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IOT-BASED SENSOR-CONTROLLED PET FEEDER WITH MEALTIME TRACKING AND ACTIVITY NOTIFICATION APPLICATION

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Abstract:

Due to the absence of a cohesive and user-friendly system, pet feeding solutions often suffer from irregular feeding schedules, limited health tracking, and poorly integrated technologies. To enhance feeding management and general pet well-being, a comprehensive automated solution with a monitoring system is required. Thus, this study presents the design and simulation of an automated pet feeding and monitoring system optimised through the integration of intelligent sensors, actuator control, and IoT-based data management. The system is powered by an ESP32 microcontroller that supports Wi-Fi for seamless data interchange and remote control. The system uses an ultrasonic sensor to measure water levels, a load cell and HX711 amplifier accurately quantifies food, and a PIR sensor detects pet presence near the feeding station. To enhance monitoring, a camera module provides live video streaming, offering remote users improved situational awareness. The ESP32 is the main processing unit, which would interpret sensor data and activate core actuators in the case of a servo motor to disperse food on command, water to refresh it, and a buzzer to alert users when food or water levels are low. The LCD shows important data like food amount, water content, detection of pets and a schedule of approaching the next feeding period. One-minute syncing between sensor data and a cloud platform makes it easy to monitor and remotely control by using

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IoT applications. The results indicate that the system is capable of improving feeding accuracy, routine compliance, and promoting pet health through the availability of food and water regularly. By combining real-time monitoring with automated control, the system delivers a reliable, forward-looking solution ideal for smart-home and pet-care contexts. Future improvements may explore adaptive feeding strategies, energy saving techniques and machine learning for forecasting pet behaviour.

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Keyword:
Internet of Thing (IoT), Pet Feeder

Introduction

The professional requirements, travel and busy settings are some of the reasons why modern pet owners are unable to keep regular feeding schedules. These feeding schedules may compromise the risk of nutritional deficiency, behavioural disorders, and stress in pets because it does not monitor live. This leads to the increased demand for smart, automated pet care, allowing the dog to be fed on time, portions to be measured properly, and to be continuously monitored without human supervision. Using the Internet of Things (IoT) technology, feeder functionality can be improved by providing remote monitoring and controlling and satisfactorily mitigating the weaknesses (Vedhashree et al., 2025; Majid et al., 2023; Kotwal et al., 2025). Introduction of Internet of Things (IoT) into pet care has inspired the creation of automated pet feeders with real-time monitoring capabilities, data-driven insights, and remote-control functionalities, especially in pet care (Sujatha et al., 2024; Neelavani et al., 2024; Castillo et al., 2024; Alam et al., 2023). The systems provide an alternative solution to contemporary pet owners who may have difficulties with regular feeding regimes. The main benefits of automated pet feeders are to offer regular feeding schedules, reduce human interactions, and enhance the health and welfare of pets. The IoT-based automated pet feeding system incorporates the use of microcontrollers and sensors to gather and transfer real-time data via a cloud-based application, and integration with automated feeding routines enhances the health condition of pets.

Literature Review

Most of the studies have shown that the IoT-based pet feeding systems could be a promising solution to controlled and reliable long-term pet feeding (Sujatha et al., 2024; Neelavani et al., 2024; Castillo et al., 2024; Alam et al.,2023). The key features and components of these IoT-based pet feeding systems can be classified into hardware and sensor modules, automated control mechanisms, mealtime tracking and behaviour monitoring, notification system and user

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interface (Bembde et al., 2023; Abisha et al., 2024; Zainuddin et al., 2024; Parthasarathi et al., 2025). These recent studies have shown that the automated pet feeder offers several advantageous features include precise portion control using sensor fusion and remote monitoring. Such functions help to enhance the overall health of pets in the long term by avoiding food waste, overeating and obesity. Additionally, this intelligent feeding system promotes automatic feeding, fewer human interactions, and better health and welfare of pets. Sujatha et al. (2024) introduced an IoT-driven feeding solution that enables meal dispensing and remote access capabilities. The system incorporates the traditional IoT operation modules with the creation of a simple operational structure in the form of infrared, ultrasonic, and float sensors to monitor the food and water levels. To deliver the notifications, a GSM module is used, and to dispense, a servo-actuated mechanism is used. The system employs comprehensive sensing elements, yet is an event-driven, rather than a behaviour-driven system. It cannot confirm actual food consumption after dispensing, is not analytical in the analysis of eating behaviours, or save sensor data to the cloud or records. Wan Azhar et al. (2025) also hypothesised a broad design of an IoT-based feeding system with a series of sensors to enable reliable food dispensing and basic monitoring capabilities. The dispensing of food and IoT connectivity are controlled by servo motors, and the system is programmed to schedule at a distance and monitor the status remotely in real time. It has a mainly hardware-based architecture with a focus on operational reliability and sensor-based automation. Nonetheless, data analytics, user experience measurements, and user-centred performance metrics are not mentioned in this study. In addition, the absence of load sensors for weight measurement prevents verification of actual food consumption and limits the detection of irregular feeding patterns. Chen and Li (2025) introduced a feeder based on a microcontroller platform, which is developed to release portions automatically on an integrated embedded control logic. The design primarily uses hardware-level scheduling combined with simple sensing components and predefined timing sequences. Although the design supports essential automated dispensing, it lacks integration of sensing technologies. Moreover, it does not incorporate IoT connectivity, cross-sensor validation, or sustained monitoring of feeding patterns. Thus, it can only be used as a reference model for a feeder system. Ahmad et al. (2025) have integrated various pet-care components, including feeding stations, water dispensers, and environmental sensors within a single IoT-enabled system. This design combines ESP32 modules, a load cell sensor to measure portions precisely and RF-based tracking to monitor and remotely manage and visualise. The method lays emphasis on real-time monitoring and usability. Nevertheless, adaptive notifications and data-driven decision-support in the system were not considered in the design. Mutiara et al. (2025) showed a sensor-fusion IoT system of livestock, which works towards enhancing weight measurement, feed monitoring, and environmental monitoring. The system combines an ESP32 microcontroller with RFID technology for animal identification, load cells for weight monitoring, environmental sensors, and a filter to reduce noise in sensor readings. Although the methodology is technically advanced, the system is designed for livestock environments, which are not suitable for household pet applications. The system has limited capabilities for tracking the functions, and it does not encourage automated food dispensing or behaviour analysis. In addition, it lacks a user-oriented interface and real-time behaviour-based notifications for pet owners. Based on existing studies, most systems automate feeding using sensors and scheduling, but do not evaluate actual consumption or pet behaviour. Moreover, they lack comprehensive mealtime tracking and behavioural analysis. Therefore, there is a need to develop a feeding system that adjusts automation according to the actual consumption of pet behaviour and is equipped with mealtime analysis.

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Methodology

In Figure 1, the flowchart is systematically displayed in a diagram with an elaboration of the significant stages involved in the development of the automated pet feeder project. It starts with ideation and planning, where system objectives and design specifications are established. This phase is centred on the concept development, system architecture planning and requirement analysis. This was followed by testing the functionality to test the idea of the proposed design system. At this stage, software and hardware modules are tested in advance in order to confirm the feasibility before integration into a full system. The next phase, hardware design, involves circuit design, choice of components, sensor design, actuator design, and mechanical structure design. The workflow then continued to assemble final prototype. This stage encompasses hardware assembly, firmware deployment, software integration, and comprehensive system-level testing to produce a fully operational prototype ready for evaluation.

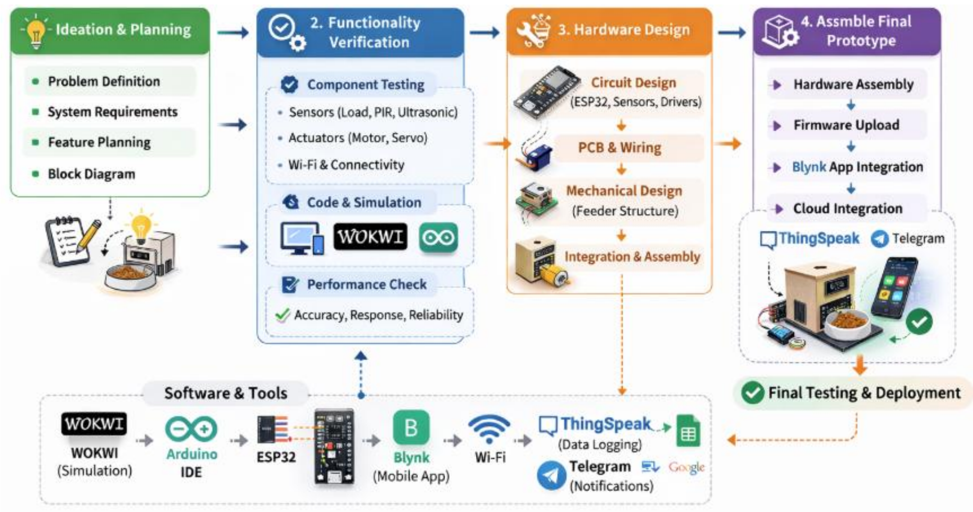

Figure 1: Flowchart Of Project Management

The automated pet dispensing system is divided into two major parts, namely software implementation and hardware implementation. The system is built around an ESP32 microcontroller, which functions as the primary processing and communication unit. This microcontroller has been chosen because of its built-in Wi-Fi features, which will allow communication between the cloud services, feeder, and user interface to proceed seamlessly. It is made of a dual-core architecture, and sufficient memory capacity allows concurrent sensor processing, actuator control, and real-time data transmission, making it suitable for IoT-based applications. Multiple sensors are integrated into the system to ensure accurate feeding control and activity monitoring, as shown in Figure 2. The input elements consist of a load cell, an ultrasonic sensor, a PIR sensor, camera. In the meantime, the output components include an LCD display, LEDs, a buzzer, a servo motor, and software (Blynk, ThingSpeak, and Telegram) to get notifications in real time and visualise data. The ultrasonic sensor is used to measure the distance separating the device and the surface or bowl containing the food so that the system can determine the food content, the level of fill in a bowl and whether a refill is required or not. The load cell, combined with the HX711 amplifier, offers accurate readings of food weight, which makes the portion dispensing accurate enough and allows for monitoring feeding habits over a long period of time. A PIR sensor is used to detect motion around the feeder to ensure that the pet is present during the feeding process. In the meantime, the camera module provides visual surveillance for event tracking, validation, and remote viewing with the help of the IoT interface. The ESP32 processes sensor data and is used to execute the programmed control logic to drive three main actuators: a water pump, a buzzer and a servo motor. The dispensing unit is controlled by the servo motor to ensure the quantity of dry food to be dispensed according to the portion sizes programmed in it. There is also automatic water dispensing, which are controlled by a water pump to keep the water flowing.

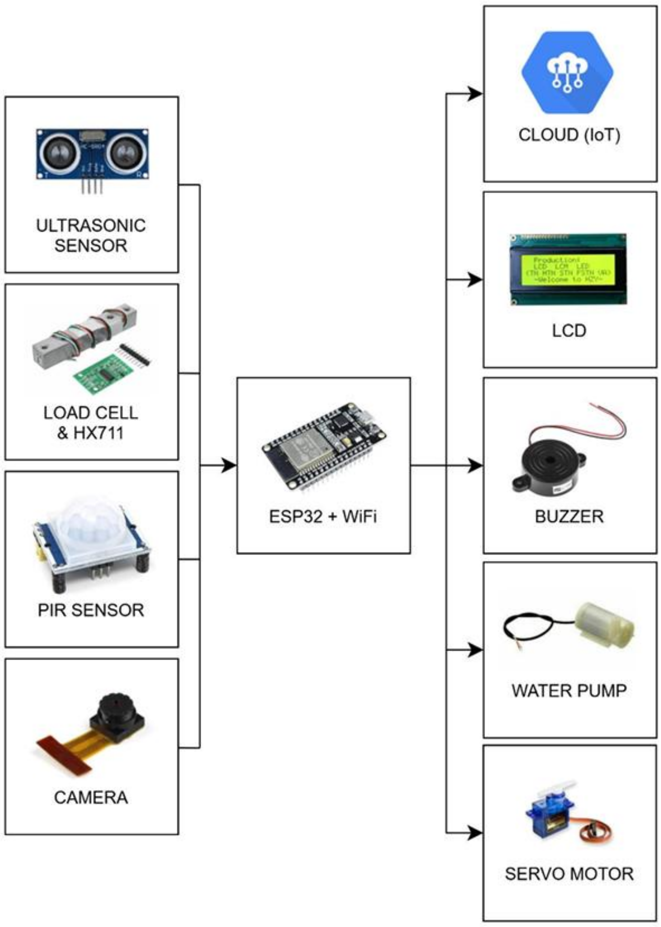

Figure 2: Block Diagram of The Automated Pet Feeder System

The LCD updates operational data of the system include bowl status, portion weight, and feeding history which can be conveniently monitored locally. At the same time, the ESP32 transfers this information to the cloud through Wi-Fi, enabling system supervision and remote access. The system uses the Blynk IoT to support the manual dispensing, schedule customisation, sensor data tracking and real-time mobile notification. Additionally, ThingSpeak, Telegram and Blynk are used for cloud-based data logging and visualisation to support long-term performance and behavioural analysis. Overall, the proposed methodology integrates multi-sensor feedback, embedded processing, and cloud connectivity to deliver a reliable and user-friendly feeding system that enhances monitoring of pet nutrition and behaviour as shown in Figure 3.

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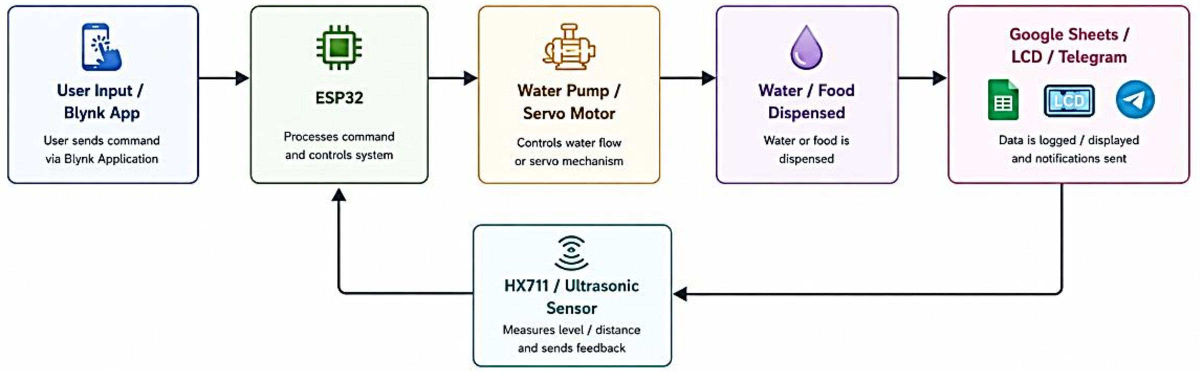

Figure 3: Operating System Of the Automated Feeder

Figure 4 depicts the functional workflow of the automatic control system designed to manage and maintain food and water levels within the pet feeder system. The process begins with system initialisation, subsequently, an ESP32 continuously monitors water level and food weight. The initial decision phase will establish the water level at least 9 cm. To ensure that this is met, a confirmation message regarding all things going well is communicated to the IoT platform and LCD display. However, below the water level of 9 cm, the system builds up a delay of 2 minutes before the weight of the food is measured. This delay will minimise unwarranted or over-actuation. After taking the delay, the system will be contacted to determine whether there is an increase in the weight of food to the desired weight of 12 grams. Once the measured weight is or surpasses this limit, the process ceases. Otherwise, notification is relayed to the IoT platform and LCD to notify the user. The servo would then be turned on to release more food, and the system would reassess the weight until it reaches the 12-gram mark. Equally, when the water level is low, the water pump is switched on. Constant water monitoring: This is done by filling up until the water level reaches 9 cm, at which point a stop is made.

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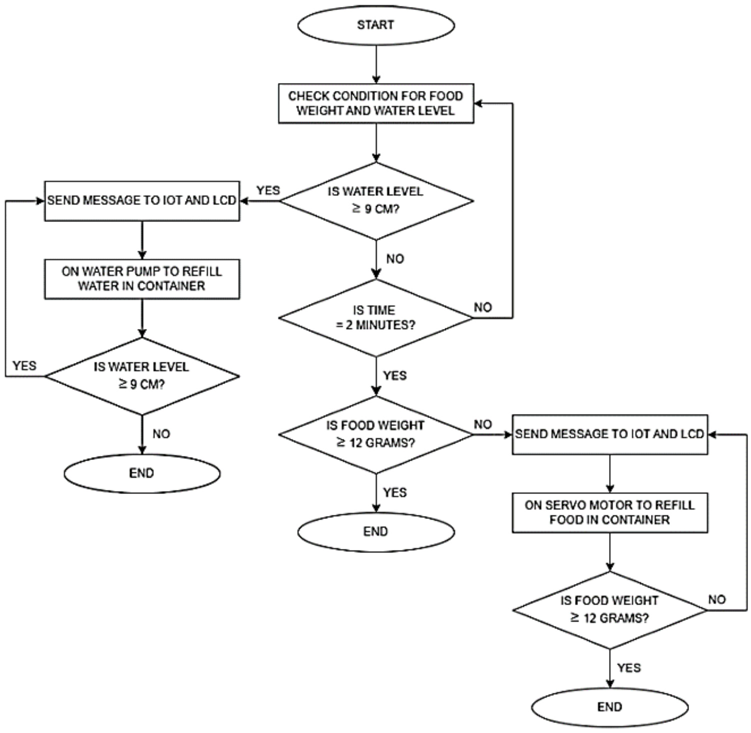

Figure 4: The Flowchart of The Automated Pet Feeder System

When designing an automatic pet feeder system using the IoT, a number of software platforms were used to support simulation, programming, remote monitoring and data management on the cloud, as shown in Figure 5. The initial simulation platform was Wokwi, which allowed performing a virtual simulation of the entire circuit, consisting of the ESP32 microcontroller, ultrasonic sensor, load cell with HX711 amplifier, PIR sensor, servo motor, LCD display, and buzzer. This method enabled the detection of wiring, logic and timing problems early enough without the danger of damaging hardware, which minimised the efficiency of development, and reduced prototyping mistakes. After the circuit design was verified, system programming was performed in an Arduino IDE, the development platform of interest for the ESP32. Libraries were introduced, and sensor calibration procedures and actuator control algorithms were configured. Debugging and deploying to the microcontroller were also done using the Arduino IDE. Telegram was also incorporated in place of remote communication as a telegram bot to deliver real-time communication to the users. Notices about water condition, the food levels, and pet location and refills were sent straight to the mobile phones, allowing the user updated all the time. Meanwhile, ThingSpeak used as the cloud-based data storage and dashboard platform. The sensor information collected by measuring water level, food weight and motion was sent to specific cloud channels to visualise in real time. This enabled long-term evaluation of system performance, feeding behaviour and environmental parameters. Together, these software tools enhanced the accuracy of simulations, made remote supervision possible and made programming simpler, allowing data-driven analysis, thus increasing the interactivity, usability and reliability of the pet feeder system.

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Figure 5: Software Types for Project Development and Data Collection

The entire hardware design comprising the IoT-enabled automatic pet feeder is shown in Figure 6, which is modelled in Proteus. The ESP32 DevKitC is the main controller, which interprets sensor values and sends actuator values. It has an embedded Wi-Fi chip that can be connected to both cloud-based services and internet of Things. Various sensors have been built into the system to ensure proper monitoring of the environment. A PIR module tracks the motion around to verify pet involvement. A distance sensor is an ultrasonic sensor used to measure the distance to get the position of a bowl or the water level. A load cell in combination with an HX711 amplifier is used to monitor food mass, thus maintaining accurate portioning and constantly monitoring food availability. Output devices comprise a servo motor of controlled food release and a relay module of switching high-power elements such as the water pump. It has a buzzer that provides auditory notifications within the system. An I2C-based LCD provides real-time representation of operating data and status messages to eliminate wiring with serial communication. All components are supplied with appropriate power and grounding to maintain stable functionality. This Proteus schematic effectively demonstrates the integrated sensing and actuation framework of the smart feeding system.

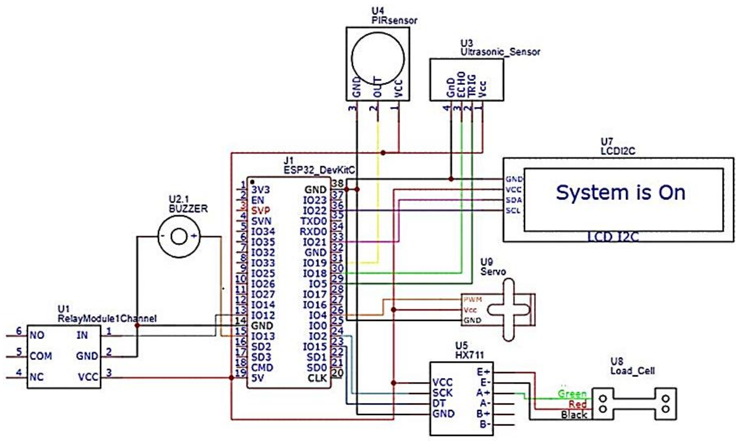

Figure 6: Circuit Diagram for The Automated Pet Feeder System

Result and Discussion

Figure 7 illustrates the various operational states of the automated pet feeder as displayed on the LCD interface during system execution. Figure 7(a) shows that the system is in the food dispensing mode. The LCD also shows real-time status, notifying that the food is in the process of dispensing and also shows sensor parameters like the weight of the food, the level of the water, the time that has elapsed, and the presence of the pet. Meanwhile, Figure 7(b) shows that the process of food dispensing is complete. Figure 7(c) depicts the stage of dispensing water, whereby the system will turn on the water pump to refill the bowl. During this stage, the LCD is used to continually update data on water level, food weight, active period (time spent on dispensing water) and pet presence detection. The state of the system at the end of the water

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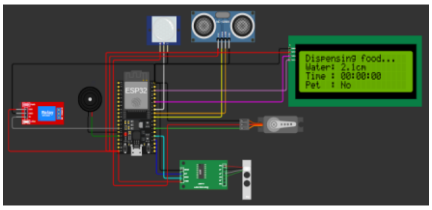
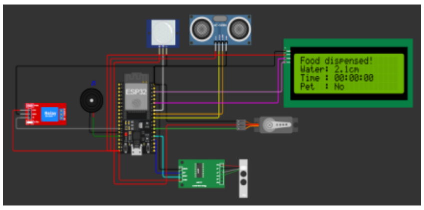
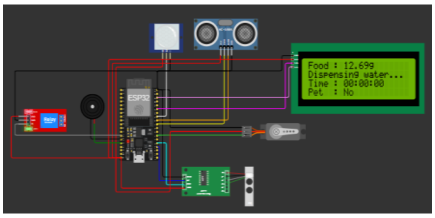
dispensing cycle is shown in Figure 7(d). The LCD shows that the refill process has been successfully performed and displays the new sensor values. The resulting features are the automated switching between the feeding and hydrating procedures, and the LCD interface that makes sure that the communication with the user remains consistent in real-time.



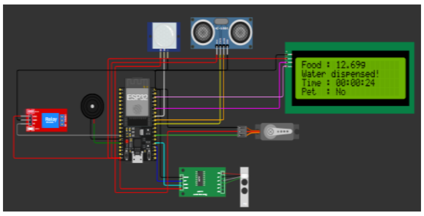
(a)



(b)



(c)



(d)

Figure 7: System Operation of The Automated Pet Feeder During (A) Food Dispensing in Progress, (B) Food Dispensing Completed, (C) Water Dispensing in Progress, And (D) Water Dispensing Completed

Figure 8 presents the LCD status when the PIR sensor detects the pet near the feeder station, confirming its presence during a feeding event. The LCD performs as a real-time monitoring interface, presenting four critical functional indicators include food weight, water level, elapsed time during water dispensing and pet presence status. The weight of food under these conditions is 12.69 g, indicating that the predetermined weight of food was discharged and measured in the load cell sensor. With such an accurate measure, the proportions are easily controlled, and the system can assess whether the correct amount of food was served. The water level is determined to be 1.9 cm, and this is the difference between the sensor and the water surface that the ultrasonic sensor indicated. The 10-second timer is the indicator of active time through which water dispensing takes place, which shows that the system is responsive. The PET: "Yes" status will be a confirmation of motion sensing through the PIR sensor during the feeding process. The findings presented in Figures 7 and 8 will serve as the reference baseline for the development of the final prototype.

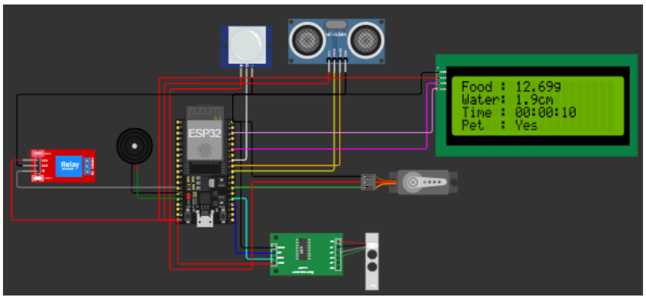


Figure 8: System Operation of The Automated Pet Feeder When the Pet Is Near the Feeder

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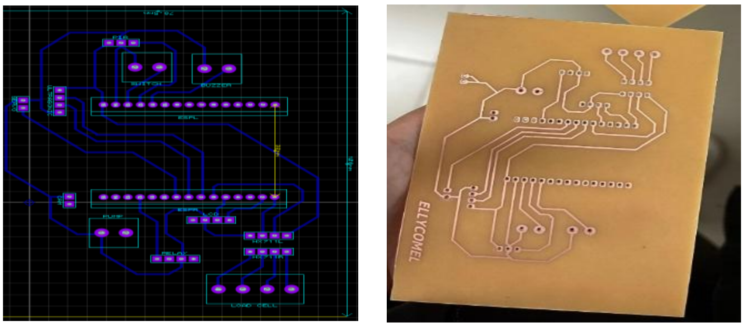
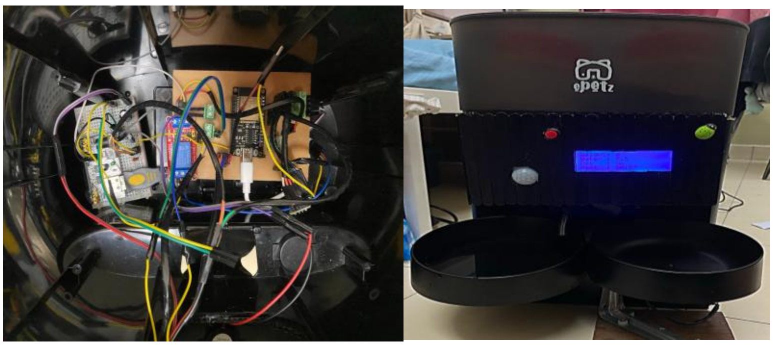
Figure 9(a) illustrates the PCB layout generated using Proteus software based on the circuit design as shown in Figure 6. The component footprints cover headers for the ESP32, buzzer, relay module, ultrasonic sensor, PIR sensor and load cell interface. A routing scheme exhibits a high level of organisation, and there is a logical separation of analogue, digital, and power circuits to minimise the amount of electrical noise and maximise stability. Figure 9(b) shows the PCB after fabrication. The copper tracks are positioned correctly and are in the correct layout that ensures that there is accuracy in the manufacturing process.



(A) (B)

Figure 9: Development Stages of The Automated Pet Feeder Using (A) Proteus Software And (B) Printed Circuit Board (PCB)

The internal design of the feeder is illustrated in Figure 10(a), indicating the systematic arrangement of electronic modules on the enclosure. The core control board is a custom PCB mounted centrally, which houses the connections to the ESP 32, HX711 load cell interface, the relay module, and circuitry supporting them. Meanwhile, Figure 10(b) shows the finalised automated pet feeder prototype. The overall housing is small and ergonomically organized and the inbuilt hardware is enclosed within the housing. The LCD frontal display gives real-time information on the weight of the portion, water level, time of operation and motion sensing. The physical buttons allow control over the system and testing. The two-channel food and water delivery system accommodate the separation of the food and water delivery systems. Together, the prototype indicates a highly accomplished convergence of the structural and electronic design and interaction with users, which confirms the realistic functionality of the system.



(A) (B)

Figure 10: Images Of The (A) Internal Assembly of The Automated Pet Feeder Mounted on A PCB And (B) The Final Prototype with Operational LCD Interface And Dual Dispensing Bowls

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Figure 11 displays the remote-control dashboard implemented within the Blynk IoT environment. The system uses virtual pins (V0 and V1) to manage food and water dispensing operations. Figure 11(a) shows the food switch (V0) turned on, indicating active food dispensing, while the water switch (V1) remains off. Conversely, the image in Figure 11(b) shows the water switch activated and the food switch deactivated. Figure 11(c) indicates that two-gauge widgets positioned below the switches provide real-time measurement values. The weight value of 17 represents measurements of the load cells, and the level of 7 is the ultrasonic sensor reading. This is an interface that allows a user to alternate smoothly between feeding operations with greater flexibility and user-friendliness. Real-time cloud communication guarantees the timely execution of instructions given by the user. This design increases remote operability, strengthens system control, and enhances overall user experience.

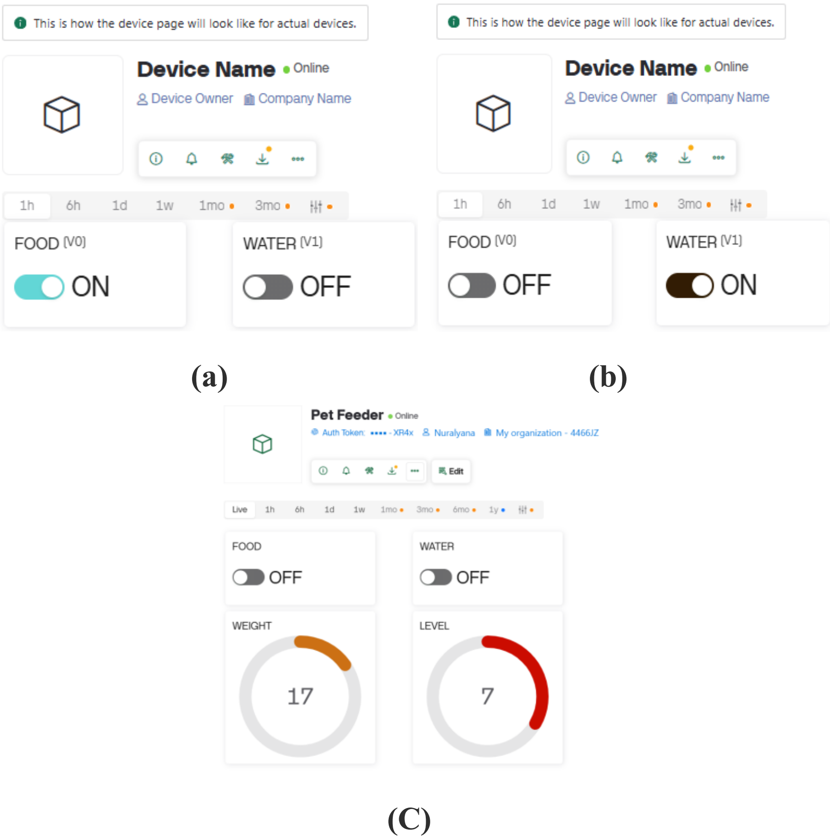

Figure 11: Blynk Application Dashboard For (A) Food Dispensing, (B) Water Dispensing And (C) Widgets for Food and Water Update Status

Figure 12 presents the time-series behaviour of food weight and water level recorded by the ThingSpeak web-based application. In the graph of food weight (Field 1) in Figure 12(a), we can see that two different feeding cycles can be followed over the period of time under observation. The values begin at 0 and sharply increase towards about 17 g at about 5:52 pm, which is an indication of the successful dispensing of food by the automatic feeder. The following gradual decrease is the result of the pet consuming the dispensed food, which reaches almost zero levels in the end. An unchanging level of zero implies that the tray was empty until the system started a second dispensing cycle at about 5:55 pm, and then the weight of food again rose to about 16-17 grams and then reduced slowly. The level soon returns to its baseline level of 2 cm throughout the rest of the observation, with little consumption or change. Overall, the results show that both sensors are highly consistent, able to capture changes in real-time,

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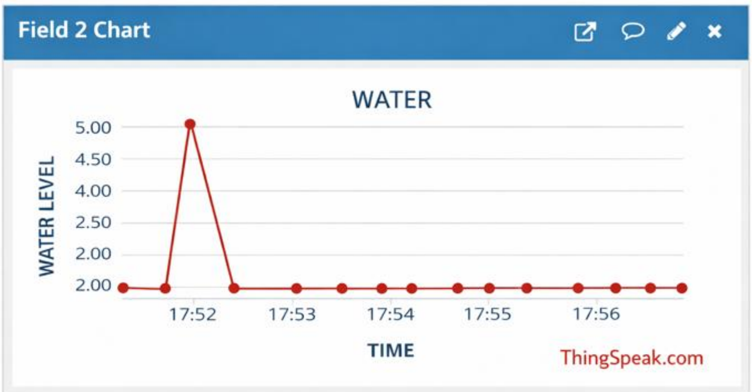
and represent the interaction of the pet with the food and water facilities are indicated in Figure 12(b). When it reaches a peak of about 2.0 cm to 5.0 cm, it is a signal of a refilling event or a disturbance event. The level quickly stabilises at its original value of 2 cm throughout the rest of the observation period, which shows very little consumption or change. Overall, it can be concluded that the results show that the two sensors are highly consistent, capture changes in real-time, and the interaction between the pet and the resources of water and food.

(A)



(B)

Figure 12: Data Collected from Thingspeak Web-Based Application For (A) Food Dispensing And (B) Water Dispensing

As shown in Figure 13, the weight of the food changed for 15 minutes interval, according to the information obtained in a Google Sheet. The food weight is also reduced by the pet initially, from 13 g to 8 g. A noticeable drop at approximately 8:03 suggests a significant feeding event. The weight subsequently increases to about 12.7 g, indicating that the system dispensed additional food. A second decline around 8:07 reflects further consumption. Overall, the pattern confirms that the feeder effectively dispenses food when levels decrease and accurately records real-time weight changes during feeding activity.

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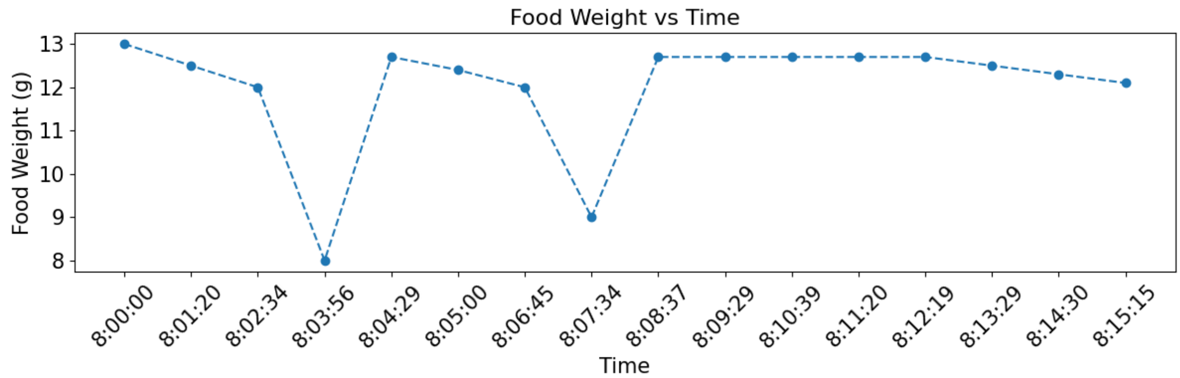

Figure 13: Data For Food Dispensing Record Collected from Google Sheet for 15 Minutes

Using the data from a Google Sheet, the water-level measurements of 15 minutes were taken and depicted in Figure 14. The water level starts at approximately 10.2 cm and gradually decreases as time progresses, indicating regular water consumption by the pet. The presence of small interim declines indicates continuous drinking. The fact that the largest decrease is to about 9.0 cm at around 8:14 suggests that there was a greater consumption episode. When it rhythmically suddenly rose to 10 cm at 8:15, this indicates that the fresh water could be dispensed by the system. Overall, the trend suggests that there is correct sensor functioning and effective automated water replenishment throughout the monitoring time.

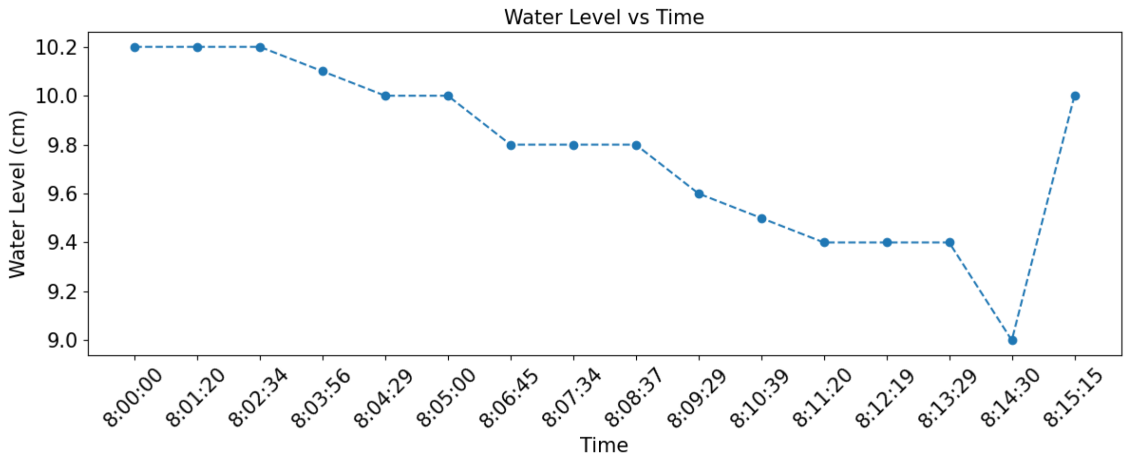

Figure 14: Data For Water Dispensing Record Collected from The Google Sheet for 15 Minutes

The data, which are captured in a Google sheet, are the dispensing state in a 15-minute observation period, as shown by the graph in Figure 15. The binary values "YES" and "NO" are the activation and inactivation of a dispensing mechanism, respectively. There are two events of activation, one at the beginning of monitoring and another approximately at 8:04. These activations coincide with the situation of less food weight that caused the system. The sustained "NO" level thereafter shows no further dispensing activities. The findings confirm the automated control mechanism of the feeder, which is a threshold.

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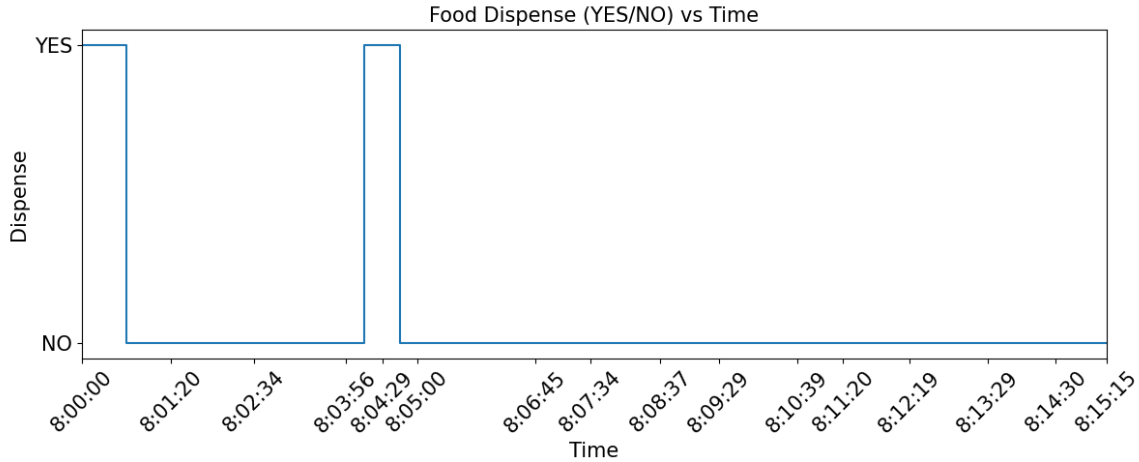

Figure 15: Data For Food Dispensing History Collected from The Google Sheet for 15 Minutes

Figure 16 shows water dispensing status over a 15-minute observation window using data logged in a Google Sheet. The binary indicators "YES" and "NO" refer to the dispensing mechanism being activated and inactivated, respectively. Two activation instances are recorded: one at the onset of monitoring and another at approximately 8:15. The two activations are consistent with threshold-based detection of low water levels. The continuous "NO" of these events indicates that there was little water level change. Altogether, the data confirm the correctness of the level-sensing mechanism and the sensitivity of the automated refill system.

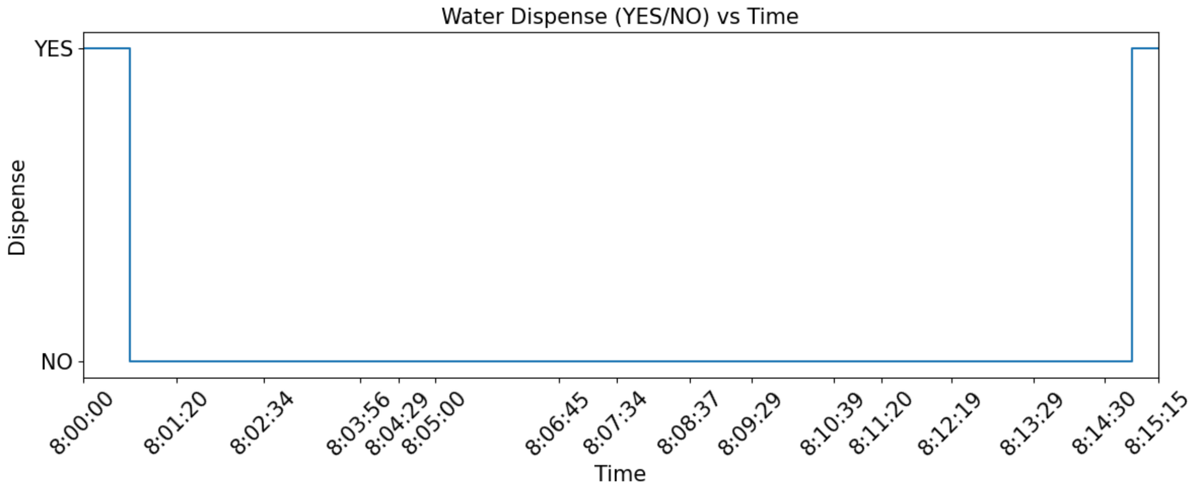

Figure 16: Data For Water Dispensing History Collected from The Google Sheet for 15 Minutes

Figure 17 is the presentation of the images of the detector performance of the camera attached to the IoT-based feeder, where the captured images are sent to the Blynk platform to get remote access. In Figure 17 (a), the pet is observed at a relatively distant position, demonstrating adequate field-of-view and long-range detection capability. In Figure 17(b), the pet is located in close proximity to the feeder, illustrating enhanced image clarity and detail at short range. The variation in positioning verifies the effectiveness of the camera across different spatial conditions. All the findings together prove the reliability of real-time image acquisition and transmission. Meanwhile, Figure 18 shows the Telegram notification received by pet owner, providing updates on cat presence, food weight and water level status.

(A) (B)

Figure 17: Pet Images Captured by The Camera and Sent to The Blynk Application for Remote Monitoring At (A) A Position Far from The Feeder Station And (B) A Position Close to The Feeder Station

Figure 18: Notification Received by Telegram Bot for Cat Presence, Food Weight and Water Level Status

Table 1 compares the proposed system with existing IoT-based pet feeding systems. Although all systems support scheduled feeding, mobile application control and real-time monitoring, the proposed system incorporates the widest range of features, including a food level mealtime tracking, activity notifications, cloud data storage, and camera surveillance. These features improve monitoring efficiency and pet care, making the proposed system a reliable and low-cost solution.

Table 1: A Comparative Analysis of Proposed System and Existing IoT-Based Pet Feeding Systems.

Feature	Proposed System	Dorge et al. (2021)	Zainuddin et al. (2024)	Deepika et al. (2026)
Scheduling feeding (Water and drink)	✓	✓	✓	✓
Food level sensor	✓	✗	✗	✓
Mealtime tracking	✓	✗	✓	✗
Activity notification	✓	✗	✗	✗
Mobile application	✓	✓	✓	✓
Real-time monitoring	✓	✓	✓	✓
Cloud data storage	✓	✗	✗	✗
Camera surveillance	✓	✗	✗	✗
Low-cost implementation	✓	✓	✗	✓

Conclusion

The automated pet feeder system created as part of this project has passed the test of incorporating several sensors, IoT systems, and communicatory modules to offer a solid and smart feeding system to domestic pets. The findings prove that both sensors were realistic and had a valuable input to the decision-making of the system. The ultrasonic sensor was successful in tracking the amount of water, making it easy to detect depletion and to instigate refill measures when necessary. The integrated load cell with the HX711 amplifier was highly responsive to the weight of food, and thus, the system was capable of tracking the consumption pattern and triggering the dispenser accordingly. The PIR sensor was critical in sensing the presence of the cat around the feeding station, so that the images taken were of the real pet action. In addition, the camera module supported a good visual indication of feeding behaviour, especially when combined with the IoT notification framework. One of the main successes of this project is the effective deployment of various cloud-based systems to monitor and log data, as well as communicate with users. The Blynk application allowed visualising food weight, water level and the presence of a pet in real time and allowed convenient remote monitoring. At the same time, Google Sheets were used to facilitate continuous data recording in order to analyse trends and confirm the 15-minute sampling intervals. The telegram notifications were real-time statements on the feeding events, low resource levels and the detection of pets. Besides this, ThingSpeak provided detailed graphical data on food dispensing, water usage and sensor data, which provided more information on the daily feeding patterns. Overall, the project has shown that it is a strong and operating automated pet feeder that can actively react to the activity of pets and the level of resources. The system is able to handle both the feeding and early fault detection through the incorporation of sensors with IoT-based platforms and ensure good pet welfare. The results verify that the system is dependable, scalable and applicable as a real-life solution in the smart pet-care setting.

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