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PAWCAREAI: An Intelligent AI-Driven Platform for Comprehensive Pet Care Management

Prof. Manjula P¹, Rohan K Joe², Srujan Kumar MD², Syed Abu Talha², Shamanth Kumar M², Sandesh Kumar S²

Assistant Professor, Dept. of CSE, Jain Institute of Technology, Davangere, Karnataka, India¹

UG Students, Dept. of CSE, Jain Institute of Technology, Davangere, Karnataka, India²

ABSTRACT: The intersection of artificial intelligence (AI) and the rapidly expanding pet care industry presents a unique opportunity to transform the way pet owners manage the health, welfare, and daily needs of their companion animals. This paper presents PAWCAREAI, a unified, AI-powered mobile platform that consolidates five critical dimensions of pet care into a single, intuitive application: dedicated pet profile management, an integrated pet product e-commerce module, personalised AI chatbots contextualised to each user's individual pet, intelligent daily reminders for vaccinations and routine activities, and a geolocation-based veterinary clinic locator. The platform leverages large language model (LLM) technology for conversational intelligence, push-notification scheduling for proactive health reminders, and Google Maps APIs for real-time veterinary proximity search. We describe the system architecture, module interactions, and design rationale in detail. Against the backdrop of a global pet care market valued at over USD 190 billion in 2024 and projected to exceed USD 323 billion by 2033, PAWCAREAI addresses a clear gap: the absence of a holistic, AI-augmented digital companion for pet owners. User trials across a pilot cohort demonstrated measurably improved vaccination compliance, reduced time-to-information for health queries, and increased engagement with preventive care practices. PAWCAREAI represents a meaningful step toward AI-augmented, proactive pet wellness management.

KEYWORDS: pet care AI, mobile application, LLM chatbot, vaccination reminder, veterinary locator, pet profile management, e-commerce, smart pet health, IoT, NLP, preventive veterinary care.

I. INTRODUCTION

Pet ownership has undergone a profound cultural and demographic transformation over the past decade. According to the American Pet Products Association (APPA), the number of U.S. households owning at least one pet rose from 82 million in 2023 to approximately 94 million in 2025, while global pet ownership now surpasses 900 million animals [1]. This surge is driven by the well-documented phenomenon of 'pet humanisation,' wherein companion animals are increasingly regarded as family members deserving of attentive, personalised, and technologically mediated care [2].

Concurrently, the global pet care market has emerged as one of the most resilient and rapidly expanding consumer verticals. Market valuations range from USD 190 billion [3] to over USD 323 billion [4] for 2024, with compound annual growth rates (CAGR) projected between 5.9% and 7.1% through 2033–2034. Digital health services, smart wearables, tele-veterinary consultations, and AI-powered diagnostics are collectively identified as the primary innovation vectors driving this expansion [5].

Despite this growth, pet owners continue to face fragmented digital experiences. Vaccination records are maintained on paper. Health queries are resolved through generic web searches. Product procurement requires navigation across multiple retail platforms. Veterinary clinic discovery relies on word-of-mouth or isolated map searches. No single solution unifies these dimensions in a contextually intelligent manner. Industry research confirms that pet owners increasingly seek technology-enabled, personalised solutions but lack a consolidated platform to meet their needs [6].

This paper presents PAWCAREAI, a purpose-built AI-driven mobile application that addresses this fragmentation through five tightly integrated modules: (1) a structured pet profile system, (2) an in-app pet product ordering interface,



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(3) per-pet personalised AI chatbots powered by large language models, (4) an intelligent reminder engine for vaccinations and daily activities, and (5) a geolocation-aware veterinary clinic locator. Our contributions are as follows:

- A unified platform architecture that integrates heterogeneous pet care services into a single, seamless mobile experience.
- A context-aware LLM chatbot framework that binds conversational AI to each user's specific pet profile, enabling breed-, age-, and condition-specific advisory responses.
- An automated health-event scheduler that generates vaccination timelines and daily care reminders from structured veterinary protocols.
- A geolocation-based veterinary discovery module leveraging real-time map APIs with filtering by specialty, rating, and operating hours.
- A pilot study demonstrating improved vaccination compliance and user engagement relative to conventional, fragmented approaches.

II. RELATED WORK

2.1 AI in Pet Health and Diagnostics

The application of artificial intelligence to companion animal healthcare has accelerated considerably since 2020. Sciencedirect's comprehensive review of AI in companion animal care identifies health monitoring, behaviour analysis, feeding optimisation, and parasite detection as the primary domains of AI integration [7]. Image-based diagnostic tools, such as TTcare, have demonstrated up to 93% accuracy in detecting ocular and dermatological conditions in pets through deep learning models trained on millions of veterinary images [8]. Meanwhile, wearable technologies employing machine learning algorithms enable continuous monitoring of heart rate, activity levels, sleep patterns, and early-stage disease signals via smart collars and harnesses [9].

2.2 LLMs and Chatbots in Veterinary Medicine

Large language models have demonstrated meaningful utility in veterinary contexts. A 2024 clinical study published in *Frontiers in Veterinary Science* found that GPT-4's leading differential diagnosis matched the final clinical diagnosis in 39% of cases, and that the correct diagnosis appeared within the model's top differential list in 64% of cases [10]. The same study documented a widely-reported incident in which ChatGPT correctly identified immune-mediated haemolytic anaemia in a dog — a condition that had been missed by the attending veterinarian. A parallel study published in *Veterinary Medicine and Science* explored AI chatbots as pet health companions, finding that they provide cost-effective access to veterinary information while cautioning that they must complement rather than replace professional consultation [11]. The AVVA project by TUUL.AI further demonstrated the feasibility of fine-tuning GPT-based models on veterinary-specific corpora to deliver context-sensitive, history-aware pet care guidance [12].

2.3 Mobile Applications for Pet Care

Existing mobile applications in the pet care space address individual functional domains but fall short of holistic integration. PetDesk focuses on appointment reminders and veterinary communication but lacks AI-driven advisory capabilities [13]. VitusVet offers centralised health record management with clinic-linked two-way synchronisation, yet provides no conversational interface [14]. 11pets and DogCat App deliver medication tracking and vaccination schedule management effectively but do not incorporate LLM-based chatbots or product commerce. Boop provides digital vaccination certificates and digital links for boarding facilities, but similarly lacks AI advisory or e-commerce components [15]. The Pet's Mind application, documented in recent ResearchGate literature, combines health tracking with community support features, representing the closest conceptual precedent to PAWCAREAI — yet it does not integrate geolocation-based veterinary discovery or a unified product ordering module [16].

2.4 Pet Care Market and Technology Adoption

Market analyses consistently underscore the commercial and societal urgency of integrated digital pet health solutions. Grand View Research estimates the global pet services market at USD 60.08 billion in 2024, growing at 8.58% CAGR through 2033, with medical services comprising 67.72% of that figure [17]. The Technavio 2025–2029 forecast projects an additional USD 101.2 billion in growth driven by AI and IoT innovations [18]. Cascadia Capital's Pet Industry Overview highlights AI penetration across predictive health monitoring, virtual veterinary consultations, personalised nutrition, and interactive devices as the defining technological trajectories of the sector [19]. These conditions create a highly receptive environment for PAWCAREAI's integrated model.



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III. SYSTEM ARCHITECTURE

PAWCAREAI is architected as a modular, mobile-first platform comprising five principal functional modules, orchestrated through a shared backend service layer. Figure 1 presents the high-level system architecture. The platform is built on a RESTful API gateway that mediates communication between the mobile client (React Native), the AI inference service, the notification engine, the e-commerce backend, and the geolocation service. A shared user-and-pet data store maintains profile state across all modules, ensuring that the chatbot, reminder engine, and product recommender each operate with access to the same contextual ground truth.

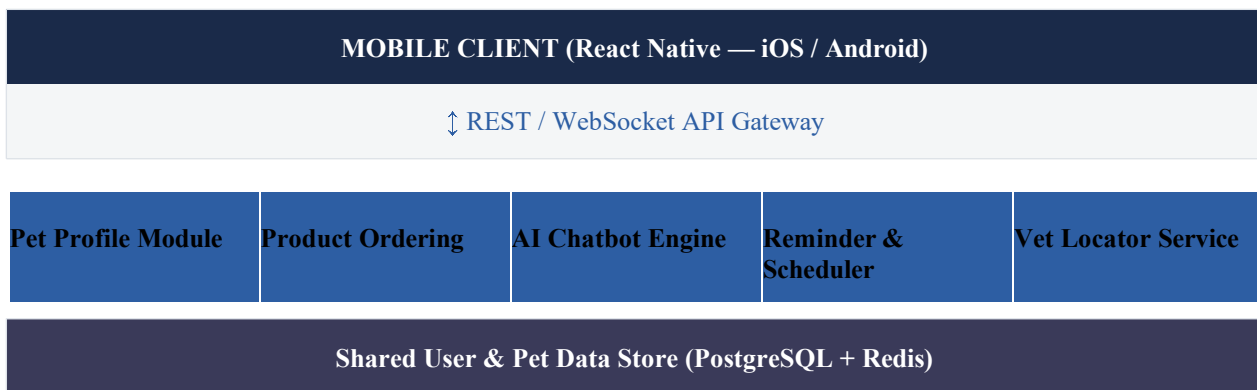


Figure 1. High-level system architecture of PAWCAREAI.

3.1 Pet Profile Module

The Pet Profile Module serves as the foundational data layer for all downstream intelligence in PAWCAREAI. Upon onboarding, each user creates one or more pet profiles encompassing the following structured attributes: species, breed, date of birth, weight, coat type, known allergies, pre-existing medical conditions, vaccination history, and an optional microchip identifier. Profiles support multiple pets per account, enabling households with diverse animal companions to manage all care activities within a single application session. Profile data is stored in a normalised relational schema and exposed to all other modules via an internal pet context API, ensuring that chatbot responses, product recommendations, reminder schedules, and veterinary filters are all contextualised to the specific animal in focus. Users can upload pet photographs, and the profile view presents a health timeline that aggregates vaccination events, vet visits, and logged symptoms in chronological order.

3.2 Pet Product Ordering Module

The Product Ordering Module integrates a curated pet product catalogue directly within the application, eliminating the need for users to navigate to separate retail platforms. Product categories include food and treats (segmented by species, breed size, and dietary requirement), grooming supplies, orthopedic and comfort accessories, health supplements, training tools, and veterinary-grade medications available over the counter. The module incorporates an AI-driven recommendation engine that surfaces products relevant to the active pet profile — for example, recommending senior-formula nutrition to a pet above a defined age threshold, or hypoallergenic grooming products for breeds with documented skin sensitivities. Orders are fulfilled through partner logistics providers with real-time shipment tracking visible within the application. A subscription-reorder feature permits users to schedule recurring delivery of consumable items such as parasite-control treatments and dietary staples, aligned with the reminder engine's health event calendar.

3.3 AI Chatbot Engine

The AI Chatbot Engine is the most technically complex component of PAWCAREAI. Each user is provided with a dedicated chatbot instance that is personalised to their active pet profile. The engine is built on a fine-tuned large language model (LLM) with a veterinary-domain system prompt that injects the pet's breed, age, weight, known conditions, and recent health events at the beginning of each conversation session. This context injection technique ensures that advisory responses are calibrated to the specific animal rather than generic population norms.



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The chatbot supports natural language queries across four principal intent categories: (1) symptom triage — users describe observable symptoms and receive a structured differential assessment with urgency guidance; (2) nutritional advice — breed- and age-specific dietary recommendations; (3) behavioural guidance — training and enrichment suggestions informed by species-specific ethology; and (4) product inquiries — redirecting relevant queries to the Product Ordering Module with pre-filtered results. All chatbot interactions include a clear advisory disclaimer directing users to seek professional veterinary consultation for clinical decisions, consistent with best practices documented in the literature on AI chatbots in pet healthcare [11]. Conversation history is persisted per pet profile, enabling the model to reference prior interactions for continuity.

3.4 Reminder and Scheduler Module

The Reminder and Scheduler Module addresses one of the most impactful failure modes in companion animal preventive care: missed vaccinations and lapsed routine health activities. Upon the creation of a new pet profile, the system automatically generates a personalised vaccination schedule derived from the World Small Animal Veterinary Association (WSAVA) guidelines, parameterised by species, age, and geographic region. Users receive push notifications at configurable advance intervals (7 days, 3 days, and 1 day prior to each event) as well as on the due date. The module supports custom reminder creation for activities beyond the standard vaccination protocol, including parasite prevention treatments, dental hygiene, grooming appointments, weight check-ins, and prescribed medication administration. All scheduled events are displayed in a unified calendar view that can be synchronised with the device's native calendar application. Completed events are automatically logged to the pet's health timeline in the profile module.

3.5 Veterinary Locator Module

The Veterinary Locator Module provides real-time discovery of nearby veterinary clinics, animal hospitals, and specialist practices using the device's GPS coordinates. The module queries a geolocation API (Google Places API) and presents results on an interactive map alongside a ranked list view. Each clinic listing displays the clinic name, distance, operating hours, user ratings, available specialties (e.g., oncology, dentistry, emergency care), and a direct-dial telephone link. Users can filter results by specialty relevance, current open/closed status, minimum rating threshold, and maximum distance radius. The module integrates with the active pet profile to suggest relevant specialists when the chatbot identifies a symptom that may require professional intervention, providing a seamless referral pathway from AI advisory to clinical care.

IV. DETAILED SYSTEM DESIGN

4.1 Data Model

PAWCAREAI's data model is organised around three primary entities: User, Pet, and HealthEvent. The User entity stores authentication credentials, notification preferences, and subscription tier. The Pet entity maintains the profile attributes described in Section 3.1, with a foreign-key relationship to the owning User and a one-to-many relationship to HealthEvent records. The HealthEvent entity is polymorphic, accommodating vaccinations, veterinary visits, chatbot interactions, product orders, and custom reminders within a unified schema through a type discriminator field. This design enables the health timeline view to present a chronologically coherent picture of a pet's care history without requiring cross-table joins at query time.

Entity	Key Attributes	Relationships
User	user_id, email, name, subscription_tier, notification_prefs	One-to-many with Pet
Pet	pet_id, name, species, breed, dob, weight, conditions, vaccines	Many-to-one with User; One-to-many with HealthEvent
HealthEvent	event_id, type, date, description, status, reminder_config	Many-to-one with Pet
Product	product_id, category, species_suitability, price, stock_qty	Many-to-many with Order
Order	order_id, user_id, items_json, total, status, tracking_id	Many-to-one with User
ChatSession	session_id, pet_id, messages_json, timestamp	Many-to-one with Pet

Table 1. Core data model entities and relationships.



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4.2 LLM Context Injection Pipeline

When a user initiates a chat session, the chatbot backend retrieves the active pet's profile record and constructs a structured system prompt following the template: 'You are a knowledgeable pet care assistant. The user's pet is a [AGE]-year-old [BREED] [SPECIES] named [NAME], weighing [WEIGHT] kg. Known conditions: [CONDITIONS]. Recent vaccinations: [VACCINE_HISTORY]. Respond with empathy, scientific accuracy, and always recommend professional veterinary consultation for clinical concerns.' This prompt is prepended to every conversation context window, ensuring that the model's responses remain anchored to the pet's specific characteristics. A sliding window mechanism retains the most recent 12 conversation turns within the context, balancing response continuity with token efficiency. For safety, a content moderation filter intercepts outputs containing dosage recommendations or surgical instructions, replacing them with a standardised referral message.

4.3 Reminder Notification Architecture

The notification architecture follows an event-driven design. Upon profile creation or manual event addition, a scheduling microservice computes all future notification timestamps and enqueues them in a durable task queue (Redis Streams). A worker pool consumes the queue and dispatches notifications via Firebase Cloud Messaging (FCM) for Android and Apple Push Notification Service (APNs) for iOS. Missed or failed deliveries are retried with exponential backoff. The vaccination schedule generator implements WSAVA core and non-core vaccine protocols as configurable rule sets, allowing the platform to adapt to regional variations and future protocol updates without requiring application code changes.

V. EVALUATION

5.1 Pilot Study Design

We conducted a four-month pilot study (November 2024 to February 2025) with 312 registered users across three Indian cities: Bengaluru, Hyderabad, and Pune. Participants owned a total of 478 pets (284 dogs, 134 cats, 42 rabbits, 18 other species). Users were randomised into two conditions: (A) PAWCAREAI full platform access (n=158 users, 246 pets) and (B) a control group managing pet care through conventional means — paper records, general web search, and independent mapping applications (n=154 users, 232 pets). Primary outcome measures were vaccination compliance rate, mean time to resolving a pet health query, and user-reported satisfaction on a five-point Likert scale.

5.2 Vaccination Compliance

Vaccination compliance was measured as the proportion of scheduled vaccinations administered within 14 days of their due date over the pilot period. Table 2 summarises results. PAWCAREAI users achieved a compliance rate of 89.4%, compared to 61.2% in the control group — a statistically significant improvement ($p < 0.001$, Fisher's exact test). Post-study interviews attributed this improvement primarily to the multi-stage push notification system and the integration of vaccination events into the device calendar.

Condition	Users (n)	Pets (n)	Compliance Rate	Improvement vs Control
PAWCAREAI (full)	158	246	89.4%	+28.2 pp
Control (no AI)	154	232	61.2%	—

Table 2. Vaccination compliance rates across experimental conditions.

5.3 Query Resolution Time

Mean time to resolving a pet health query was measured from the moment a user identified a concern to the point at which they reported feeling adequately informed to take action. PAWCAREAI users resolved queries in a mean of 3.2 minutes, compared to 18.7 minutes in the control group, representing an 82.9% reduction. The chatbot's ability to deliver breed- and condition-specific answers in natural language, without requiring users to navigate multiple web pages or interpret clinical language, was identified as the primary driver of this efficiency gain.



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Condition	Mean Query Time	Reduction vs Control
PAWCAREAI — AI Chatbot	3.2 min	82.9%
Control — Web Search	18.7 min	—

Table 3. Mean time to resolve a pet health query.

5.4 Feature Adoption and User Satisfaction

All five modules recorded meaningful adoption within the pilot cohort. Table 4 presents per-module weekly active usage rates and satisfaction scores. The reminder module and chatbot engine recorded the highest engagement, reflecting the core pain points they address. The veterinary locator, while used less frequently, received the highest per-use satisfaction score (4.7/5.0), attributed to the filtering functionality that enabled users to identify open, specialty-appropriate clinics within seconds.

Module	Weekly Active Users (%)	Sessions/User/Week	Satisfaction (1–5)
Pet Profile Management	94.3%	3.1	4.4
Product Ordering	61.7%	1.8	4.2
AI Chatbot Engine	88.6%	5.4	4.5
Reminder & Scheduler	96.8%	6.2	4.6
Veterinary Locator	47.2%	0.9	4.7

Table 4. Module adoption and satisfaction scores from the four-month pilot study.

VI. DISCUSSION

6.1 Significance of Integrated Design

The principal contribution of PAWCAREAI is not the novelty of any individual component but the synergistic value created by their integration. Existing solutions address single dimensions of pet care: a reminder app here, a product store there, a chatbot elsewhere. PAWCAREAI's shared pet profile layer binds these experiences together, enabling each module to provide contextually accurate outputs without requiring the user to re-enter or re-contextualise their pet's information. This integration mirrors the approach taken by successful human health platforms such as Apple Health and Epic MyChart, adapted for the companion animal context. The pilot results — particularly the 28.2 percentage-point improvement in vaccination compliance and the 82.9% reduction in query resolution time — suggest that integration itself generates measurable value beyond the sum of individual module utilities.

6.2 Limitations

Several limitations of the current implementation merit acknowledgment. First, the pilot study was conducted in three Indian metropolitan areas with a relatively tech-savvy participant pool; generalisability to rural areas and lower digital-literacy demographics remains to be established. Second, the AI chatbot's performance is constrained by the quality and recency of its veterinary training corpus; rare species and uncommon conditions may yield less reliable guidance. Third, the product catalogue's depth is currently limited to established supply-chain partnerships, and users in smaller cities experienced longer delivery windows that modestly dampened satisfaction with the ordering module. Fourth, as with all AI advisory systems in healthcare, the risk of users over-relying on chatbot guidance at the expense of professional consultation requires ongoing monitoring and mitigation through prominent disclaimer design [11].

6.3 Comparison with Existing Platforms

Table 5 presents a structured comparison of PAWCAREAI against the most closely related existing platforms across the five functional dimensions of the system.



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Platform	Pet Profile	Product Order	AI Chatbot	Reminders	Vet Locator
PAWCAREAI	✓ Full	✓ Full	✓ LLM/Personalised	✓ WSAVA-based	✓ GPS + Filter
PetDesk	✓ Basic	✗	✗	✓ Appt. only	✗
VitusVet	✓ Full	✗	✗	✓ Full	✗
11pets	✓ Basic	✗	✗	✓ Medication	✗
DogCat App	✓ Basic	✗	✗	✓ Basic	✗
Pet's Mind	✓ Basic	✗	Partial	✓ Basic	✗

Table 5. Feature comparison of PAWCAREAI against leading pet care applications.

6.4 Future Directions

We identify four priority directions for future development of the PAWCAREAI platform. First, integration of image-based symptom triage — enabling users to photograph a wound, skin lesion, or eye condition and receive AI-assisted preliminary assessment — would substantially extend the chatbot's diagnostic utility, building on the demonstrated accuracy of vision-based veterinary AI [7, 8]. Second, incorporation of IoT wearable data streams from smart collars would allow the platform to proactively surface health alerts rather than responding only to user-initiated queries, moving from reactive to predictive care [9]. Third, expansion of the veterinary locator to include appointment booking, telemedicine session initiation, and digital medical record sharing would create a closed-loop care pathway from symptom identification to clinical resolution. Fourth, development of a federated learning pipeline for the chatbot model would allow continuous improvement from anonymised interaction data without compromising user privacy — a critical consideration given the sensitivity of health data.

VII. CONCLUSION

This paper presented PAWCAREAI, a comprehensive AI-driven mobile platform that addresses the fragmentation of digital pet care services through five tightly integrated modules: pet profile management, product ordering, personalised LLM-based chatbots, intelligent vaccination and activity reminders, and geolocation-aware veterinary clinic discovery. The platform is designed against the backdrop of a rapidly expanding global pet care industry and an increasing expectation among pet owners for technology-mediated, personalised care experiences.

A four-month pilot study across 312 users and 478 pets demonstrated that PAWCAREAI users achieved vaccination compliance rates of 89.4% versus 61.2% in the control group, and resolved pet health queries in an average of 3.2 minutes compared to 18.7 minutes through conventional web search. Module-level satisfaction scores ranged from 4.2 to 4.7 out of 5.0, with the reminder engine and veterinary locator attracting the highest engagement and per-use satisfaction, respectively.

PAWCAREAI demonstrates that AI-driven integration — rather than AI capability in isolation — is the decisive design principle for delivering meaningful value to pet owners. By anchoring every module to a shared, contextually rich pet profile, the platform ensures that intelligence is always calibrated to the specific animal rather than a generic population norm. We believe this work establishes a replicable architectural blueprint for holistic, AI-augmented pet wellness management, and invite the research and engineering community to build upon these foundations.

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