IT4010 – Research Project - 2024

Topic Assessment Form

Project ID : R25-064

1. Topic (12 words max)

PawPal: The AI-Powered Pet Care App

2. Research group the project belongs to

SST - Software Systems & Technologies

3. Specialization of the project belongs to

Information Technology (IT)

4. If a continuation of a previous project:

Project ID	RP-064
Year	2025

5. Brief description of the research problem including references (200 – 500 words max) – references not included in word count.

Cats and dogs are cherished companions, each with distinct needs and behaviors that require careful attention from their owners. However, many pet owners face challenges in providing optimal care, particularly when it comes to understanding their pets' health, behavior, and emotional well-being. Existing solutions, such as IoT-based devices or regular veterinary consultations, can offer support but are often inaccessible due to high costs, complex usage, or lack of availability in certain regions [1]. This creates a significant gap for the average pet owner seeking reliable and affordable ways to monitor and enhance their pet's well-being.

Early detection of health issues is critical to improving outcomes for pets, as many conditions can escalate without timely intervention. Additionally, understanding behavioral cues, such as changes in activity levels or eating patterns, can provide valuable insights into a pet's physical and emotional health. Offering emotional support to pets is equally essential, as stress or anxiety can negatively impact their overall quality of life [2][3].

Traditional methods of monitoring pet health, such as wearable sensors and smart collars, have shown promise in areas like activity tracking and posture analysis. However, these devices often pose challenges, including discomfort for the pet, privacy concerns, and technical limitations in their robustness and usability [4]. As a result, there is a growing need for more accessible, non-invasive, and user-friendly solutions.

The rapid advancements in smartphone technology present an opportunity to bridge this gap. With built-in sensors, advanced cameras, and AI capabilities, smartphones can be transformed into powerful tools for pet care. Applications such as the proposed PawPal app aim to utilize these features to provide an affordable and accessible solution for monitoring pet health and behavior. By leveraging AI-driven technologies, PawPal will offer personalized insights tailored to individual pets, empowering owners with actionable information to enhance their pet's quality of life [5].

Such a solution can revolutionize pet care, enabling early detection of issues, deeper understanding of behavioral patterns, and improved emotional support for pets. With its affordability and ease of use, this smartphone-based approach has the potential to make comprehensive pet care accessible to all pet owners, regardless of location or income level.

References

[1] Ambiq. (n.d.). *Smart Devices for Pet Health Monitoring*. Retrieved from https://ambiq.com/blog/smart-devices-for-pet-health-monitoring/

[2] Gupta, S. (2024). *AI Applications in Animal Behavior Analysis and Welfare*. In *Agriculture 4.0* (pp. 21-42). CRC Press. Retrieved from https://www.taylorfrancis.com/chapters/edit/10.1201/9781003570219-12/ai-applications-animal-behavior-analysis-welfare-sheetanshu-gupta

[3] Cogniteq. (2021). *Advanced Technologies for Pets Health Monitoring System*. Retrieved from https://www.cogniteq.com/blog/advanced-technologies-pets-health-monitoring-system

[4] Pet Insight. (2023). *The Role of Smartphones in Pet Care*. Retrieved from https://petinsight.com/articles/smartphones-for-pet-care-solutions

[5] Frontiers in Veterinary Science. (2024). *Advancements in AI for Pet Care and Veterinary Science*. Retrieved from https://www.frontiersin.org/journals/veterinary-science/articles/10.3389/fvets.2024.1347550/full

6. Brief description of the nature of the solution including a conceptual diagram (250 words max)

PawPal is an AI-powered mobile application designed to improve the care of cats and dogs by leveraging smartphone capabilities and advanced AI technologies. The app provides a comprehensive set of tools to address various aspects of pet health and well-being in an intuitive and user-friendly way.

The **Personalized Nutrition Plans** feature allows pet owners to create detailed pet profiles by inputting data such as breed, age, weight, and health conditions. Using machine learning, the app generates tailored feeding schedules, portion sizes, and nutritional advice. These recommendations dynamically adapt as the pet grows or experiences changes in health.

With the **AI Health Monitoring** module, pet owners can capture photos of visible symptoms, like rashes or injuries, using their smartphone camera. The app employs image recognition to analyze the symptoms and provides potential diagnoses, home care tips, or recommendations for veterinary consultations.

The **Virtual Veterinary Assistant**, powered by natural language processing (NLP), acts as a 24/7 resource for pet owners. It provides instant advice on pet care, symptom explanations, and behavioral guidance while also determining when professional veterinary assistance is necessary.

The **Pet Sound Identifier** uses the smartphone's microphone to analyze sounds such as barking, whining, or meowing. By interpreting these sounds, the app helps pet owners understand their pets' emotional and physical states, offering actionable feedback.

Together, these features create an all-in-one solution, enabling pet owners to proactively manage their pets' health and well-being without the need for costly external devices.

7. Brief description of specialized domain expertise, knowledge, and data requirements (300 words max)

The successful implementation of PawPal requires expertise across multiple domains to ensure the application is accurate, reliable, and user-friendly.

- **Artificial Intelligence and Machine Learning**:
    - Developing machine learning algorithms to analyze pet profiles and generate personalized nutrition plans tailored to factors like breed, age, weight, and health conditions.
    - Training AI models to identify health issues using image recognition of pet symptoms (e.g., skin rashes, wounds).
    - Building sound analysis models to interpret vocalizations, such as barking or meowing, to infer pets' emotional or physical states.
- **Mobile Application Development**:
    - Seamless integration of smartphone sensors like cameras and microphones to enable real-time data collection and analysis.
    - Developing a user-friendly interface to guide pet owners in inputting data, capturing images or sounds, and receiving actionable insights.
- **Veterinary Knowledge**:
    - Collaboration with veterinarians to curate reliable datasets and ensure the accuracy of recommendations provided by the app.
    - Establishing guidelines for breed-specific dietary needs, common health conditions, and behavior patterns.
- **Data Requirements**:
    - Comprehensive datasets of pet nutrition standards for different breeds and ages, including portion sizes and common dietary restrictions.
    - High-quality images of common pet symptoms, such as skin issues or injuries, to train the image recognition model.
    - Sound samples of barking, whining, and meowing to build the Pet Sound Identifier’s analysis capabilities.

This interdisciplinary approach ensures that PawPal is a robust, accessible tool for pet owners, offering scientifically backed, personalized care recommendations to improve the health and well-being of their pets.

8. Objectives and Novelty

Main Objective

The primary objective of this project is to develop an AI-powered mobile application that leverages the advanced capabilities of modern smartphones to provide personalized pet care. The app is designed to enhance pet health, safety, and owner engagement by eliminating the need for external IoT devices, making it an affordable and accessible solution for a wider audience. By harnessing the computational power and sensors of smartphones, such as cameras and accelerometers, and integrating cutting-edge machine learning algorithms, this application will empower pet owners with tools to monitor and support their pets' well-being in real time.

The app aims to address key challenges faced by pet owners, such as identifying health issues early, understanding pet behavior, and providing tailored nutrition plans. Existing pet care solutions often rely on expensive IoT devices like smart collars or external health monitors, which may not be feasible for many users. Moreover, generic advice and static care routines fail to account for the unique needs of individual pets, reducing the effectiveness of such solutions. By focusing on smartphone-based functionality, this app bridges these gaps, offering a cost-effective and convenient alternative.

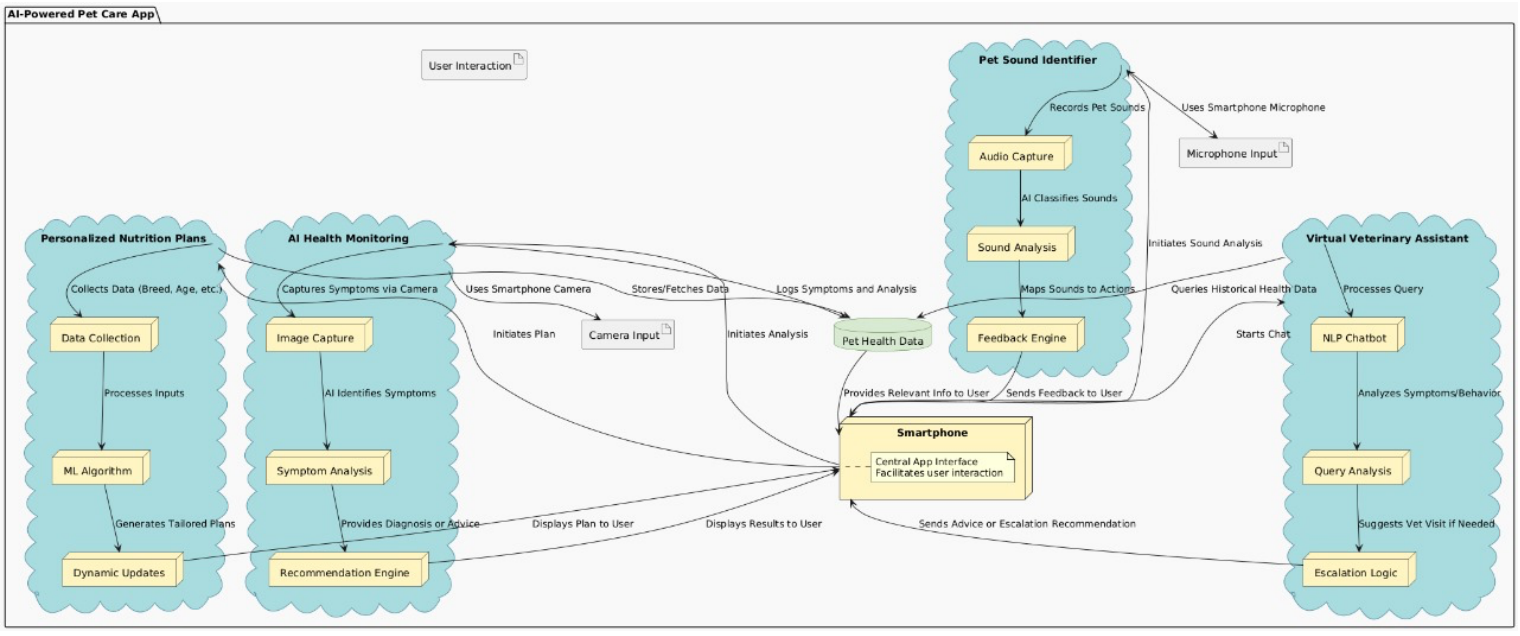
The application incorporates AI-driven features to deliver precise and actionable insights tailored to each pet's unique profile. For example, it provides personalized nutrition plans based on breed, age, and health status, while dynamically adjusting recommendations as the pet's condition evolves. Additionally, the app includes image-based health monitoring, enabling pet owners to capture and analyze photos of potential symptoms like rashes or swelling, with the AI system offering diagnostic suggestions and guidance for further action.

By removing the dependency on external devices and focusing solely on smartphone-based solutions, this application ensures high accessibility and usability. It integrates seamlessly into the daily routines of pet owners, encouraging proactive care while reducing reliance on costly veterinary visits for basic concerns. This innovative approach not only improves the quality of life for pets but also empowers their owners with confidence and knowledge to provide the best care possible.

Member Name	Sub Objective	Tasks	Novelty
Warnakula H.D	Personalized Nutrition Plans to enhance pet health and wellness	- Collect pet-specific data such as breed, age, weight, and health conditions from the user. - Develop machine learning algorithms to	- Addresses the gap in existing research that relies on generic or static meal plans by offering dynamically

		create feeding schedules, portion sizes, and nutritional recommendations. - Implement dynamic updates to adjust plans based on real-time user inputs, such as changes in weight or health.	updating, personalized nutrition plans. - Achieves high accessibility by eliminating dependency on IoT devices and focusing on smartphone-only solutions.
Godage P.S.P	AI Health Monitoring for early detection of potential health issues	- Design an image recognition module to analyze pet health symptoms, such as rashes, injuries, or swelling, from photos captured by the user. - Build a database of common pet health issues to train the image recognition system. - Implement a recommendation engine to provide actionable insights, such as home remedies or suggestions for vet visits.	- Fills the gap where current solutions require specialized IoT devices or external sensors for health monitoring. - Offers an AI-powered diagnostic tool that is specifically optimized for image-based symptom detection using smartphone cameras.
Abesekara D.A.P.D.	Virtual Veterinary Assistant to provide instant pet care advice	- Create an NLP-powered chatbot capable of understanding and responding to user questions related to pet care, behavior, and symptoms. - Develop escalation logic to recommend a vet visit for complex or unclear symptoms. - Integrate multilingual support to ensure accessibility for diverse	- Unlike general-purpose chatbots in past research, this assistant is specifically tailored to address cats' and dogs' health and behavior concerns. -Adds multilingual and pet-specific care advice, making it globally accessible and unique for veterinary guidance.

		users. - Continuously refine the chatbot by incorporating feedback from real-world usage.	
Rathnayaka R.M.L.D	Pet Sound Identifier to predict pet's status and emotional needs	- Use pre-trained AI models to analyze sounds like barking, whining, or meowing. - Map these sounds to predefined categories (e.g., hunger, stress, playfulness). - Implement actionable feedback, such as "Your dog might be hungry" or "Your cat may be stressed." - Optimize the feature for real-time sound analysis using the smartphone microphone.	- Addresses the research gap of lacking real-time, smartphone-based pet sound analysis solutions. - Provides actionable feedback without requiring expensive external hardware, making it more accessible and practical for average pet owners.



9.

	Title	First Name	Last Name	Signature
Supervisor	Dr	Samantha	Rajapaksha	
Co-Supervisor	Dr	Dinuka	Wijendra	09/12/2024
External Supervisor	Dr	Yashani		(Mrs) P.H.B. Yashani Veterinary Surgeon, BVSc(Hons) SLVC Reg No. 2119

Summary of external supervisor's (if any) experience and expertise

Dr. (Mrs) P.H.B. Yashani is a qualified veterinarian with extensive experience in animal healthcare and welfare. Their expertise includes diagnosing and treating various animal health issues, ensuring ethical and accurate practices in veterinary care. They bring valuable knowledge and guidance to our project.

SLIIT UNI
THE KNOWLEDGE UNIVERSITY

IT4010 – Research Project - 2024

Topic Assessment Form

<u>This part is to be filled by the Topic Screening Staff members.</u>

a) Does the chosen research topic possess a comprehensive scope suitable for a final-year project?

Yes		No	

b) Does the proposed topic exhibit novelty?

Yes		No	

c) Do you believe they have the capability to successfully execute the proposed project?

Yes		No	

d) Do the proposed sub-objectives reflect the students' areas of specialization?

Yes		No	

e) Supervisor's Evaluation and Recommendation for the Research topic:

IT4010 – Research Project - 2024

Topic Assessment Form

Acceptable: Mark/Select as necessary

Topic Assessment Accepted	
Topic Assessment Accepted with minor changes*	
Topic Assessment to be Resubmitted with major changes*	
Topic Assessment Rejected. Topic must be changed	

* Detailed comments given below

Comments

Staff Member's Name	Signature

*__Important__:

1. According to the comments given by the evaluator, make the necessary modifications and get the approval by the **Evaluator**.
2. If the project topic is rejected, identify a new topic, and request the RP Team for a new topic assessment.