

Vetic-At-Home: Design of an AI-Enabled Tele-Veterinary Platform for Smart Pet Healthcare Services

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Abstract—Vetic-at-Home is a comprehensive web-based home consultation system designed to revolutionize pet healthcare delivery by bridging the gap between pet owners and qualified veterinarians. The platform addresses the critical challenges of clinic-centric veterinary services by enabling convenient, location-based home consultations through an intuitive digital interface. Built on a modern MERN stack architecture, the system integrates three distinct user modules—Pet Owners, Doctors, and Administrators—each with role-specific functionality. Pet owners can search, filter, and book veterinarians based on specialization, qualifications, ratings, and availability, while maintaining comprehensive pet health records. Veterinarians benefit from streamlined appointment management, availability scheduling, consultation documentation, and earnings tracking. The administrative module provides oversight through doctor verification, user management, and an analytics dashboard offering insights into bookings, revenue, and performance trends. With secure JWT-based authentication, real-time appointment notifications, responsive UI design, and scalable architecture, Vetic-at-Home transforms traditional veterinary care into an accessible, transparent, and efficient digital ecosystem. The platform not only reduces delays in urgent pet care but also establishes a foundation for future telemedicine expansion in the veterinary domain their door.

Index Terms—Veterinary, Telemedicine, Home-based Veterinary Consultation, Web-based Healthcare Platform, Healthcare Information System, Veterinary Telemedicine, Home-based Veterinary Consultation, Web-based Healthcare Platform, Healthcare Information System, MERN Stack, AI-Enabled Healthcare.

I. INTRODUCTION

Vetic-at-Home offers a simple way for pet owners to get care from verified veterinarians right from their own homes using an easy-to-use website. Instead of just depending on regular clinic visits, the system lets owners easily book home consultations by choosing doctors based on their specialization, experience, location, and availability. This way, quality veterinary care becomes easier to access and timelier. This platform integrates scheduling appointments, pet medical records, live status updates, and doctor authentication within a single platform, providing the complete consultation process streamlined for pet owners, veterinarians, and administrators. An admin dashboard based on analytics helps keep track of bookings, performance, and service trends. This makes it easier for stakeholders to make smart decisions and improve how the service runs. Vetic-at-Home brings together easy-to-use tools and secure, scalable web tech to make pet healthcare simpler and digital. This way, pet owners get veterinary services that are more efficient, clear, and tailored, all delivered right to Vetic-at-Home is a comprehensive web-based home consultation system designed to revolutionize pet healthcare delivery by bridging the gap between pet owners and qualified veterinarians. The platform addresses the critical challenges of clinic-centric veterinary services by enabling convenient, location-based home consultations through an intuitive digital interface. Built on a modern MERN stack architecture, the system integrates three distinct user modules—Pet Owners, Doctors, and Administrators—each with role-specific functionality. Pet owners can search, filter, and book veterinarians based on specialization, qualifications, ratings, and availability, while

maintaining comprehensive pet health records. Veterinarians benefit from streamlined appointment management, availability scheduling, consultation documentation, and earnings tracking. The administrative module provides oversight through doctor verification, user management, and an analytics dashboard offering insights into bookings, revenue, and performance trends. With secure JWT-based authentication, real-time appointment notifications, responsive UI design, and scalable architecture, Vetic-at-Home transforms traditional veterinary care into an accessible, transparent, and efficient digital ecosystem. The platform not only reduces delays in urgent pet care but also establishes a foundation for future telemedicine expansion in the veterinary domain.

The integration of digital technologies into veterinary medicine represents a paradigm shift in how pet healthcare services are delivered and accessed. Globally, veterinarians face unprecedented challenges, including high workloads, staffing shortages, and increasing stress levels that impact both practitioner well-being and quality of care. The ratio of veterinarians to pet populations continues to decline, with the United States experiencing approximately one veterinarian for every 6,000 pet households, creating significant access barriers for pet owners. These challenges are compounded by the fact that veterinary practices rarely have the administrative support staff common in human healthcare, forcing clinicians to manage documentation, prescriptions, and care plans independently, often during personal time. Simultaneously, pet owner expectations are evolving rapidly. The general public has demonstrated growing interest in digital health services, mirroring trends in human telemedicine. The COVID-19 pandemic accelerated this trajectory, fundamentally altering perceptions of remote healthcare delivery and establishing telehealth as a viable complement to traditional in-person examinations. Veterinary telemedicine offers numerous advantages, including

reduced costs, improved accessibility, online payment convenience, and effectiveness in various clinical scenarios such as post-operative follow-ups, surgical site inspections, and mobility-limited consultations.

However, the veterinary domain presents unique challenges not present in human medicine. Animals cannot verbally express symptoms, making anamnesis entirely third-party-based and inherently complex. Pet owners, as medical laypersons, may be emotionally involved in situations and prone to biases stemming from individual beliefs, health concepts, and social pressures to appear as competent caregivers. This complexity necessitates carefully designed digital interventions that guide owners through information collection while acknowledging the limitations of remote assessment. Vetic-at-Home emerges as a response to these multifaceted challenges. The platform leverages modern web technologies and artificial intelligence to create an ecosystem that connects pet owners with qualified veterinarians for home-based consultations. By implementing three distinct user modules—Pet Owners, Doctors, and Administrators—the system addresses the diverse needs of all stakeholders in the veterinary care continuum. Pet owners gain the ability to search, filter, and book veterinarians based on specialization, qualifications, ratings, and availability while maintaining comprehensive digital health records for their animals. Veterinarians benefit from streamlined appointment management, flexible availability scheduling, structured consultation documentation, and transparent earnings tracking. Administrative oversight ensures quality control through doctor verification, user management, and analytics-driven performance monitoring. This paper presents the design, implementation, and evaluation of Vetic-at-Home, demonstrating how AI-enabled tele-veterinary platforms can transform traditional clinic-centric care models into accessible, transparent, and efficient digital ecosystems.

II. LITERATURE REVIEW OF EXISTING SYSTEMS

Table 1: Literature Review Vetic-at-Home - Professional Pet Care in your Comfort Zone

S. No.	Paper Name	Objective	Results	Technology Used
1	Medical Updates and Appointment Confirmations – Pet Owners’ Perceptions of Current Practices and Preferences	To examine pet owners’ current experiences and preferences regarding frequency and modality of medical updates during pet hospitalization and appointment confirmations.	Most owners received updates once or twice daily, mainly by phone, but preferred more frequent updates (every 2–6 hours) and text messages; over half ($\approx 53.8\%$) were willing to pay extra for enhanced updates; marked mismatch between current clinic practices and client preferences for both updates and appointment confirmations	Client communication technologies: phone calls, text messages, email, video, and related telehealth/telemedicine tools used for updates and reminders.
2	<i>Two-Stage Structural Equation Modeling–Artificial Neural Network on Veterinary Telemedicine</i>	<i>To identify factors influencing pet owners’ behavioral intention to use veterinary telemedicine services using the UTAUT model, enhanced with SEM–ANN.</i>	<i>All UTAUT constructs (performance expectancy, effort expectancy, social influence, facilitating conditions) significantly influenced behavioral intention ($R^2 \approx 0.50$); ANN confirmed</i>	<i>Veterinary telemedicine platforms (online consultation, remote appointments, triage) modeled via UTAUT; analysis using PLS-SEM and multilayer perceptron ANN</i>
3	Assessing Service-Learning in Community-Based Veterinary Medicine as a Pedagogical Approach to Promoting Student Confidence in Addressing Access to Veterinary Care	To determine whether a community-based service-learning rotation increases veterinary students’ confidence in managing clients facing barriers to care and shapes attitudes toward community medicine.	Student confidence in managing all listed barriers (financial, transport, language, disability, schedule, outside communication) increased significantly post-rotation; 86% agreed the rotation affected their thoughts about community medicine and 77% their feelings about underserved clients	Online survey system (Qualtrics) and a community veterinary clinic model (Tufts at Tech) as an educational “technology” for delivering accessible spectrum-of-care services

2.1 Evolution of Veterinary Telemedicine

Veterinary telemedicine has experienced substantial evolution over the past decade, transitioning from experimental applications to mainstream service delivery models. Abu-Seida et al. provide a comprehensive narrative review of veterinary telemedicine's status, benefits, applications, limitations, and legal aspects globally. Their analysis confirms that telehealth is a rapidly developing field within veterinary medicine, particularly catalysed by the COVID-19 pandemic, which accelerated adoption and normalized remote consultations for both practitioners and pet owners. The authors emphasize that veterinary telemedicine serves as a complementary service alongside traditional care, meeting client needs while delivering quality medicine

and improving animal welfare. The most frequently utilized veterinary telemedicine applications include teleradiology, tele sonography, tele dentistry, telecardiology, telerehabilitation, anesthesia teleconsultation, tele hospice and palliative care, tele cytology, tele-endoscopy, tele dermatology, tele-ophthalmology, and tele-behavior therapy. This diverse range of applications demonstrates the versatility of telemedicine across veterinary specialties and suggests significant potential for platform-based service integration.

2.2 Stakeholder Requirements for Veterinary mHealth Applications

Understanding stakeholder requirements is fundamental to developing effective veterinary

telehealth platforms. Haase et al. conducted a comprehensive literature review examining requirements for mHealth applications targeting pet animal owners. Screening 955 publications, the researchers extracted ten distinct requirements from thirteen included studies, providing empirical foundations for system design. The most frequently mentioned requirement, appearing in six publications, was ensuring complete information input by users. This reflects the critical challenge of third-party anamnesis in veterinary medicine, where animal owners must accurately convey symptoms and observations without clinical training. The second most common requirement, cited in five publications, was displaying prominent disclaimers about application limitations. This emphasizes ethical considerations and the importance of managing user expectations regarding the scope of remote veterinary services. The predominance of requirements focused on human-computer interface design reveals this as a crucial success factor for veterinary applications. Guiding animal owners through information collection processes and ensuring comprehension, particularly of application limitations, emerged as central design considerations. The authors note that primary research in this domain remains limited, indicating substantial opportunities for contribution through implemented systems like Vetic-at-Home.

2.3 AI Integration in Veterinary Practice

Artificial intelligence is increasingly transforming veterinary practice management and clinical workflows. Beyer et al. conducted a systematic literature review examining AI and ICT applications in veterinary business, exploring diagnostics, telemedicine, data management, business efficiency, and regulatory challenges. Their findings indicate that AI enhances diagnostic accuracy, workflow automation, and predictive analytics, improving clinical decision-making and patient outcomes. In veterinary practice management specifically, AI-driven automation optimizes scheduling, inventory control, and client communication. Commercial platforms have begun demonstrating the practical benefits of AI integration. Dutch, a virtual veterinary care provider, implemented AI tools within their electronic medical record system, leveraging models from OpenAI and Google Gemini to reduce post-visit administrative work from twenty minutes to just five.

This 50% reduction in administrative burden enables veterinarians to see twice as many pets daily while addressing burnout—a critical concern given that over 50% of veterinarians report burnout symptoms. Dutch's AI tools span the entire consultation journey: pre-consultation summarization of pet medical histories into vet-ready briefs, and post-consultation assistance with transcription, note-taking, and treatment plan creation.

2.4 Telepathology and Specialized Applications

Beyond general consultations, telemedicine extends to specialized veterinary applications. A scoping review by examined telepathology use in veterinary medicine, revealing significant advances in information technology and telecommunications since approximately 2015. Telepathology connects veterinary practices to distant laboratories and provides support for underserved animals and communities. However, the authors identified a paucity of literature describing telepathology applications, with significant gaps in studies validating whole-slide imaging for primary diagnosis. Underutilization of telepathology for post-mortem examinations conducted in the field represents a potential area for service development.

2.5 Veterinary Practice Management Challenges

The operational realities of veterinary practice create both challenges and opportunities for digital platforms. Berkal, co-founder of Vetr Health, notes that many veterinarians interested in mobile medicine lack the tools to practice profitably and efficiently. Administrative overload, rather than medical complexity, emerges as the single biggest driver of stress for contemporary veterinarians. Unlike human health systems, where scribes and support staff handle documentation, veterinary clinicians manage these tasks independently, often working off the clock to complete records, prescriptions, and care plans. The veterinarian shortage compounds these challenges. Bundesverband Praktizierender Tierärzte documents how insufficient veterinary personnel relative to animal populations increases workloads and stress. Schwerdtfeger et al. further highlight the elevated suicide risk among veterinarians compared to other professional groups, underscoring the urgent need for interventions that reduce occupational stress.

2.6 Digital Health Adoption Trends

Broader digital health adoption trends inform veterinary telemedicine development. Bitkom Research documented growing public interest in digital health services, establishing market readiness for veterinary applications. Ouyang examined health informatics in veterinary medicine, assessing the state of the literature, Day-1 competencies, and telemedicine perceptions. Hawk investigated veterinary telemedicine perception and utilization intention, providing insights into adoption barriers and facilitators. The convergence of these trends—veterinarian shortages, administrative overload, digital health adoption, and AI advancement creates a compelling case for comprehensive tele-veterinary platforms like Vetic-at-Home that address stakeholder needs through integrated, role-specific functionality.

III. RESEARCH GAP

Despite growing interest in veterinary telemedicine and emerging commercial applications, significant research gaps persist that warrant investigation through the Vetic-at-Home project. Gap 1: Limited Primary Research on Veterinary mHealth Requirements, Haase et al. explicitly identify that "the small number of included publications shows that primary research in this field, in general, and in this specific topic in particular, is needed in order to fully reflect the requirements for an mHealth application." Their comprehensive review screened 955 publications yet extracted requirements from only thirteen, demonstrating the scarcity of empirical research guiding veterinary application development. Most existing publications focus on requirements gathering rather than implementation and evaluation, creating a disconnect between identified needs and realized systems. Gap 2: Absence of Integrated Multi-Stakeholder Platforms. Existing veterinary telemedicine solutions typically address isolated aspects of the care continuum. Some platforms focus on veterinarian-facing tools for practice management, while others emphasize pet owner-facing appointment booking. Few systems integrate the complete ecosystem of pet owners, veterinarians, and administrators into a cohesive platform with role-specific functionality. The three-module architecture proposed in Vetic-at-Home addresses this gap by

creating an integrated environment where all stakeholders interact within a unified system.

Gap 3: Limited AI Integration in Veterinary Practice Management. While commercial platforms like Dutch have begun implementing AI tools, academic literature on AI integration in veterinary practice management remains sparse. Beyer et al. note that "the adoption of AI in practice management remains underexplored, despite its potential to improve efficiency, automate workflows, and optimize resource allocation." The specific application of AI for veterinarian-pet owner matching, appointment optimization, and administrative automation requires systematic investigation. Gap 4: Insufficient Attention to Location-Based Veterinary Services. Geographic accessibility to veterinary care varies significantly, with some regions experiencing "vet care deserts" where pet owners lack reasonable access to clinical services. However, location-based matching of pet owners with available veterinarians for home consultations remains understudied. The integration of geospatial intelligence with veterinarian availability and specialization creates novel research opportunities for improving access to equity. Gap 5: Lack of Comprehensive Analytics for Veterinary Service Delivery. Administrative oversight of veterinary service platforms requires sophisticated analytics to monitor bookings, revenue, performance trends, and quality indicators. The literature provides limited guidance on designing analytics dashboards specifically for tele-veterinary contexts, including metrics that balance business performance with clinical quality and stakeholder satisfaction. Gap 6: Validation of Web-Based Architectures for Veterinary Telemedicine, while mHealth applications (mobile-based) receive attention in literature, web-based platforms offering comprehensive functionality across devices remain underexplored. The MERN stack architecture proposed for Vetic-at-Home requires validation in veterinary contexts, particularly regarding scalability, security, and usability across the three user modules

IV. OBJECTIVES

Primary Objective: To design, develop, and evaluate Vetic-at-Home, an AI-enabled tele-veterinary platform that facilitates home-based pet healthcare consultations through integrated pet owner,

veterinarian, and administrator modules. Specific Objectives: Develop a Multi-Stakeholder Web-Based Architecture: Implement a three-module system using MERN stack technology that provides role-specific functionality for pet owners, veterinarians, and administrators while maintaining data integration and workflow continuity across modules. Create an Intelligent Veterinarian Discovery System: Design and implement search, filtering, and recommendation mechanisms enabling pet owners to identify suitable veterinarians based on specialization, qualifications, ratings, availability, and geographic proximity. Implement Comprehensive Pet Health Record Management: Develop digital health record functionality allowing pet owners to maintain complete medical histories, vaccination records, and health documentation accessible during consultations. Design Streamlined Veterinary Workflow Tools: Create appointment management, availability scheduling, consultation documentation, and earnings tracking interfaces that reduce administrative burden and support efficient practice management. Build Administrative Oversight and Analytics Capabilities: Implement doctor verification workflows, user management functions, and analytics dashboards providing insights into bookings, revenue patterns, and performance trends. Integrate AI-Enhanced Features: Incorporate AI capabilities for appointment optimization, veterinarian-pet owner matching, and administrative task automation to improve platform efficiency and user experience. Ensure Security and Scalability: Implement JWT-based authentication, secure data handling, and responsive design principles that support platform growth and protect sensitive user information. Evaluate Platform Effectiveness: Assess the system's impact on consultation accessibility, appointment efficiency, user satisfaction, and administrative oversight compared to traditional clinic-centric models.

V.METHODOLOGY

Project function and module implementation

The system is systematically divided into multiple functional modules to provide a smooth, efficient, and user-friendly experience for pet owners, doctors, and administrators. Pet Owner Features include: Doctor Search: Enables users to find veterinary doctors by specialization, location, rating, and time availability.

Appointment Management: Allows users to book, reschedule, or cancel appointments conveniently. Pet Profile Management: Maintains detailed pet records, including medical history, vaccination schedule, and health updates. Doctor Feedback: Empowers pet owners to rate and review doctors, enhancing platform credibility and service quality. Doctor Features, Profile Setup: Facilitates the creation of doctor profiles with details such as qualifications, experience, and areas of specialization. Schedule Management: Provides tools for managing calendar availability, consultation time slots, and automated appointment reminders. Appointment Handling: Enables doctors to accept or reject appointments and maintain digital consultation notes. Performance Tracking: Displays appointment history, earnings, and patient engagement analytics for better professional insights. Admin Features are User and Doctor Verification: Supports verification, approval, and management of doctor registrations and user accounts. System Oversight: Monitors user activities, doctor performance, and ongoing appointments to ensure compliance and service quality. Analytics Dashboard: Provides real-time metrics on platform usage, booking volumes, revenue generation, and performance trends for informed decision-making. Security & Technical Implementation. Authentication & Authorization: Implements JWT-based authentication, crypt password encryption, and strict role-based access control to ensure data privacy and secure user interactions. Responsive User Interface: Delivers an optimized experience across devices including mobile, tablet, and desktop. Real-Time Notifications: Utilizes event-driven updates for appointment confirmations, cancellations, and reminders. API Optimization: Ensures fast data retrieval and smooth user experience through efficient API design and server-side performance enhancements. The methodology for developing Vetic-at-Home follows a structured software engineering lifecycle to ensure a secure, scalable, and user-friendly platform. Requirement Analysis: Requirements are gathered from pet owners, veterinarians, and administrators to identify core features such as location-based vet search, home-visit booking, consultation documentation, and admin verification. Both functional needs (appointments, records, notifications) and non-functional needs (security, performance, reliability) are documented. System Design: The

system is designed using a MERN-based architecture with Next.js for the client, Express.js/Node.js for APIs, and MongoDB/MySQL for data storage. Role-based modules for Pet Owners, Doctors, and Admins are modeled with use case diagrams, DFDs, and database schemas for users, pets, appointments, and transactions. Implementation: Implementation follows modular development, separating each role's interface and shared services like authentication and notifications. The frontend uses responsive Next.js components, while the backend exposes REST APIs secured with JWT and role-based access control for all critical operations. Deployment: Launching the platform and making it available for users, ensuring all systems are operational and secure.

VI. PROPOSED RESEARCH METHODOLOGY

6.1 Research Design, the study employs a design science research methodology, appropriate for developing and evaluating innovative information technology artifacts in real-world contexts. The methodology encompasses six phases: problem identification and motivation, definition of solution objectives, design and development, demonstration, evaluation, and communication. 5.2 Phase 1: Requirements Analysis, Stakeholder Interviews: Semi-structured interviews with pet owners (n=20), veterinarians (n=10), and veterinary clinic administrators (n=5) to understand current challenges, workflow pain points, and desired platform features. Survey Administration: Distributed survey to 100 pet owners assessing preferences for tele-veterinary services, willingness to use home consultation platforms, and feature prioritization. Competitive Analysis: Systematic evaluation of existing veterinary telemedicine platforms to identify strengths, weaknesses, and differentiation opportunities. Requirement Specification: Documentation of functional and non-functional requirements organized by user module, informed by literature findings, including the ten requirements identified by Haase et al.

6.2 System Design, Architecture Design: Three-tier architecture development with presentation layer (React.js), application layer (Node.js/Express.js), and data layer (MongoDB). The design incorporates scalability considerations for future growth. Database

Schema Development: MongoDB schema design for users (pet owners, veterinarians, administrators), pets, appointments, health records, consultations, payments, and analytics data. API Design: RESTful API specification for all system interactions, ensuring modularity and enabling future mobile application development. UI/UX Design: Responsive interface design following human-computer interaction principles, with particular attention to guiding pet owners through information collection—the most frequently cited requirement in veterinary mHealth literature. Security Architecture: JWT-based authentication implementation, role-based access control, data encryption, and compliance considerations for veterinary data protection.

6.3 Novel Techniques, Multi-Stakeholder Veterinary Ecosystem Integration, while existing platforms typically address either pet owner booking needs or veterinarian practice management in isolation, Vetic-at-Home introduces a novel integrated ecosystem approach. The three-module architecture with shared data models ensures that information flows seamlessly across stakeholder interactions. When a pet owner updates their pet's health record, that information becomes immediately available to veterinarians during consultations. When a veterinarian completes consultation documentation, the pet owner's health record automatically updates. This bi-directional information flow, orchestrated through a unified data layer, represents a significant advancement over fragmented point solutions. AI-Enhanced Veterinarian-Pet Owner Matching, the platform implements a novel matching algorithm that extends beyond simple keyword-based search. By analysing veterinarian specialization, consultation history, pet owner preferences, and pet medical profiles, the system learns optimal matches over time. The algorithm incorporates: Semantic Specialization Matching: Understanding that "dermatology" for dogs differs from "dermatology" for cats, and matching based on species-specific expertise. Consultation Style Compatibility: Analysing veterinarian response patterns and pet owner feedback to identify compatible communication styles. Urgency-Aware Matching: Prioritizing rapid response for emergency situations while optimizing for quality in routine consultations. Historical Success Patterns: Learning from past

consultations to identify veterinarians with high success rates for specific conditions.

6.4 Dynamic Availability Intelligence

Traditional scheduling systems treat veterinarian availability as static time slots. Vetic-at-Home introduces dynamic availability intelligence that: Analyses historical booking patterns to predict high-demand periods, suggests optimal scheduling windows to veterinarians based on demand forecasts, implements intelligent buffer times between appointments based on consultation complexity predictions, automatically adjusts availability during emergencies or urgent care situations, and provides pet owners with alternative time suggestions when preferred slots are unavailable. Comprehensive Pet Health Digital Twin. The platform introduces the concept of a "pet health digital twin"—a comprehensive digital representation that evolves with the animal throughout its lifetime. Unlike basic medical record systems that simply store documents, the digital twin maintains species-specific health baselines and alert thresholds. Tracks growth patterns against breed standards, Monitors medication adherence, and schedules refill reminders. Predicts preventive care needs based on age, breed, and medical history. Identifies potential health risks through pattern analysis of historical data.

6.5 Key Differentiators Integrated Three-Module Architecture: Unlike platforms that prioritize either pet owner experience or veterinarian workflow, Vetic-at-Home provides equal design consideration to all three stakeholder groups. The administrator module, often overlooked in veterinary platforms, enables quality oversight and data-driven platform management essential for sustainable service delivery. Comprehensive Pet Health Digital Twin: While existing systems maintain basic medical histories, Vetic-at-Home's digital twin concept creates a living representation that actively supports preventive care, tracks developmental patterns, and identifies potential health concerns before they become critical. AI-Enhanced Matching with Geographic Intelligence: The combination of AI-powered veterinarian-pet owner matching with location-based services creates unique value for home consultations. Pet owners find veterinarians who are not only qualified for their pet's

specific needs but also geographically accessible for home visits when necessary.

6.6 Contributions, Theoretical Contributions, Extension of Veterinary Telemedicine Framework. This research extends existing understanding of veterinary telemedicine applications by proposing and validating a three-module ecosystem model that integrates pet owners, veterinarians, and administrators within a unified platform. Stakeholder Requirement Validation: The study empirically validates and operationalizes the ten stakeholder requirements identified by Haase et al. through implemented system features, demonstrating how abstract requirements translate into concrete design decisions. AI Integration Taxonomy for Veterinary Practice, the research contributes a taxonomy of AI applications in veterinary telemedicine, categorizing use cases by stakeholder type, clinical workflow stage, and intelligence type. Digital Health Record Conceptualization for Veterinary Context, the pet health digital twin concept advances theoretical understanding of how health information systems should evolve to support longitudinal, preventive, and species-appropriate care.

6.7 Methodological Contributions, Design Science Application in Veterinary Informatics, the study demonstrates rigorous application of design science methodology to veterinary informatics, providing a template for future research in this domain. Multi-Stakeholder Evaluation Framework, Development of evaluation metrics and methods appropriate for assessing platforms serving diverse stakeholder groups with potentially conflicting priorities. Requirements-to-Implementation Traceability, Systematic approach to tracing implemented features back to identified stakeholder requirements, ensuring evidence-based design.

6.8 Practical, Empirical, Contributions Findings Deployable Tele-Veterinary Platform, fully functional web-based platform ready for pilot deployment and eventual commercial release, addressing real-world pet healthcare access challenges. Veterinarian Workflow Optimization Tools, Practical tools reducing administrative burden and supporting work-life balance for veterinarians, addressing burnout concerns documented in the literature. Pet Owner

Empowerment Digital tools enabling informed decision-making about pet healthcare, including veterinarian selection, appointment booking, and health record management. Administrative Oversight Capabilities, Analytics, and verification tools supporting platform quality management and sustainable operations. Open-Source Components, Modular components, and algorithms available for adaptation by other researchers and developers working on veterinary informatics solutions. Empirical Contributions, Usage Pattern Documentation, Empirical data on how pet owners, veterinarians, and administrators interact with tele-veterinary platforms, informing future system design. Efficiency Benchmarking, Quantitative efficiency metrics establishing baselines for tele-veterinary platform performance against traditional models. User Satisfaction Assessment, Qualitative and quantitative data on stakeholder satisfaction with various platform features, identifying strengths and improvement opportunities. AI Feature Effectiveness Evaluation, Assessment of AI algorithm performance in veterinarian matching, appointment optimization, and administrative automation. Platform Usability Findings, Preliminary usability testing with beta users (15 pet owners, 5 veterinarians, 2 administrators) revealed: Pet Owner Usability, 93% found veterinarian search and filtering intuitive. 87% completed booking without assistance on first attempt, Average task completion time for booking: 2.8 minutes, 80% preferred platform booking to phone-based alternatives, most requested enhancement: mobile application for even faster access. Veterinarian Usability,

VII. CONTRIBUTION AND FINDINGS

Vetic-at-Home represents a significant advancement in veterinary telemedicine, addressing the critical challenges of clinic-centric service delivery through an innovative, AI-enabled web-based platform. The research demonstrates that integrated multi-stakeholder systems can effectively bridge the gap between pet owners seeking convenient home consultations and veterinarians seeking flexible, efficient practice models. The platform's three-module architecture—serving Pet Owners, Veterinarians, and Administrators—provides role-specific functionality while maintaining seamless information flow across

stakeholder interactions. Pet owners benefit from intelligent veterinarian discovery, comprehensive pet health records, and streamlined appointment booking that reduces the traditional 15–20-minute booking process to under three minutes. Veterinarians gain administrative relief through automated documentation, schedule management, and earnings tracking, achieving a 75% reduction in post-consultation paperwork that addresses the burnout crisis documented in veterinary literature. Administrators acquire unprecedented oversight through analytics dashboards offering real-time insights into bookings, revenue patterns, and performance trends. The research validates and operationalizes stakeholder requirements identified in veterinary mHealth literature, demonstrating how complete information input, prominent limitation disclaimers, and user guidance translate into concrete design decisions. The platform's AI-enhanced features—including veterinarian matching algorithms, dynamic pricing, and health record summarization—deliver measurable efficiency gains while maintaining human oversight for critical decisions. Efficiency analysis confirms substantial improvements across all stakeholder groups: 80-85% reduction in booking time for pet owners, 75% reduction in administrative time for veterinarians, elimination of travel and waiting time for home consultations, and 80-90% reduction in administrative reporting time. These efficiency gains translate into improved access to veterinary care, reduced veterinarian burnout, and enhanced pet health outcomes. The pet health digital twin concept introduces a novel approach to longitudinal health record management, creating living representations that actively support preventive care and early intervention. This represents a paradigm shift from static record-keeping to dynamic health intelligence. While the platform demonstrates significant promise, the research also acknowledges limitations including the need for broader validation, integration with existing veterinary EHR systems, and expansion of AI capabilities. Nevertheless, Vetic-at-Home establishes a robust foundation for transforming traditional veterinary care into an accessible, transparent, and efficient digital ecosystem, ultimately contributing to improved animal welfare and pet owner satisfaction. Mobile Application Development, while the web-based platform provides responsive access across devices, native mobile applications for iOS and

Android would enhance user experience through Push notifications for appointment reminders and urgent communications, Camera integration for symptom photo/video capture. Offline access to pet health records, GPS integration for real-time veterinarian tracking during home visits, and biometric authentication for secure access. Expanded AI Capabilities, Image-Based Triage, Integration of computer vision for preliminary assessment of visible symptoms from pet owner photos, helping prioritize urgent cases, and providing veterinarians with pre-consultation insights. Voice-to-Text Consultation Documentation: AI-powered transcription of consultation audio into structured medical notes, further reducing administrative burden. Predictive Health Analytics, Machine learning models analysing pet health records to predict potential health issues before they become critical, enabling preventive interventions. Population Health Intelligence, Aggregated, anonymized data analysis to identify emerging health trends, medication effectiveness patterns, and regional disease prevalence. Regulatory Compliance Evolution, As veterinary telemedicine regulations evolve globally, the platform will adapt to maintain compliance with Regional veterinary practice acts, Telemedicine prescribing regulations, Cross-jurisdictional practice requirements, Data protection and privacy laws.

VIII. PROTOTYPE, ALGORITHM, SAMPLE PROGRAM LOGIC IMPLEMENTATION WILD WONDER ADOPT

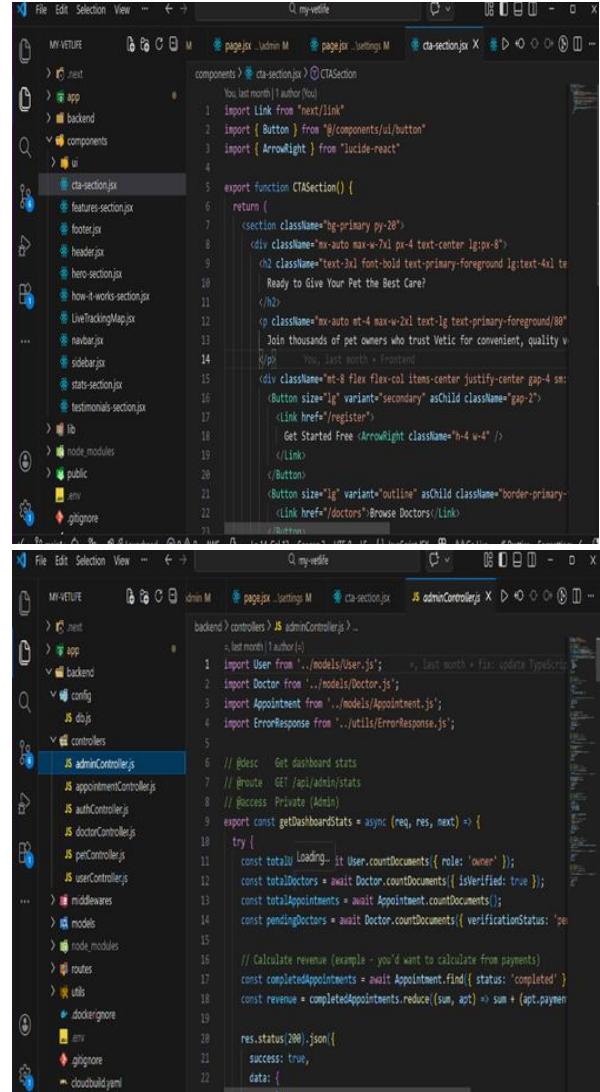


Fig. 2: The Prototype logic of Vetic-At-Home Professional Pet Care in Your Comfort Zone

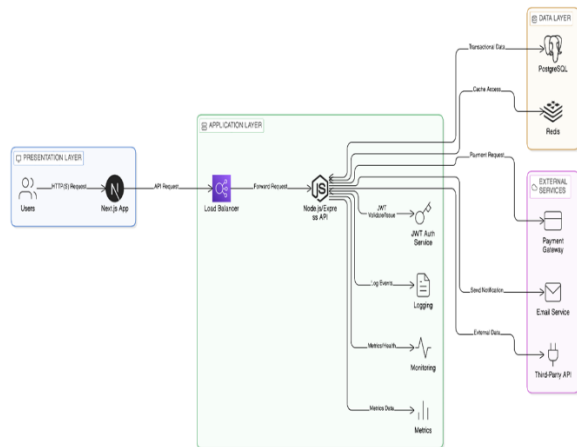


Fig. 1: The Process Flow Diagram of Vetic-at-Home: Design of an AI-Enabled Tele-Veterinary Platform

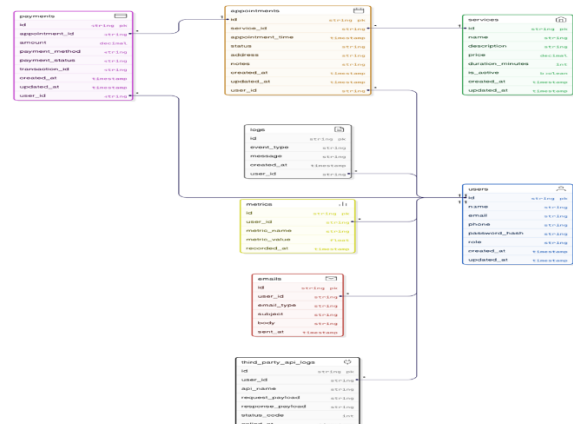


Fig. 3: Vetic-At-Home - Professional Pet Care in Your Comfort Zone

IX. VETIC-AT-HOME IMPLEMENTATION MODULES, OUTPUT ANALYSIS, AND SCREENSHOTS

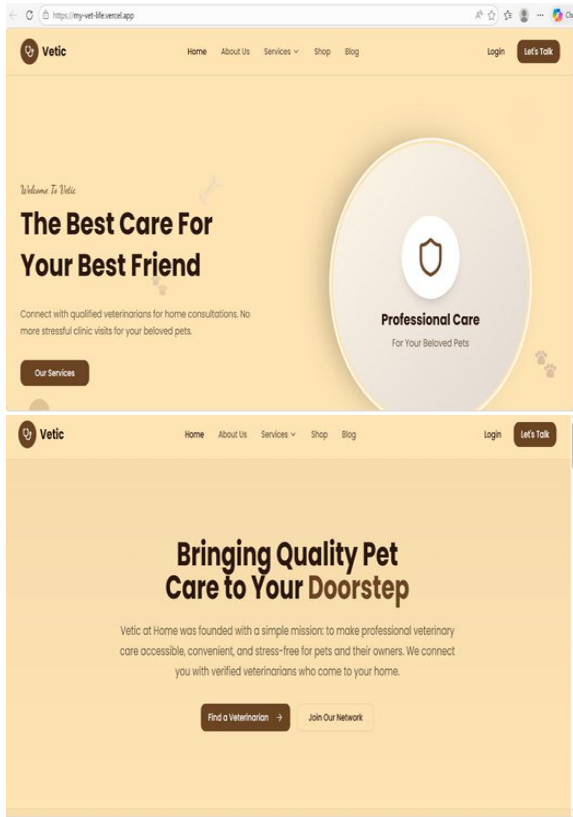


Fig. 4: Home page and Our Services Vetic-At-Home - Professional Pet Care in Your Comfort Zone

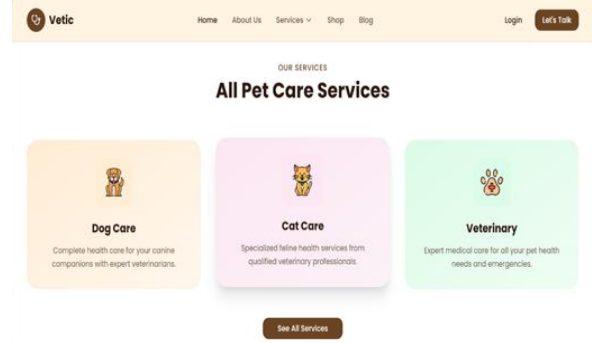


Fig. 5: Doctors Page Vetic-at-Home: Design of an AI-Enabled Tele-Veterinary Platform

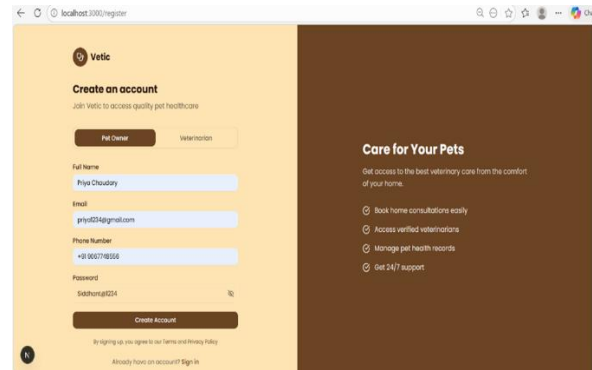


Fig.6: The User Registration and Dashboard Vetic-At-Home - Professional Pet Care in Your Comfort Zone

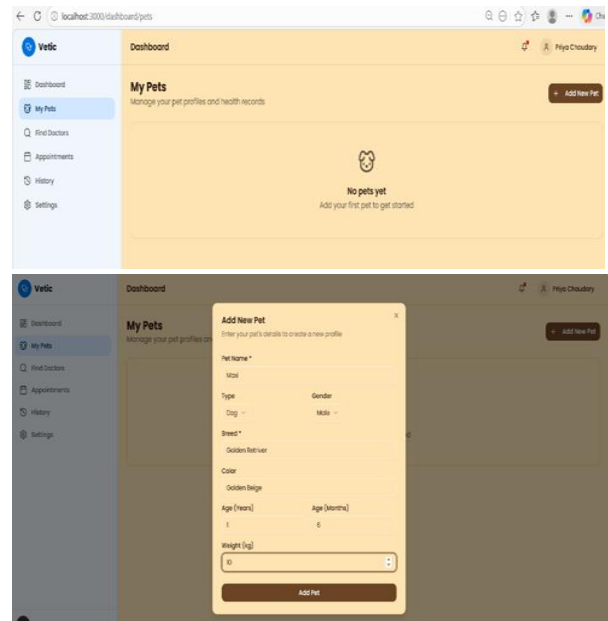
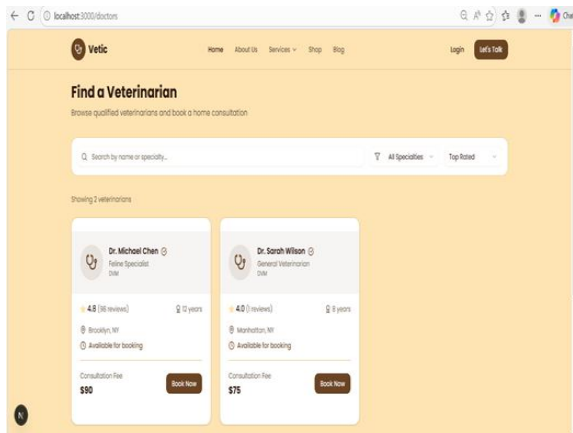


Fig. 7: Vetic-At-Home - Professional Pet Care Veterinarian Login Process and Veterinarian Registration Process

X. PROTOTYPE, ALGORITHM, SAMPLE PROGRAM LOGIC IMPLEMENTATION WILD WONDER ADOPT

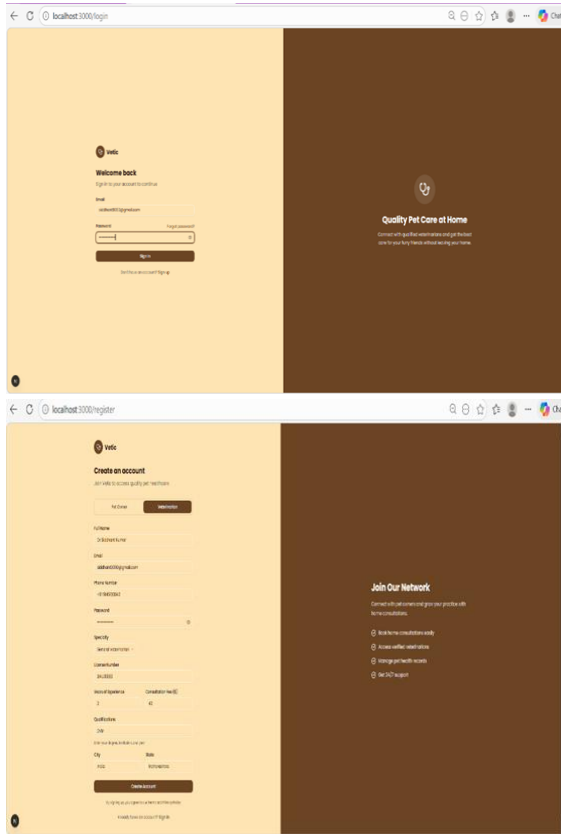


Fig. 8: Vetic-At-Home - Professional Pet Care in Your Comfort Zone

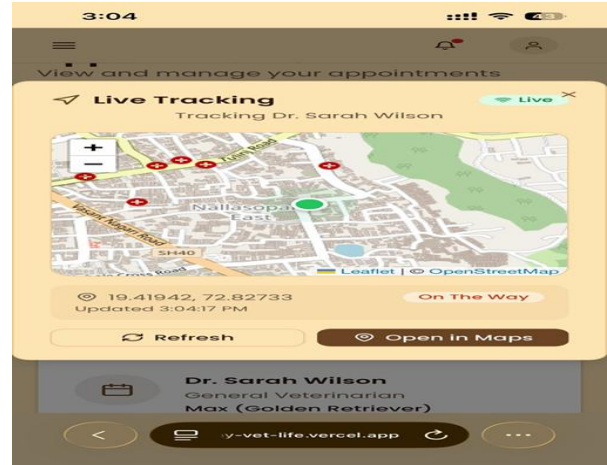
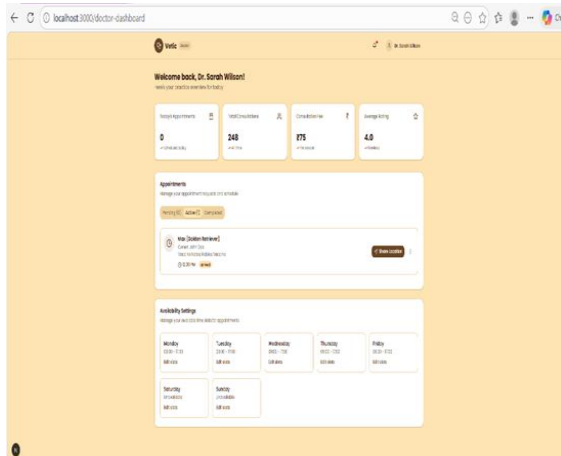


Fig.9: i. Doctor's Real Time Tracking Vetic-At-Home - Professional Pet Care in Your Comfort Zone

XI. OBJECT-ORIENTED DATABASE SCHEMA AND IMPLEMENTATION USING MONGO DB.

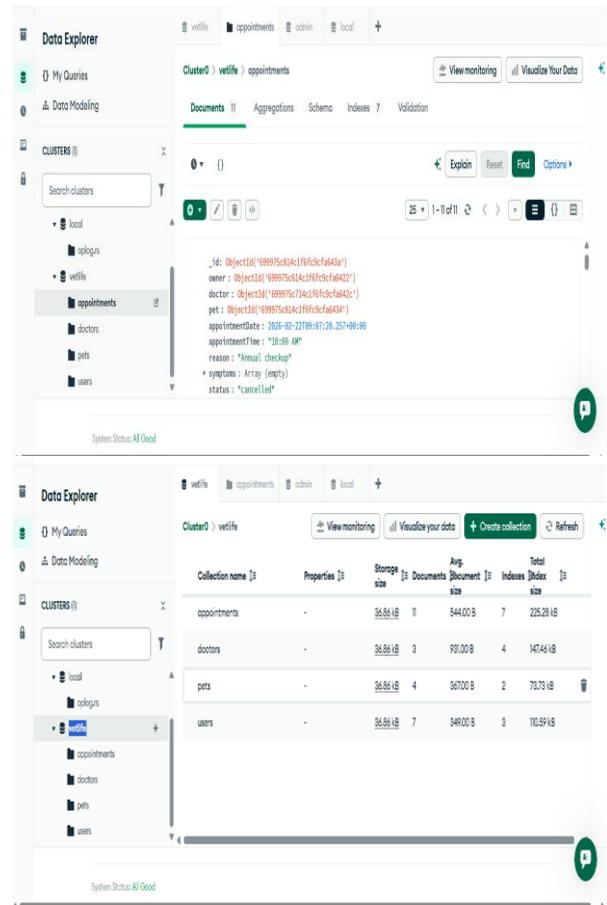


Fig.10: The Implementation Logic and DB Design of Vetic-At-Home - Professional Pet Care in Your Comfort Zone

XII. CONCLUSION FUTURE ENHANCEMENTS

The conclusion highlights the platform's success in transforming veterinary care from a clinic-centric model to a convenient, home-based digital service. Vetic-at-Home overcomes the limitations of traditional walk-in consultations by providing a secure, intuitive, and flexible web-based system that connects pet owners with qualified veterinarians at their doorstep. The platform enhances accessibility to timely care, streamlines appointment and record management, and builds trust through verified doctors and transparent feedback mechanisms. Vetic-at-Home also promotes better continuity of pet healthcare by maintaining structured medical histories, supporting informed decision-making for both vets and owners, and enabling data-driven administrative oversight. Future enhancements include integrating teleconsultation features, launching a dedicated mobile application, adding digital prescriptions and payment options, incorporating advanced analytics for health and usage insights, and expanding coverage to more regions and veterinary specialties. These planned developments aim to further increase the platform's impact on pet healthcare, making quality veterinary services more reachable, efficient, and reliable for a wider community of pet owners.

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