction

### 1.1 Problem Statement:

The ability to generate high-quality images using AI has become an essential tool in various creative fields. However, running and optimizing AI models like Stable Diffusion requires technical expertise and computational resources. This project aims to address these challenges by providing an intuitive approach using Comfy UI, allowing users to generate images without deep technical knowledge.

### 1.2 Motivation:

The increasing demand for AI-generated art and media has created a need for simplified tools that can be used by designers, artists, and content creators. Comfy UI streamlines the workflow of Stable Diffusion, making it more accessible and efficient. This project seeks to explore its capabilities and optimize it for better usability.

### 1.3 Objective:

- Implement Stable Diffusion using Comfy UI.
- Optimize system parameters to enhance image quality.
- Experiment with different textual prompts and analyze the generated results.
- Demonstrate the practical applications of AI-generated imagery in creative fields.

### 1.4 Scope of the Project:

This project focuses on the implementation of Stable Diffusion using Comfy UI, aiming to:

- Simplify the user experience with an intuitive interface.
- Provide a flexible and customizable workflow for image generation.
- Evaluate the effectiveness of the generated images in different use cases.
- Identify future improvements and possible integrations with other tools.

## **CHAPTER 2**

### **Literature Survey**

#### **2.1 Overview of Image Generation Models**

Image generation has evolved through various deep learning techniques, including Generative Adversarial Networks (GANs), Variational Autoencoders (VAEs), and Transformer-based models. While GANs are known for producing high-quality images, they suffer from instability during training. VAEs, on the other hand, provide structured latent spaces but generate blurry images. Recent advancements, such as diffusion models, have proven to be more stable and efficient in producing high-quality images.

#### **2.2 Role of Diffusion Models in Image Synthesis**

Diffusion models have revolutionized image synthesis by progressively refining noisy images over multiple iterations. Stable Diffusion, an advanced diffusion model, leverages latent space encoding to efficiently generate images from textual descriptions. Compared to GANs, diffusion models provide more diverse outputs with fine-grained control over the generation process. This approach enables artists and designers to generate high-quality images with precision and creativity.

#### **2.3 Comfy UI and Its Advantages**

Comfy UI is a graphical interface designed to simplify the workflow of Stable Diffusion. Unlike command-line implementations that require coding knowledge, Comfy UI allows users to interact with the model through an intuitive drag-and-drop interface. It enables easy parameter adjustments, model customization, and real-time visualization of generated images. This project aims to leverage Comfy UI to make AI-driven image generation more accessible to non-technical users.

## **CHAPTER 3**

### **Proposed Methodology**

#### **3.1 System Design**

##### **1. Latent Image Processing Node**

- Seed: 582177676120663 (controls reproducibility)
- Steps: 20 (more steps improve quality)
- CFG: 8.0 (higher values make the image follow the prompt more strictly)
- Sampler: Euler (determines how noise transforms into an image)
- Denoise: 1.00 (full noise reduction)

##### **2. Save Image Node**

- Saves the generated image with the filename prefix "ComfyUI"
- Displays a preview of the image

##### **3. Generated Image**

- Shows three wine bottles placed outdoors against a green, hilly background

#### **3.2 Requirement Specifications**

##### **3.2.1 Hardware Requirements:**

- GPU-enabled system (NVIDIA RTX recommended)
- Minimum 8GB RAM

##### **3.2.2 Software Requirements:**

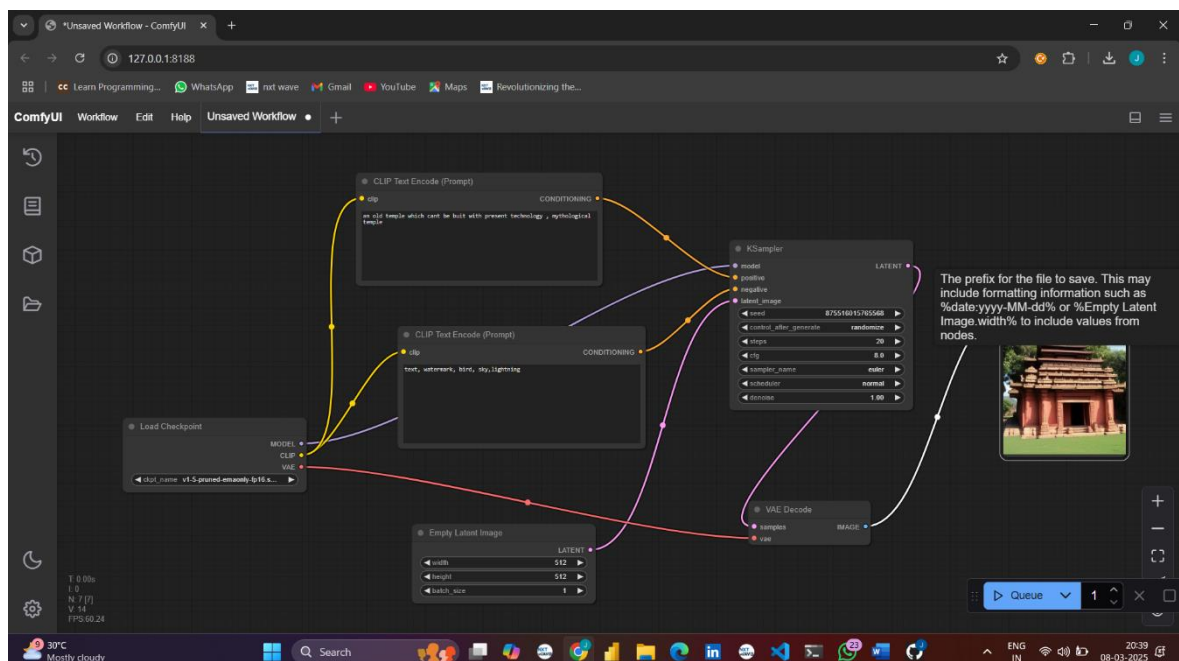
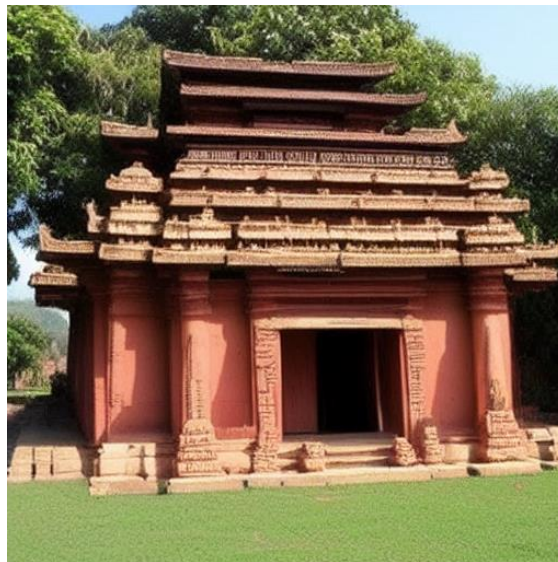
- Stable Diffusion Model
  - Comfy UI framework
  - Python, CUDA, and necessary dependencies
-

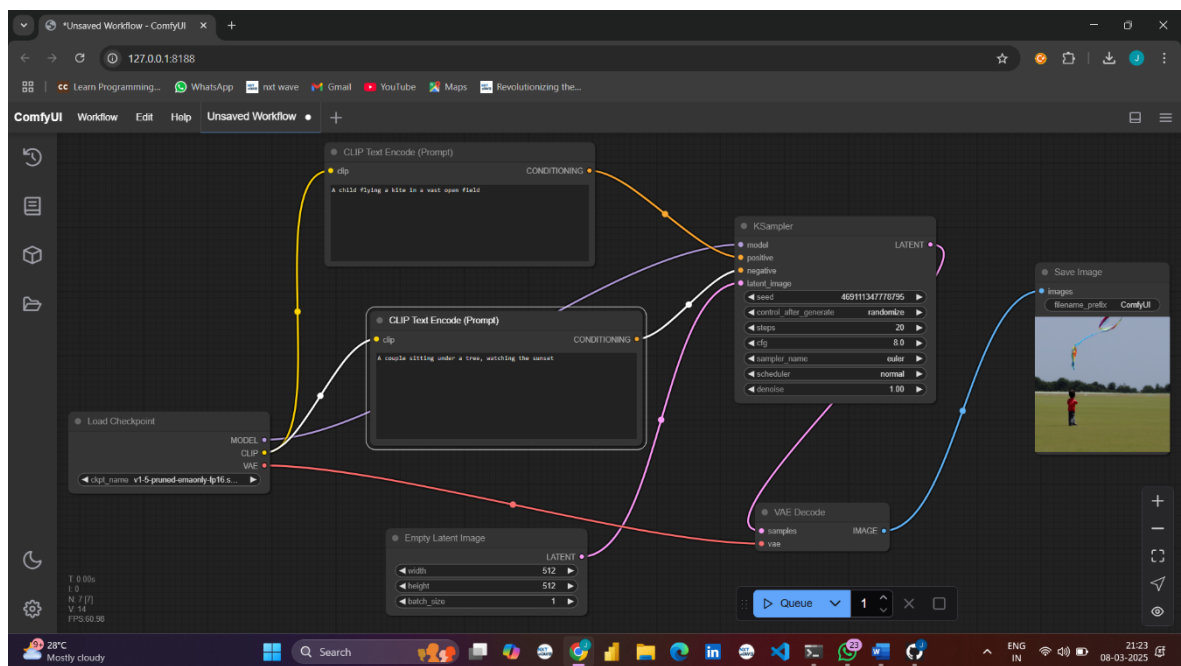


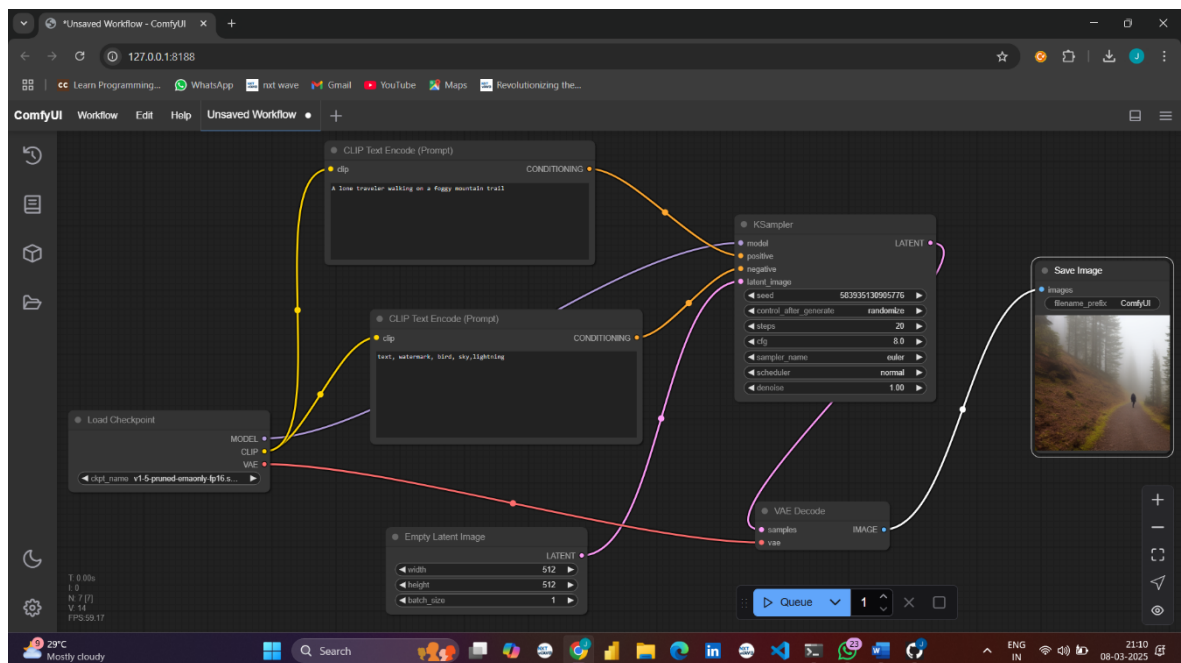
## CHAPTER 4

### Implementation and Result

#### 4.1 Snap Shots of Result:







## 4.2 GitHub Link for Code:

<https://github.com/jagadeesh015/Stable-Diffusion-using-comfy-UI.git>

## **CHAPTER 5**

### **Discussion and Conclusion**

#### **5.1 Future Work:**

- Enhancing system performance for faster image generation.
- Exploring advanced fine-tuning techniques for more refined results.
- Expanding the functionalities of Comfy UI to support additional features.

#### **5.2 Conclusion:**

This project successfully demonstrates the use of Stable Diffusion for AI-generated image creation and how Comfy UI simplifies the process. The results indicate that this approach can provide a powerful tool for artists and content creators, making AI-driven creativity more accessible and efficient.

## **REFERENCES**

The information in this project was gathered from various sources, including Google, YouTube, and guidance from my mentors Jay Rathod and Pavan Sammohan. Additionally, hands-on experimentation and self-learning contributed to the project's development.