

# Remote Dog Care Application

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**Abstract** - This study proposes a mobile-based remote dog care application that offers features such as smart cage management, obesity level checker, behavioral health issues identification, and health assistance. The application uses ICT technology to combine smart devices, allowing pet owners to monitor and manage multiple activities of their pet, including temperature, lightness, darkness, and humidity indicators. Furthermore the project aims to monitor dog behavior at home using a mobile app and deep learning models. It uses Tensorflow and Yolov7 models to detect dog objects and identify behavioral issues. The app includes a Dog Behavior Health button and a camera connected to a Raspberry Pi 3 board. The system also includes a dog collar and angular motion sensors. The project aims to provide a proactive tool for dog owners, trainers, and shelters to detect and treat behavioral issues, advance animal behavior research, and prevent health issues from obesity.

**Keywords:** IoT, Health Assistance, Tensorflow, Yolov 7, Raspberry Pi 3, ICT, Dog.

## I. INTRODUCTION

The system's purpose is to make a leap from manual to the automated system that can have the information about the dogs. The application focuses on four main features to build up an overall application that can work on smartphones. The increasing pet ownership rate has prompted the development of ICT solutions for pet care, enabling remote monitoring and monitoring of pets' health. The global economic crisis has made it crucial for pet owners to have access to these tools, leading to research initiatives focusing on optimizing ICT for pet care. Also this study discusses smart cage management using cooling fans, sunlight balance, and cage darkness to regulate the cage's climate remotely. Sensors like DHT11 and BH1750 detect temperature, humidity, and lighting in the cage. Electronic devices and equipment control the cage, and the mobile-based pet care system provides a practical, affordable solution for pet owners. The research focuses on implementing a mobile app for smart cage management, obesity level management, sensor collar, remote behavior monitoring, and health assistance. The study also addresses ethical and unethical aspects of pet care systems.

A mobile app using machine learning techniques, Yolov7, is being developed to identify behavioral health issues in dogs. The app uses data from a smartphone's camera and microphone to analyze cues like facial expressions and vocalizations. The app uses Firebase for real-time dog position capture and uses sensors like Gyroscope and Accelerator to monitor the dog's behavior. Furthermore this research aims to address dog obesity in Sri Lanka by implementing a mobile application that provides automatic exercise and a step counter. Overfeeding, inactivity, and high-calorie diets are leading causes of obesity. Dogs should eat well, exercise regularly, and have their condition closely monitored. Education and awareness campaigns are crucial to debunk misconceptions and promote healthy habits. More research is needed to develop effective treatments for canine obesity in Sri Lanka.



Figure 1: The Cage Management Device



Figure 2: The Smart dog collar

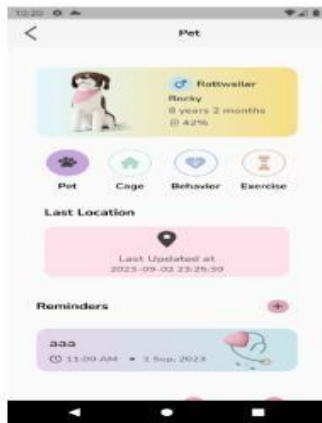


Figure 3: The Smart dog app

Furthermore, this research is conducted to provide the opportunity for the dog owners to briefly identify the diseases that their dogs are having by entering the dog's symptoms into the mobile application. Through a data model the system suggests all the possible diseases the dog can have due to entered symptoms with the percentages of each disease's possibility.

## II. METHODOLOGY

First, the pet owner has to register for the remote dog care pet application. There the user has to enter all the required basic information of the dog which will be later used to prepare the e- book for the dog. The user has the access to four main components as smart cage management, obesity level checker of the dog, behavioral health issues identification and health assistance module. Within these main components, there are subcomponents as well to provide a better service to pet owners. The subcomponents of the health assistance module diagnosing the dog diseases using their behavior irregularities, scheduling vet appointments through the system and the AI chat bot which will provide solutions for the basic question related to the dog health.

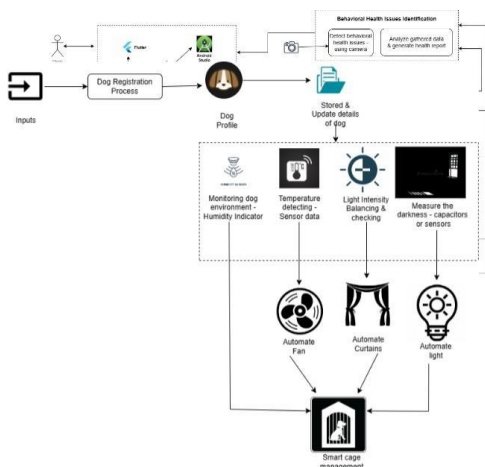


Figure 4: Overall High Level Architectural Diagram

A) Provide health assistance and guidance to pet owners on how to respond to their pet's diseases

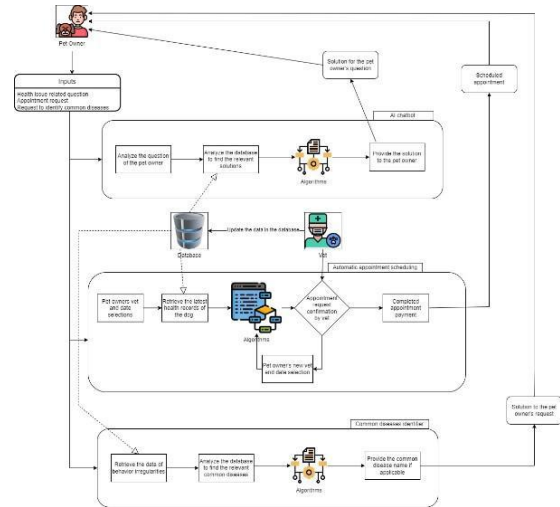


Figure 5: Health Assistant Diagram

The component aims to provide health assistance and guidance to pet owners on how to respond to their pet's diseases. It helps identify the dog's medical condition based on behavior irregularities, determining the severity of the condition, and directing the owner to a veterinary appointment. Basic treatments and first aids are provided for minor diseases. The app allows the owner to specify the appointment date and time, and their preferred veterinary surgeon. An AI chatbot answers health-related questions, and the mobile application updates the dog's e-health record with the latest medical information.

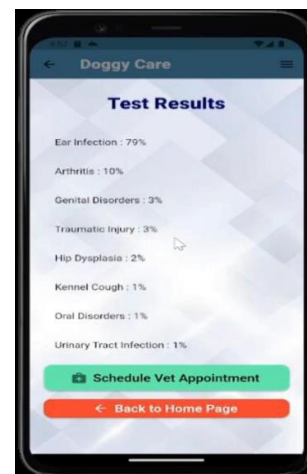


Figure 6: Disease prediction output

B) Smart Cage Management

This study discusses Smart Cage Management, which uses cooling fans, sunlight balance, and cage darkness to regulate the cage's climate remotely. The system uses sensors like DHT11 Sensor for temperature and humidity detection

and BH1750 Sensor for light intensity detection to measure temperature, humidity, and lighting. Electronic devices and equipment are used to control and build the dog's cage, including a Servo SG90 9g 180 Degree Server Motor, 7805 Voltage Regulator IC, Relay Module (5V), Power Adapter (12V), DC fan, and LED Strip.

The mobile-based pet care system provides a practical, affordable, and effective solution for pet owners. The system is designed to be simple to use anytime and anywhere, making pet care less stressful and less time-consuming. The research is based on a mobile-based Remote Dog care application, which includes smart cage management, obesity level management, sensor collar, remote behavior monitoring, and health assistance. The research method involves searching relevant research using keywords, conducting manual and automatic searches, removing redundant research, and contacting veterinarians for guidance on ethical and unethical aspects of pet care systems.

The researchers will maintain close contacts with veterinary surgeons to obtain their suggestions and data for implementing the components. A few veterinary surgeons will be registered in the system to validate the outputs given to users by the system.

### C) Dog Behavior Health Identification

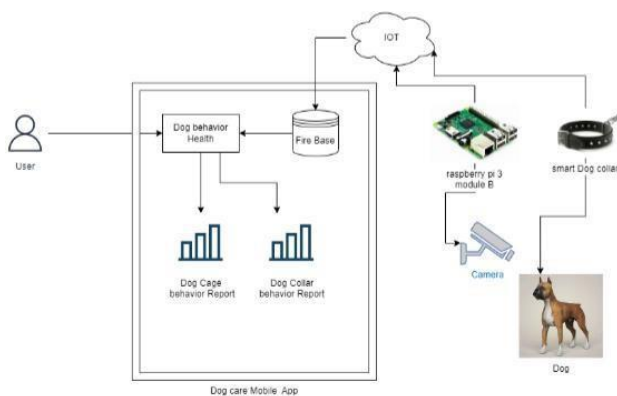


Figure 7: Dog Behavior Health Identification Diagram

Remote camera monitoring is a practical and adaptable method used in various fields such as safety, security, surveillance, and zoological study. The methodology for implementing machine learning and camera monitoring involves identifying the problem and project scope, describing the requirements, and creating the system architecture. The goal is to develop a system that can monitor cameras via LAN and use machine learning algorithms to analyze video data and discover specific occurrences or patterns of interest. The evolution of remote video monitoring solutions ensures more effective remote observation and control.

### D) Maintain the obesity level of the dog

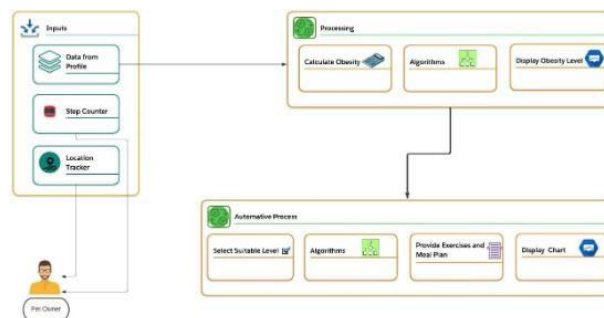


Figure 8: Maintain the Obesity Level of the Dog Diagram

In Overall Remote Dog Care Application, in this report, we explain to maintain the obesity level of the dog.

- We refer to the Data Sets on the Obesity level of dogs, diseases related to obesity levels, and what are the solutions to these.
- In Obesity Level Measuring Parallel we get the Step count of the pet dog and track their exercises.

## III. RESULTS AND DISCUSSIONS

The system registers pet owners and dogs, remotely controls the cage using window coverings, cooling fans, and low-capacity light, and detects dog behavior through a voice camera. It determines indoor cage temperature, humidity, and lightning using sensors like DHT11 and BH7805. It alerts the owner or dog for environmental issues and their needs, such as barking, feeding, and behavioral changes. The system also automatically starts a cooling fan in high temperatures, maintains lighting balance through window coverings, and automatically turns on the light when the cage is dark.

The cage sensor's availability and continuous operation are crucial for system stability. Its data analysis is essential for detecting potential system breakdowns. Additionally, increasing the accuracy of cage management can enhance trust by analyzing it as a separate module.

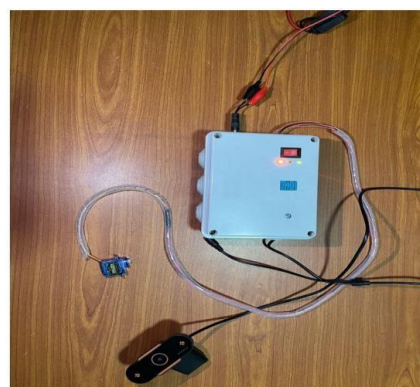


Figure 9: Dog Cage Collar

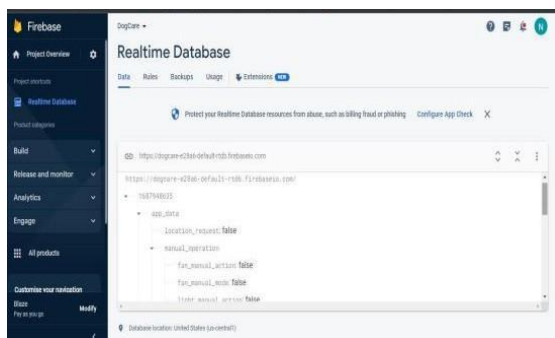


Figure 10: Real-time Database

Detect the Dog behavior issue using by camera. Identifying Dog movement using ML YoloV7 & tensorflow. Monitoring camera system using IOT.

Send dog status via Mobile app. System generate the Dog behavior issue report using camera and Collar.



Figure 11: Dog Collar

As the result, we implemented Dog collar and the mobile application UI of those parts using Flutter with dart language.

Dog collar with including GPS module, GSM module, Accelerator and Gyroscope, ESP-32, Power bank modular, Buck converter, micro-controller and Battery. Using ESP-32 we connect Wi-Fi to collar and GSM module used to connect the internet. Also, Gyroscope used to capture angular motions, GPS module used to track the current pet location using UNIX timestamp. Also, we used power bank modular to get 5V to GPS module Antenna and we used Buck converter to control voltage. Lastly, we used 3.7 lithium battery and its work as balance charger.

The online veterinary appointment scheduling component uses a flowchart algorithm to schedule appointments with dog owners. The algorithm considers two parameters: appointment day and time and preferred veterinarian. If one is unavailable, the app can request a new appointment or arrange with a different surgeon.

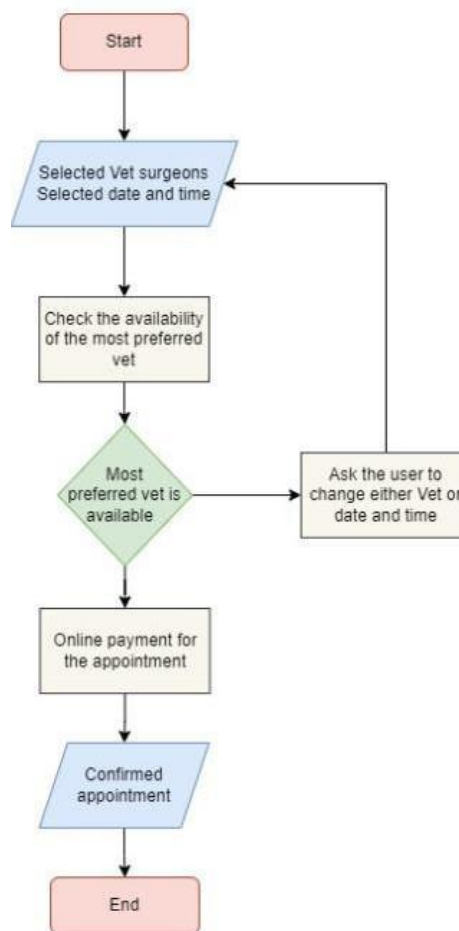


Figure 12: Flow of scheduling appointment

#### IV. CONCLUSION

The research focuses on developing a mobile-based remote dog care application that integrates various electronic devices within a dog's cage through IoT technology. The application includes smart cage management, obesity level checkers, behavioral health issues identification, and health assistance. The system uses ICT technology to combine multiple smart devices, allowing pet owners to monitor and manage various activities. The app handles functions like switching and brightness control, making it a practical, affordable, and effective solution for pet care.

Maintain the Obesity of the Dog is a smartphone app designed to help dog owners control their pet's weight and fitness. It offers customized workouts based on the dog's age, breed, weight, and activity level. The app also features a pet step counter and a pet distance measurer for tracking progress.

The app is user-friendly, provides reminders, and accurately tracks the dog's movement. Its features make it a valuable resource for pet owners looking to maintain their pet's health and fitness. Furthermore in this system we used smart dog collars too.

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