IOT BASED PET FEEDER

A Project Report

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COMPUTER SCIENCE & ENGINEERING

Under the Guidance of

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VADODARA

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CERTIFICATE

This is to Certify that Project - 3 -Subject code 203105450 of 8^{th} Semester entitled "Iot Based Pet Feeder" of Group No. PUCSE_140 has been successfully completed by

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under my guidance in partial fulfillment of the Bachelor of Technology (B.TECH) in Computer Science and Engineering of Parul University in Academic Year 2022- 2023. Date of Submission :-

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ABSTRACT

Domestic pets are very common in every country. Also in our country there are many families who are fond of keeping pets. As people like to keep pets, pets also need special treatment and care. We need to feed our pet timely. But because of our busy schedule we are unable to do so. We have designed a smart pet feeder system. This will help us feeding pets anytime. We will be able to feed pets no matter where we are. This device will be totally dependent on internet connectivity. The main idea is to allow pet owners to automatically feed them and even monitor them. Using smart pet feeder in houses will assure pet owners and increase comfort and peace of mind. Especially when we are unavailable for them. To achieve the foregoing, the proposed system uses a food dispenser that is connected to a microcomputer which is programmed to control the feeder as scheduled, remotely or intelligently. Thus, allowing the user to have full control over the time a pet is fed and the amount of food consumed by the pet. The feeder can be controlled through a secure web-application hosted on a local server and through advance scheduling. The results of the evaluation show that the design is viable and that the prototype automatic feeder system worked as designed.

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Chapter 1

Introduction

1.1 Definition

Nowadays, pets have been considered as part of the owner role in the human activities and lifestyles. The growing number of pets has come with the elderly population increasing. A pet is mostly treated as one of the family. Dogs and cats are the most popular pets. The pet care industry and business has continuously expanded every year, and the need of products with new technologies has been essential for helping senior people for taking care their pets.

Household pets need special treatment and care. Owners need to ensure food, drinks, and medication are served as at when due. Lack of adequate attention to pets' needs might have great consequential effects, such as starvation, ill health, among others. Due to concurrent tasks demanding owners' attention, couple with busy life style, management of these pets may not be as simple as expected. Hence, the need to migrate from manual to technology-based management of pets' daily needs. An Internet of Things (IoT) based automatic feeder system comes handy to assist in the management of pets needs. The latter technology will enable pet owners to remotely manage critical needs that are automatable while engaged in other time and attention demanding tasks.

Asides the benefits automatic pet feeders give its users, it can also regulates the

amount of food given to pets since it can be programmed to dispense specific amount of food, thereby ensuring pets are not malnourished or overfed which may lead to obesity especially when the pets are still very young. In view of the aforementioned benefits, People have already developed an Arduino micro-controller based mechanism. The microcontroller is used to control a pet feeder. In determining the maximum stress the mechanism can withstand, the latter authors applied finite element analysis; they achieved appreciable success that provides insight into how to improve the mechanism.

Many of the people have used an existing Smartphone application (i.e. Blynk) to automate the feeding of fish. They argued that keeping and viewing fish at home can reduce stress when treated as pet like cats, dogs, cows, etc. Unlike other domestic animals or pets, fish requires extra care, thus the automation will minimized human effort in managing its needs.

1.2 Purpose

The purpose of this proposed machine is to make a convenience for the pet's owners and make a promotion to raise their pets in healthy fashion. To raise a healthy, the pet feeding for each meal has to be seriously considered. When feeding is not timely, it will directly affect the health of the pet. It can cause malnutrition and various illnesses or diseases..

Now a days, everyone can have a pet at home without giving their full commitment to have a healthy pet. With this feeding machine, it will help pet owner to manage their pet diet wheel. When user is at home, it can be controlled by a mobile application through internet. If user is not at home, user can set the timer to feed their pet. To make sure that the food does not exceed force sensor will active and detect the exact amount should be in the bowl.

1.3 Scope

This design of an Iot based automatic pet feeder system was done in consideration of some factors such as: economic application, user convenience, availability of components and research materials, efficiency, compatibility, portability and durability. As earlier stated, this work aims to enhance the management of pets, giving their owners greater flexibility in the provision of essential care and nutritional and medical needs, despite their multiple time and attention demanding tasks and busy schedules

1.4 Overview

The Overview of this project is to create an automatic feeding machine for pets feeding. This project is designed keeping the view of dairy farms, poultry farms and pets at home it is important to maintain the diet of animals just like human being from keeping them healthy for better production and good quality of milk in the case of dairy farm and eggs and chicken in the case of poultry farm. Now a days, everyone can have a pet at home without giving their full commitment to have a healthy pet. With this feeding machine, it will help pet owner to manage their pet diet wheel. When user is at home, it can be controlled by a mobile application through internet. If user is not at home, user can set the timer to feed their pet. To make sure that the food does not exceed force sensor will active and detect the exact amount should be in the bowl. Whenever we go to work or are away on vocation. We always end up paying so much money for pet sitters to feed our pets. We realized that adapting a pet feeder to an iot application would not only solve our problem but would also benefit other pet owners.

Chapter 2

Literature Review

1 : Movement Monitoring of Pet Animal Using Internet of Things

Author: ANAKAPURE, P. S. SHAH, A.

Year:2018

Relying on this aspect, even notorious pets can be found. There is yet another feature in the device which is referred as automated calling and it can be beneficial in the cases when there is a threat.

2 : Interactive on smartclassroom system using beacon technology

Author: Dong, H.J., Abdulla, R., Selvaperumal, S.K., Duraikannan, S., Lakshmanan, R

Year:2015

collar must be intelligent and it can be achieved with the addition of a microcontroller unit. GSM technology will be used by the collar for providing updates and monitoring to the phone. The GPS technology will be used by it for the purpose of tracking. The technology of motion sensing will be used by it for the activity of monitoring. Additionally, the program of microcontroller allows various features like environment sensing, feed advisor on the basis of activeness, feeding alarm, sensors etc. The user will be enabled by android application for obtaining the control and updates of real time on a smartphone.

3. : Automatic feed distribution

Author: : E. Vittuari, G. Vittuari, M. Vittuari and M.R.

Year: 2000

You just have to say ”Okay Google. Feed my pet” and rest of the things will be done by this machine. You can also seta specific time using Google Assistant to feed your Pet. For example Say ”Okay Google. Feed my pet Today Morning” and it will feed your pet at previously specified time.

4 : Automated Fish Feeder

Author: Mackenzie Banker Charlie Brooks Jake Halverson Rachel Huntley

Year:2018

A new design of pet feeder is proposed which can be controlled by interactive remote controller which helps to get rid of the manual settings of the previous versions of pet feeder.. In this design user can adjust the feed time, time gap between consecutive feeds and the quantity of feed served. This design also contains the call for pet at feed time,refill alert, dual power supply with battery charger, Message alert system for owner in case of pet don’t get it’s feed, safety lock for container, sensor based system to serve previously served feed in case of left feed and the priority feeder with dual option of serve as by owner can opt for multi time and pet can opt for 1 time between feed time gap.

5 : Design and modeling of a hybrid stepper motor

Author: Ionică, M. Modreanu, A. Morega and C. Boboc

Year:2017

Explain that as new technologies are being developed, RFID or Radio Frequency Identifier has expanded immensely as a major technology for tracking of things over the globe. The tags of RFID can either be passive or active. RFID in the applications of animal tracking tell about the application of domestic animal tagging by a number of nations that help them in the tracking of animals.

6 : Review of IOT in Pet Management

Author: Jigarmasekar , Jashsohni ,Shweta Sharma

Year:2018

In this paper, unlike the other a buzzer is used to indicate that food is being fed. There are chances for food getting stuck in its journey; to avoid this vibrating dc motor is used. The working is explained as follows. At first we have to load food into the feeder column, select the timing required in both the knobs and reset the microcontroller.. As soon as the microcontroller resets, the food is released based on the timing of the two knobs Pet feeders came into existence as more and more pet owners found it difficult to cater time to feed their pets. Pet feeders are automated machines that dispense food at pre-set schedule. They are mainly timed based and dispense a certain amount of food at specific time of the day. The pet feeder is a programmable system which is mainly controlled by a microcontroller.

7 : IOT based Automated Fish Feeder

Author: K. Jadhav, G. Vaidya, A. Mali, V. Bankar, M. Mhetre and J. Gaikwad

Year:2020

pets according to their diet schedule, in fact most of the pet owners who are working or studying until late ours of the day are not punctual at feeding their pet, well generally people under estimate the harm of this problem, pet owners usually under look this issue with an un-solving dangerous solution which is over filling the food dish with a very large quantity of food.

8 : Scalable verification of border gateway protocol configurations with an SMT solver

Author: K. Weitz, D. Woos, E. Torlak, M.D. Ernst

Year:2010

Once the dog comes closer to the device, the PIR sensor recognizes it and the servo is triggered. In addition, we also decided to add the option to control the pet feeder from our mobile phone, using a pre -defined dashboard made with Freeboard. We saw this as a great opportunity to introduce you to the option of connecting your circuito project to the internet with ESP8266-01 - the wifi module.

9 : Intelligent Pet Collar

Author: KARYONO, K. AND NUGROHO

Year:2015

It explains that it will help the pet owner in taking care of every pet in the house even when he or she is not present. The device is created for helping pet owners as predetermined amounts of the food are dispensed when the user gives a common using an infrared remote control that is wireless. It is very significant for the owner to realize the diet of pets for ensuring their health. Actually, this system acts in two ways, one is sending information to owners and the other one is feeding pets.The feature concerning the quantity of feed means the quantity of food that the system will be serving in every other feed. In the system, there is a unique feature of refill alert which lets the owner know that the bowl is running empty .

10 : Automatic pet feeder

Author:S. Krishnamurthy

Year:2010

IT connected devices at any scale, from small IoT projects to millions of commercially available connected items. It can be used to connect the hardware to the cloud and build no-code iOS, Android, and web apps to analyze real-timeandhistorical data from devices, control them remotely from anywhere in the globe, receive vital notifications, and much more. In this project, we are going to use the Blynk mobile application for controlling the servo motor that is connected to the pet feeder setup.

11 : Automatic Pet Food Dispenser by using Internet of Things (IoT)

Author: Sangvanloy and K. Sookhanaphibarn

Year:2020 used different automatic feeder, the components of the automatic feeder include LCD display, Wi-Fi module, T- section of PVC pipe, Acrylic sheets, Arduino UNO, RTC or Real Time Clock, Ky-40 Rotatory Decoder Encoder, and Continuous Servomotor with MG995. Servo motor for continuous rotation is being used with digital modulation.

12 : Gravity feed dog feeder

Author: A.R. Page

Year :1985

The major reason for the development of Raspberry Pi is to promote basic computer skills in schools and developing countries around the world. According to Raspberry Pi Foundation, an approximate of 5 million or more Raspberry Pi units were sold in the year 2015 and by early 2018, the total sale reached over 19 million. Raspberry pi gradually became the world third best-selling general purpose computer due to its use of Python as a major programming language.

13 : Remote Controlled and GSM Based Automated Pet Feeder

Author:Prashant Singh, Amit Kumar Sharma, Payal Sood, Paramdeep Singh

Year:2015

It consists of a LCD screen for input display, buzzer to alert pets for meals, stepper motor to control the speed and a turn table which is divided into different sections for placement of different food. Pet feeding can be difficult in this busy age but the perfect Pet feeder delivers a worry free solution to modern, caring pet-parents while away.

14 : Certain Investigations on Automatic Feeding of Domestic Pets

Author: Ramya G , Keerthana V , Mahalakshmi M , Mahalakshmi T A , Maheshwari S

Year:2019

This project uses an ESP8266 WIFI board via the Blynk Mobile app to trigger a measure of dry food for your cat or in a suitable outdoor enclosure Koi Carp pellets for your fish pond.Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other things. Only a few basic electronic components are used and any wiring is kept to a minimum .Two old mobile phones are used as a video servers one monitors the feeding via the Blynk app and another is used as a general IP cam using IP Webcam Pro.

15 : Iot Based Pet Feeder System

Author: Saurabh A. yadav, Sneha S. kulkarni, Ashwini S. jadhav, Prof. Akshay R. jain

Year:2018

Finally, we saw the smart Google Assistant that helps us in carrying out telephone tasks by talking to him and how he developed to include household tasks also.To make it easier for us to use sound to control electronic devices,

16 : Automatic Pet Food Dispenser by using Internet of Things (IoT)

Author: T. Sangvanloy and K. Sookhanaphibarn

Year:2020

This work proposes an Internet of Things based automated feeder system that uses Raspberry pi to drive its remote control, scheduling and intelligence. Its design and implementation is expected to take care of the nutritional aspects of pets by providing as either scheduled or intelligently the food, drinks and medication of pets as at when due in the Thus, this work aims to automate the monitoring and feeding process that is usually done manually by pet owners. To achieve the foregoing, the proposed system uses a food dispenser that is connected to a microcomputer which is programmed to control the feeder as scheduled, remotely or intelligently The concept of voice recognition and the algorithms that phones use to recognize the human voice, especially the smart assistant that analyzes and understands the human voice and its commands .

17 : Smart dog feeder design using wireless communication, MQTT

Author: Vania , Kanisius Karyono , Hargyo Tri Nugroho I.

Year:2017

An expanding number of ranches are depending on programmed nourishing to facilitate their workload, spare time and accomplish adaptability. The ranches reviewed were useful clients of programmed bolstering frameworks. There are different frameworks which allow mechanization of nourishing frameworks.Humans are exposed to such vast scope of technologies that they couldnt have even imagined it in the past. IoT is an important and rapidly advancing technology.

18 : Animal Tracking and Caring using RFID and IOT

Author: WANKHEDE, D. K. PEDNEKAR, S.

Year:2017

It established the study of Internet of Things and suggested its use for smart feed systems for pets. This system can beconnected to a smart phone and the owner can easily watch the activity. Through the communication device, the time and quantity of food can be managed easily. For the purpose of identification of the dog, the RFID smart system is used which can detect the tag of the dog to allow for services. explain that for animal tracking and monitoring, IoT is used. The monitoring of animals in remote areas is quitedifficult because of the harmful surroundings .

19 : Automatic pet feeder having rotating food hopper and food leaking plate

Author: M.A. Yaomin

Year:2017 The motor's position can be programmed to start of stop at specific steps. Stepper motors use the theory of operation for magnet to make its shaft turn in a particular distance. A stepper motor consists of stator and rotor with eight and six poles respectively. The rotor moves exactly 15 degrees for each pulse of electricity received.

Chapter 3

Project Flow And Methodology

This section explains the materials, as well as the methods adopted in this study. The section discusses the components used and concepts that relate to this work. In addition, the process of choosing individual material and procedure for fabrication and assembly of the proposed automated pet feeder is explained.The system can be divided into software and hardware. Software is a programming part to control various devices and provide a user interface. Hardware is an assembly of equipment into the project. The user will be able to control the machine via google assistant and blynk appp. With the press of a button from anywhere in Blynk mobile application through internet the user can feed their pet. We will add the weight machine to the food dish which will be controlled by blynk app and will send the message to the user via message or email whether the pet has eaten the food or not.

3.1 PROPOSED WORK

The device we are proposing will have a servo motor which will act as a food outlet, whose controls will be given by the Blynk app or google Assistant.The figure 3.1 shows the data flow for our propose model.

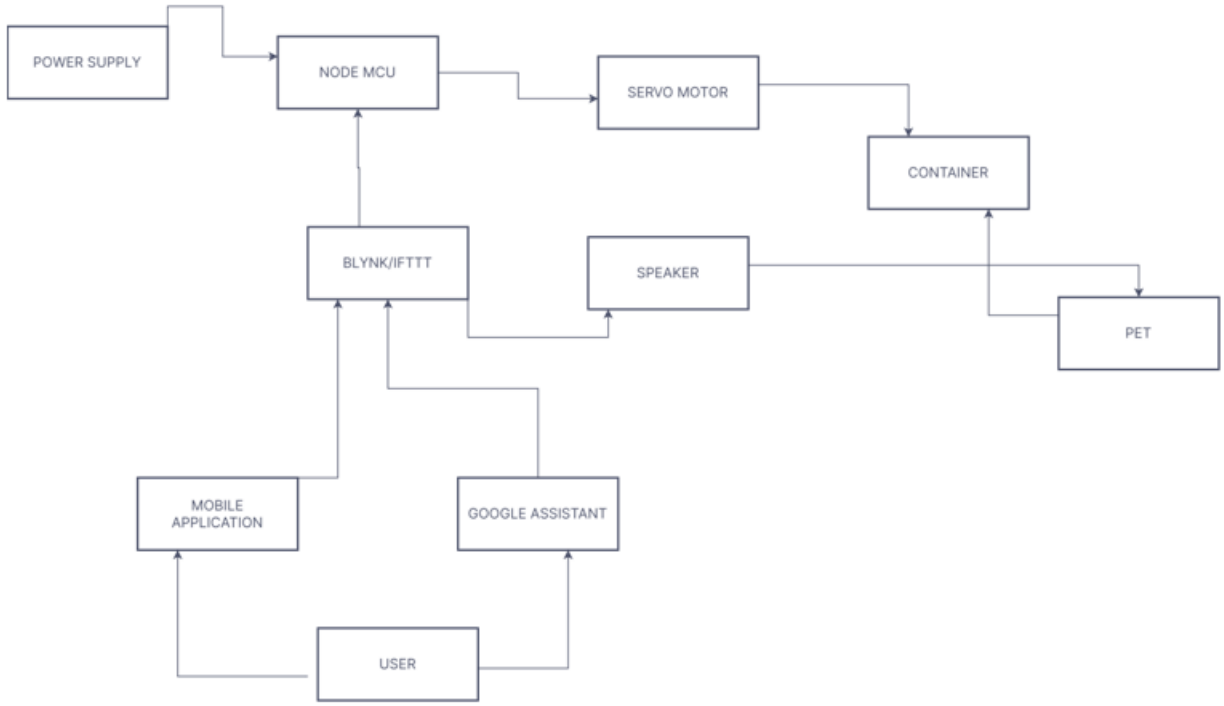

Figure 3.1: data flow

The food bowl will be attached to a load sensor which will sense the weight and when the pet eats the whole food from the bowl, a message will be send to the user via IFTTT.

3.2 TECHNOLOGY USED:

The technologies we will be using in this project are following:-

- IFTTT
- ARDUINO IDE
- GOOGLE ASSISTANT
- BLYNK
- ADAFRUIT IO

3.3 COMPONENTS:

The following are the components required for the device:-

1. Node MCU Module-An open-source firmware and development kit that helped us to prototype or build our IoT product. It includes firmware which runs on the ESP8266 Wi-Fi SoC from Expressive Systems, and hardware which is based on the ESP-12 module. It will be used to control the servo motor.

2. Servo Motor Module-A rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. The servo motor after recieving signal form will rotate from its initial position 0 degree to 170 degree and after a delay, it returns to its initial position, this will lead to flow the food into the container for a period of time.

3. IFTTT-IFTTT aka 'If This Then That' is a free web-based service to create chains of simple conditional statements, called applets. IFTTT allows users to create triggers and execute actions based on the triggers. In this IoT pet feeder project, we are using IFTTT to create a trigger when we say a specific line using Google Assistant. For that we have to create an applet in which we will integrate the Google Assistant with BLYNK.

4. Blynk App-Blynk is a complete set of software for prototyping, and remotely managing connected devices at any scale, from small IoT projects to millions of commercially available connected items.In this project, we are going to use the Blynk mobile application for controlling the stepper motor that is connected to the pet feeder setup.Using these application we can control the motor and get notification when pet eats the food from container.

5. Google Assistant-Google Assistant is an artificial intelligence–powered virtual assistant developed by Google that is primarily available on Android, Google Home, Wear OS or even Android TV, as well as on devices smart home devices. Users primarily interact with the Google Assistant through natural voice, though keyboard input is also supported. The Assistant is able to search the Internet, schedule events and alarms, adjust hardware settings on the user's device, and show information from the user's Google account.

After uploading the code to the Node MCU, if we Say "Okay Google. Feedpet" to our Google Assistant. Google Assistant will recognize the phrase and respond with "Feeding pet."After that it rotates the servo motor from its initial position 0 to 170 and after a delay, it returns to its initial position. We will also try feed your pet at a specific time.

6. Load Cell-A load cell is a type of transducer, specifically a force transducer. It converts a force such as tension, compression, pressure, or torque into an electrical signal that can be measured and standardized. As the force applied to the load cell increases, the electrical signal changes proportionally. Load cells are used to measure weight.It's purpose will be to sense when the weight of the food bowl goes to between 0 to 20 g.

7. HX711 Module-The HX711 Dual-Channel 24 Bit Precision A/D weight Pressure Sensor Load Cell Amplifier and ADC Module is a small breakout board for the HX711 IC that allows you to easily read load cells to measure weight. By connecting the module to your microcontroller you will be able to read the changes in the resistance of the load cell and with some calibration. You'll be able to get very accurate weight measurements.It will convert the analog output from the load cell to digital output and send to the node mcu.

8. Adafruit IO- Adafruit.io is a cloud service that just means we run it for you and you don't have to manage it. You can connect to it over the Internet. It's meant primarily for storing and then retrieving data but it can do a lot more than just that. It will act as an action for our IFTTT and will send the signal to nodemcu to run the servo motor.

3.4 IMPLEMENTATION :

1. Construct the circiut and connect the nodemcu to servo motor and the HX711 module.

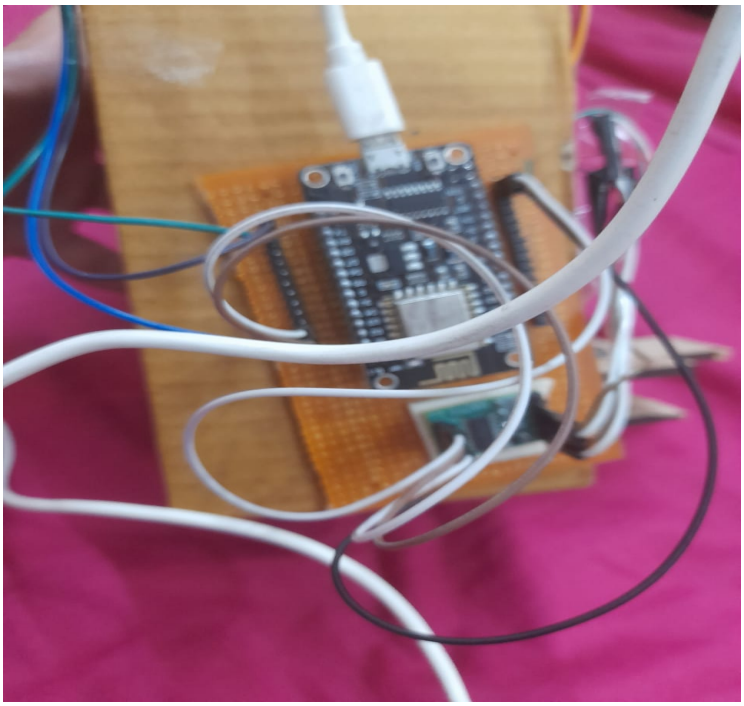

Figure 3.2: circuit diagram

2. Install the Arduino IDE and downloaded the HX711,servo,blynk,adafruit libraries from the library manager.

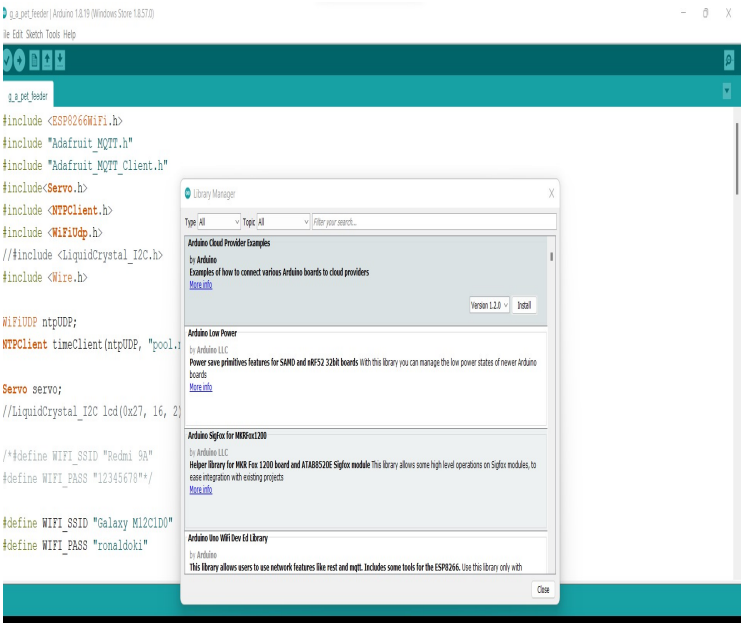

Figure 3.3: arduino ide

3. Create an account on adafruit.io and add the device for servo motor which will send the singal to nodemcu to turn on the servo motor.It will act as an action part for the IFTTT.

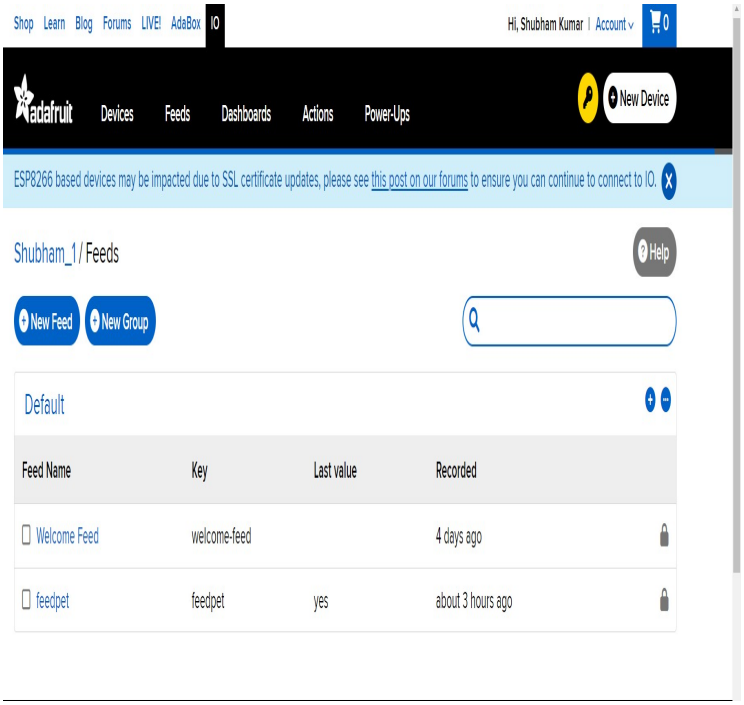

Figure 3.4: adafruit.io

4. Create an account for IFTTT and and added a trigger via google assistant which will be sending message to trigger when we speak a phrase ”feedpet” to our google assistant.

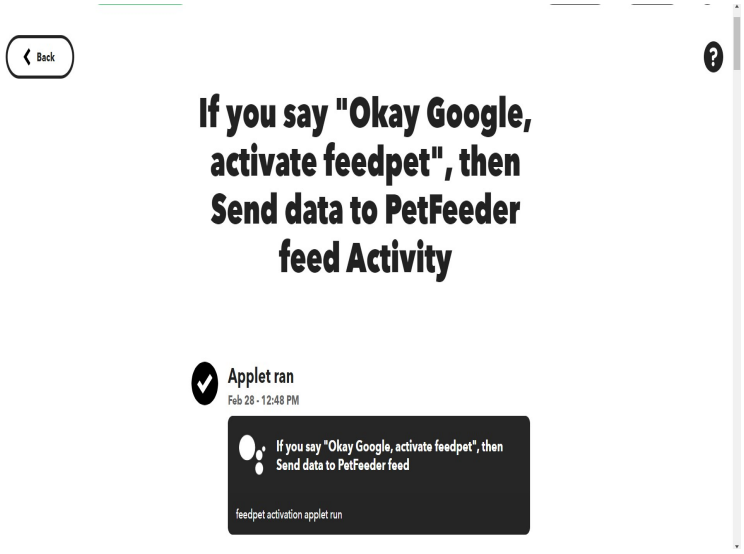

Figure 3.5: IFTTT

5. After IFTTT trigger install home app to mobile and add the same account to it.Connect the IFTTT to Google assistant in the app and set required configuration for the phrase,"feedpet".The home app will send "done"/"feeded " message when the action is done.

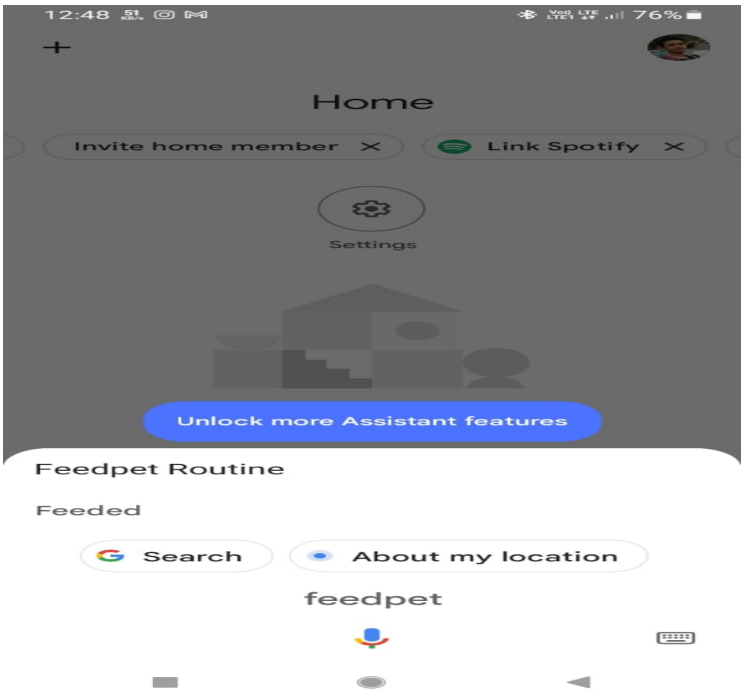

Figure 3.6: Google home

6. Add code for the google assistant part in arduino ide and upload it to the node mcu ,it will be using mqtt server for connection between the google assiatant and nodemcu.

7. Now its time for setting blynk app, create an account on blynk in the web application and add widget to the dashboard and set the virtual pins for servo motor and load cell.

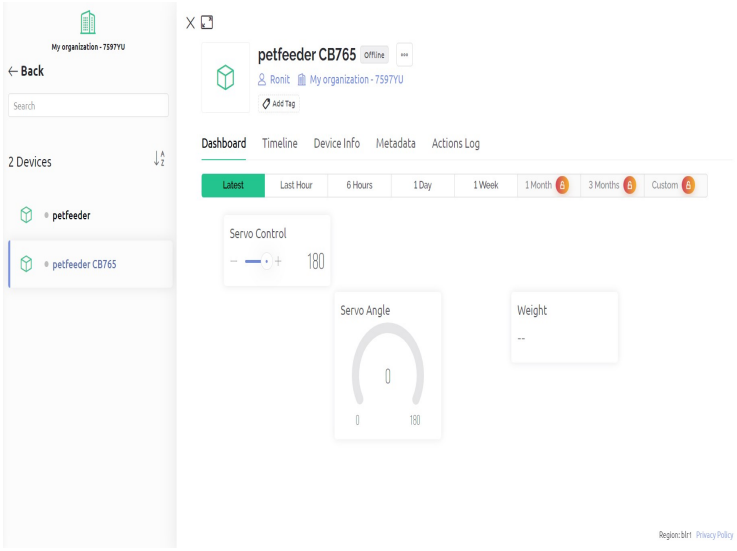

Figure 3.7: blynk web-application

8. After that install blynk app to mobile and add the same account and load the template have created on web application and set the pins for it.

Figure 3.8: blynk mobile-app

9. Now, write the code for blynk in ide and uplaod it to nodemcu(not to forget to use the template token from the web application).Now connect the device to node mcu to the blynk app using same wifi.

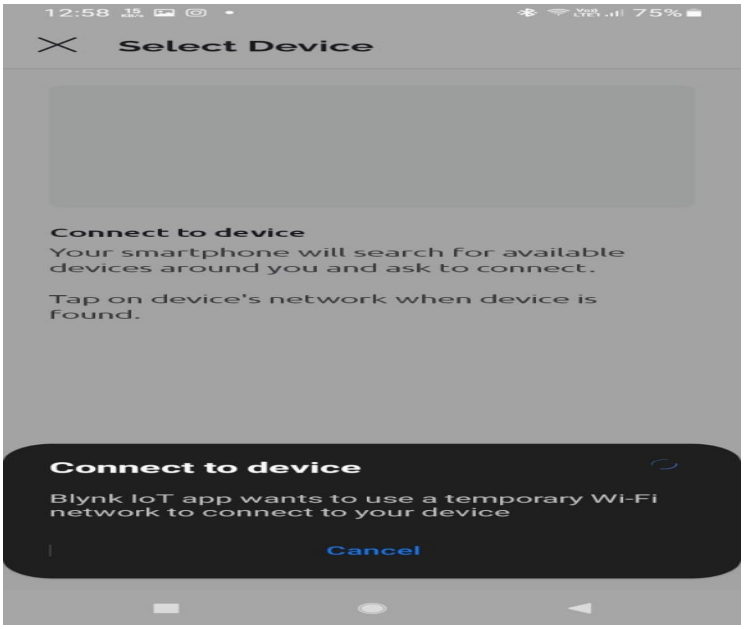

Figure 3.9: connecting to node mcu

3.5 RESULT:

Figure 3.10: result

3.6 CONCLUSION

This design of pet feeder provides the features which will make pet care more convenient for both owner and the pet. This system will allow the user to monitor the feeding process remotely via google assistant and blynk app. As earlier stated, this work aims to enhance the management of pets, giving their owners greater flexibility in the provision of essential care and nutritional and medical needs, despite their multiple time and attention demanding tasks and busy schedules.

3.7 FUTURE SCOPE

This design of pet feeder provides the features which will make pet care more convenient for both owner and the pet this system.

As earlier stated, this work aims to enhance the management of pets, giving their owners greater flexibility in the provision of essential care and nutritional and medical needs, despite their multiple time and attention demanding tasks and busy schedules.

We can change the pet container acoording to the demand same goes with the notification of the events during the process like a reminder to feed pet .

3.8 ABBREVIATIONS

IFTTT : If this then that

MCU : Microcontroller Control Unit

ESP : Espressif Systems

IDE : Integerated Development Environment

SOC : Systems On Chips

3.9 BIBLIOGRAPHY

HX711 :It's a 24 bit analog to digital converter

adafruit :Platform to design to display,respond and interact with project data.

Blynk :Blynk is a platform for mobile used to control IOT devices via internet

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