



# Enchanted Wings: Marvels of Butterfly Species

## 1. INTRODUCTION

### 1.1 Project Overview

“Enchanted Wings: Marvels of Butterfly Species” is an AI-powered web application that classifies butterfly species using a deep learning model (VGG16) to promote biodiversity awareness and support conservation efforts.

### 1.2 Purpose

The purpose is to help users identify butterfly species easily by uploading their images, thus spreading awareness about butterfly diversity and encouraging conservation using technology.

## 2. IDEATION PHASE

### 2.1 Problem Statement

Manual identification of butterfly species is time-consuming and requires expertise. An AI-based classification tool makes it faster and accessible to everyone.

### 2.2 Empathy Map Canvas

- **Who are we empathizing with?**

Students, researchers, nature enthusiasts.

- **What do they need?**

Quick, accurate butterfly identification.

- **What do they see?**

Complex identification guides.

- **What do they hear?**

Scientific names difficult to remember.

- **What do they say/do?**

Capture butterfly photos and search online.

- **What do they think/feel?**

Curious but sometimes confused.

### 2.3 Brainstorming

We brainstormed to build a **website + AI model** combining deep learning (VGG16) with a user-friendly interface for instant butterfly species classification.

### **3. REQUIREMENT ANALYSIS**

#### **3.1 Customer Journey Map**

<b>Stage</b>	<b>Action</b>	<b>Experience</b>
Awareness	Learns about website	Curious
Consideration	Uploads butterfly image	Easy process
Conversion	Gets classification	Feels informed and happy

#### **3.2 Solution Requirement**

- Trained deep learning model (.h5)
- Butterfly image dataset
- Flask web framework
- HTML, CSS, Bootstrap for UI

#### **3.3 Data Flow Diagram**

User → Upload Image → Flask App → VGG16 Model → Prediction Result → User

#### **3.4 Technology Stack**

- **Frontend:** HTML, CSS, Bootstrap
- **Backend:** Flask, Python
- **Deep Learning:** TensorFlow, Keras (VGG16)
- **Others:** NumPy, pandas, scikit-learn

### **4. PROJECT DESIGN**

#### **4.1 Problem Solution Fit**

Using deep learning image classification to identify butterfly species easily and accurately.

#### **4.2 Proposed Solution**

Develop a web app where users upload butterfly images to get instant species classification results.

#### **4.3 Solution Architecture**

- User uploads image via web UI
- Flask handles routing and preprocessing
- VGG16 model classifies the image
- Output displayed back on result page

## 5. PROJECT PLANNING & SCHEDULING

### 5.1 Project Planning

- **Day 1-2:** Dataset preparation and preprocessing
- **Day 3-4:** Model training using VGG16
- **Day 5:** Flask app development
- **Day 6:** Frontend design with HTML, CSS, Bootstrap
- **Day 7:** Testing, debugging, and documentation

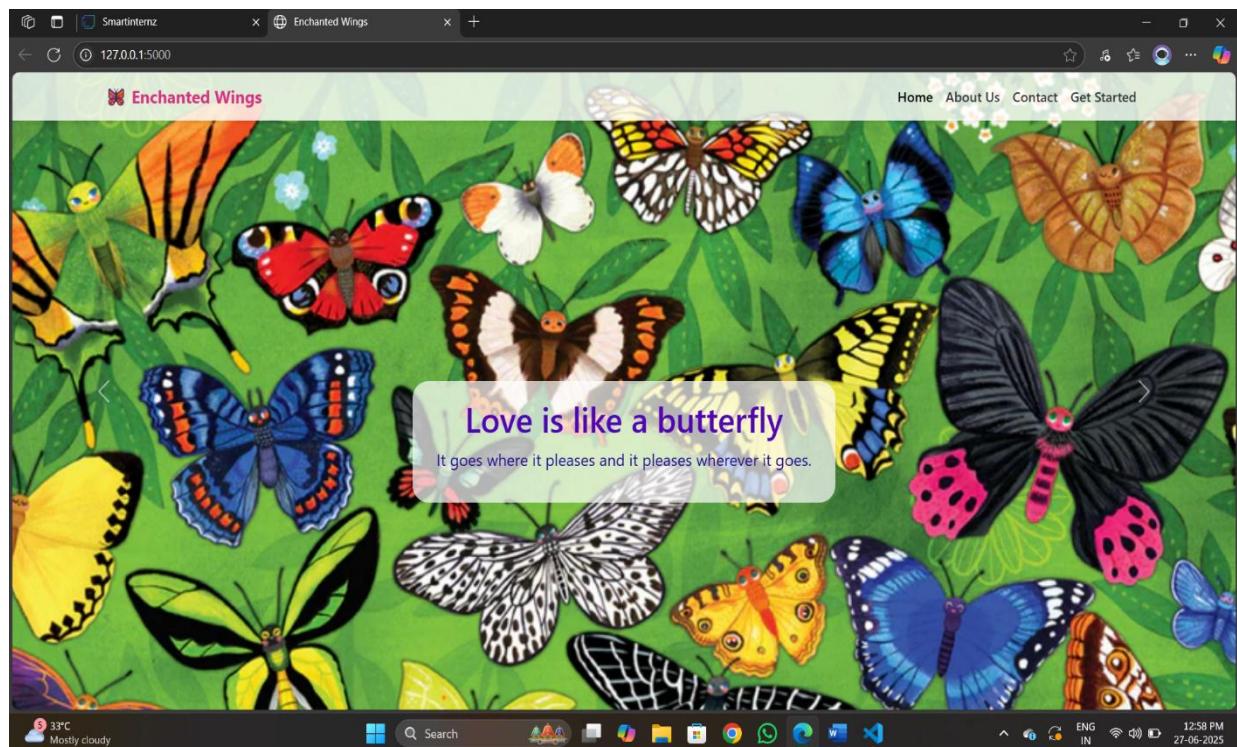
## 6. FUNCTIONAL AND PERFORMANCE TESTING

### 6.1 Performance Testing

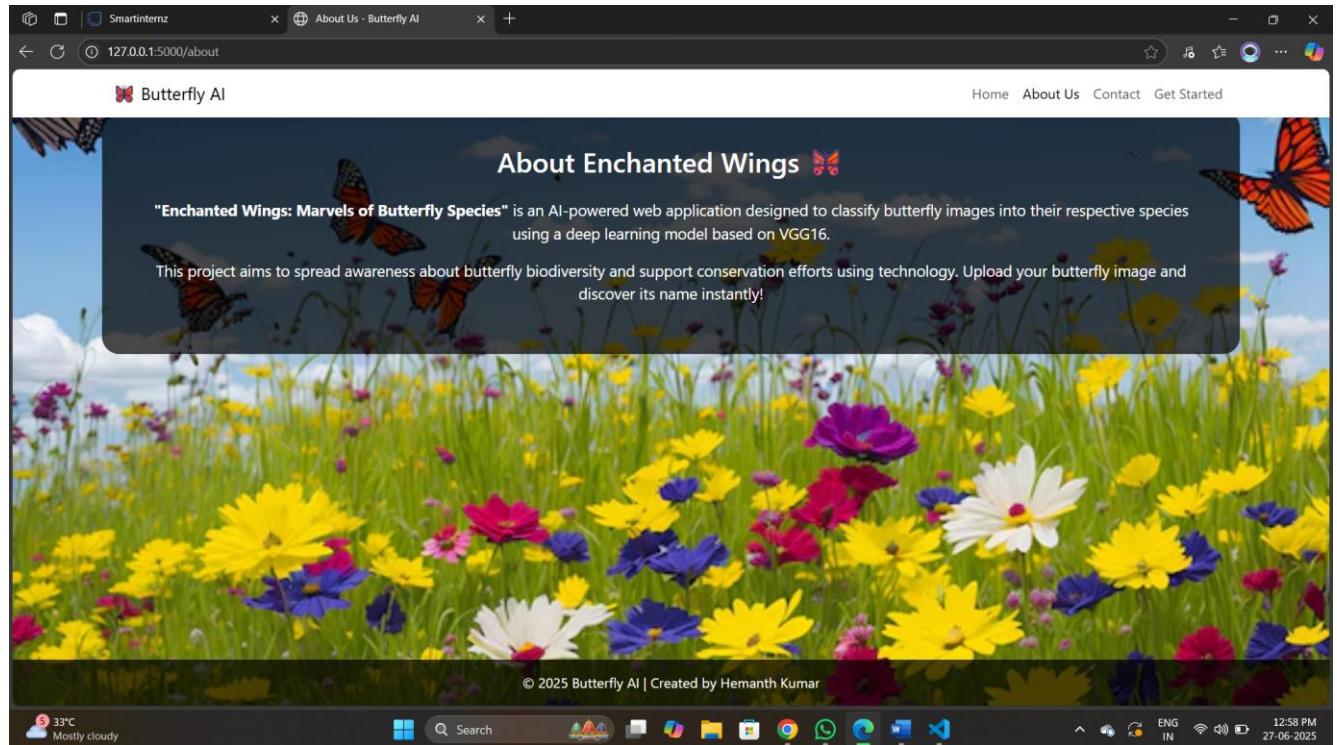
Tested with multiple butterfly images to check accuracy and quick response of the web application on localhost.

## 7. RESULTS

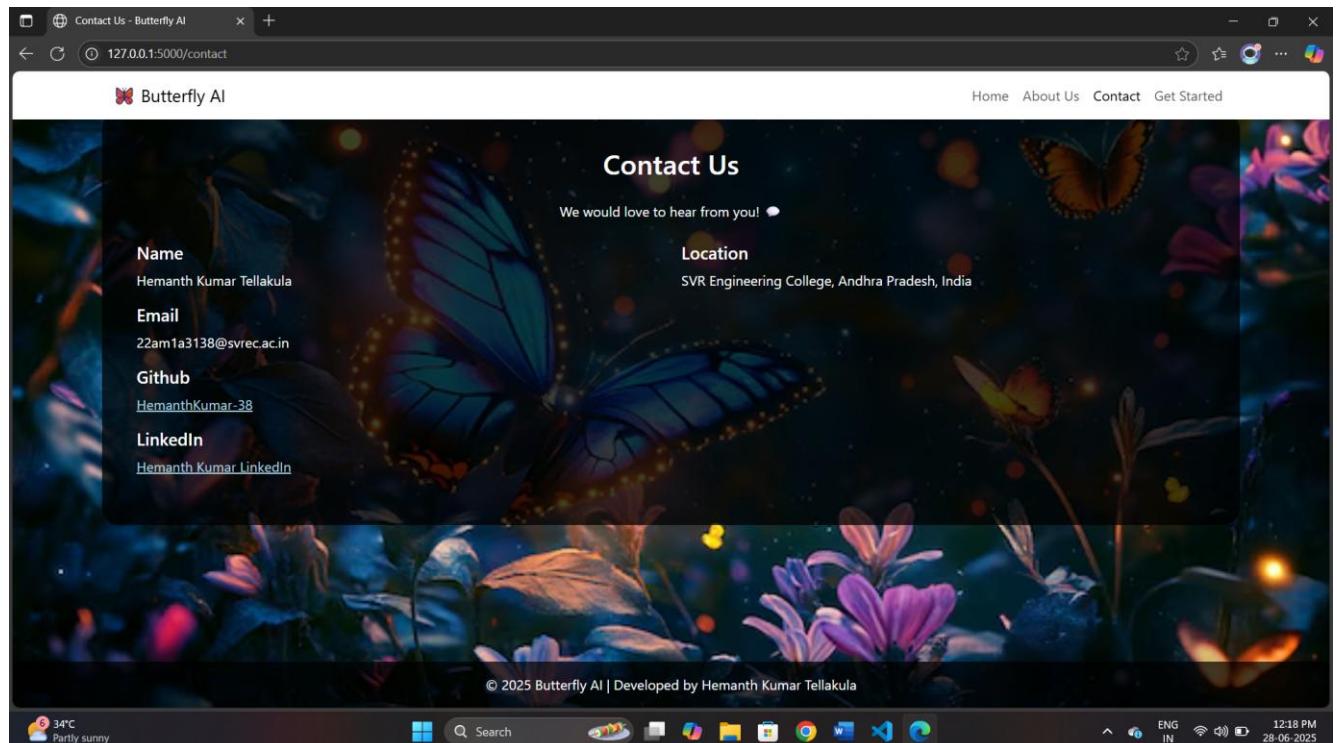
### 1. Homepage



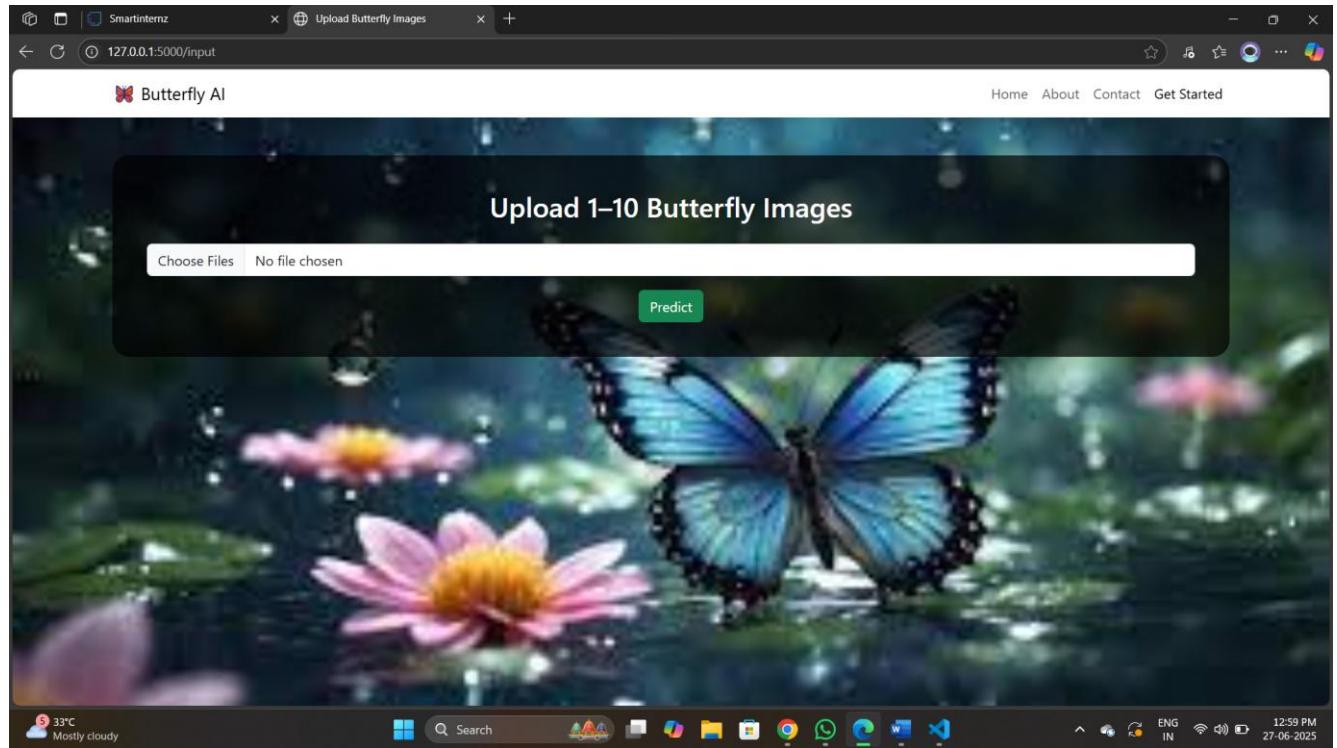
## 2. About Us page



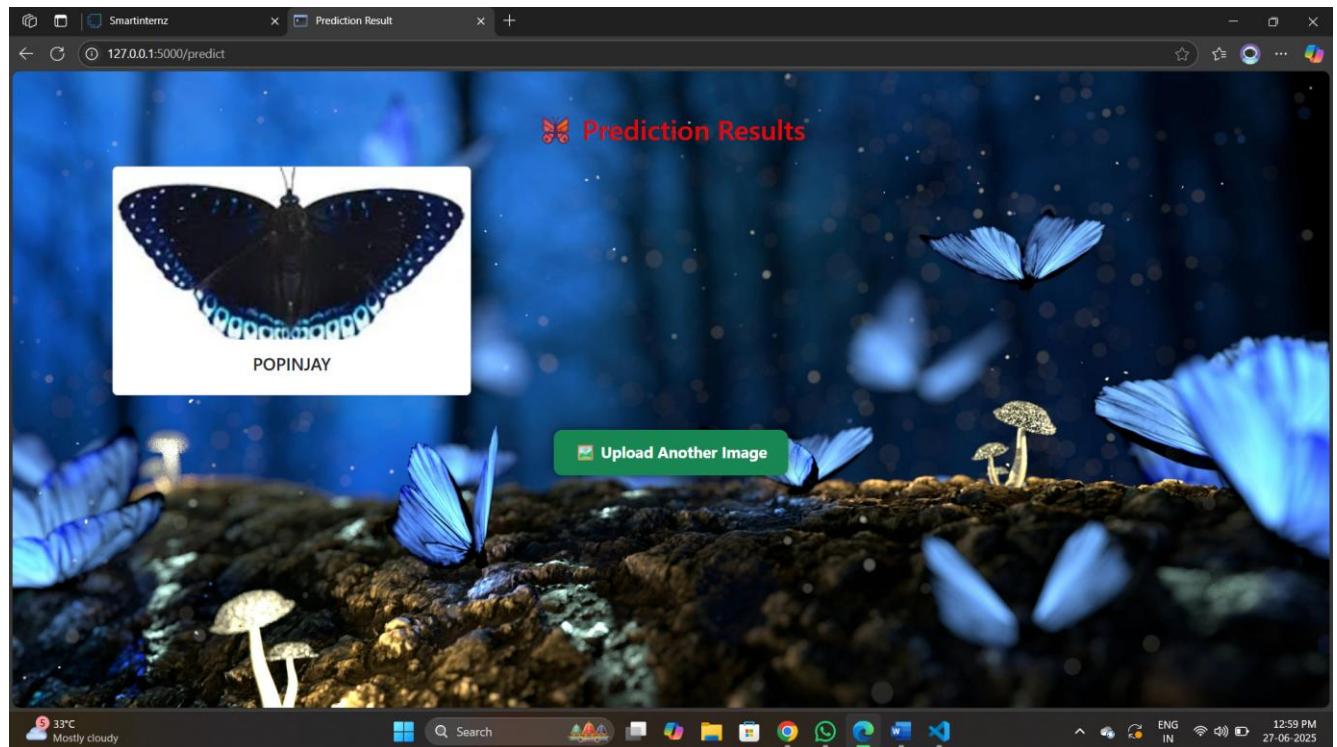
## 3. Contact Page:



#### 4. Upload Page:



#### 6. Output Prediction Page:



#### 8. ADVANTAGES & DISADVANTAGES

##### Advantages

- Easy to use for students and researchers

- Accurate classification using VGG16
- Simple web interface for practical usage

#### Disadvantages

- Requires internet/server to deploy
- Limited to trained classes only

### 9. CONCLUSION

This project successfully built a butterfly classification web app using Deep Learning (VGG16) and Flask. It helps in identifying species for educational and research purposes efficiently.

### 10. FUTURE SCOPE

- Deploy on cloud for global access
- Increase dataset for more species
- Build a mobile app version
- Add detailed butterfly information with each prediction

### 11. APPENDIX

 Source Code:

[GitHub Repository](#)

 Dataset Link:

[Butterfly Image Classification Dataset – Kaggle](#)

Project Demo Link: <https://youtu.be/3jqIZLPvj8c>

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