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IoT-Based Dog Daycare Robot for Automated Pet Feeding System

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Abstract- This paper explains the design and development of an IoT-based dog daycare robot that can automatically provide food and water to pets. The proposed system uses a Raspberry Pi Zero as the main controller, which connects to the internet and allows users to control the system remotely using a mobile application or web interface. A servo motor is used to dispense a fixed quantity of food, ensuring proper portion control. A relay-controlled submersible pump is used to supply water when required. In automatic mode, feeding can be scheduled at fixed times. It shows how IoT technology can be used to solve real-life problems and improve pet care.

Keywords- IoT, Raspberry Pi, Pet Feeding System, Automation, Servo Motor, Smart System, Remote Control.

I. INTRODUCTION

Pets are an important part of many families, and they need proper care to stay healthy and active. Feeding pets at the right time and providing clean drinking water are basic but essential responsibilities. However, due to busy daily schedules, many pet owners are not always available at home.
Traditional feeding methods depend completely on human presence. If the owner is late or away, pets may miss their meals. This can lead to health problems and stress for both pets and owners.

With the growth of Internet of Things (IoT) technology, it is now possible to control devices remotely using smartphones or computers. IoT allows devices to connect to the internet and communicate with users in real time.
This paper presents an IoT-based automated feeding system that helps pet owners take care of their pets even when they are not physically present. The system ensures that pets receive food and water on time, improving their overall well-being.

II. LITERATURE SURVEY

Several researchers have developed automated pet feeding systems using IoT technology to improve pet care. Early systems were based on timers and provided food at fixed intervals, but they lacked remote control and flexibility.

Recent studies have introduced IoT-enabled pet feeders that allow users to monitor and control feeding through mobile applications. Some systems use Raspberry Pi or microcontrollers to automate food dispensing and provide real-time access. Advanced solutions also include cameras, sensors, and artificial intelligence for monitoring pet behavior and feeding patterns.

However, many existing systems focus only on food dispensing and do not provide automatic water supply. Some advanced systems are expensive and complex to implement. To overcome these limitations, the proposed IoT-Based Dog Daycare Robot provides both food and water automatically using a Raspberry Pi Zero, servo motor, and water pump while maintaining low cost and ease of use.

Research Gap:

- Most systems provide only food dispensing.
- Limited water management features.
- High cost of advanced smart feeders.
- Complex installation and maintenance.

The proposed system addresses these issues by offering an affordable, user-friendly, and complete pet feeding solution with remote monitoring and control.

III. PROBLEM STATEMENT

Existing pet feeding methods have several drawbacks that make them unsuitable for modern lifestyles.
Manual feeding requires the owner to be present at home, which is not always possible. Timer-based systems provide

some automation, but they only work at fixed times and do not allow real-time changes. If the schedule needs to be changed, it becomes difficult.

Many available systems also focus only on food and ignore water supply, which is equally important for pets. In addition, smart feeding systems available in the market are often expensive and complicated to use, making them inaccessible for many users.

Because of these issues, there is a need for a system that is simple, affordable, flexible, and capable of providing both food and water with remote control.

IV. PROPOSED SYSTEM

The proposed system is a smart IoT-based dog daycare robot designed to automate pet feeding and watering.

The system uses a Raspberry Pi Zero as the central controller. It connects to the internet and receives commands from the user through a mobile application or web interface.

A servo motor is used to control the food container. It rotates at a specific angle to release a fixed amount of food into the bowl. This helps maintain proper portion control and prevents overfeeding.

A relay module is used to control a submersible water pump. The relay acts as a switch, allowing the Raspberry Pi to safely turn the pump ON and OFF. The pump supplies water from a container to the pet's bowl.

Key Features:

- Remote control from anywhere using internet
- Automatic feeding based on schedule
- Manual control for instant feeding
- Combined food and water system
- Simple and user-friendly design

This system is designed to be practical, efficient, and suitable for everyday use.

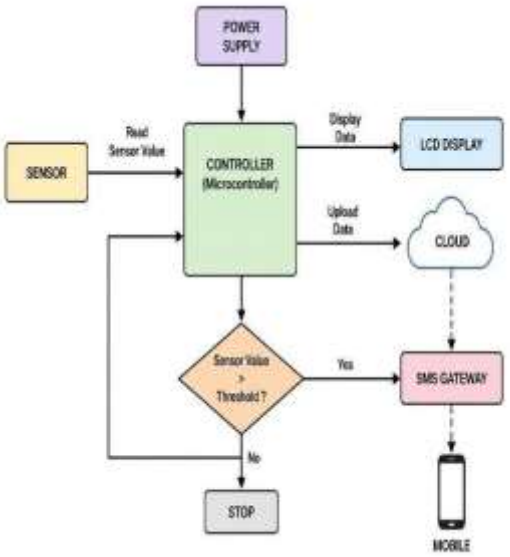
V. SYSTEM DESIGN AND WORKING

System Architecture

The system is divided into three main parts: input, processing, and output

- Input: User commands from mobile app or web interface
- Processing: Raspberry Pi processes the commands
- Output: Servo motor and water pump perform actions

All components are connected through internet and hardware interfaces to ensure smooth operation.



Working Principle

The working of the system is simple and efficient.

First, the system connects to the internet and stays ready to receive commands. The user sends a command using a mobile app or web interface.

The Raspberry Pi receives the command and processes it. If the command is to feed food, the servo motor rotates and releases a fixed amount of food into the bowl.

If the command is to provide water, the relay module is activated, which turns on the water pump. The pump then supplies water to the bowl.

After completing the action, the system returns to standby mode and waits for the next command.

Modes of Operation

The system works in two modes

Manual Mode:
In this mode, the user directly controls the system. Food or water can be provided at any time using the mobile app.

Automatic Mode:
In this mode, feeding is scheduled at fixed times. The system automatically provides food and water without user intervention.

VI. HARDWARE DESCRIPTION

Raspberry Pi Zero
The Raspberry Pi Zero is the main controller of the system. It receives commands, processes them, and controls all connected components. It acts as the brain of the system.

Servo Motor
The servo motor controls the food dispensing mechanism. It rotates at a specific angle to release a fixed quantity of food. This ensures accurate and controlled feeding.

Relay Module
The relay module acts as an electronic switch. It allows the Raspberry Pi to control high-power devices like the water pump safely. It also protects the system from electrical damage.

Water Pump
The submersible water pump is used to supply water to the pet. It draws water from a container and delivers it into the bowl when activated.

Power Supply
The power supply provides stable electricity to all components. Proper power management ensures smooth and safe operation of the system.

VII. ADVANTAGES

This system provides many benefits for pet owners.
It saves time and effort by automating the feeding process. Users can control the system remotely, which is very helpful during travel or busy schedules.

The automatic feeding feature ensures pets receive food on time. The system also provides both food and water, making it a complete solution.

It is cost-effective compared to other smart systems and is easy to use, even for beginners. The system is reliable and works efficiently with minimal human involvement.

VIII. APPLICATIONS

This system can be used in many real-life situations.
It is useful for pet owners at home who are not always available.
It can be used in pet daycare centers to manage feeding of multiple animals.

Animal shelters can use it to ensure all animals are fed properly.
Veterinary clinics can use it for animals under care.
It can also be integrated into smart home systems, adding automation and convenience.

IX. CONCLUSION

The IoT-based dog daycare robot is an effective and practical solution for automatic pet feeding. It successfully combines hardware and software to create a smart system that ensures proper pet care.

The system is affordable, easy to use, and reliable. It reduces human effort and ensures pets are fed on time. This project also shows how IoT technology can be applied to solve everyday problems.

Overall, the system meets all objectives and provides a useful solution for modern pet owners.

Future Scope
The system can be improved in several ways in the future.
A camera can be added for live monitoring of pets. Sensors can be used to detect food and water levels.

A dedicated mobile application can improve user experience. Voice control can be added for hands-free operation.
Artificial intelligence can be used to analyze pet behavior and adjust feeding schedules. A battery backup system can ensure operation during power cuts.

The system can also be expanded to support multiple pets and improved with a compact design.

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