Project Design Phase

# Problem – Solution Fit

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| Date | 23 June 2025 |
| Team ID | LTVIP2025TMID47029 |
| Project Name | Enchanted Wings: Marvels of Butterfly Species |
| Maximum Marks | 2 Marks |

**Problem:**

Accurate identification of butterfly species is a significant challenge for students, nature enthusiasts, and researchers due to the need for expert knowledge, time-intensive classification processes, and the lack of real- time support tools. Traditional guides or manual search methods are inefficient and inaccessible to many users.

# Solution:

The project "Enchanted Wings: Marvels of Butterfly Species" presents an end-to-end AI-powered butterfly classification system:

* A VGG16-based deep learning model trained on a structured dataset (/dataset/train) organized by butterfly species.
* A user-friendly Flask web application (app.py) with a clean frontend using HTML templates (/templates) for real-time butterfly image uploads and predictions.
* Images uploaded by users are handled through a secure file system (/static/uploads) for classification.
* A pre-trained model (vgg16\_model.h5) and its corresponding species label mapping (class\_indices.json) are used to ensure accurate predictions.
* The train\_model.py script provides the complete training pipeline for reproducibility and updates.



**8.2 OFFLINE**

Nature walks, printed guides, university labs, biodiversity workshops, field research expeditions

1. **EMOTIONS: BEFORE / AFTER EM** 
   * *Before:* Confused, unsure, overwhelmed with species info
   * *After:* Informed, excited, confident in species recognition

Use of apps, Kaggle datasets, Flask web tool, Google searches, YouTube tutorials, GitHub

**CH**

1. **CHANNELS of BEHAVIOUR**
   1. **ONLINE**

**SL**

**10. YOUR SOLUTION**

An AI-powered web app using VGG16 model that classifies butterfly species from uploaded images in real-time, offering speed, accuracy, and ease of access for both experts and enthusiasts

**3. TRIGGERS TR**

Seeing a butterfly in the field, needing quick identification for research, interest in learning species, image posted on social media

Take butterfly photos, upload them online or compare manually with images, post on forums asking for help

**BE**

**7. BEHAVIOUR**

**RC**

**J&P 9. PROBLEM ROOT CAUSE**

Butterfly species are highly diverse and often visually similar; traditional ID methods are slow, subjective, and require expert input

**2. JOBS-TO-BE-DONE / PROBLEMS**

Identify butterfly species quickly and accurately from images, support biodiversity tracking, and aid ecological studies

**5. AVAILABLE SOLUTIONS**

Printed field guides, online identification forums, manual comparison with online image results, generic image recognition tools

**CC**

Limited internet access in field, lack of species knowledge, limited access to butterfly experts, time constraints in research

**CS 6. CUSTOMER CONSTRAINTS**

**1.CUSTOMER SEGMENT(S)**

Researchers, ecologists, biology students, conservation NGO'S, citizen scientists, and nature

enthusiasts

Purpose / Vision

**Focus on J&P, tap into BE, understand Extract online & offline CH of BE**

**Identify strong TR & EM**

**Focus on J&P, tap into BE, understand**

# Outcome for Users:

* Educators & Students: Instantly identify butterfly species through a web interface—boosting engagement and learning.
* Researchers & Conservationists: Quickly classify new samples, aiding ecological surveys and biodiversity tracking.
* Nature Enthusiasts: Easily explore butterfly species using only a camera and a browser.

# Repository Resource:

³ https://github.com/JeevanKumar009/Enchanted-Wings-Marvels- of-Butterfly-Species-Project