**Chapter 1**

**Introduction**

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This chapter will introduce the reader with Automatic Pet Feeder System. It will light up the topics like the description of the project and the former formulation of the problem behind it as well as what motivated the makers of the project to take a decision to make this project and its related problem solutions and thus covering up the scope of the project.

**About**:  
  
The latest surveys conducted throughout the nation concluded that due to our busy lifestyle and job schedules the dream of many pet-lovers to have a fur ball is just stuck in their bucket list.Even if they manage to get a pet, there are issues that bothers them all the time, especially for people who live alone.One of major issues is not being able to feed their pet on time and also the inability to communicate when not near it.The motive of our project, ‘Automatic Pet Feeder’, is to free the owner from the worry of feeding his pet, so that he can do his job without any concern and the lovely animal will also not suffer and starve. Here we introduce our Automatic Pet Feeder which will pour the food in the bowl for the pet on just one click of the owner or by pre-setting a timer.

* 1. **Description**

The idea of purchasing a pet, in the information era i.e. the world of hustle and chaos is just alive in the dreams of a lot of pet lovers. With a pets come numerous responsibilities such as maintaining the health of the pet i.e. timely feeding, constant love, and endless care. With the never-ending struggle at work, college and school, the care and love expected by the pet cannot be fulfilled buy the owner. For this very reason, we have come up with ‘Automatic Pet Feeder’ system in which the owner need not worry about feeding the pet and also, with the buzzer notify the pet about the food being served, even from 7 seas apart.

In this project we aim to assure the health of the pet via well-timed feeding of the domesticated by the owner. With the proposed system, the worry of the pet lovers will be reduced, and they may not necessarily worry about the tame starving. This will also give a boost to the kept lovers to buy one.

Easy said than done, buying a pet brings a lot of errand, as stated earlier. Having said that, the ‘Automatic Pet Feeder’ allows the owners to apprehend less about the feeding factor. The variety of pets, in the market are, spread over a variety of domain. Pets could come in the form of dogs, cats, fishes, turtles, birds, and so on. Even these species come with further bifurcations. Dogs could be German Shepard, Golden Retriever, Huskies etc.; cats could be Himalayan, Persian, Russian etc.; fishes include Common carp, Goldfish, Siamese Fighting fish etc.; turtles include Singaporean, Malaysian, etc. and the list is never ending. The food requirements of each of these differ from the other.

The proposed system will help the user to meet these varied requirements of nourishment by the diversity of pets. According to the necessity of the tame, the owner can release food into the tank or the container by pressing a button on their device. On the click of the button, the food will be released into the container for the kept to feed on. A buzzer will buzz after the release of food, to notify the trained that the food is on the loose.

The Feed button is embedded in the Blynk application which will run the portable device of the owner. This button acts as an interface between the owner and the pet. On clicking the button, a message is sent from the device to the feeder system. On receiving the message, the servo motor will rotate thus releasing the food. The servo motor will rotate at an angle of 90 degrees for a specific interval of time, as set by the owner. After the set interval, the opening to the release of food will be closed and the limited food will fall into the tank or container.

Finally, a buzzer will buzz, alerting the domesticated that the food has been released and that it can enjoy its meal with to the fullest.

* 1. **Problem Formulation**

The problem formulation consists of just one sentence and should make it clear to everyone what research problem, you aim to address and to whom and where it is relevant. In other words, the problem formulation is the heart (or core) of your thesis to which you should always return if you lose track during your further research and writing process.

The concerns of medical and community officials about responsible pet ownership have increased. Before a practical solution can be found for irresponsible ownership and community health problems associated with pet populations, the public's attitudes on issues related to responsible pet ownership must be determined. Responses to a questionnaire were used to evaluate the attitudes of 910 pet owners and nonowners toward factors comprising responsible pet ownership. The median age of the respondents was 33 years; 414 (45 percent) were men, and 496 (55 percent) were women. At the time of the study, 18 percent owned a cat and a dog, 35 percent owned only a dog, 11 percent showed only a cat, and 36 percent were nonowners. The one’s who were working owners, reflected a poor quality of health of the pet as compared to the nonworkers. On analyzing the reason for poor health was the inability to feed the pet on time or over-feeding of the tamed because the container was overflooded for the pet to feed from for the entire day.

In this worldever-growing competition, there are too many people who are stressing over the fact of maintaining the health of the housebroken. This is a pullback for every pet lover to buy a fur ball.

* 1. **Motivation**

In the era of hustle, a pet acts as a stress buster. Coming home to a fur ball and a wagging tail is the dream of most of the people around the globe. After the exhausting and energy draining day, arriving home to a pet that has eagerly been waiting for your presence through the stretch of the day, is one of the best feelings in the world. It not only rejuvenates the lost energy but also refreshes the mind of the owner. Refreshing of energy is of utter importance for improved performance in the forthcoming days.

So, we wished to design a system that could help the user to worry less about the pet by being able to feed it on time. The holder can live up to his dreams of having a fur ball in the house. Afterall, we have one life and we need to live it to the fullest. Having a pet is nothing but scratching off one item from the bucket list of an individual.

* 1. **Proposed Solution**

The solution infers with the extraction of food from the holder on the command of the owner. As stated earlier, the owner will command the release of food from the container by clicking a button on the Blynk application, installed in the device of the owner. On receiving the command, the Node MCU will pass the message to the servo motor to rotate and open the aperture for the food to fall down. The servo motor will rotate back and forth at an angle of 90 degrees for the specified amount of time for the limited amount of food to fall out.

After the rotation, the food will be filled in the tank or the container. After the servo motor rotates back to the original position, there is a buzzer attached to the system, which will buzz to intimidate the domesticated that the food is released and that he can have it as it’s food time. On hearing the buzzer, the pet can have its food, in turning assuring the timely nourishment of the tamed.

**1.5 Scope of the project**

The project aims to ease the process of feeding the pet of the owner. According to the survey conducted by the medical and community officials, the health of the pet owned by working professional is poor and sometimes even pitiful at times as they are not able to feed the pet on time or on contrary lead to the overfeeding of the kept. The proposed system will solve all the major and serious concerns related to the health of the pet. The pet will get its nourishment on time and also feel the presence of the mentor by the feeding. When the owner returns home after a long and tiring day, the pet’s excitement to see its mentor after a long stretch will also make the pet enthusiastic and thrilled. The proposed system thus results in the overall benefit of the owner as well as the domesticated. The owner may fulfill his will to have a pet and the pet will be fortunate to have a loving and caring owner, who always wished to have it in his life.

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**Chapter 2**

**Review of Literature**

**Chapter 2**

**Review of Literature**

Here we will elaborate the aspects like the literature survey of the project and what all projects are existing and been actually used in the market which the makers of this project took the inspiration from and thus decided to go ahead with the project covering with the problem statement.

**2.1 Literature Survey**

The paper [1] has introduced a smart pet feeding machine enabling pets and pet owners to post photos to share a pet’s daily routine on Facebook. Pets can send a photo through the pedal pressing of the NuriPet machine. In addition, the machine feeds pet automatically when pet owners remotely control it through the NuriPet application. To implement the machine, a pet feeder was designed and was printed using a 3D printer. Then a Raspberry Pi, camera, pedal, and servomotor was added to the pet feeder. Through the feeding machine, pets can open a tray for foods and take a shot to send to social network service.An Android application was also developed to control the machine remotely. Using the application, pet owners can control the machine whenever and wherever. Also, pet owners can check their pet’s photos and write stories for sharing their friends.

The paper [2] tested semi-automatic crayfish farm system. Semi-automatic crayfish farm system can be used in crayfish farm and control growth factor in crayfish by demand. Test processes are as follows.

● Test method crayfish farm by the semi-automatic crayfish farm system.

○ Operative crayfish farm by the semiautomatic crayfish farm system in order to observed crayfish can grow in farm or not.

○ Feeding and cooling water system were controlled automatically by the web application.

● Test method control water temperature.

○ Set up cooling water system by web application in order to turn on or off the machine automatically.

○ Make a note of the farm and show results on the web application.

● Test method transfer water.

○ Because testing of crayfish farm is done by semiautomatic crayfish farm system is in a short period so, cannot set up automatic water transferring. So test transfers waste water by self-command on the web application.

○ Water transfer test is simulated on normal crayfish farm that there were crayfishes in the farm in order to show that the water transferring cause no harm to crayfishes.

● Test method for feeding.

○ Set feeding through web application in order to ensure that the system feeds through feed hole.

○ The frequency and amount of feed times was set on web application.

The paper [3] includes the 2 implementation i.e. intelligent pet door and pet feeder. Pet doors are one of the most common production in the today's market. The pet door consists of a flap, horizontal axis to swing against the force of gravity when pushed by an animal. This door is designed with magnetically operable latches. Now, the other implementation is based on automated feeding machine can provide food. For this technique we require some components like a feeding bowl, a timer platform, a bowl cover, handle to bowl cover and locking mechanism. This can be done by programming of the timer and IR remotes. Here some intelligent pet doors and pet feeder compromises of animal detector and sensors, a pet wears the sensing tag on the collar as track node, using OCTUPS-X (WSN platform), on the other hand pet eating schedule through the web page remotely. According to this implementation, the system can overcome the drawbacks of traditional products.

**2.2 Problem Statement:**

Before buying a pet, the to-be owner thinks a lot as he is responsible for the well-being of the innocent creature. The busy schedule of the people in today’s generation is a very big hindrance to the idea of having a pet. Owners worry a lot about not being able to be there for the pet and not being able to feed the hungry pet on time, as they have to be there at work to meet their requirements.

Due to world’s massive growth of networking and rise of job requirements, owner is uncertain most of the time. To ease the doubt of the owners, the ‘Automatic Pet Feeder’ system is introduced to give confidence to the owners about having a pet. The owner can remotely feed the pet with the click of a button, thus ensuring the timely nourishment of the tamed and well-being of the domesticated.

**Chapter 3**

**System Analysis**

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**System Analysis**

System Analysis will cover the topics like the Functional, Non-Functional and the specific requirements of the project and touching all the software and the hardware requirements as well.

**3.1 Requirements**

Requirements and Specifications Marketing Requirements

1. The user should be able to wirelessly connect to the Automated Pet Feeder system.
2. The user should be able to add and remove pets from the feeder system.

3. The user should be able to assign a feeder to a specific pet.

4. The user should be able to modify a pet’s feeding time and food amounts.

5. The user should be able to monitor a pet’s overall dietary habits.

6. The overall ability to feed one to several animals independently.

1. The capacity for a multi-day food supply.
2. The feeders should only dispense dry food.
3. The device should be capable of long-term reliability for continued operation.
4. The device should have a level of dispensing precision to work with different animals.
5. The device can easily be set up wirelessly.
6. Multiple devices should be easily set up for scalability.

**3.2 Concept Selection**

Concept selection for the proposed project comprises of a lot of prior studies and analysis of the existing system, to come up with a similar system with modification or improvements.

**3.2.1 Existing Systems**

The Feed and Go Smart pet feeder are a Wi-Fi enabled automated pet feeder that allows a user to remotely feed a pet, and it also comes with a smartphone application that can modify a pet’s feeding schedule and food amount.

Moving away from existing general feeders, more macro components must also be considered, specifically the mechanism being used to dispense the food from the container. This mechanism must have fine control of dispensing food and also be mechanically sound enough to avoid jamming and binding along the path of the food. Several dispensing mechanisms were found in practical scenarios. The first mechanism is the paddle-based dispenser seen in cereal dispensers. These are simple but often bind and do not have very fine control. The second mechanism is the sliding door dispenser. This is a simple open and close sliding door that would rarely experience any binding but would be very difficult to control portions. The final mechanism is the feed screw, or auger. This design uses a helical screw to push food along a pipe. Small amounts of food fall between each screw blade and are pushed by the rotating motion. This allows for precise feeding as well as a design that mitigates binding on the edges.

**3.3 Functionality**

The final result of our project design accomplished the main goal of designing an automated pet feeder. The remote component was able to acquire and implement a feeding schedule and the feeder component was able to refill the pet bowl at appropriate times and to the appropriate amount.

**3.3.1 Food Container**

A cereal container was used to contain the pet food. The wheel in the cereal container was connected to a servomotor so that when the motor was turned on, the wheel was turned, and the food would be dispensed. Initially, we had a lot of difficulty getting the wheel to turn as there was too much friction and the pet food was too heavy. The servomotor provided by the DC motor was insufficient in turning the wheel. Friction was minimized by cutting down the flaps of the wheel which reduced the contact between the wheel and the sides of the cereal container. The cereal container was also tilted at an angle to reduce the weight of the pet food on the wheel. The motor and cereal container was then taped down into position using duct tape and a box to hold the cereal container in position.

**3.3.2 Speed of Execution**

Since feeding times were accurate to the minute, speed of execution was not an issue since the process of refilling the pet bowl at a specified time could be completed within a minute. More specifically, the IR transmission of the refill bowl instruction and the subsequent refilling of the pet bowl took less few minutes.

**3.3.3 Accuracy**

The final design was able to meet the accuracy requirements as set in our project expectations.

**3.3.4 Usability**

The usability of our project as an actual pet feeder is inhibited by the limitations of our mechanical design. Realistically, the feeding component of our device would be susceptible to a rowdy pet who tried tampering with it. However, with the current set-up using duct tape and cardboard boxes, the structure of the pet feeder is not ideal and could be made more stable with better materials.

However, from a user point of view our project is simple to use. The user interface on the remote is instinctive and easy to navigate. Storing schedule and timing information into EEPROM also makes the design very robust. All that is lacking is a timing device that is active even when the remote is turned off.

**3.4 Security**

Safety and security of the product, after it is made, is of equal importance as the procedure to actually make the product.

**3.4.1 Safety and Interference**

Safety was not a concern in our project since all components excluding the MCU and motor ran on 5V. Also, there were no heavy objects in our design or direct connections to the human or pet body. Interference was also not an issue since our signals were transmitted over a very small distance.

**3.4.2 User Interface**

The risks associated with developing the user interface mainly have to do with the overall unfamiliarity with Android application development and limited experience with networking and databases. A thorough amount of research and documentation available online will be used to alleviate these risks.

**3.4.3 Constraints and Considerations**

Apart from all the requirements, functionalities stated above, there are certain constraints and considerations as follows:

**3.4.3.1 Extensibility**

This project can be extended for other applications. The Automated Pet Feeder can be used to feed various kinds of animals, or it could be repurposed to monitor people’s feeding habits. Additionally, this project is been designed with scalability in mind from the beginning. It can easily accommodate many additional pets and/or feeders.

**3.4.3.2 Reliability**

Due to the nature of a pet feeder, the device must be extremely reliable and should never fail to feed. This means that any code written will be tested for long term continuous runs. The dispensing unit will also need to run without binding or jamming. Utmost care will go into the reliability of the drive unit, as the unit may be awake and running but no food will be able to come out due to a jam

**Chapter 4**

**Design**

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**Design**

Design will elaborate the step by step flow of Automatic Pet Feeder system.

**4.1 Flowchart**

Flowcharts are used in designing and documenting complex processes or programs. Like other types of diagrams, they help visualize what is going on and thereby help the people to understand a process, and perhaps also find flaws, bottlenecks, and other less-obvious features within it. There are many different types of flowcharts, and each type has its own repertoire of boxes and notational conventions. The two most common types of boxes in a flowchart are:

* A processing step, usually called *activity*, and denoted as a rectangular box
* A decision usually denoted as a diamond.

A flowchart is described as "cross-functional" when the page is divided into different swim-lanes describing the control of different organizational units. A symbol appearing in a particular "lane" is within the control of that organizational unit. This technique allows the author to locate the responsibility for performing an action or making a decision correctly, showing the responsibility of each organizational unit for different parts of a single process.

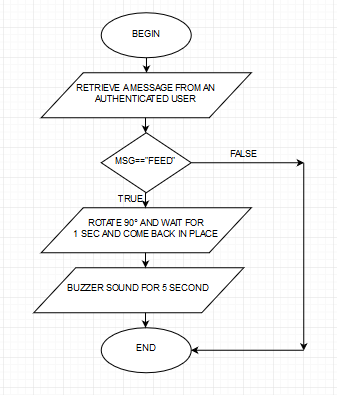


Figure 4.1: Flowchart for Automatic Pet Feeder system.

**Chapter 5**

**Implementation Details**

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**Implementation Details**

This chapter will give all the Implementation details and methods used to implement the Application in brief.

**5.1 Implementation**

The hardware kit consists of Node MCU, buzzer, a servo motor. The supply of power from a portable Battery or power bank from a type B USB cable. Here Node MCU acts as Microcontroller, a gateway and with the help of embedded Wi-Fi module makes connection and use of internet easy and efficient. Using the concept of IoT, Node MCU and through Blynk application we can implement our project in effective manner to serve food as required.There is a wireless connectivity between System and the smartphone, which provides us with the necessary information.

The main requirements to implement automatic pet feeder are:

**Hardware requirement:**

1. Node MCU

2. Servo Motor

3. Buzzer

4. Jumper Wires

5. Bread Board

6. Power Source

7. Type B USB

**Software Requirements:**

1. Blynk application

2. Arduino IDE

3. Various library

**Physical Requirements:**

1. A bowl

2. Cardboard

3. A food container

4. A stand

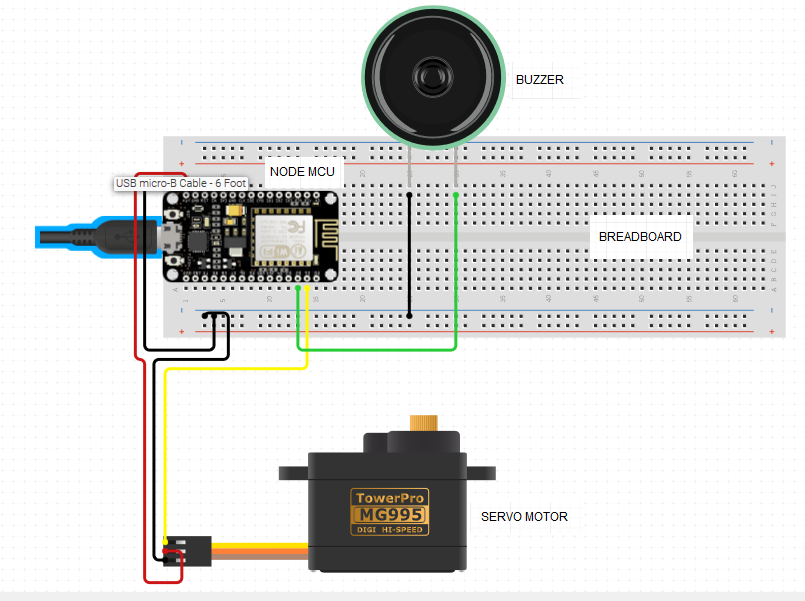


Figure 5.1: Design implementationfor Automatic Pet Feeder system.

SERVO MOTOR NODE MCU

GND -------------------------- GND

POWER -------------------------- 3.3v

YELLOW WIRE -------------------------- GPIO15

BUZZER NODE MCU

GND -------------------------- GND

RED WIRE -------------------------- GPIO2

**The basic Algorithm for the implementation is as follow:**

Step1: Node MCU is powered up and it is made sure that the food container contains food.

Step2: The user from a distant place wishes to feed his pet.

Step3: He starts the Blynk application and presses the button “FEED “. That’s it, the work of user is done.

Step4: The message is sent over the internet and received by Node MCU, it verifies the authenticity and rotates the servo motor by 90 degree so that the food from the container is served into the bowl then makes the buzzer sound letting the pet know that it’s time to eat Yumm-Yumm.

**CODE:**

#include <ESP8266WiFi.h>

#include <BlynkSimpleEsp8266.h>

#include <Servo.h>

// You should get Auth Token in the Blynk App.

// Go to the Project Settings (nut icon).

char auth[] = "2oReKW--MKgmuahvpKhH9ujcK2dsDhjr";

// Your WiFi credentials.

// Set password to "" for open networks.

char ssid[] = "good luck bud";

char pass[] = "hellodemocheck";

Servo servo;

int frequency=1000; //Specified in Hz

int buzzPin=2;

int timeOn=5000; //specified in milliseconds

int timeOff=1000; //specified in millisecods

BLYNK\_WRITE(V3)

{

int button=param.asInt();

if (button==1){

servo.write(0);

delay(1000);

servo.write(90);

tone(buzzPin, frequency);

delay(timeOn);

noTone(buzzPin);

delay(timeOff);

// Make servo go to 90 degrees

button=0;

}

}

void setup()

{

// Debug console

Serial.begin(9600);

Blynk.begin(auth, ssid, pass);

servo.attach(13);

}

void loop()

{

Blynk.run();

}

**Chapter 6**

**Conclusion**

**Chapter 6**

**Conclusions**

**9.1 Conclusion**

* Thus, using IOT in the making of an Automatic Pet Feeder, we can ensure that there is better communication, connectivity and reliability between the owner and the pets.
* One can look over that the pet is safe by timely release of food and avoid the starvation of the little creature.
* Lastly, via the speaker, the pet can have the feeling of the owner being about him, to keep happy and enthusiastic, even when the owner isn’t around.

**9.2 Future Scope**

* The main purpose of this project to bring an animal lover and its lovely pet closer to each other. However, there is scope for further development.
* We can add motion sensors and make our system fully automated.
* By adding an additional software, we can keep track of all the pet that one has and provide the necessary amount of food for that particular pet.
* By implementing a monitoring camera and connecting it with our smartphone we could monitor our pet in real time.

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