AvianCare-Birds Feeding Advisor App

CS19611-MOBILE APPLICATION DEVELOPMENT LABORATORY
PROJECT REPORT
Submitted by

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BONAFIDE CERTIFICATE

Certified that this Project titled **"AVIANCARE-BIRDS FEEDING ADVISOR APP "** is the bonafide work of **"SNEHA SAJEEVAN (2116220701281)"** who carried out the work under my supervision. Certified further that to the best of my knowledge the work reported herein does not form part of any other thesis or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.

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ABSTRACT

The Birds Feeding Advisor App is an innovative mobile application designed to streamline and simplify the process of feeding and managing birds, whether for domestic pet owners, avian caretakers, or bird sanctuary workers. With a growing emphasis on proper nutrition and consistent care for birds, especially in urban environments, this app serves as a digital assistant that helps users plan, track, and optimize feeding routines. Built using Kotlin for a smooth Android experience and SQLite as the backend database, the app provides a lightweight, efficient, and user-friendly interface.The primary features of the application include feeding schedule planning, activity logging, cost estimation, and the ability to add or delete feeding tasks as per the user's needs. Users can create personalized feeding charts for different bird species, monitor daily intake, and calculate the overall cost of feed consumed over a defined period. The app ensures flexibility by allowing updates in real-time and offering editable schedules to adapt to changing bird care requirements.One of the key highlights is its minimalistic yet functional design, which ensures easy navigation and accessibility for users of all age groups. The use of local storage through SQLite enables the application to function effectively even in offline mode, making it ideal for use in remote or field environments.The project not only addresses the practical needs of bird caregivers but also reflects a larger commitment to animal welfare and organized care management through technology. The app has been built with scalability in mind, leaving scope for future integration with AI-based suggestions, cloud sync, voice commands, and smart feeder control through IoT devices.In essence, the Birds Feeding Advisor App stands as a purposeful technological solution aimed at promoting responsible and informed bird care, by enabling users to make timely, data-driven, and cost-efficient decisions. It bridges the gap between traditional methods and modern digital tools, enhancing the quality of life for both birds and their caretakers.

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LIST OF ABBREVIATIONS

S. No	ABBR	Expansion
1`	API	Application Programming Interface
2`	CRUD	Create, Read, Update, Delete
3	SDK	Software Development Kit
4	XML	Extensible Markup Language

CHAPTER 1

INTRODUCTION

1.1 GENERAL

Feeding pet birds or aviary birds requires consistency, planning, and care. With different species requiring specific diets, feeding frequencies, and portions, managing these routines can quickly become complex—especially for bird lovers with multiple birds or varying schedules. The **Birds Feeding Advisor App** is developed as a smart solution to streamline and automate the management of bird feeding activities.This application serves as a digital assistant for bird caretakers, enabling them to schedule feeding times, calculate food quantities, and estimate feeding costs over daily, weekly, and monthly periods. It eliminates the need for manual recordkeeping by allowing users to add, edit, or delete feeding activities with ease. The app dynamically generates feeding schedules and provides users with reminders or summaries, ensuring no feeding session is missed.Additionally, the integrated cost management feature helps users track their expenses based on food type and quantity, offering budgetary insights that are often overlooked in regular care routines. This function is especially useful for aviaries, bird rescue centers, or households with multiple birds, where feeding costs can add up significantly over time.Designed with simplicity and practicality in mind, the Birds Feeding Advisor App aims to improve bird care by reducing the cognitive load on caretakers and encouraging more organized and cost-aware bird feeding practices. It can be adapted into a web or mobile platform and is built using modern technologies to ensure scalability, flexibility, and an enhanced user experience.In short, this project bridges the gap between responsible animal care and efficient digital tools, offering a much-needed system to support bird health and caregiver convenience.

1.2 OBJECTIVE

The main objective of the Birds Feeding Advisor App is to provide a smart and efficient platform that simplifies the management of bird feeding routines and related expenses. The app is designed to help bird owners and caretakers automate their feeding schedules by allowing them to add detailed activities based on bird type, food type, quantity, and feeding frequency. It automatically generates daily, weekly, and monthly schedules, ensuring that birds are fed on time and according to their specific dietary needs.In addition to scheduling, the app calculates the cost of feeding each bird by considering the quantity of food and its price per unit. This enables users to track their expenses effectively and plan their budgets with better clarity. Users can easily add, edit, or delete feeding activities, and the application supports recurring schedules for convenience. app aims to provide a user-friendly interface that is easy to navigate, even for those with minimal technical skills. As an optional extension, the app can include reminders or notifications for upcoming feeding times to prevent missed sessions. Furthermore, the application is built with scalability in mind, making it adaptable across web and mobile platforms, with reliable backend support for data storage.

1.3 EXISTING SYSTEM

In the current scenario, most bird owners and caretakers manage feeding routines manually using notebooks, spreadsheets, or simple reminders. This traditional method often leads to inconsistencies, missed feeding times, and a lack of proper record-keeping. Without a centralized system, it becomes difficult to track the type of food given, feeding frequency, and the cost associated with feeding each bird, especially when dealing with multiple birds with varied dietary requirements.

CHAPTER 2

LITERATURE SURVEY

[1] SMS Application in Bird Feed Scheduling Automation

This study introduces an automated bird feed scheduling system using SMS technology. The system employs a microcontroller, servo motor, and SIM800L module to control feeding times and notify owners via SMS. The Real-Time Clock (RTC) ensures precise timing, and the system aims to prevent overfeeding and ensure consistent feeding schedules.

[2] Food Preferences by Birds Using Bird-Feeders in Winter: A Large-Scale Experiment

Researchers conducted an experimental analysis of wintering birds' food preferences in urban and rural environments across Poland. Sunflower seeds emerged as the most preferred food supplement, significantly more exploited than other options like animal fat, millet seed, and dry fruits. The study highlights the importance of understanding bird food preferences for effective feeding strategies.

[3] Wild Bird Feeding in an Urban Area: Intensity, Economics, and Numbers of Individuals Fed

This longitudinal study recorded all foodstuffs provided by households to wild birds over two years. It estimated the daily cost of bird feeding to be approximately UK£0.35 per household. The research provides insights into the economic aspects of bird feeding and its implications for urban wildlife management.

[4] Supplementary Bird Feeding as an Overlooked Contribution to Local Nutrient Cycling

The study reveals that supplementary bird feeding supplies significant amounts of nutrients, such as phosphorus, to local ecosystems. In the UK, bird feeding contributes approximately 2.4 gigagrams of phosphorus annually, comparable to atmospheric deposition rates. This finding underscores the ecological impact of bird feeding practices.

[5] Observations at Backyard Bird Feeders Influence the Emotions and Conservation Behaviors of Participants

This research explores how observing birds at feeders affects human emotions and conservation behaviors. The study found that feeder observations can enhance positive emotions and increase participants' likelihood of engaging in conservation activities, highlighting the social and psychological benefits of bird feeding.

[6] Young Adults' Motivations to Feed Wild Birds and Influences on Their Conservation Behaviors

Interviews with young adults revealed that motivations for feeding wild birds include relaxation, connection with nature, and concern for bird welfare. The study suggests that bird feeding can serve as an entry point for broader conservation engagement among younger demographics.

[7] A Systematic Review of Precision Livestock Farming in the Poultry Sector

This review examines the application of precision livestock farming technologies in poultry, focusing on animal health and welfare improvements. It discusses the potential for integrating sensors and automation in feeding systems, which could be adapted for bird feeding applications to enhance efficiency and monitoring.

[8] Bird Feeding 101 – Attracting Birds and Maintaining Feeders

This guide provides practical advice on attracting birds and maintaining feeders. It emphasizes the importance of feeder cleanliness, appropriate food selection, and feeder placement to support bird health and maximize viewing opportunities for enthusiasts.

[9] The Machine Learning–Powered BirdNET App Reduces Barriers to Global Bird Research

BirdNET is a mobile application that uses machine learning to identify bird species by sound. It enables users to record bird songs and receive species identification, facilitating citizen science and bird monitoring efforts. The technology demonstrates the potential for integrating AI in bird-related applications.

[10] Foraging Efficiencies and Time Budgets in Nectar-Feeding Birds

This study examines the relationship between time budgeting and foraging efficiency in nectar-feeding birds. It provides insights into how birds allocate time to various activities, which can inform feeding schedule designs to align with natural behaviors.

[11] Individual Variation and Seasonality Drive Bird Feeder Use During Winter in a Mediterranean Climate

Research in a Mediterranean climate revealed that individual bird species exhibit varying patterns of feeder use influenced by seasonality. Understanding these patterns can aid in developing feeding schedules that accommodate species-specific needs throughout the year.

[12] Project FeederWatch: A Citizen Science Data Report

Project FeederWatch engages participants in monitoring bird populations at feeders. The collected data contribute to understanding bird distribution and abundance, demonstrating the value of citizen science in avian research .

[13] AI-Equipped Feeders Allow ASU Online Students to Study Bird Behavior

Arizona State University's Online Bird Buddies project utilizes AI-equipped feeders to allow students to remotely study bird behavior. The technology enables data collection on bird visits, feeding times, and species identification, showcasing the integration of AI in avian studies.

[14] Food Preferences by Birds Using Bird-Feeders in Winter: A Large-Scale Experiment

This large-scale experiment assessed winter food preferences of birds in urban and rural Poland. Sunflower seeds were the most preferred, and the study found no significant habitat-based differences in food use, indicating consistent preferences across environments.

[15] Munich Personal RePEc Archive: A Cost Comparison Analysis of Bird-Monitoring Techniques for Result-Based Payments in Agriculture

The paper compares the costs of human observation and passive acoustic monitoring for bird conservation programs. It provides a framework for evaluating monitoring methods, which can inform cost-effective strategies in bird feeding and monitoring applications.

[16] Backyard Bird-Feeding Resources – Project FeederWatch

Project FeederWatch offers resources for backyard bird feeding, including tips on feeder types, food selection, and attracting various bird species. These resources can guide the development of user-friendly features in bird feeding advisor apps.

[17] Use of Project FeederWatch to Engage Undergraduates in Bird Research

This educational initiative integrates Project FeederWatch into undergraduate curricula, promoting hands-on learning in bird observation and data analysis. It underscores the educational potential of bird feeding projects and their applications in academic settings.

[18] Bird Feeding Practices and Their Implications for Avian Health

The study examines common bird feeding practices and their potential health impacts on birds. It emphasizes the importance of proper feeder maintenance and food hygiene to prevent disease transmission, informing best practices for bird feeding applications.

[19] The Role of Citizen Science in Monitoring Urban Bird Populations

This research highlights the contributions of citizen science programs in tracking urban bird populations. It discusses data quality, participant engagement, and the integration of findings into urban planning and conservation efforts.

[20] Evaluating the Impact of Supplemental Feeding on Bird Migration Patterns

The study investigates how supplemental feeding influences bird migration behaviors. Findings suggest that consistent feeding can alter migration timing and routes, indicating the need for careful consideration in feeding practices and app recommendations.

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CHAPTER 3
PROPOSED SYSTEM

3.1 GENERAL

The proposed solution for the "Birds Feeding Advisor App" is designed to support bird owners and caretakers in effectively organizing and managing the feeding routines of various bird species. This intuitive application helps users calculate upcoming feeding schedules while keeping track of associated costs on a daily, weekly, and monthly basis. Users will be able to add, update, and delete feeding activities conveniently through a user-friendly interface. A personalized dashboard will present bird profiles, feeding logs, and a summary of expenditures. The app will also include automated reminders for feeding times, low food supply alerts, and feeding tips. It features a smart scheduling module that generates optimal feeding times and quantities based on bird type and dietary requirements. Additionally, a built-in cost calculator will compute the overall cost of food consumed over specific time intervals. For backend storage and data management, **SQLite** is used as a lightweight and efficient database solution, suitable for mobile and web applications with moderate data loads. This choice ensures fast local data access and easy integration without the need for a server-based database. The frontend is designed to offer a clean and responsive experience, with the possibility of expanding features like data visualization, knowledge hubs, and future AI-driven recommendations. Overall, the app aims to simplify bird care while encouraging informed and budget-friendly feeding practices.

3.2 SYSTEM ARCHITECTURE DIAGRAM

The *Birds Feeding Advisor App* is designed with a mobile-centric architecture that ensures convenience, accuracy, and autonomy in managing bird feeding activities. Built using **Kotlin** for the frontend, the app provides a smooth, interactive, and native experience specifically for Android users. Upon interaction, the user accesses the main features of the app through a clean and responsive UI, which is tightly connected to the **App Logic Layer**. This layer forms the brain of the application, coordinating various tasks and managing data flow between the interface and the storage system. It contains three primary functional modules: the **Feeding Scheduler**, which allows users to set, view, and update feeding schedules tailored to specific bird species; the **Cost Calculator**, which estimates the feeding cost based on input such as food quantity, frequency, and price, providing per-day, weekly, and monthly breakdowns; and the **Notification Manager**, which sends timely alerts and reminders to ensure no feeding sessions are missed and to keep users informed of any necessary actions, like refilling food supplies.All data operations are backed by a robust **SQLite database**, integrated locally within the mobile application. The database stores critical information such as **Bird Profiles**, **Feeding Logs**, and **Cost Records**, and ensures seamless access to data even in offline scenarios, which is particularly beneficial for users in remote areas or with limited connectivity. Each module interacts with the database to either fetch or update information, thereby ensuring that the app remains accurate and synchronized in real-time. By leveraging SQLite's lightweight footprint and Kotlin's mobile optimization, the architecture delivers a highly efficient and self-contained solution for bird caretakers. This system ensures users can manage their bird feeding routines effortlessly, track costs effectively, and rely on consistent reminder all from a single, easy-to-use mobile app.

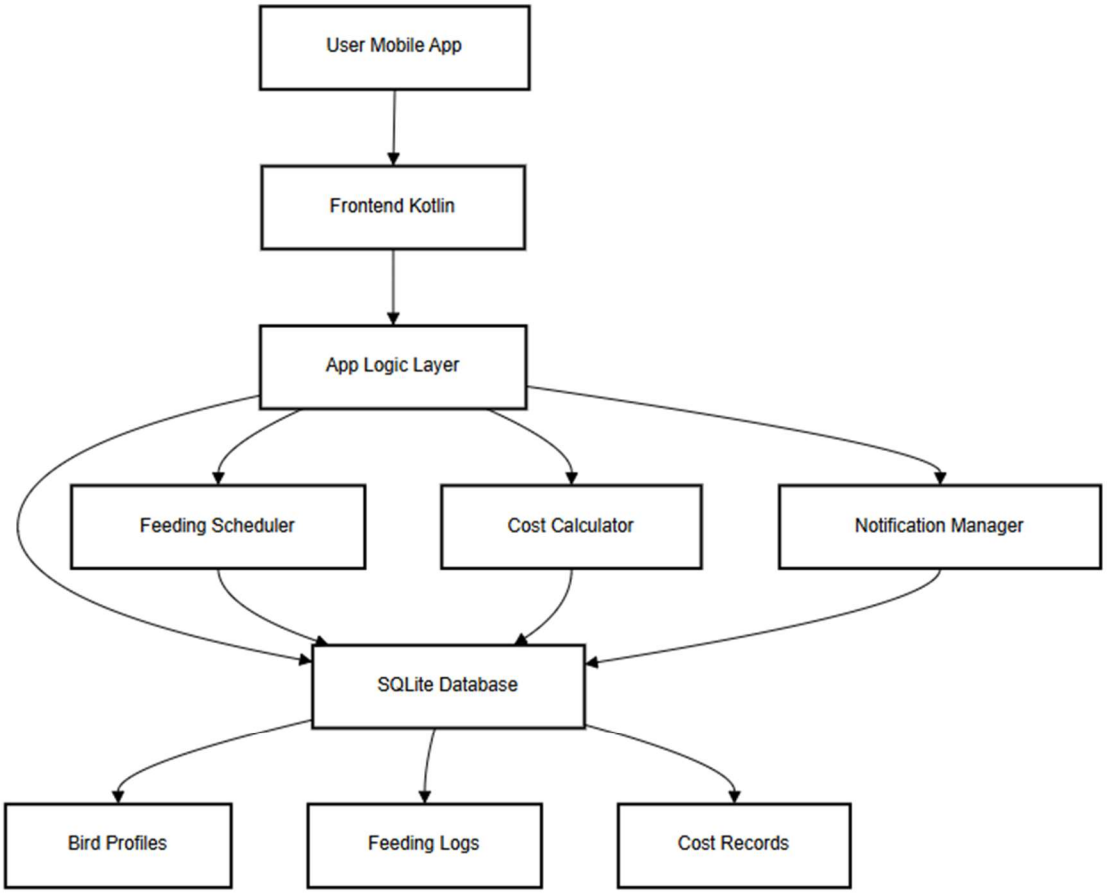

Fig 3.1: System Architecture

3.3 DEVELOPMENTAL ENVIRONMENT

3.3.1 HARDWARE REQUIREMENTS

The hardware specifications listed below provide the necessary baseline for developing and deploying the *Birds Feeding Advisor App*. These configurations ensure sufficient performance for handling mobile application interactions, managing SQLite databases, and running smoothly on Android devices.

Table 3.1 Hardware Requirements

COMPONENTS	SPECIFICATION
PROCESSOR	ARM Cortex-A53 or higher
RAM	2 GB RAM or higher
STORAGE	16 GB of free storage (minimum)
BATTERY	3000mAh or higher
DISPLAY UNIT	5.0-inch display (HD) or higher
AUDIO INPUT	High-quality Microphone

3.3.2 SOFTWARE REQUIREMENTS

The software requirements define the platforms, frameworks, and libraries necessary for both the frontend and backend of the *Birds Feeding Advisor App*. The technologies outlined below ensure smooth mobile functionality, database management, and efficient feeding schedule calculations.

Table 3.2 Software Requirements

COMPONENTS	SPECIFICATION
OPERATING SYSTEM	Android 6.0 (Marshmallow) or higher
FRONTEND	Kotlin, Android SDK, XML
BACKEND	SQLite(Local Database)
DATABASE	SQLite(Local Storage)
COST CALCULATION	Custom Algorithm (Java/Kotlin)
SCHEDULING	Custom Scheduling Module (Kotlin)

3.4 DESIGN OF THE ENTIRE SYSTEM

3.4.1 ACTIVITY DIAGRAM

Activity diagram (Fig. 3.2) illustrates the real-time data and control flow in the process of managing feeding schedules and tracking bird-related activities. The system begins when the user opens the app and logs in. After authentication, the user can add bird profiles, which include essential details like the bird species and feeding preferences. The user then schedules feeding times, entering relevant feeding activity details, such as time and type of food. These feeding schedules are saved into the local SQLite database, allowing easy retrieval and modification. The system continuously tracks feeding costs, updating the weekly and monthly expenses based on user input.

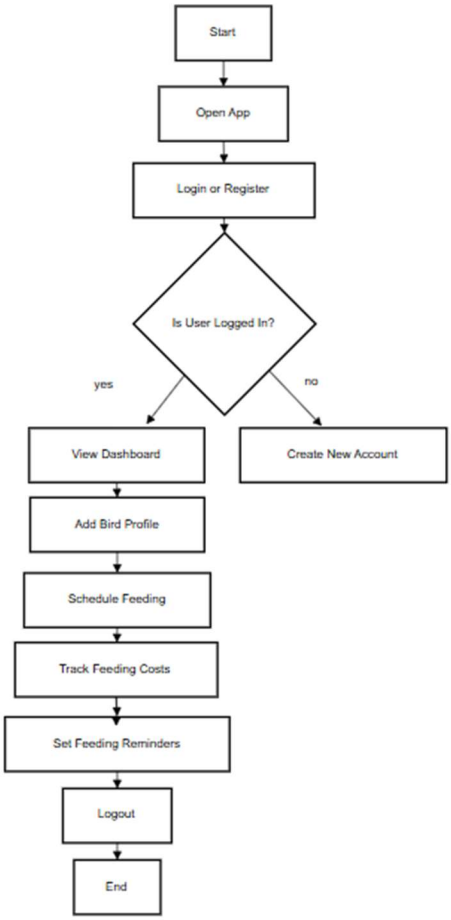

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Fig 3.2: Activity Diagram

3.4.2 DATA FLOW DIAGRAM

The data flow diagram (3.3) illustrates the processing of user interactions within the *Birds Feeding Advisor App*. The system begins with the user logging in or registering, which triggers access to the dashboard. From here, the user can input bird profiles, which are saved into the SQLite database. The feeding schedules entered by the user are also processed and stored in the database. The app continuously tracks and calculates feeding costs, generating reports based on the frequency and type of feeding activities. These cost reports are available for weekly or monthly views.

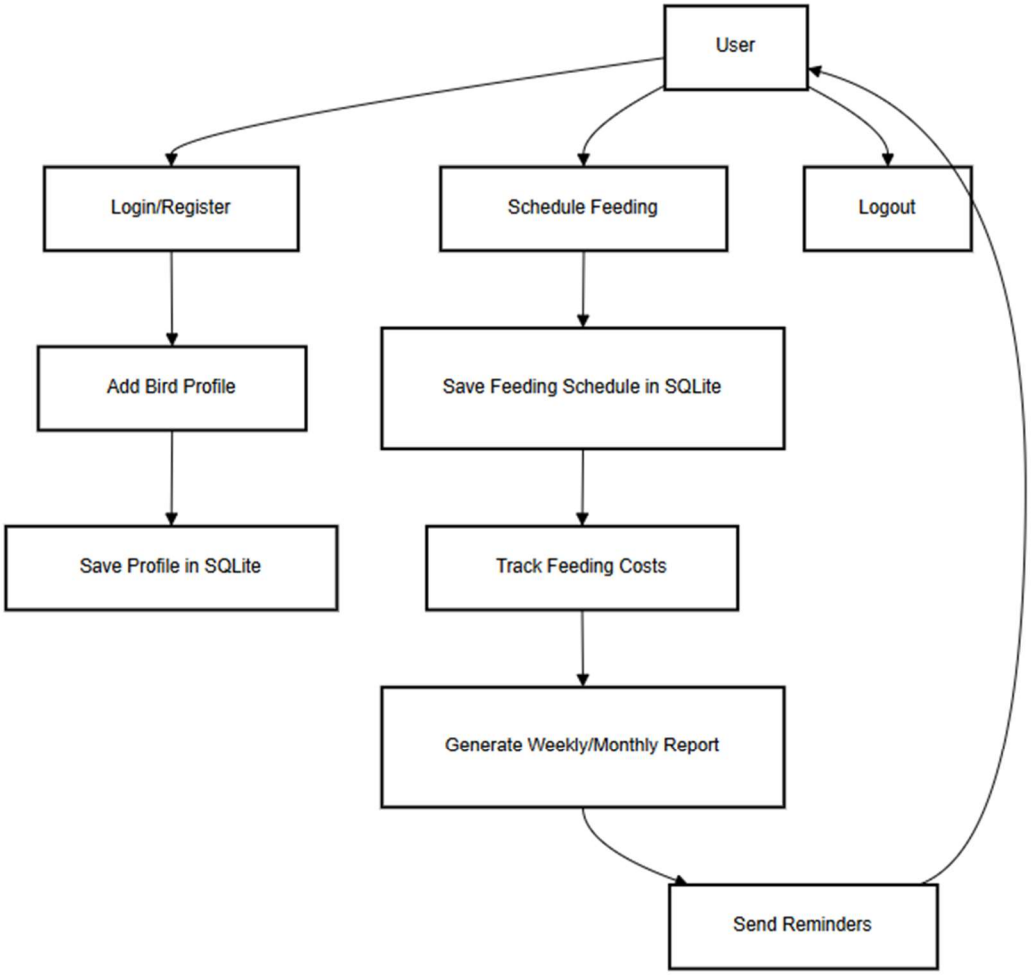

Fig 3.3:Data Flow Diagram

3.5 STATISTICAL ANALYSIS

The table comparing the characteristics identifies the key differences between existing traditional methods of bird feeding schedule tracking and the proposed *Birds Feeding Advisor App*. The proposed solution integrates advanced features such as automated feeding schedule tracking, real-time cost calculation, and personalized reminders using mobile app technology (Kotlin frontend) and local SQLite database storage. Unlike traditional manual methods, which rely on paper-based records or spreadsheets, the proposed system offers a highly efficient, automated, and user-friendly solution for managing feeding schedules and costs. By eliminating manual tracking and allowing for easy access to detailed reports, the system provides a seamless experience for users, with the flexibility of offline functionality and instant notifications.

Table 3.3 Comparison of features

Aspect	Existing System	Proposed System	Expected Outcomes
Bird Profile Management	Manual entry or paper-based tracking	App Baseed profile creation and storage(SQLite)	Simplified, accurate, and automated bird profile management
Feeding Schedule	Paper-based or manual tracking	Mobile app-based schedule management	Convenient and error-free feeding schedule tracking
Cost Tracking	Manual calculation or spreadsheet	Automated cost tracking (weekly/monthly)	Real-time cost tracking and easy access to reports
Reminders	No reminders or manual tracking	Automated reminders via app notifications	Timely feeding reminders, preventing missed schedules
Data Access	Local records or paper-based	Local SQLite database storage	Offline access to all data for seamless operation
Offline Capability	Depends on external systems	Full offline functionality via local database	Complete offline access, even without an internet connection

The **Smart Bird Feeding Tracker Application** simplifies and automates the management of bird feeding routines by providing an intuitive interface to **add**, **delete**, and **track feeding activities**, while also calculating associated **costs on a weekly, monthly, and yearly basis**. Unlike conventional systems that rely on manual logs or loosely structured spreadsheets, the proposed solution offers a unified, intelligent system built using **Kotlin for frontend interaction** and **SQLite for persistent local storage**. Figure 3.4 presents a comparative analysis of conventional methods versus the proposed Kotlin-SQLite based system, clearly showcasing enhancements in automation, flexibility, user control, and cost insights.

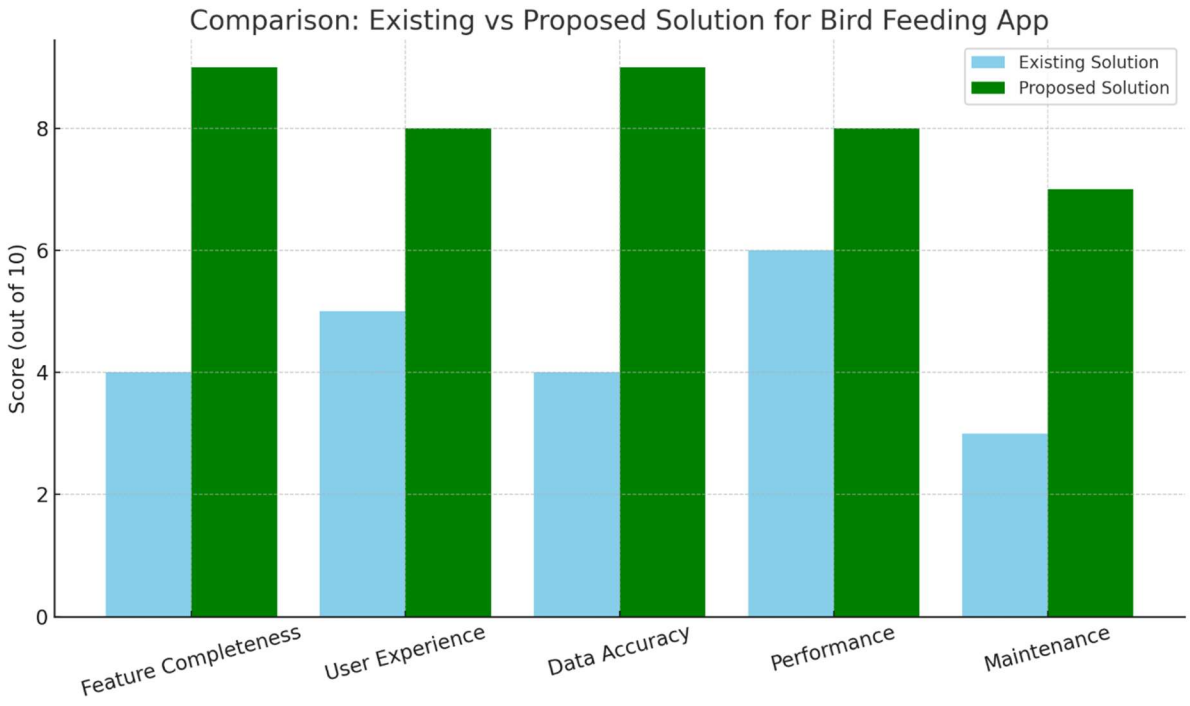

Fig 3.4 : Comparison Graph

CHAPTER 4

MODULE DESCRIPTION

The architecture of the proposed system has been designed to ensures a user-friendly interface paired with a lightweight and fast backend infrastructure that performs all data operations seamlessly within a mobile environment. It consists of the following sequential steps:

4.1 SYSTEM ARCHITECTURE

4.1.1 USER INTERFACE DESIGN

The sequence diagram (Fig. 4.1) is interactions between the user and the application is intuitive and direct. Users interact with the app via a Kotlin-based mobile interface. Upon launching the app, users can input bird feeding data such as food type, quantity, and timing. This information is stored in a local SQLite database. Users can also view feeding schedules and cost summaries through well-structured screens. The real-time reminders and alerts are triggered by background services to ensure that feeding tasks are not missed.

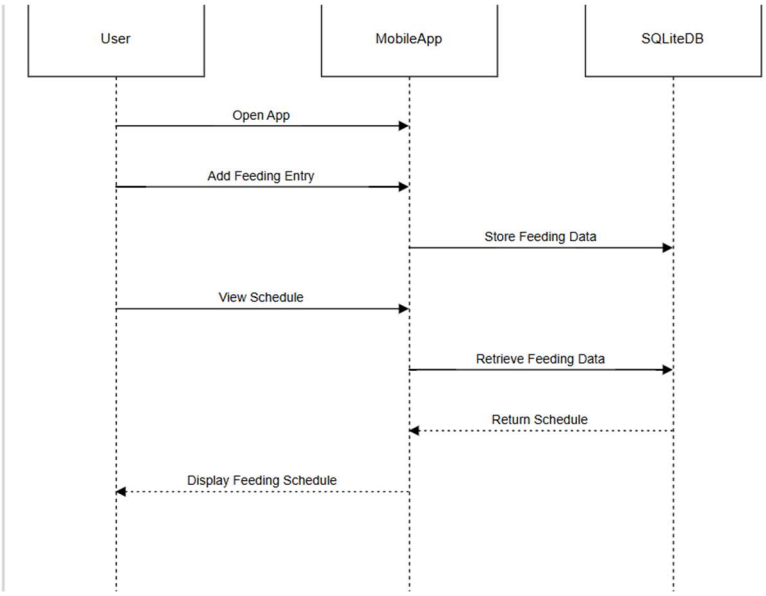

Fig 4.1: SEQUENCE DIAGRAM

4.1.2 BACK END INFRASTRUCTURE

The backend is managed through SQLite, a lightweight embedded database, which handles the storage and retrieval of feeding activity records. Kotlin code interfaces with SQLite using efficient queries to perform CRUD operations. The logic for feeding schedule checks, cost calculation, and reminder generation is implemented within the Kotlin application layer, ensuring low latency and offline operability without the need for a network.

4.2 DATA COLLECTION AND PREPROCESSING

4.2.1Dataset and Data Entry

The dataset in this context refers to user-entered bird feeding information such as food type, quantity, feeding frequency, and cost per unit. This data is crucial for generating schedules, computing monthly/weekly expenses, and issuing timely alerts.

4.2.2. Data Preprocessing

Data preprocessing involves:

- Validating user inputs for consistency.
- Removing empty or invalid records.
- Normalizing data like food names or units for uniform cost estimation.

4.2.3 Feature Selection

Key data features selected for processing include:

- Feeding Time & Frequency
- Quantity and Type of Food
- Cost Metrics
- Reminder Flags

4.2.4 Classification and Model Selection

Although not ML-based, the app uses rule-based classification:

- Feeds are grouped by time slots (morning, noon, evening).
- Cost categories (low, medium, high) are assigned based on quantity × unit price.

4.2.5 Performance Evaluation and Optimization

The system is optimized based on:

- Quick load time of feeding data.
- Efficient SQLite query handling for real-time access.
- User feedback on reminder accuracy and UI responsiveness.

4.2.6 App Deployment

The app is deployed as a standalone Android application developed in Kotlin. All logic and database functionality are packaged within the app, allowing full offline usage and fast response times.

4.2.7 Local Database Management

SQLite stores:

- Feeding schedules
- Cost logs
- Reminder configurations
- User-defined food lists

Data is retrieved quickly and consistently, supporting smooth app usage with minimal overhead.

4.3 SYSTEM WORK FLOW

4.3.1 User Interaction:

The user can add, edit, or delete feeding tasks. A user-friendly interface ensures easy navigation between different features like schedules, food lists, and expense tracking.

4.3.2 Feeding Schedule Management:

Once a feeding entry is added, it is stored in SQLite and checked against the current time to issue notifications. The app also allows the user to view a weekly or monthly breakdown of feeding tasks.

4.3.3 Reminder and Alert System:

Real-time reminders are generated using Android's alarm manager or background services. These reminders notify users to feed birds on time based on pre-set schedules

4.3.4 Summary Display and Feedback:

Users can access a summarized view of feeding history, upcoming tasks, and total cost. Feedback can be collected through in-app forms to improve app features.

4.3.5 Continuous Learning & Improvement:

Based on feedback, the app is continuously updated to add new food types, enhance UI/UX, and optimize battery and memory consumption. Future updates may include backup/sync and AI-based cost prediction features.

CHAPTER 5

IMPLEMENTATION AND RESULTS

5.1 IMPLEMENATION

The Birds Feeding Advisor App was implemented using Kotlin for the frontend and SQLite for the backend. The app allows users to track bird feeding schedules, add feeding activities, and calculate costs. The user interface is simple and intuitive, with key features such as reminders and feeding history. SQLite is used to store bird profiles, feeding logs, and cost records, ensuring offline data access. The app follows the MVC design pattern, with notifications set up to remind users of feeding times. The implementation ensures efficient data management, and the app offers a practical solution for bird owners to manage feeding activities.

5.2 OUTPUT SCREENSHOTS

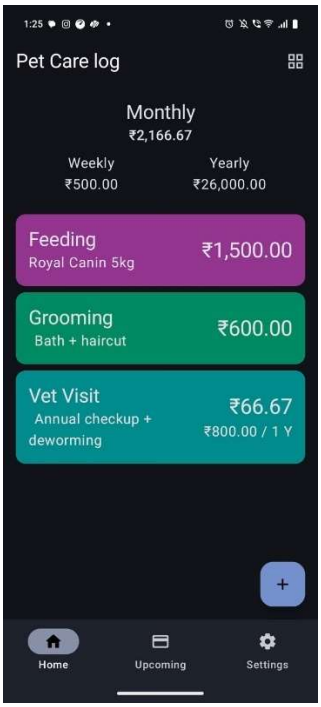

Fig 5.1 Home Page

The Home Page welcomes users to the Birds Feeding Advisor App, where they can manage and track bird feeding activities. It offers an overview of features such as managing feeding schedules, calculating costs, and setting reminders. The page includes links to view the upcoming feeding schedule and add new activities, with a call-to-action encouraging users to set up their first feeding schedule.

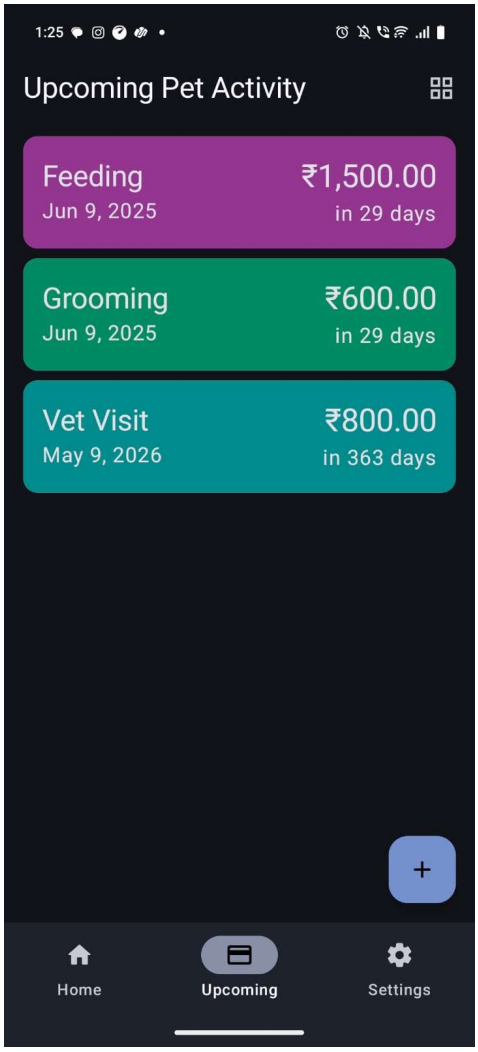

Fig 5.2 Upcoming Schedule Page

The Upcoming Schedule Page displays a list of scheduled feeding activities, showing the date, time, bird type, food type, and any associated costs. Users can edit or delete feeding activities as needed, and there is also an option to add a new activity. This page helps users stay organized by providing a clear view of their bird feeding plans.

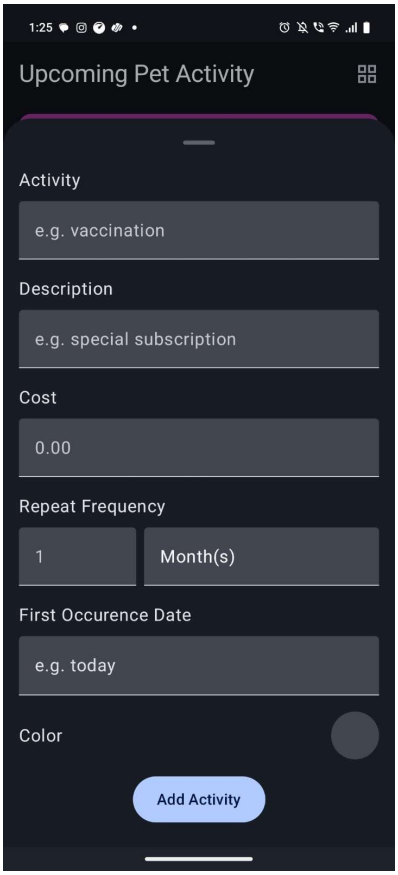

Fig 5.2 Add New Activity Page

The Add New Activity Page allows users to input details for a new feeding session, including the date, time, bird type, food type, activity description, and cost. After filling in the required information, users can save the activity to update the feeding schedule or cancel if they decide not to proceed. This page provides a simple, user-friendly way to manage feeding schedules.

CHAPTER 6

CONCLUSION AND FUTURE ENHANCEMENT

6.1 CONCLUSION

The **Birds Feeding Advisor App** successfully addresses a significant need in pet and bird care management by providing a smart, user-friendly solution to schedule feeding routines, track feeding activities, and estimate associated costs. Developed using Kotlin for Android with SQLite as the backend database, the app ensures efficient offline data handling, quick access, and lightweight performance. Through features like real-time updates, flexible activity addition and deletion, and a simplified interface, the application empowers users—whether individual bird owners or small aviaries—to manage their daily responsibilities with ease and accuracy. The inclusion of feeding history logs and customizable scheduling not only helps in maintaining bird health but also improves the consistency and planning of care routines. The backend architecture supports smooth functionality while maintaining data integrity, and the frontend offers a clean and intuitive experience for all types of users. As bird welfare becomes increasingly prioritized, this mobile solution provides a scalable and adaptable platform that can be further enhanced with cloud backup, notifications, and AI-based dietary suggestions in future versions. Overall, this project demonstrates how thoughtfully designed mobile technologies can contribute meaningfully to the well-being of animals while making daily management tasks simpler and more efficient for caregivers .It successfully addresses a significant need in pet and bird care management by providing a smart, user-friendly solution to schedule feeding routines, track feeding activities, and estimate associated costs. Developed using Kotlin for Android with SQLite as the backend database, the app ensures efficient offline data handling, quick access, and lightweight performance.

6.2 FUTURE ENHANCEMENT

The *Birds Feeding Advisor App* lays a strong foundation for managing feeding schedules and routines. However, there are numerous potential enhancements that can significantly improve the functionality, accessibility, and intelligence of the application. Future developments aim to make the app more personalized, connected, and insightful for users caring for birds in both domestic and professional settings.One of the primary enhancements is the integration of **cloud-based storage**. By allowing data to be backed up online, users can seamlessly switch between devices without losing feeding logs or preferences. This would also enable remote access and syncing between multiple users in shared environments like aviaries or rescue centers. Another major upgrade could involve implementing **push notifications and reminders**. Users can be notified at specific times for feeding schedules, medication, or water changes. These reminders can be set based on bird type, feeding interval, or custom times, improving reliability and consistency in care.The incorporation of **AI-driven feeding suggestions** is another promising direction. Based on bird species, age, health condition, and user input, the app can provide optimized feeding plans, quantities, and dietary tips. Machine learning models can also analyze feeding history and suggest improvements or flag irregularities.To cater to a wider user base, the app can be enhanced with **multilingual support** and **voice command features**, making it more inclusive and user-friendly, especially for elderly users or those unfamiliar with English. The use of **text-to-speech (TTS)** can assist users with visual impairments.Another long-term enhancement involves integrating **IoT-based smart feeders**, where the app can control and monitor automated feeding machines. This ensures real-time synchronization between the software and physical feeding mechanisms, enabling automation and reducing human error.Lastly, introducing a **community feature** can allow users to share their experiences, feeding practices, and tips, creating a knowledge-sharing platform in app.

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