FINAL PAPER.docx

by Turnitin LLC

IOT-BASED CONNECTED PET COMPANION

G M Sasikala

Assistant Professor,

Department of Computer Science and Engineering,

Rajalakshmi Engineering college

Tamil Nadu, India

sasikalagm@gmail.com

D Monashree

UG Student,

Department of Computer Science and Engineering,

Rajalakshmi Engineering college

Tamil Nadu, India

210701165@rajalakshmi.edu.in

M Praveen

UG Student,

Department of Computer Science and Engineering,

Rajalakshmi Engineering college

Tamil Nadu, India

210701193@rajalakshmi.edu.in

Abstract: This IoT-based pet care system automates feeding, hydration, and health monitoring. The smart dispenser, remotely controlled via a mobile app, includes a weight sensor for portion control to promote a balanced diet. A smart collar tracks motion and temperature, sending alerts if the pet's temperature exceeds safe limits. A motion sensor also activates a light when the pet nears the feeder. Cloud storage enables long-term tracking of health and feeding patterns, offering real-time monitoring. Future enhancements may include AI for personalized pet care.

Keywords: IoT, Smart Pet Care, Automated Feeding, Health Monitoring.

1. Introduction:

Smart home technology has brought IoT into many areas, but its use in pet care is still developing. Traditional pet care tasks like feeding and health monitoring are time-consuming, especially for busy owners. This paper introduces the IoT-Based Connected Pet Companion, designed to automate tasks like feeding, motion detection, and temperature monitoring, allowing owners to remotely manage their pets' needs. The system provides real-time updates on pet health, ensuring consistent care. The paper covers its design, IoT's role, and potential future advancements in smart pet care.

Keywords: IoT, Smart Pet Care, Automated Feeding, Health Monitoring, Smart Home.

2. Literature Survey :

1. The paper "IoT-Based Smart Pet Care System" by Suvitha P S et al. addresses challenges in remote pet care, proposing an IoT-based robotic system. It features a camera for live video, automatic food and water dispensers, and a speaker for remote interaction. Managed via a smartphone app, it enables real-time monitoring and control, with a Raspberry Pi controller ensuring smooth online operation.
2. The paper "Implementation of Smart Pet Care Applications in an IoT-Based Environment" by WLSV Liyanage and N. Wedasinghe presents an IoT-based mobile app for managing pet care. It offers features like remote feeding, defecation management, and real-time monitoring through CCTV, addressing challenges posed by busy lifestyles and

the emotional attachment of pet owners.

3. The paper "Implementation of an IoT-based Pet Care System" by Yixing Chen and Maher Elshakankiri presents a system with a smart feeder, water dispenser, and litter box connected via Arduino Uno and Wi-Fi. It tracks pet habits and provides real-time updates through a smartphone app, but has basic features and potential connectivity issues.

4. The paper "Smart Pet Care System Using Arduino IoT Cloud" by Sravan Kumar Pyda et al. presents an IoT-based pet feeder with load sensors, controlled via a web app for scheduling and remote monitoring. It allows for customizable feeding schedules and notifications but lacks a rechargeable battery and focuses mainly on basic food and water dispensing.

5. The paper "Smart PetHouse" by Hassan Saed Abu Thiab and Mohammad Belal Mousa presents an IoT-based system for automating pet care tasks such as feeding, lighting, water refilling, cooling, and gate control via a mobile app. It also includes GPS tracking and camera streaming for monitoring. However, it has limited manual override features and lacks rechargeable power options.

6. The paper "Cat's Monitoring and Feeding Systems via IoT" by Nasrin Hannani Mohd Rasyidi and Rosnah Mohd Zin presents an IoT system for remote cat feeding and monitoring. It uses NodeMCU ESP32 for automated feeding and food tracking, with live video streaming via an ESP32 camera. Limitations include feeder capacity and reduced image quality beyond 150 cm.

7. The paper "Design of Pet Feeder Using Web Server as IoT Application" by Andi Adriansyah et al. presents an IoT pet feeder using Arduino Uno, ESP8266, and sensors for remote management. It enables owners to monitor feeding and food levels via a web interface with real-time alerts. However, it requires stable internet and public IP access, complicating remote use.

8. The paper "Home Monitoring of Pets Based on AIoT" by Wen-Tsai Sung and Sung-Jung Hsiao introduces an AIoT system using Arduino Uno and ESP8266 for controlling appliances based on sensor data. It monitors temperature, humidity, air quality, and light, allowing remote adjustments via a mobile app. Benefits include automation and AI adaptability, but it relies on stable internet and can be complex to set up.

9. The paper "Smart Pet Monitoring and Feeder using IoT" by Madhu R et al. presents an IoT-based automatic pet feeder that ensures consistent feeding schedules. Utilizing an Arduino Uno, RTC module, and ultrasonic sensor, it allows owners to set feeding times and control portions. While it provides automation, it requires a reliable internet connection and lacks health monitoring features.

10. The paper "IoT-Based Automatic Pet Feeding and Monitoring System" by Jiten Kulaikar and colleagues presents an IoT solution using a Raspberry Pi for remote pet care. It includes a food feeder, water dispenser, live-streaming Pi camera, and a speaker to call pets at mealtime. The system enables online control and video monitoring but relies on a stable internet connection and lacks advanced health tracking features.

11. The paper "Pet Feeder Using IoT" by Adnan Shah and colleagues presents an IoT-based pet feeder that allows remote control via a mobile app. Utilizing a BOLT Wi-Fi module and Arduino UNO, it ensures timely feeding for pets. Benefits include easy setup and automated feeding, but it lacks monitoring for whether pets have eaten, is limited to dry food, and does not include advanced features like camera integration.

12. The paper "SPF: Smart Pet Feeder using IoT for Day-to-Day Usage" by Sanjay S Tippannavar et al. introduces an IoT-based pet feeder that automates feeding schedules and manages portion sizes. Using Wi-Fi and Blynk, it sends alerts to pet owners via a mobile app. While it provides automated feeding and portion control, it requires Wi-Fi and only dispenses dry food.

13. The paper "Design and Build of an Automated Animal Feed Dispenser" by Soroush Sedigh describes an Arduino-based system that automates feed dispensing based on time and weight. It reduces overfeeding risks but faces issues with spillage and structural durability, limiting its large-scale application.

14. The paper "Pet Feeding System" by Helmi Che Hasni and Suhazlan Suhaimi presents an IoT-based feeder for busy owners, utilizing a Raspberry Pi to control a servo motor and webcam for feeding and monitoring. A web app enables remote management of feeding schedules and live video. Key advantages include remote control, affordability, and 79% positive user feedback, though it is limited to small pets, restricting its applicability.

15. The paper "Automatic Pet Feeder Using Internet of Things" by Jayaram Kumar Kondapalli et al. presents an IoT-based feeder that automates feeding and watering using a NODEMCU microcontroller and Blynk app. Benefits include remote control and consistent management of food and water. However, it relies on continuous internet connectivity, and app disruptions may affect feeding.

16. The paper "Smart Pet Feeder" by Soumallya Koley et al. presents an automated feeder that allows pet owners to set feeding times and portions using an ATMEGA32 microcontroller. It features a load cell for accurate food dispensing and a float sensor for water refilling. While it offers adjustable portions and low power consumption, it requires continuous power and needs securing from pets.

17. The paper "Design and Implement of IoT-Based Pet Food Feeder Robot" by D.L.S.T. Jayarathne et al. presents an IoT pet feeder for remote monitoring and control, featuring an ESP-32 CAM for video, ultrasonic sensors for food levels, and a servo motor for dispensing via a web app. It enables real-time feeding but relies on internet connectivity and may face setup challenges.

18. The paper "Internet of Things based Pet Feeder Automation using Raspberry Pi" by Adetokunbo A. Adenowo et al. presents an IoT pet feeder that automates feeding for busy owners using a Raspberry Pi, a stepper motor for dispensing, and a camera for real-time monitoring via a secure web app. However, it relies on stable network connectivity and has potential security concerns.

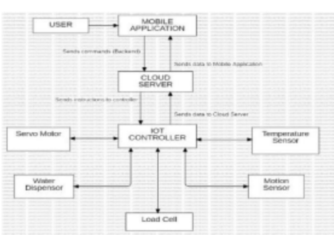
19. The paper "IOT based Pet Feeder" by Raed Abdulla et al. introduces an automated IoT pet feeder for busy owners. It uses a load cell and ultrasonic sensor to monitor the pet's weight and food levels, allowing personalized feeding through a mobile app. While it simplifies feeding and enables remote monitoring, it relies on stable internet and power, with possible setup complexity and calibration issues.

20. The paper "Automatic Pet Feeder" by Masum Rayhan introduces an Arduino-based feeder for busy pet owners, using a servo motor and real-time clock for scheduled dispensing. While cost-effective and simple, with a plastic bottle and LCD for interaction, it lacks real-time monitoring and remote access.

3. Proposed System:

The IoT-Based Connected Pet Companion project is an automated pet care solution that enhances convenience for pet owners and ensures pet well-being. It includes a mobile-controlled food and water dispenser, utilizing a Raspberry Pi or Arduino for operating a servo motor and water pump. Load cells monitor food levels, while a motion sensor detects the pet's presence. A collar-mounted temperature sensor sends health alerts to the owner's device. The system allows real-time monitoring through a camera feed, ensuring pets receive timely care even when owners are away.

3.1 System Architecture



1. **User (Pet Owner):**

The pet owner interacts with the system through a mobile application. This app allows them to manage the pet's feeding schedule, observe the pet's activities, and receive real-time notifications regarding the system's performance.

2. **Mobile Application:**

This serves as the user interface for the pet owner. Through the app, the owner can:

Adjust or set feeding schedules.

Receive alerts for things like low food or water levels, or when the pet is near or away from the feeder. The app sends commands to the cloud server and displays data received from the IoT sensors.

3. **Cloud Server (Backend):**

The cloud server facilitates communication between the mobile app and the IoT controller. It stores important data, such as feeding schedules and sensor readings, and processes commands sent by the mobile app before forwarding them to the IoT controller.

Data storage: Maintains feeding schedules and sensor data (e.g., food levels, activity tracking, temperature).

Command processing: Receives instructions from the mobile app and sends them to the IoT controller to activate specific hardware components.

4. **IoT Controller:**

This device serves as the system's central hub, controlling all hardware components based on the instructions it receives from the cloud server.

Command execution: The controller receives instructions from the cloud server and manages the connected hardware components to ensure they operate correctly in real-time.

5. **Servo Motor:**

The servo motor is tasked with releasing food into the pet's bowl. When the controller sends the command, the motor rotates, dispensing the appropriate amount of food as per the set schedule.

6. **Water Dispenser:**

The water dispenser refills the water bowl when the system detects low levels. The IoT controller manages this component to ensure a continuous supply of fresh water for the pet.

7. **Motion Sensor:**

The motion sensor detects when the pet is near the feeding area. This can trigger various actions, such as activating lights, enabling the camera for monitoring, or sending a notification to the owner about the pet's proximity to the feeder.

8. **Temperature Sensor:**

This sensor tracks the pet's body temperature. If abnormal readings are detected, such as excessively high or low temperatures, the system sends an alert to the pet owner via the mobile app, helping to monitor the pet's health.

9. **Load Cell:**

The load cell measures the amount of food left in the feeder. It transmits this data to the cloud, where the system can notify the pet owner when food levels are low, ensuring that the feeder is refilled as needed.

3.2 Functions involved:

Automated Food and Water Dispenser

The automated dispenser controls the pet's food and water intake, allowing for scheduled meal releases even when the owner is away. A mobile app enables remote control of feeding schedules, manual food dispensing, and monitoring of food levels. A built-in weight sensor ensures accurate portion sizes, preventing overfeeding or underfeeding and promoting a healthy diet to avoid obesity or malnutrition.

Mobile Application for Control and Monitoring

The mobile application serves as the control hub, allowing pet owners to remotely manage the system, including scheduling feeding times, monitoring activity, and receiving alerts. It provides real-time data on feeding habits, body temperature, and proximity to the feeder, along with notifications for critical events like high temperatures or low food levels. These features enhance the owner's ability to monitor and respond to their pet's needs while away from home.

Motion-Activated Lighting

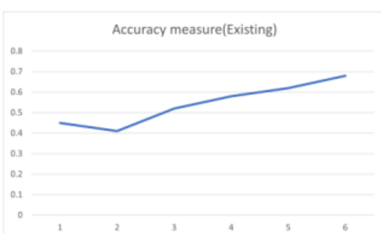
A unique feature of the system is the motion-activated lighting near the food dispenser. The pet's collar contains a motion sensor that detects when the pet approaches the feeding area, automatically illuminating the dispenser for visibility in low-light conditions. This assists the pet in locating food and allows the owner to monitor the pet's behavior, enhancing safety and usability.

Temperature Monitoring and Alerts

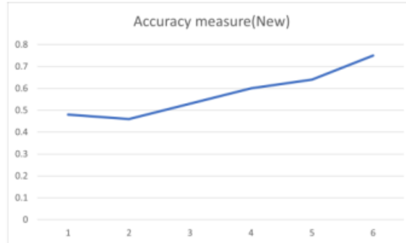
Health monitoring is crucial in pet care. This system features a temperature sensor in the pet's collar that continuously tracks body temperature. If the temperature exceeds a predefined threshold, indicating potential health concerns, an alert is sent to the owner's mobile app. This early warning system allows for prompt detection of health issues, enabling timely veterinary intervention. Temperature monitoring is particularly valuable for pets prone to illness or with existing conditions, ensuring improved health outcomes through immediate alerts.

3.3 IMPLEMENTAION:

Our enhanced food dispenser includes a weight sensor to monitor the amount of food already in the bowl. The system dispenses food when the pet approaches or upon manual activation, ensuring proper portion control based on real-time data. This prevents overfeeding and promotes a healthier diet for the pet. Additionally, the system adapts to the pet's eating habits, providing more precise and customized feeding schedules. Compared to the existing system, which follows a timed dispensing model without monitoring the bowl's content, our system offers improved accuracy and efficiency. The accompanying graphs illustrate the food and water dispensing accuracy for both systems, emphasizing the enhanced feedback loop in our design.



3.3.1 Food dispenser Accuracy graph(Existing)



3.3.2 Food dispense Accuracy graph (New)

4. CONCLUSION:

The IoT-Based Connected Pet Companion project enhances automated pet care by integrating an automatic food and water dispenser, real-time monitoring, and health tracking, ensuring timely care for pets even when owners are away. Through a user-friendly mobile app, owners can set feeding schedules, manage portions, and receive health alerts, while added sensors and camera modules provide peace of mind with real-time pet observation. Overall, the project improves pet health and reduces the stress of pet ownership, fostering a stronger bond between pets and their owners, with future enhancements potentially including AI-driven behavioral analysis and expanded remote interaction.

5. References :

- Adetokunbo A. Adenowo, Jonathan C. Anyi, James A. Akobada. (2022). Internet of Things based Pet Feeder Automation using Raspberry Pi. Godavari Institute of Engineering and Technology, India.

- Madhu R, Addula Swetha, Sanjana Dharmavar, Tejashwini V J, Vidhya Shree N. (202[illegible] Smart Pet Monitoring and Feeder using IoT. International Journal of Advanced Research in Science, Communication and Technology, 3(7), 1-10.

- Helmi Che Hasni, Suhazlan Suhaimi. (2022). Pet Feeding System. International Journal of Recent Technology and Applied Science.

- Soroush Sedigh. (2016). Design and Build of an Automated Animal Feed Dispenser. BioResource and Agricultural Engineering Department, California Polytechnic State University.

- D.L.S.T. Jayarathne, H.K.A. Jayasinghe, H.M.R.G. Herath. (2022). Design And Implement of IoT-Based Pet Food Feeder Robot.

- Raed Abdulla, Ahmed Abdlekader Eldebani, Sathish Kumar Selvaperumal, Maythem K. Abbas. (Year). IOT based Pet Feeder.

- Jayaram Kumar Kondapalli, Venkata Ramana Sanepu, Balakrishna Satyam Kothapalli, Shankar Pattabhi Ram Peketi, Venkata Dattu Naveen Kukatla. (2022). Automatic Pet Feeder Using Internet of Things.

- Wen-Tsai Sung, Sung-Jung Hsiao. (2022). Home Monitoring of Pets Based on AIoT. Computer Systems Science & Engineering, 43(1), 1-10.

- Masum Rayhan. (Year). Automatic Pet Feeder.
Sanjay S Tippannavar, Raghavendra G, Rishab Jain, Prasanna Golasangi. (Year). SPF: Smart Pet Feeder using IoT for Day-to-Day Usage.

- Sourav Mandal, Biswajit Mukherjee, Supriya Ghosh, Indranil Mukherjee. (2022). IoT-Based Pet Feeder: A Novel Approach for Pet Care. Journal of Electronics, 1-12.

- Jiten Kulaikar, Dhanshree Kurade, Anamika Sawant, Pooja Sthawarmath, Anupama Chaurasia. (2023). Automatic Pet Feeder Using Internet of Things. International Journal of Modern Developments in Engineering and Science, 2(4), 1-12.

- S. Vinodh Kumar, P. Kumar, K. Ramya Bharathi and M. Riddhiya, "AYAN: IoT-based Interactive Robot," 2024 3rd International Conference on Applied Artificial Intelligence and Computing (ICAAIC), Salem, India, 2024, pp. 1749-1754,doi:10.1109/ICAAIC60222.2024.10575269.

- Kumar, P., Kumar, S.V. (2023). Precise and Accurate Farming Framework Utilizing IoT. In: Joshi, A., Mahmud, M., Ragel, R.G. (eds) Information and Communication Technology for Competitive Strategies (ICTCS 2022). ICTCS 2022. Lecture Notes in Networks and Systems, vol 623. pp 293-301, Springer, Singapore.

FINAL PAPER.docx

ORIGINALITY REPORT

15%	13%	7%	11%
SIMILARITY INDEX	INTERNET SOURCES	PUBLICATIONS	STUDENT PAPERS

PRIMARY SOURCES

1	link.springer.com Internet Source	1%
2	Submitted to De La Salle University Student Paper	1%
3	journal.ijmdes.com Internet Source	1%
4	www.ijeat.org Internet Source	1%
5	lamintang.org Internet Source	1%
6	Minal Ghute, Shreyas Deshpande, Abhishek Sondavle, Swaraj Bhalerao, Mayur Deshmukh. "IoT Based Pet Day-Care Robot", 2022 6th International Conference on Electronics, Communication and Aerospace Technology, 2022 Publication	1%
7	Submitted to Pathfinder Enterprises Student Paper	1%

8	Submitted to University of Central Florida Student Paper	1 %
9	Wen-Tsai Sung, Sung-Jung Hsiao. "Home Monitoring of Pets Based on AIoT", Computer Systems Science and Engineering, 2022 Publication	1 %
10	kahedu.edu.in Internet Source	1 %
11	Submitted to Middle East College of Information Technology Student Paper	1 %
12	Submitted to Universiti Teknikal Malaysia Melaka Student Paper	1 %
13	ir.kdu.ac.lk Internet Source	1 %
14	Submitted to University of Illinois at Urbana-Champaign Student Paper	1 %
15	Submitted to CSU, San Jose State University Student Paper	<1 %
16	network.bepress.com Internet Source	<1 %
17	repository.unhas.ac.id Internet Source	<1 %

18	www.coursehero.com Internet Source	<1 %
19	digitalcommons.calpoly.edu Internet Source	<1 %
20	www.pvpsit.ac.in Internet Source	<1 %
21	www.jazindia.com Internet Source	<1 %
22	www.jetir.org Internet Source	<1 %
23	iesce.info Internet Source	<1 %
24	Yixing Chen, Maher Elshakankiri. "Implementation of an IoT based Pet Care System", 2020 Fifth International Conference on Fog and Mobile Edge Computing (FMEC), 2020 Publication	<1 %

Exclude quotes	Off	Exclude matches	Off
Exclude bibliography	Off		