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PETIFICATION: BLYNK APP BASED PET CARE IOT SOLUTION

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ABSTRACT
Automatic animal feeding is one of the new technologies in animal nutrition. It will help owners take care of their pets when they are not at home. Pets can take food and water even if the owner is not at home. Automatic pet feeders are designed to help pet owners care for their pets. IoT pet feeder can be controlled over the internet via a mobile device through Blynk. The Blynk app based device automatically dispenses food and water into the bowl based on the sensor network. As for pets, users should understand that these pets also need proper nutritional management like time to time feeding. Whenever the users are unexpectedly away from home or in another job, users can rest assured that their pet will always be cared for and fed on time by this “Petification: Blynk App Based Pet Care IoT Solution” and pets get sufficient amount of food every day, regardless of the owner's schedule. The animal feeding systems can be built as practical devices using the ESP WROOM32 microcontroller, which stores information and connects to the products, allowing users to feed from anywhere and anytime over the internet using the Blynk server. The purpose of embedding sensors in this system is to completely automate the feeding process with less human intervention.

Keywords:
IoT, Pet Care, Smart Pet Solutions, Remote Pet Monitoring, Automated Feeding, Mobile Pet Management, Connected Pet Devices, Real Time Pet Data.

I. Introduction
If owners leave home unexpectedly or simply want to focus on other things, they can be sure that their beloved pet will always be cared for and fed on time. The project aims to make pet ownership easier for owners by providing automatic pet feeders. The emergence of the Internet of Things (IoT) has paved the way for a new era of problem solving, and the pet industry is no exception. Recognizing the challenges pet owners face in maintaining a consistent feeding schedule in their busy lives, we developed a smart feeding device designed to transform pets. This IoT technology provides feed control for small animals such as dogs and cats. Offering the ability to monitor the feeding process from an Android smartphone, this guide paves the way for exploring the features and benefits of our free pet medications.
The smart dog feeder is designed to provide regular dog feeding and allows owners to monitor and control their pet's feeding from an Android smartphone using the Blynk app. It combines RFID authentication, a weighing scale for accurate measurement, and communication via the MQTT protocol to solve pet feeding problems that dog owners often experience. "Petification: Pet Care IoT Solution Based on Blynk Application aims to create pet care by using IoT technology to perform automatic feeding, nutrition monitoring and meal preparation. The system includes hardware such as ESP32 Wi-Fi microcontroller and LM2596 motors, BO axis motors and water pump, as well as software such as Blynk application for smartphone connection and Arduino IDE for coding.

Experiments with real users have shown good results, demonstrating the body's ability to provide easy and correct nutrition like time to time feeding. An IoT-enabled pet care system seamlessly integrates food and water dispensers, connecting to Blynk for remote monitoring of food and water levels. Pet owners are faced with managing their pet's feeding time. It leverages IoT technology using microcontrollers and various hardware devices to provide controlled distribution of food and water to animals. The device is controlled by a mobile phone using Blynk software, which provides resources for remote control. These include the Internet of Things and a focus on remotely sensing animals.

II.Literature

Food delivery machine uses an Android app to control the Wi-Fi connected FRDM KL25Z microcontroller. The microcontroller opens the food container by operating the DC motor connected to the container. The desired food can be delivered by opening the lid and storage box at the same time. An Android application allows the user to adjust how long the engine remains in action, thus facilitating food delivery [2,3]. Some models have cameras for tracking pets in a fixed position and it is not easy to capture images of moving animals. To solve this limitation, this paper presents a remote control using a camera-equipped toy car that can deliver food and water. This system allows owners to view real-time images from Android devices and use the MQTT protocol to control the movement of toy vehicles to facilitate feeding and watering [4,6]. These animal feeders use various sensors for efficient operation. The proximity sensor connected to the Arduino detects the animal's proximity to the feeder, allowing food to be sent to the bowl. When the animal arrives, the sensor next to the food bowl detects movement and starts the service process.

Additionally, servo motors are used in the locking mechanism for reliable functionality. These components together increase the performance of the feeder [1,5]. Simple Object Access Protocol(SOAP) is about web services used to manage many devices in the home. A variety of sensors are used, including infrared sensors to monitor food levels and RFID tags on pet collars to identify animals. Data collected by Arduino is sent wirelessly to cloud storage for access from a smartphone. Of course, the network works wirelessly. Both smartphones are used in the standard and IEEE 802.15.4 and IEEE 802.11 standards are planned. For IEEE 802.11p, a minimum sampling rate of 10 MS/s is required using PBSK and QPSK modulation.

Future improvements may include adding a real-time clock (RTC) to the feed to improve performance [7]. The article describes a new design for pet feeding that uses an interactive remote control instead of a manual control. There are many improvements in the design, including feeding time and food amount. It also includes features such as pet call feature, food filling alarm, battery-charged dual power supply, notification to the owner when the pet is not fed, and food bowl security lock. The sensor-based system detects the remaining food in feeding bowl and storage container. It is also important to feed with the option of multiple feeding or one feeding at a time [8,9,10]. The system is usually time-based and distributes food on time. This is a programmable control system using a microcontroller.It uses an LCD screen to display input; A stepper motor is used to control the speed, and the rotating machine is divided into several parts to accommodate different foods [11]. Phone-controlled pet feeding technology allows people to dispense food correctly without the need for human feeding. It has hardware (feeder) and Android application. The app allows users to access their pet's information such as name, weight and feeding rate. This information is sent to the feeder where the animal can get food. The system can support up to two animals at a time and has been successfully tested to accurately dispense food based on user input within a 15 cm animal detection range [12].

III.Methodology

The architecture of proposed system is designed to connect the 2-in-1 pet feeding system with the user. Each user device can communicate in both directions through the Blynk App. The architecture of the proposed system is shown in fig.1.

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Let us discuss each unit shown in fig.1. Feed and Water Supply Machine unit represents the physical device that dispenses water and food to the pet. It likely having container for water storage, a water pump to deliver the water, a dispenser for the pet food, and other control mechanism called BO Shaft.User unit represents the person who uses the device to care for their pet like releasing food water from Blynk Application through buttons.Web Dashboard unit refers to a web interface that the user can access to monitor and control the device. The web dashboard likely displays information about the device, such as the water level and food level in the container, the amount of food remaining in the bowl. It may also allow the user to control the device remotely, such as starting or stopping the watering cycle and Food control.

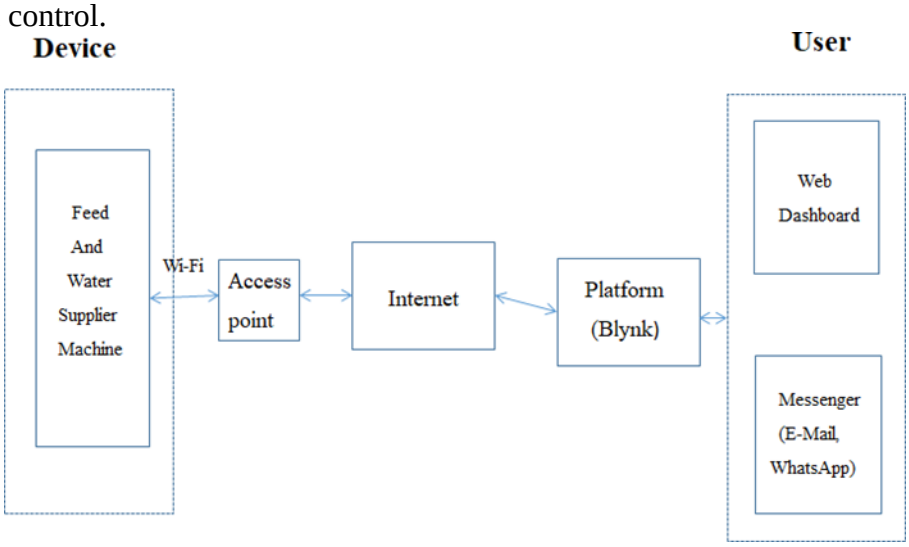

Fig.1:Block Diagram of Petification

Wi-Fi Access Point unit represents a device that provides wireless internet access to the feed and water supply machine. The machine connects to the internet through the Wi-Fi access point, which allows the user to monitor and control it remotely via the web dashboard.Internet Platform (Blynk) unit refers to a cloud-based platform that the device uses to communicate with the web dashboard. Blynk is an Internet of Things(IoT) platform that allows developers to create web dashboards and mobile apps for controlling and monitoring IoT devices like ESP32 Microcontroller which is used in automatic feeding system. The feed and water supply machine likely uses Blynk to send data about its status to the web dashboard, and to receive commands from the user.Messenger unit refers to the way that the user receives notifications from the device. The device may be able to send alerts to the user's phone via Blynk Application and for example, if there is no food or water in the bowl then blynk gives notification as “There is no Food in Bowl” and“There is no Water in Bowl”.

IV. Implementation

4.1 Hardware

Two ultrasonic sensors are employed to measure the levels of food and water in a dual-purpose storage container, depicted in Fig.2. These sensors are positioned on top of the container and connected to an ESP32 Microcontroller. To dispense food, a BO Shaft motor, also referred to as a DC Gear Motor, is affixed to the food section of the container. Water dispensing is facilitated by a water pump connected to the water compartment of the storage unit. Additionally, another ultrasonic sensor is placed near the bowl to gauge the food level. A raindrop sensor is utilized to ascertain the presence of water in the bowl. The operational functionality of the Feed and Water Supplier Machine is contingent upon the ESP32 Microcontroller. The circuit connections outlined above are illustrated in Fig.2.

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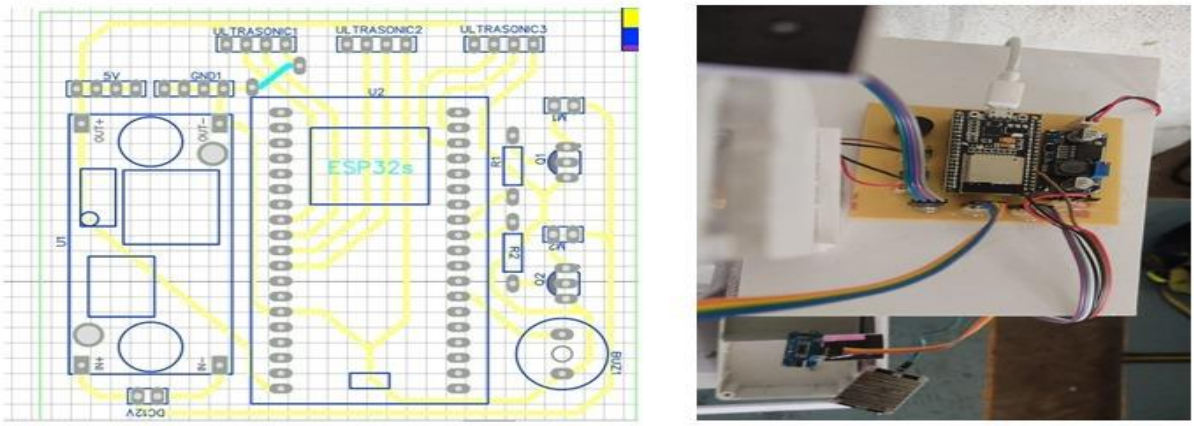

Fig. 2:Circuit Connections of Feed and Water Supplier Machine

The proposed model of Petification: Blynk App Based Pet Care IoT Solution is shown in Fig.3

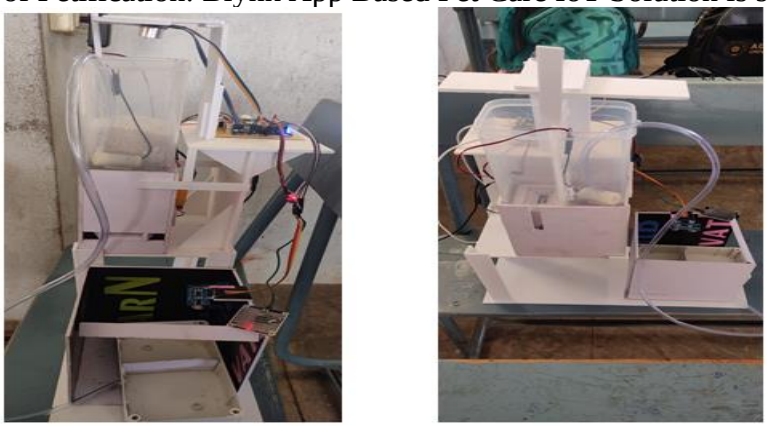

Fig. 3:Proposed Model

4.2 Software

The Blynk app interface seamlessly integrates with our hardware prototype, offeringintuitive controls for essential functions. With just a tap on the screen, users can triggerthe release of food from the container with the Food button, ensuring their pets receivetimely andaccuratemeals.Similarly,theWaterbuttonactivatesthewaterpump,drawing water from the container and delivering it to the pet's bowl via a dedicatedpipe,ensuringhydrationis alwaysreadilyavailable.

The Fig.4 shows the blynk Platform which is interfaced with Hardware.

Fig. 4: Blynk Platform

V.Results

The proposed system gives result of dispensing food and water from 2 in 1 Storage Container with just a tap on the screen, users can trigger the release of food from the container with the Food button,

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ensuring their pets receive timely and accurate meals. Similarly, the Water button activates the water pump, drawing water from the container and delivering it to the pet's bowl via a dedicated pipe, ensuring hydration is always readily available.

Let's see all the possible test cases on the BLYNK app starting from the initial stage where the storage container and feeding bowl are empty.

Case-1: When There Is No Food And Water In Storage Container And Feeding Bowl.


Fig.5.1.a

Fig.5.1.b

Fig.5.1.c

Fig.5.1.d


Fig.5.2.a

Fig.5.2.b

Fig.5.2.c

Fig.5.2.d

Initially, Fig.5.1.a depicts an empty storage container and feeding bowl. Subsequently, Fig.5.1.b showcases the interface of the Blynk platform. Within this interface, the levels of the storage container and feeding bowl are displayed, indicating 0% food storage and 6% water as default as it contains water pump inside the storage container and indicating 0% food in the feeding bowl. Under these conditions, a notification is triggered, alerting the user of the absence of food at the bowl, as illustrated in Fig.5.1.c. Similarly, in the event of insufficient water, a notification is sent, indicating the absence of water at the bowl, as depicted in Fig.5.1.d.

Case-2: When There Is Food But No Water In Storage Container And With Empty Feeding Bowl

Fig.5.2.a depicts that there is food but no water in the storage container and an empty feeding bowl. Subsequently, Fig.5.2.b showcases the interface of the Blynk platform. Within this interface, the levels of the storage container and feeding bowl are displayed, indicating 30% food storage and 6% water as default as it contains water pump inside the storage container and 0% food in the feeding bowl. Under these conditions, a notification is triggered, alerting the user in the absence of food at the bowl, as illustrated in Fig.5.2.c. Similarly, in the event of insufficient water, a notification is sent, indicating the absence of water at the bowl, as depicted in Fig.5.2.d.

Case-3: When There Is Food And Water In Storage Container And Some Food But No Water In The Feeding Bowl.

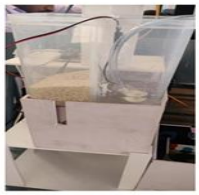
Fig.5.3.a

Fig.5.3.b

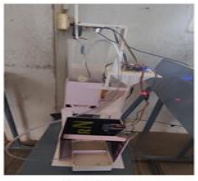
Fig.5.3.c

Fig.5.3.d


Fig.5.4.a

Fig.5.4.b


Fig.5.4.c

Fig.5.4.d

Fig.5.3.a depicts that there is food and water in the storage container and food but no water in the feeding

bowl. Subsequently, Fig.5.3.b showcases the interface of the Blynk platform. Within this interface, the levels of the storage container and feeding bowl are displayed, indicating 12% food storage and 18% water in the storage container and 90% food in the feeding bowl. Under these conditions, a notification is triggered, in the event of insufficient water, a notification is sent, indicating the absence of water at the bowl, as depicted in Fig.5.3.c and Fig.5.3.d.

Case-4: When There Is Food And Water In Storage Container And No Food But Water In The Feeding Bowl.

Fig.5.5.a

Fig.5.5.b

Fig.5.5.c

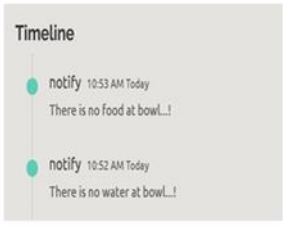

Fig.5.5.d

Fig.5.4.a depicts that there is food and water in the storage container and food but no water in the feeding bowl. Subsequently, Fig.5.4.b showcases the interface of the Blynk platform. Within this interface, the levels of the storage container and feeding bowl are displayed, indicating 12% food storage and 18% water in the storage container and 0% food in the feeding bowl. Under these conditions, a notification is triggered, in the event of insufficient food, a notification is sent, indicating the absence of food at the bowl, as depicted in Fig.5.4.c and Fig.5.4.d.

Case-5:WhenThereIsFood And No WaterIn Storage Container And Some Food And Water In The Feeding Bowl.

Fig.5.5.a depicts that there is food and but no water in the storage container and some food and water in the feeding bowl. Subsequently, Fig.5.5.b showcases the interface of the Blynk platform. Within this interface, the levels of the storage container and feeding bowl are displayed, indicating 24% food storage and 6% water as default as it contains water pump inside the storage container. The60%shows the amount of food in the bowl as shown in Fig.5.5.c. Whenever itfinishes the food or water again it gets notification in the app or in the notification sector as shown in Fig.5.5.d

IV. Conclusion And Future Scope

The new pet feeder and water bowl combo, along with the BLYNK app, are big steps forward in pet care. They make it easier for pet owners to feed their pets and ensure they always have food and water at regular intervals of time and shows food and water levels in Storage Container and feeding bowl weather it was consumed or not. The device sends alerts when it's time to refill the bowl and controls how much food is dispensed. The proposed model not only offers a significant reduction in the overall cost compared to the existing model [1], but can also take personal care if required based on the food remains in the bowl. This cost reduction is primarily attributed to the replacement of two Raspberry Pi units with a single ESP32, which features a built-in Wi-Fi module. It's also great for small spaces because it combines two essential pet care items into one, cutting down on clutter.

In the future, this technology could get even better. We might see more sensors to monitor pets' health

in real time and personalized feeding schedules based on their behavior. By working with other pet gadgets like activity trackers and improve the mobile application interface to enhance user experience and provide additional functionalities such as nutritional advice, reminders for vet appointments, and access to online pet communities.it could create a complete system for pet care. Overall, this project makes pet care easier and more efficient, showing how technology can improve our furry friends' lives.

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