**Project Design Phase**

**Problem – Solution Fit**

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| Date | 23 June 2025 |
| Team ID | LTVIP2025TMID36354 |
| 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.



## 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:

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