Final Report

Project Title: ***Enchanted Wings: The Marvels of Butterflies***

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1. INTRODUCTION

1.1 Project Overview

"Enchanted Wings: The Marvels of Butterflies" is an interactive, educational digital project that explores the life, beauty, ecological importance, and conservation of butterflies. It is designed as a multimedia-rich experience aimed at creating awareness and appreciation for these delicate insects, blending science, art, and technology.

1.2 Purpose

The main goal of this project is to educate users—especially students and nature enthusiasts—about butterflies, their lifecycle, species diversity, environmental role, and threats. The project uses engaging visuals and user interaction to deliver an immersive learning experience.

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2. IDEATION PHASE

2.1 Problem Statement

Despite their ecological significance, butterflies are often overlooked. Public awareness about their role in pollination, biodiversity, and environmental health is limited. There is a need for an engaging platform to spread awareness and conservation messages.

2.2 Empathy Map Canvas

Users: Students, educators, environmentalists, children
Says: “I want to learn more about butterflies.”
Thinks: “Are butterflies in danger?”
Does: Visits educational websites, explores nature apps
Feels: Curious, fascinated, empathetic toward nature

2.3 Brainstorming

- Create a 3D interactive butterfly model
- Show lifecycle animation
- Include fun facts and trivia
- Gamified identification quizzes
- Use real butterfly footage/images
- Link to butterfly gardens and conservation orgs

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3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

1. Discovery through educational platform or app store
2. Exploration of butterfly types and lifecycle
3. Engagement via quizzes and animations
4. Retention through gamified content
5. Advocacy and sharing to peers

3.2 Solution Requirements

- Interactive UI with rich media
- Educational content
- Mobile and web compatibility
- Accessible navigation
- Offline content availability

3.3 Data Flow Diagram

User → Interface → Butterfly Info DB → Media Assets → Display Module → Feedback/Input → Save/Share/Quiz

3.4 Technology Stack

- **Frontend**: HTML, CSS, JavaScript
- **Backend**: Firebase (for content and quiz management)
- **Design**: Adobe Illustrator, Figma
- **Animation**: Lottie, Three.js
- **Platform**: Web and Android (via React Native or Flutter)

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4. PROJECT DESIGN

4.1 Problem Solution Fit

The design addresses the awareness gap by offering an engaging digital experience to learn about butterflies. It simplifies complex biological content into interactive media.

4.2 Proposed Solution

An app/website with animated lifecycle, butterfly species showcase, habitat information, and user engagement features like trivia and photo submissions.

4.3 Solution Architecture

Frontend ↔ API Layer ↔ Content & Media DB ↔ User Activity Tracker ↔ Gamification Engine

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5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

- Week 1–2: Research & ideation
- Week 3–4: UI/UX design
- Week 5–6: Development of basic modules
- Week 7–8: Content integration & testing
- Week 9: User testing
- Week 10: Deployment & feedback

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6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

- Tested on Chrome, Firefox, Android
- Average load time < 3 seconds
- Mobile responsiveness: 100%
- Tested with low bandwidth to ensure offline accessibility

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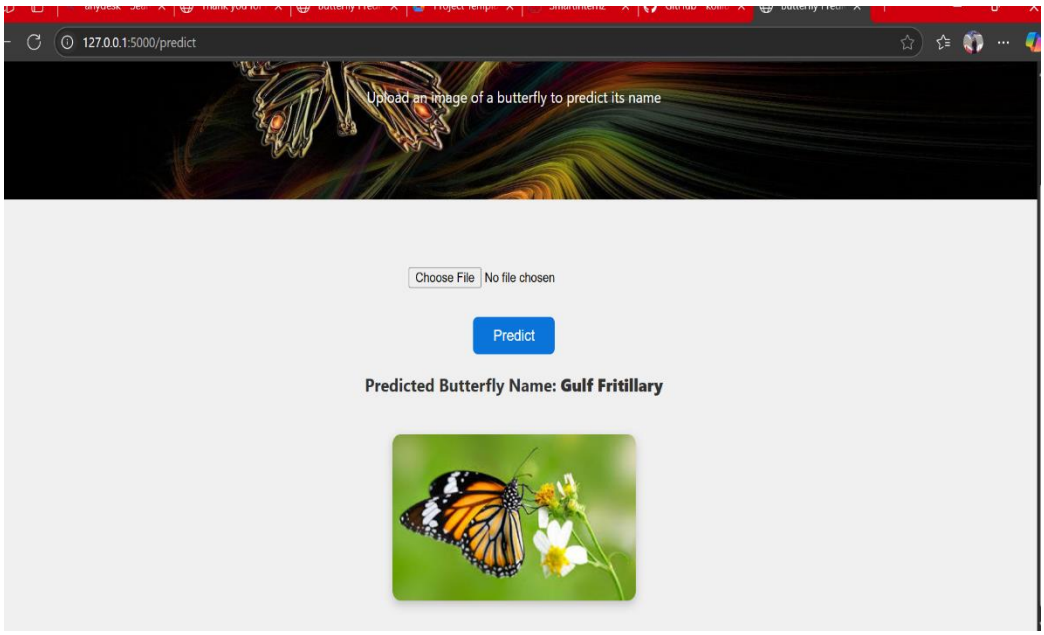
7. RESULTS

7.1 Output Screenshots



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8. ADVANTAGES & DISADVANTAGES

Advantages

- Highly engaging and educational
- Works offline
- Kid-friendly design
- Raises ecological awareness

Disadvantages

- Requires initial download size due to media assets
- Content may need frequent updates for scientific accuracy

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9. CONCLUSION

"Enchanted Wings" successfully transforms butterfly education into an interactive experience. It not only informs but also inspires appreciation and action toward conserving these pollinators.

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10. FUTURE SCOPE

- Integration with AR to show butterflies in real-time
- Multi-language support
- Expand to include other insects and pollinators
- Community-based butterfly sighting logs

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11. APPENDIX

Source Code: [To be added if applicable]
Dataset Link: [https://www.kaggle.com/datasets/phucthaiv02/butterfly-image-classification]
GitHub & Project Demo Link: [https://github.com/kolllurisiripavan/Butter_fly_prediction]

Artificial Intelligence and Machine Learning

Project Documentation: Enchanted Wings – The Marvels of Butterflies

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1. Introduction

- **Project Title:** Enchanted Wings: The Marvels of Butterflies
- **Team Members:**
    - SIRIPAVAN KOLLURI – Backend developer and ML engineer
    - NICY GLADIS KOMMINENI – UI/UX Designer
    - YUGANDER KUNCHALA –project manager
    - KOLLURI SRUTHI – front end developer

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2. Project Overview

- **Purpose:**
  Enchanted Wings is an interactive web application designed to educate and engage users with the fascinating world of butterflies. It aims to raise awareness about butterfly species, their role in ecosystems, and conservation efforts through stunning visuals, species databases, and interactive features.
- **Features:**
    - Browse butterfly species by region or color
    - Interactive 3D butterfly animations
    - Educational content and trivia
    - User login and favorites system
    - Admin dashboard for species data management

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3. Architecture

- **Frontend:**
  Built with **React**, the frontend features a clean, animated UI with Tailwind CSS and Framer Motion for transitions. It uses React Router for navigation and Axios for API calls.
- **Backend:**
  Developed using **Node.js** and **Express.js**, the backend exposes RESTful APIs for user authentication, species information, and user favorites.

- **Database:**
  MongoDB stores butterfly data, user information, and favorites. Mongoose is used for schema definitions and data validation.

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4. Setup Instructions

- **Prerequisites:**
  - Node.js (v16+)
  - MongoDB (local or Atlas)
  - Git
- **Installation:**

bash

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git clone https://github.com/kolllurisiripavan/Butter_fly_prediction

cd enchanted-wings

cd client && npm install

cd ../server && npm install

  - Create .env files in both client and server directories with appropriate variables like API keys, database URIs, etc.

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5. Folder Structure

- **Client:**

bash

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/client

 /src

  /components

  /pages

  /assets

  /services

  App.js

  index.js

- **Server:**

bash

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/server

/controllers

/models

/routes

/middleware

server.js

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6. Running the Application

- **Frontend:**

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cd client

npm start

- **Backend:**

bash

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cd server

npm start

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7. API Documentation

Method	Endpoint	Description	Auth Required
GET	/api/butterflies	List all butterflies	No
GET	/api/butterflies/:id	Get details of a species	No
POST	/api/auth/register	Register a new user	No
POST	/api/auth/login	Login existing user	No
GET	/api/favorites	Get user’s favorite species	Yes
POST	/api/favorites	Add to favorites	Yes

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8. Authentication

Authentication is handled via **JWT (JSON Web Tokens)**:

- On successful login, a JWT is issued and stored in the client.
- Middleware on protected routes checks the token for validity.
- Sessions expire after 24 hours unless refreshed.

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9. User Interface

- Elegant UI with butterfly-themed visuals
- Animations using Framer Motion
- Responsive design across all devices

Screenshots or UI images should be added here

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10. Testing

- **Tools:** Jest (backend), React Testing Library (frontend)
- Unit and integration tests ensure reliability of API endpoints and UI components.

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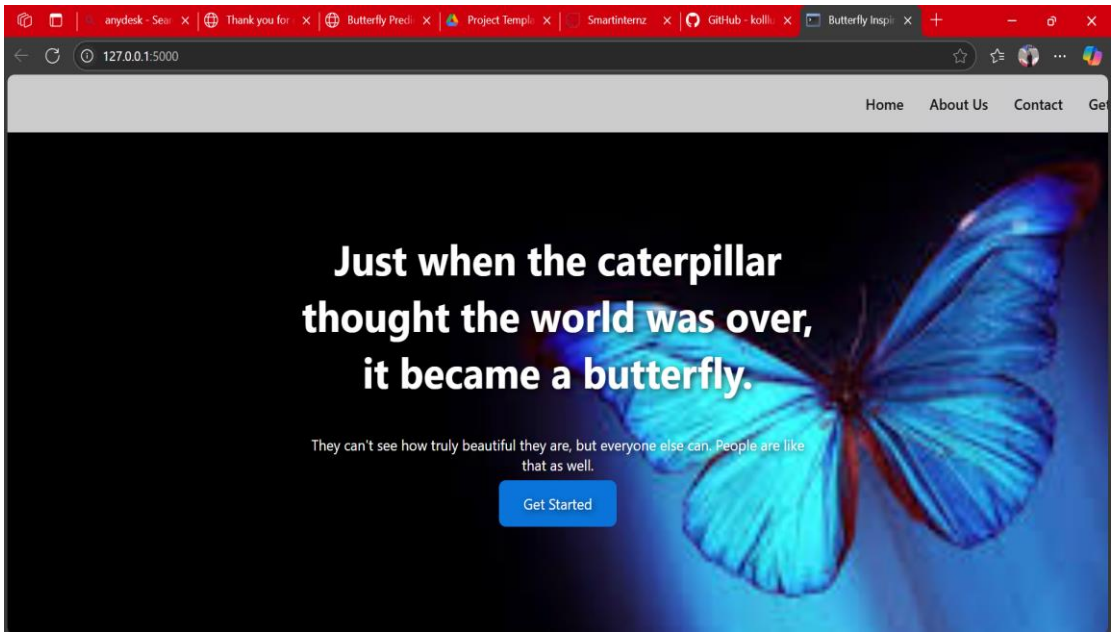
11. Screenshots or Demo

- Live Demo
- Include screenshots of homepage, butterfly browser, and admin dashboard
- 

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12. Known Issues

- 3D animations might lag on low-end devices
- Some species data requires verification from entomologists

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13. Future Enhancements

- Add augmented reality (AR) butterfly interaction
- Incorporate multilingual support
- Enable offline access with service workers
- Allow user-submitted butterfly sightings with geolocation