



Development of Real Time Cat Auto Feeder Dispenser Using Arduino

Safuan Naim Mohamad¹, Nurul Huda Mat Tahir^{1*}, Ahmad Hakimi Marzuki¹, Farah Hanan Azimi¹, Suzanna Ridzwan Aw¹, Wan Faizura Wan Tarmizi¹, Muhammad Luqman Muhd Zain¹

¹ Faculty of Engineering Technology, University College TATI, 24100, Kemaman, Terengganu, MALAYSIA.

*Corresponding author: nurulhudamt@uctati.edu.my

| KEYWORDS | ABSTRACT |
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| Automatic Cat Feeder Pet Food Dispenser Arduino Ultrasonic sensor | <p>The most prevalent problem that cat owners confront is feeding. Certain pet owners have a very hectic daily routine at work, so the cat leave alone for a day or days while the owner attend to other activities, training, or business concerns outside the house where the pet is not allowed to come in together. As a result, the automatic cat feeder was created to help the cat to be always fed without the owner presence. This project explains about designing and developing an automatic pet feeder which unlike the ordinary automatic cat feeding product. The automatic cat feeder invented not just feeding the cat on time but also controlling the cat diet by just feeding it sufficiently. Using ultrasonic sensor to sense the level of cat food inside the bowl, the amount of food can be controlled and released accordingly. Thus, it leads to reducing in food wastage. This project was developed using Arduino Uno used as the main controller to program the desired output. Real Time Clock (RTC) used as well to keep track the real time operation of the feeder. The result shown the servo motor activated by the Arduino once the feeding time comes and fill up only until the bowl is full.</p> |

1.0 INTRODUCTION

It is common that any pet needs to be cared for, and the owner must be present to do it. Some pets are unable to control their eating habits and will eat as long as there is food available. When an owner has to leave their pet for an extended period of time and no one is available to look after them, a problem arises. As a result, a system that can automatically feed the pet without the presence of the owner is required to remedy the problem and ensure that the pet remains healthy (Gelila et.al., 2014).

A gravity feeder is one of the types of pet feeder, consisting of a container full of food that falls into a bowl as the bowl is emptied by the pet (Babu et.al., 2019). This type of feeder enables the pet owner to ensure that their pet has access to food throughout the day or for a longer amount of time, and it does so without the need of human power, instead relying on gravity (Andi et.al., 2016). It also has no effect on the amount of food consumed by the pet. There are pet feeders on

the market designed to provide regular feedings to pets even when the owner is not home called as auto feeder (Seungcheon, 2016).

Another researcher (Delgado et. al., 2020) design prototype of food auto dispenser by using the Raspberry Pi to improve the feeding of pets at home. It was shown that the Raspberry Pi is a versatile tool because it assisted the communication with the motor driver, sensors, and motor stepper so that the food slides when the animal approaches. According to the results of this study, the dispenser design will have a good societal influence whereby benefiting both family members and pets and making pet feeding more convenient.

A phone controlled automatic pet feeder built by (Babu et.al., 2019) that can dispense the correct amount of food on time, based on the type of animal that demanding it. The project used Arduino Mega aim for providing convenience to owners by helping them feed their pets easily. Owners will be able to feed their pets the exact amount of food by setting it on the phone app. The data will be sent over Ethernet to the PCB, which will then transmit signals to the food distribution gates.

Automatic cat feeder and location tracker invented by (Nur and Nadilah., 2020) is a stand-alone module Arduino UNO and Node MCU ESP8266. Together with appropriate sensor types such as ultrasonic sensor, servo motor and GPS module tracking position. The developed product able to feed pets while owners are not available at homes. Through the use of mobile application, owner can click button to the system for the bowl to be refilled. Also, the system sends notification to the owner when there is critical level on food and water on the bowls. Therefore, it can help pet owner be aware of pet whereabouts by tracking the location. The outcome of the project is a fully functioning prototype that can interact remotely via Mobile Application.

A system of programmable Pet Feeder was proposed by (Gelila et. al., 2014) using microcontroller. According to this article, this project is developing a programmable pet feeder that depending on the rotational speed of a DC motor and give the pet owner the advantage of dispensing food. A stepper motor is used for speed control and a DC motor for food dispensing. The time schedule for each segment can be set by the pet owner to achieve the objectives of this project.

Auto feeder come in handy since pet keeping necessitates continuous commitments and time consuming (Vania et.al., 2016). It provides convenience to the pet owner by assisting them in feeding their pets while they are away from home for work or vacation. Being preoccupied with a personal goal, keeping track of your pet's diet on time and correctly can be difficult. The cat necessity which needs to be feed regularly but not leads to overeating and obesity would goes ashtray. All those concerned raised leads to development of real time cat auto feeder dispenser system benefiting not only the cat but also the owner.

2.0 METHODOLOGY

This project possessed two inputs which is ultrasonic sensor and real time clock (RTC), a microcontroller using Arduino Uno and a servo motor as output. Similar to radar and sonar, ultrasonic sensors are used to analyze targets by evaluating reflected signals. The distance of an object can be known by measuring the duration between transmitting a signal and getting an echo. In this project ultrasonic sensor will calculate the level of food inside the bowl while RTC utilized to keeps track of the current time notifying Arduino on the feeding time. RTCs is chosen because it features a backup power source, which allows to keep track of time even if the primary power source fails or is unavailable. The alternate source of power for RTC is using a lithium battery.

The microcontroller which is Arduino Uno is an open-source microcontroller board used in this developed system. Arduino board is known equipped with sets of digital and analog input or output pins interface. Finally, the servomotor acts as an output, allowing the food grain to flow from the container into the bowl. It is a rotary or linear actuator that can control angular or linear position, velocity, and acceleration precisely. The servo motor will move 90° once activated to allow the food released from the container inside the bowl. Once the food level reaches the

maximum level, the servo motor will slide back to initial position stopping the food flows. Figure 1 shows the block diagram of the project.



Figure 1: Block Diagram

There are three feeding time set on daily basis which is on 9am, 3pm and 9pm. When the feeding time comes the ultrasonic sensor will sense the food level inside the bowl and send the information to Arduino Uno. If there is no food or not enough, Arduino will send instruction to release the food by activating servo motor. If the food is still available or at maximum level the servo motor did not activate to release the food. Figure 2 show the flow chart of the system.

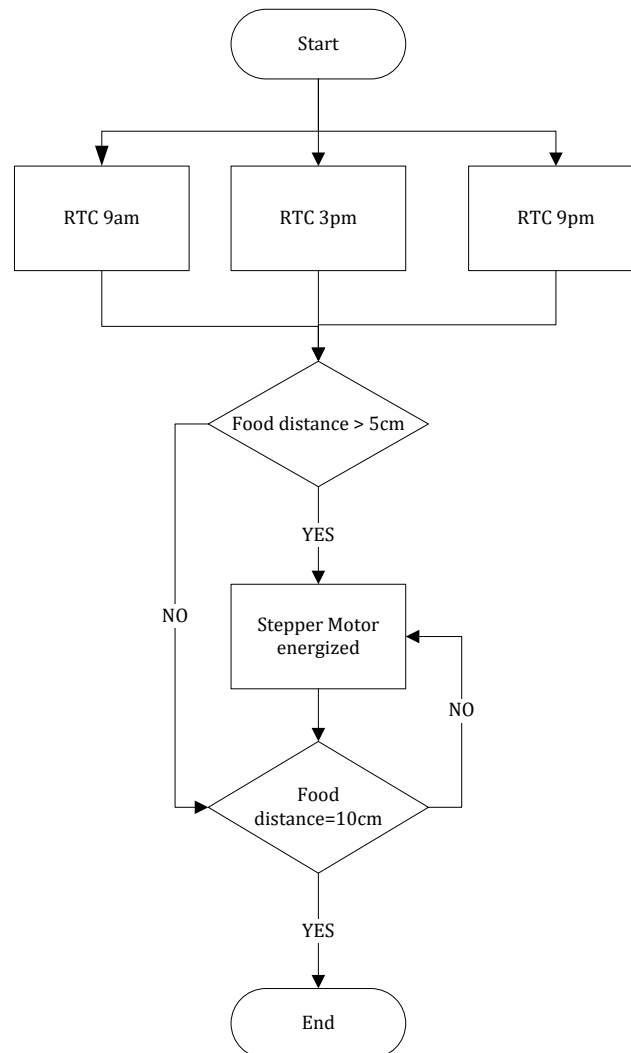


Figure 2: Flow Chart

Before constructing the circuit, it initially has been drawn and test using Proteus software. These facilities the further processed in constructing the circuit physically and subsequently determining whether or not the circuit employed is functional. The RTC is connected to analog pin 4 and 5, ultrasonic sensor to digital pin 10 and 11 and servo motor to digital pin 5 as shown in Figure 3.

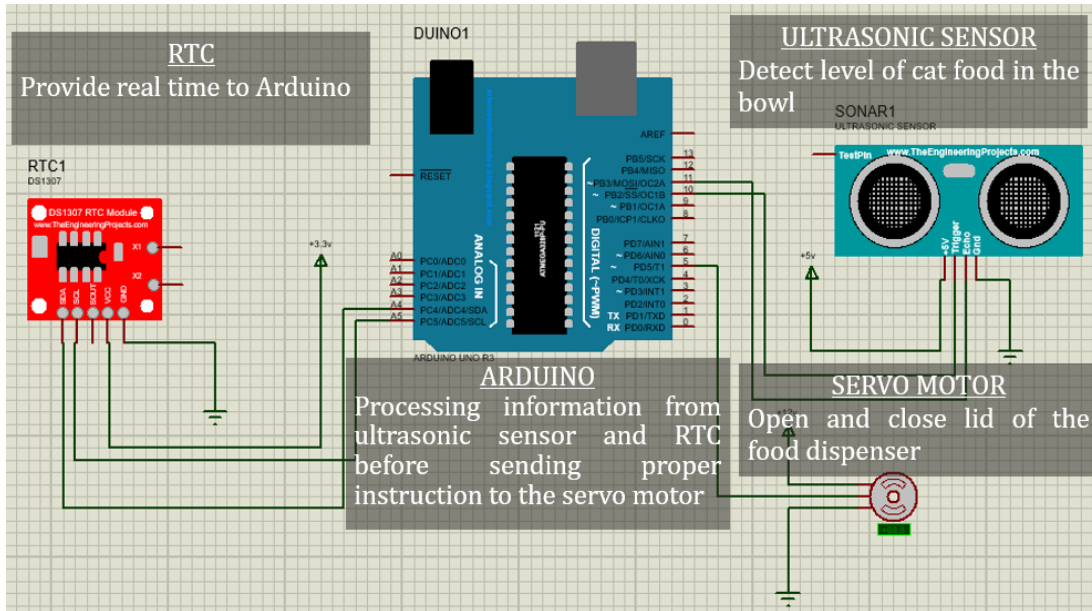


Figure 3: Schematic Diagram

For this project, particle board was used as a platform, and a canister with a plastic bottle inside was set on top as a food container. The table's bottom is equipped with an ultrasonic sensor that detects the level of food in the bowl and a servo motor that releases the food from the container. The microcontroller was slot in a junction board that was placed beside it. For the purpose of clarification, Figure 4(a) shown the hardware top view, Figure 4(b) reveal the top view and Figure 4(c) present the side view.



Figure 4(a): Front View



Figure 4(b): Top View



Figure 4(c): Side View

3.0 RESULTS AND DISCUSSION

This project developed an automatic real time cat feeder system which only applies for grains food type. Once each feeding time comes notified by RTC, the ultrasonic sensor will measure the level of food in the bowl. The food level measured by the distance between sensor to the food surface. The minimum distance which is between the sensor and the bowl's bottom is 10cm, while the maximum level is 5cm. When the sensor detects a distance of more than 5cm between the ultrasonic sensor and the food, Arduino will power up the servo motor. Servo motor energized and the food released from container into the bowl. The servo motor will keep energized until the sensor detect the food level reaching back to maximum level at 5cm. However, when the food level still on 5 cm on the feeding time, the motor will not be activated, implying that the cat may not consume the food at all. Table 1 shows the results for three days for each feeding period, which is 9 a.m., 3 p.m., and 9 p.m.

Table 1: System demonstration

| Day | Time | Distance between ultrasonic sensor to food surface (cm) | Servo Motor |
|-----|------|---|-------------|
| 1 | 9am | 10 | ON |
| | 3pm | 8 | ON |
| | 9pm | 7 | ON |
| 2 | 9am | 9 | ON |
| | 3pm | 8 | ON |
| | 9pm | 5 | OFF |
| 3 | 9am | 10 | ON |
| | 3pm | 8 | ON |
| | 9pm | 6 | ON |

Figure 5 shown the graph of food consumption for one week compared to gravity cat feeder with 5 liters of capacity. The gravity cat feeder will pour itself once the cat eats the food and it always filled the bowl. The cleared space will allow the dry food to slide out from the upper container using gravity. It does not control the food consumption as well as cat diet. Real time cat auto feeder shown lower in food consumption compared to gravity feeder which reducing the food leverage up to 33.94%.

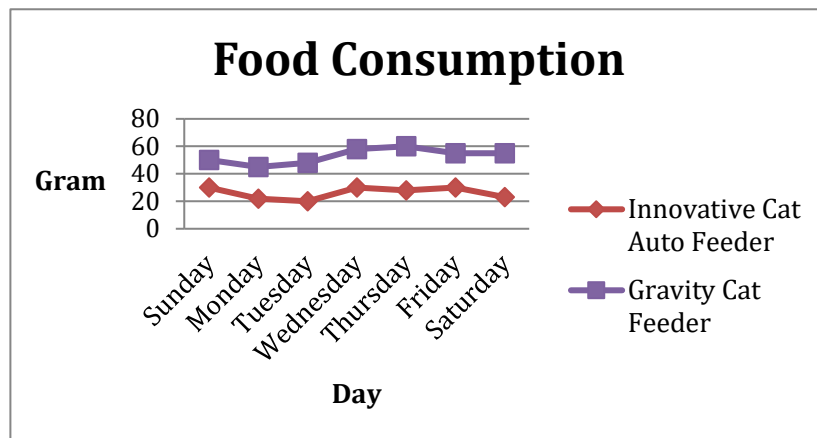


Figure 5: Food Consumption

4.0 CONCLUSION

As a result of the demonstration, the real time cat auto feeder dispenser yielded a positive result and functioned properly. These systems assist the pet owner in being more organized in regard to feeding the pet and preventing them from becoming malnourished, particularly when the owner is absent due to extended working hours or unexpected journeys. It has been revealed that automatic real time cat feeder is a versatile tool since it not just helping in feeding the cat on time but also controlling the pet diet by only releasing food if the bowl not at the desired maximum level. Thus, while achieving the design goal, it also able to sustain food level avoiding unnecessary spilled food that also leads to leverage. The application was successfully tested in real time environment and satisfactory result is achieved.

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