Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	27 June 3035
Team ID	LTVIP2025TMID59407
Project Name	Enchanted Wings: Marvels Of Butterfly Species
Maximum Marks	4 Marks

Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Project Design Phase-II
Data Flow Diagram & User Stories

Date	27 June 2025
Team ID	LTVIP2025TMID59407
Project Name	Enchanted Wings: Marvels Of Butterfly Species
Maximum Marks	4 Marks

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

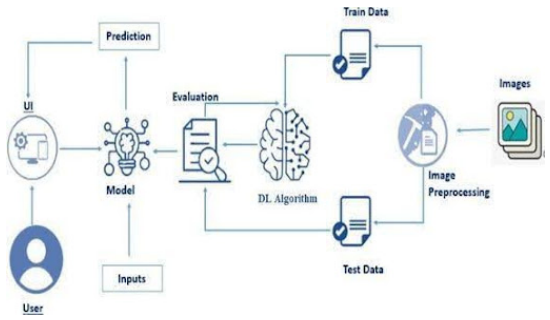

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1	Image Input Interface	Allows users to upload or capture butterfly images from their device.	HTML, CSS, JavaScript, Streamlit or React
2	Image Preprocessing	Resizes, scales, and formats the image before sending it to the model.	OpenCV, TensorFlow/Keras utilities
3	Model Inference Engine	Uses a trained model to predict the butterfly species from the input image.	TensorFlow, Keras, VGG16, MobileNet
4	Prediction Visualizer	Displays top predictions with confidence scores to the user.	Streamlit / React frontend UI
5	Explainability Module	Provides Grad-CAM visual heatmaps to explain model predictions.	Keras + Grad-CAM, Matplotlib
6	Species Info Provider	Fetches or shows facts, habitat, and links for the predicted species.	Wikipedia API / Custom JSON DB

Table-2: Application Characteristics:

S.No	Characteristic	Description
1	**User-Friendly**	Simple, intuitive UI for students, nature lovers, and researchers.
2	**Accurate**	Uses a deep learning model (e.g., VGG16) to classify species with high accuracy.
3	**Responsive**	Works well on both desktop and mobile devices with fast load and response times.
4	**Explainable**	Provides visual explanations (e.g., Grad-CAM) to increase user trust in predictions.

5	**Educational**	Displays species information to help users learn more about the butterfly.
6	**Scalable**	Can handle multiple users and be extended to classify more species.
7	**Secure**	Handles image data privately, with no unnecessary storage of user uploads.
8	**Maintainable**	Built using modular components and clean code for easy updates.
9	**Deployable**	Can be deployed as a web app using platforms like Streamlit, Flask, or Heroku.
10	**Offline-Friendly**	Can optionally support offline predictions using a light model (future scope).