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

Date	31 January 3035
Team ID	LTVIP2025TMID34696
Project Name	Enchanted Wings: Marvels Of Butterfly Species
Maximum Marks	4 Marks

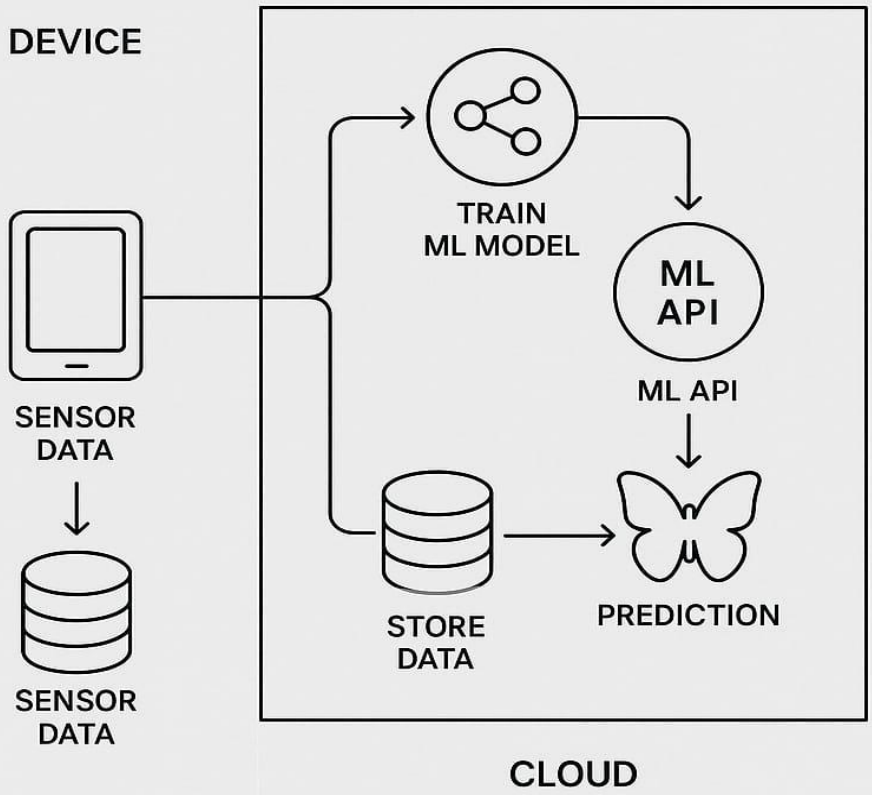
Technical Architecture:

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

Example: Order processing during pandemics for offline mode

Reference: https://developer.ibm.com/patterns/ai-powered-backend-system-for-order-processing-during-pandemics/

Example Technical Architecture



GUIDELINES

Include all the processes (As an application logic/ Technology Block)
Provide infrastructural demarcation (third party APIs etc.)
Indicate Data Storage components/ services If applicable

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How users interact with the system through web pages	HTML, CSS, JavaScript, Flask (Python)
2.	Application Logic-1	Logic for butterfly image upload, preprocessing, and routing	Python (Flask Framework)
3.	Application Logic-2	Transfer Learning Model (VGG16) for butterfly classification	TensorFlow, Keras
4.	Application Logic-3	Display species name and confidence, retrieve species info	Python + Flask Backend
5.	Database	Display species name and confidence, retrieve species info	SQLite / MySQL
6.	Cloud Database	Stores user data, prediction history, species info	Firebase / Google Cloud SQL

7.	File Storage	Cloud-hosted database for scalability	Google Drive API / Local Filesystem / Firebase
8.	External API-1	Stores uploaded butterfly images and results	Wikipedia API / Custom REST API
9.	External API-2	Retrieve butterfly species description from encyclopedia APIs	Google Maps API / GeoTagging API
10.	Machine Learning Model	Classifies butterflies using deep learningl	VGG16 (Transfer Learning), TensorFlow, Keras
11.	Infrastructure (Server / Cloud)	Hosting the app locally and optionally on cloud platforms	Localhost, Google Cloud Platform, Render, Heroku

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Web framework and ML libraries used are open-source	Flask, TensorFlow, Keras, Bootstrap
2.	Security Implementations	Basic authentication and image upload protection; optionally, email OTP	SHA-256, Flask-Login, HTTPS
3.	Scalable Architecture	Basic authentication and image upload protection; optionally, email OTP	3-tier Architecture, Flask REST API
4.	Availability	Can be deployed on cloud platforms for high uptime	Load balancing (Render/Heroku), Auto-scaling
5.	Performance	Optimized image size (128x128), caching results, quick model inference	Model quantization, ImageDataGenerator, Flask Caching

References:

https://c4model.com/

https://developer.ibm.com/patterns/online-order-processing-system-during-pandemic/

https://www.ibm.com/cloud/architecture

https://aws.amazon.com/architecture

https://medium.com/the-internal-startup/how-to-draw-useful-technical-architecture-diagrams-2d20c9fda90d