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SPF: Smart Pet Feeder using IoT for Day-to-Day Usage

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***Abstract:** An autonomous pet feeding system based on the Internet of Things is what this project aims to build (IoT). the development of a feeder that would help distribute dry food diets to tiny pets like dogs and cats. It will be useful if a pet owner is away from home and/or unable to normally feed his or her animals. When given free reign to eat anything they want, pets will put on weight. Pets' feeding patterns will also be monitored using this technology in order to teach them to eat at certain times. The system sends alerts to the carer when the pet is hungry and wanders in front of the machine, which is a key component in providing pets with the food they need in the right amount. You may open or shut the slit by using the switch mechanism.*
***Keywords:** Pet Feeder, Animals, IoT, Communication, Gesture, Monitoring*

I. INTRODUCTION

Cat owners used to leave a simple device—an automated pet feeder—out when they left on a quick business trip or weekend break. Since then, they have become strong tools that all pet owners may use to control and enhance their dogs' health despite lengthening workdays and hectic schedules. The simplest automated pet feeder is a straightforward device that continuously provides fresh water to keep your pet healthy. A hydrated pet is a healthy pet, which is common knowledge. A water bottle that may be easily replaced and is detachable should be included with feeders. The most recent feeders may be set up to deliver dry pet food days in advance. Not only is this essential for travellers, but it is also particularly good for managing the portion sizes and feeding schedules for animals that may need specialised nutritional demands. Scheduled portions might be beneficial in managing weight reduction in an overweight pet instead of removing all of the food for the day.

The more sophisticated models even have Wi-Fi connectivity, enabling you to monitor how much your pet has consumed, purchase fresh food, and schedule feedings right from your smartphone. You may use a pet feeder in a variety of ways, such as programming it to refill the bowl at a certain time or telling it to do so whenever it is empty. Another option is to use it to reward your dog for following a series of commands that you have taught it. We programmed the feeder to sometimes begin beeping for this particular project. The servo is actuated as soon as the dog approaches the object near enough for the PIR sensor to detect it. We have took the decision to include the capability of controlling the pet feeding via a Freeboard-created preconfigured dashboard on a mobile device. We saw this as a fantastic chance to introduce you to the ESP8266-01 WiFi module, which is now offered on Circuito.io, as a means of linking your circuit project to the internet.

One of the newest innovations in pet feeding is the automatic pet feeder. Taking care of a pet when a pet owner is away from home would be helpful. Owners may still feed their pets even if they are not at home. To assist pet owners in caring for their animals, automatic pet feeders were created. IoT pet feeder is one of the pet feeders that can be managed online using a mobile application. An quantity of food and water that has been specified will be automatically dispensed to the bowls by the automated pet feeder. Users should be aware that pets also need good nutrition control as they are animal lovers. Whether a user is suddenly away from home or just wants one less duty to worry about, they can rest assured knowing their cherished pet will be looked after and fed on schedule each and every time. In order to ensure that every pet has access to a sufficient quantity of food throughout the day, independent of the owner's schedule, the automatic pet feeder will address two issues that pet owners confront. ensuring that each pet only consumes food that belongs to it Although a wide range of goods are available on the market to address the first issue, none do so for the second. The automated pet feeder will offer pet owners with a solution to both issues, enhancing the quality of life for both pets and owners by enabling the owner to consistently feed a pet at the time the owner desires and preventing the pet from accessing the food saved for subsequent feedings. Many animal feeding systems are capable of being created as automated devices that let the user feed whenever and from anywhere he pleases over the internet. The goal of a system like this is to entirely automate the feed process with little human intervention.

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Today's pet owners like to spend time with their animals for companionship. Some pet owners have the patience and time to feed their animals, while others do not. In order to create a system that can meet the demands of the pet owner without endangering the pets, automation and the Internet of Things (IoT) might be useful in this situation. As a result, both old and new projects will be reviewed in the literature review chapter. Great projects have been created and delivered to the market, and these automated pet feeders are working to provide a completely customised experience. Where the pet owner can programme the feeding schedule, where food can be dispensed at specific times and in specific amounts, where prior research will be taken into consideration, where it will be opening up more opportunities to understand more and learn from prior experiences, and finally to combine the ideas of prior research to reach a point where the system can be enhanced with the most number of features to make the pet owner

Generally speaking, people underestimate the harm of this problem. Pet owners typically look at this issue with an unsolvable dangerous solution, which is overfilling the food dish with a very large quantity of food. Not only do busy pet owners do this, but most pet owners who work or study until late hours of the day are not punctual at feeding their pet. The IoT offers a collection of standards and strategies for connecting things in the physical environment. The Internet of Things (IoT) uses information-sensing devices to link all objects with the internet [1]. It should go without saying that pets demand particular attention and care. However, taking care of pets becomes quite challenging due to the hectic schedule. [2]present a smart pet system that has a system for pet collars, a pet food dispenser, and pet door monitoring.

Until the pet wants to eat, the pet feeder may maintain the cleanliness of the food and water. The bowl cover on it shuts and opens automatically. The sensor detects the presence of a pet, at which point the lid is opened so that only the animal may reach the food. Additionally, the collar features a GPS tag that tracks a pet's movements and transmits that information. The current technology has been shown to be unsuitable for delivering the best security and tolerating delays. [3] states that since people are exposed to such a wide range of technology, they could never have even dreamed about them in the past. The Internet of Things is a significant and developing technology. The gadget has a pet tracking feature that will alert the owner of the pet's whereabouts as there are several occasions when the owner is preoccupied and unable to keep an eye on the animal.

All users have easy access to the Blynk app, which is simply loaded via the Google Play store and is controllable over mobile data. A WiFi connection exists between the WiFi-connected smart pet system and the home. A link is established between the user and the system via the IOT communication interface.

II. MOTIVATION

Having pets requires a lot of dedication. This entails keeping them company, expressing your worries, and of course, providing them with timely and appropriate nourishment. Taking care of your pet's nutrition may be difficult and time-consuming, however not everyone is an expert on animals. Obesity and overeating are two major health issues for dogs. They often accept whatever amount is provided to them, especially when they are younger. Many adult pets are fed in a way that isn't scientific, which may shorten their lives afterwards. Owners may not always be home on a regular basis, which presents another issue with feeding dogs. Owners are always troubled by the thought of being preoccupied with personal ambitions while yet having to tend to a ravenous young one at home. The third issue we want to address is the lack of a device on the market today that can dispense various diets for different sorts of dogs. However, it's possible that pets themselves are unaware of the potential health risks associated with eating the improper diet. In order to address owners' concerns about feeding, we are developing a phone-controlled automated pet feeder that can administer the right quantity of food at the right time, depending on the sort of animal that is demanding it.

Over 50% of people in the globe consciously keep pets as companions, yet these animals are starting to weigh down on their owners. While feeding their animals, owners experience considerable stress. Numerous automated pet feeders have been introduced to the market over the years, but none of them has been able to resolve many issues, such as obesity and overeating. The goal of this project is to leverage the internet of things to build effective automated pet feeders that address the issues brought on by current feeders.

III.METHODOLOGY

The internet of things, or IoT, is an interconnected network of computing devices, mechanical and digital machines, objects, animals, or people who are given unique identifiers (UIDs) and the capacity to transfer data over a network without the need for human-to-human or human-to-computer interaction. An IoT ecosystem comprises of web-enabled smart devices that use embedded systems, such as processors, sensors, and communication gear, to gather, transmit, and act on data they gather from their surroundings. By connecting to an IoT gateway or another edge device, where the data is either delivered to the cloud to be shared, IoT devices exchange the sensor data they gather.

An IoT ecosystem comprises of web-enabled smart devices that use embedded systems, such as processors, sensors, and communication gear, to gather, transmit, and act on data they gather from their surroundings. IoT devices link to IoT gateways or other edge devices to exchange the sensor data they gather. From there, the data is either transferred to the cloud for analysis or is examined locally. These devices sometimes exchange information with other similar devices and take action based on that information. Although individuals may engage with the devices to set them up, give them instructions, or retrieve the locally processed data, most of the work is done by the devices without human involvement. These devices sometimes exchange information with other similar devices and take action based on that information. The connection between the PIR sensor and ESP8266 is shown in Fig. 1. The LHI778 Passive Infrared Sensor and the BISS0001 IC regulate how motion is sensed by this motion sensor module. A motion detecting range of 3 to 7 metres is possible with the module's configurable sensitivity. In order to fine-tune your application, the module also offers time delay changes and trigger choices.



Fig. 1. Circuit diagram of the PIR circuit interfaced

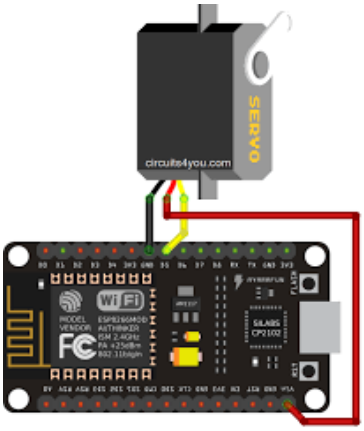


Fig. 2. Circuit diagram of the Servo motor interfacing

Because the ESP8266 board can only offer a maximum of 3V and the SG-90 servo motor requires a 5V supply, we utilise an Arduino Uno board to power the servo motor. Because it is the pin utilised for connecting during board programming, the ESP8266 board's 8th Digital Pin is attached to the servo motor.

To allow the ESP32 to communicate over IFTTT, the necessary host name and private key are specified in the code. We make advantage of this to periodically send an SMS to the owner's phone. To do this, we first build TCP using the WifiClient class, and then we create a URL for the request. The server is contacted, and if the needed message is not shown, the connection will be lost.

In order to spin the servo motor 90 degrees for a predetermined period of time, a Blynk button is developed that interacts with the D8 pin of the board that is attached to the motor. To return the motor to its initial position, press the opposite button. A display is constructed to indicate whether or not motion is detected by the PIR sensor by connecting it to the board's Analog pin. To provide the user even more flexibility, a slider is also made so that they may turn the motor in whatever direction they like.

IV. RESULTS AND DISCUSSIONS

The circuits built within the prototype need a box or other storage area to be kept there. a storage unit with an aperture for food flow that will hold pet food. The container's opening and shutting are accomplished by the servo motor, which is fastened to a cap that rotates.



Fig. 3. Front -View of the proposed system

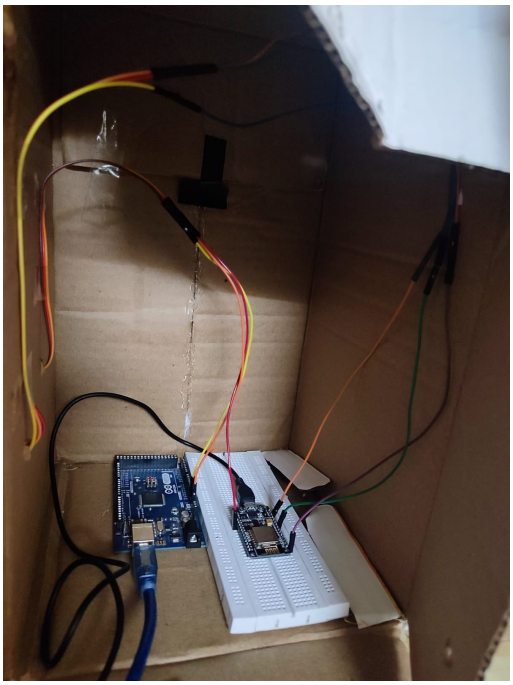


Fig. 4. Inside view of the proposed system

Fig. 3 shows the front view of the suggested system, which includes an animal/user interface made up of a motion sensor and a bottle for individual feedings. Feeding is distributed onto the food tray in response to motion being sensed. Depending on how long the servomotor keeps the valve open, food production varies. Depending on what the animal requires, it may be designed differently.

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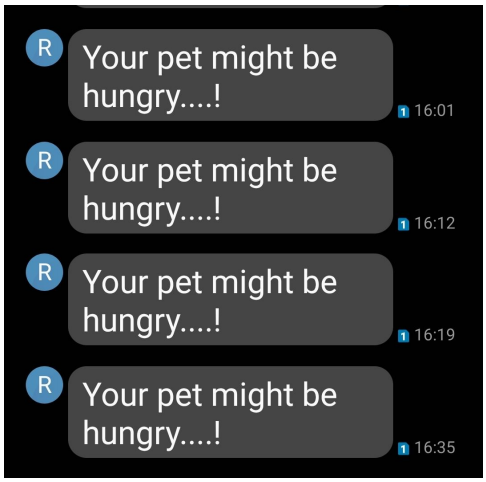


Fig. 5. Message sent via IFTTT to the user's device.

Fig. 5 shows what happens when the animal's feeding timer expires. It sends a message to the user's smartphone through IFTTT. It is used to remind the owner to feed the animal or pet at the appropriate times.

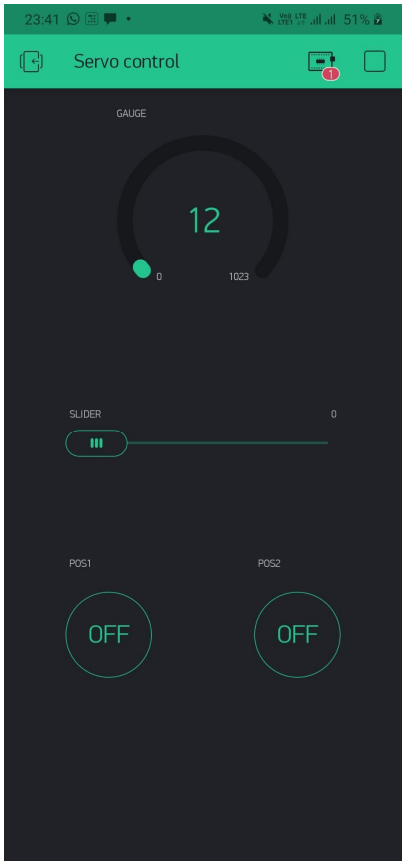


Fig. 6. Blynk Interface setup on the user's device.

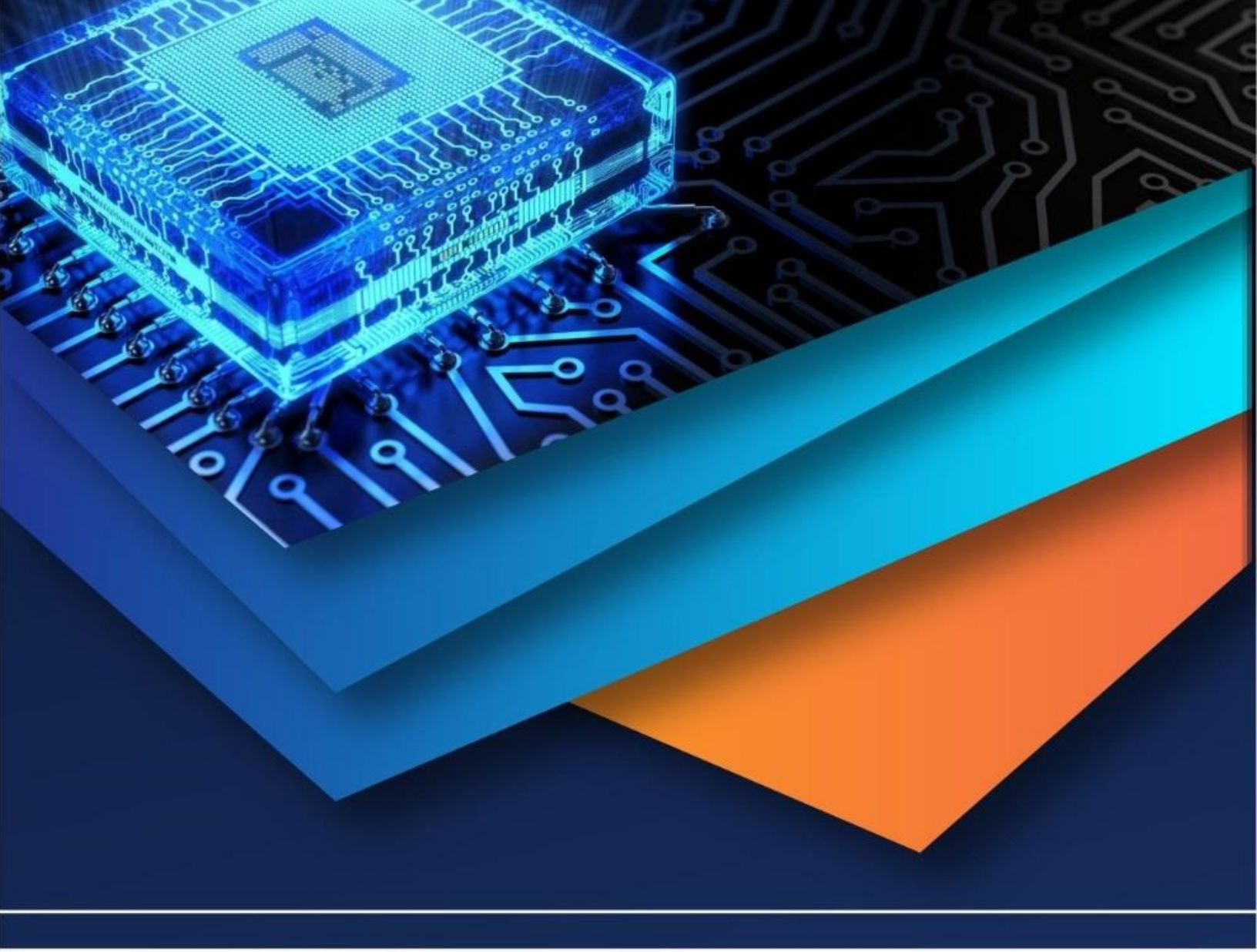
Fig. 6. Depicts the Blynk interface setup on the user's device with variable slider, two buttons for varying the servo-button at feeding times. Project's name is "Servo Control." It contains 2 buttons, a slider, a gauge for the display, and 4 functions. We have choices for a slider and a switch, as shown in figure 1. The slider is used to alter the servo angles, and the switch is used to shift the angle straight to 90 degrees. The PIR sensor's output values may be seen on a gauge that is provided. If the PIR sensor picks up any movement, the display will indicate 1024, else it will show 12.

V. CONCLUSIONS

Feeding pets of many kinds is the job we completed. However, this design is put into practise to feed a pet of a similar or different species. Depending on whether or not a pet is required, the product and design may be changed. The Feed Time, Time Between Consecutive Feeds, Call for Pet at Feed Time, and the Ability to Control the Amount of Food Served are some other advantages that this type of pet feeder offers that will be more Convenient for Both Owner and Pet. The IFTTT software platform is also used by this system to text the owner once each pet has been successfully fed.

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