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Research Paper

Internet of Things based Auto-Feeding Machine for Animals

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Abstract— *Pets are now often seen as essential members of the family. However, caring for pets can be a bother, especially if no one is there to supervise them. Most pet owners aren't able to stay home all day to provide their animals the nutrition they require, but that shouldn't stop them from trying. That is why using NodeMCU to create a Pet Feeder makes sense. With the use of the Time Scheduling technique, the owner can feed their pets at a pre-determined time without having to be present at the feeding spot. In order to create this system, the Waterfall method was applied. Requirement Analysis, Design, Implementation, and Testing are the four stages of this process. In the early stages of the software development lifecycle, iterative waterfall methodologies will yield working software that is quick to implement. As a second benefit, pets can be fed when their owners are away, freeing their owners to focus on work or travel rather than worrying about their pets' feeding needs. Owners may feed their pets from afar, and their pets are fed at the proper time, thanks to this project's success.*

Keywords—*IoT, Auto-feeding machine, NodeMCU, Servo Motor, Ultrasonic Sensor.*

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I. INTRODUCTION

Cats are the most popular pets in the world, according to Hodgson & Barton (2015), and it's easy to see why. British Short Hair, American Short Hair, Bengal Cat and Persian Cat are just a few of the many varieties of cats in existence. In India, the number of cats being pampered is on the rise.

Many families are asked to take on the responsibility of caring for their pets, but they may lack the necessary skills to do so (Russo, Vergnano, Bergero, & Prola, 2017). Concern, companionship, and—most importantly—feeding pets correctly and on schedule all play a role. Not everyone is an expert when it comes to caring for pets, therefore it can be difficult and time consuming to keep track of their food. Overeating and obesity are two of the most common health issues for pets. Excessive fat in pets, like in humans, raises the risk of several preventable health problems (Increase et al., 2015). Most children, especially those who are still young, are content with as little as is offered to them.

Using a smartphone application or by hand, the Pet Feeder with NodeMCU can assist pet owners in feeding their animals. This system also offers the ability to feed your pet, schedule a feed, save your pet's name, and monitor the amount of food remaining in your container.

II. PROBLEM STATEMENT

As the world becomes increasingly interconnected, people are increasingly opting to spend their free time away from home. Stress has a detrimental effect on our well-being, and having a pet to lean on seems to alleviate that impact. While pets can provide companionship and fulfil their owners' needs, their owners are often unable to provide for their dogs' most basic needs, such as food and water. Until recently, pet owners had an issue with how to feed their pets while they were away from home.

To ensure that their pets receive the greatest possible support and care, pet owners are being reminded that they have made an additional investment of time and effort. "Quality pet food is in ever-increasing demand in Asian markets, according to industry data (Balzer, 2015)." Unfortunately, pet owners who aren't home on a regular basis don't have the energy or time to properly feed their animals. Traveling and working on the side will be difficult for them. The pet owners' predicament can lead to unanticipated animal cruelty because of a lack of food. After some haunting asks, pet owners may find themselves having to ask family and friends to babysit their pets while they are gone.

NodeMCU-powered Pet Feeder with Mobile App will make life easier for pet parents as well as their four-legged family members. It is developed to ensure that the difficulty that pet owners face will be solved. There's a good chance that it will raise awareness among pet owners about the benefits and feasibility of utilising a Pet Feeder with NodeMCU using a Mobile Application in the future.

III. OBJECTIVE

Here, we're going to look at some of the most common sensors, as well as remote sensors and control systems, and automatic feed dispensers for livestock. Extensive research was carried out, and numerous academic articles and conference proceedings were examined for relevant material on the subject. The use of technology to remotely control a number of operations is becoming increasingly prevalent in today's society. There are many ways to entirely automate the feeding process using MCU's and a well-designed feed distribution system, resulting in a significant reduction in labour expenses on a big scale.

IV. PROPOSED METHODOLOGY

The flowchart of the IoT-based Auto-Feeding Machine for Animals is shown in **Fig. 1**.

This flowchart shows the Entire process of Our Project. Based on the flowchart we can know every process How it works, and How it runs. Flow chart configures the detailed matter. In the flowchart, we can imagine the Entire program.

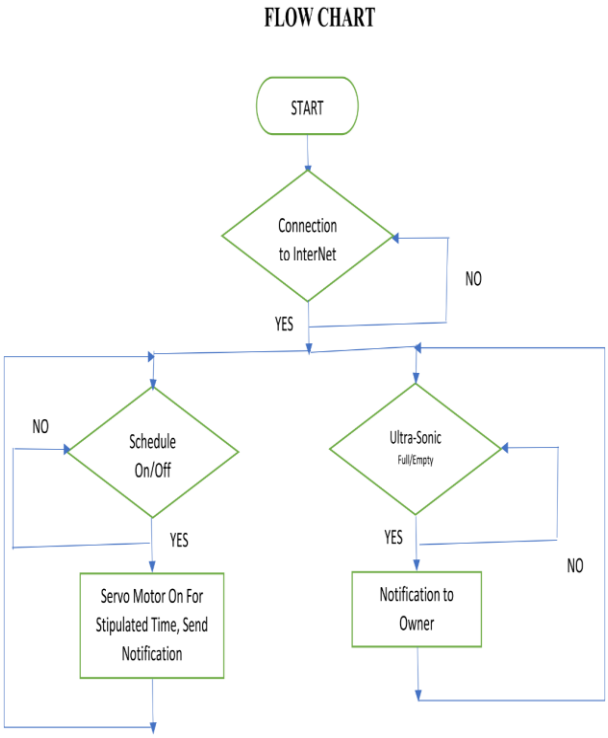

Fig. 1: Flowchart of IoT based Auto-Feeding Machine for Animals

1. Ultrasonic Sensor

HC-SR04 Ultrasonic Sensor with the ESP8266 NodeMCU board using the Arduino core. The ultrasonic sensor uses sonar to determine the distance to an object. We'll show you how to wire the sensor to the ESP8266 and provide several example sketches to determine the distance to an object using the HC-SR04.

ultrasonic sensor uses sonar to determine the distance to an object. This sensor reads from 2cm to 400cm (0.8inch to 157inch) with an accuracy of 0.3cm (0.1inches), which is good for most hobbyist projects. In addition, this particular module comes with ultrasonic transmitter and receiver modules.

2. **NodeMCU**

The NodeMCU ESP8266 development board comes with the ESP-12E module containing the ESP8266 chip having Tensilica Xtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and operates at 80MHz to 160 MHz adjustable clock frequency. About NodeMCU Brief has 128 KB RAM and 4MB of Flash memory to store data and programs. Its high processing power with in-built Wi-Fi / Bluetooth and Deep Sleep Operating features make it ideal for IoT projects.

NodeMCU can be powered using a Micro USB jack and VIN pin (External Supply Pin). It supports UART, SPI, and I2C interface.

Servomotor interfaced with nodemcu esp8266 12e: Controlling servo motor over WiFi

You will learn how to use the nodemcu esp8266 WiFi module to control a servo motor in this tutorial. The nodemcu serves a web page that lists all of the servo motor controls. The web page can be accessed by connecting to the nodemcu esp8266. Users must enter the server's URL in order to open the web page in a browser. Servo motors come in two flavours: ac and dc. Ac servos use a lot of power because they operate on alternating current. Because they have so much power, they can lift heavier objects. There are numerous industrial uses for AC servos Ac servos are able to precisely move their shafts to any angle or position. To alter the control variables, they employ a controller that has a feedback mechanism built in. In contrast, dc servo motors are commonly used in medium-sized applications, such as toys. Servo motors, both ac and dc, are capable of a full 360-degree rotation in both directions. Any servo motor controller on the market can be used to regulate the speed and velocity of servo motors.

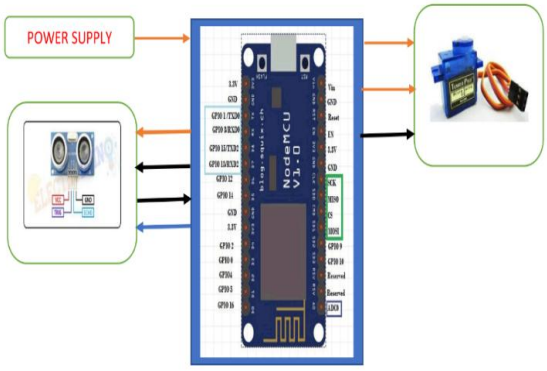

Fig. 2: Schematic of NodeMCU with HC-SR04

Fig. 3: hardware setup of Animal feeder

V. RESULT

An automatic pet feeder works well and accomplishes its goal of feeding a pet when its master is not there. Powered by a 9-volt DC supply, it operates. In the NodeMCU application, the propeller is rotated by a servo motor, and food is supplied to the plate in the same way. The time is obtained from an NTP server that is linked to the internet. The microprocessor activates the servo motor to feed the food if the time is within a

predetermined range. Notifications are also sent to check on the status of the food containers. Every time food is fed, a pushover message is sent, and an LCD display has been added to the hardware so that we can see if the food has been fed. For example, if there is 100 percent of food, the Ultrasonic Sensor will not notify us; if there is 60 percent of the food, the Ultrasonic Sensor will notify us. This allows us to readily determine how much food has been fed.

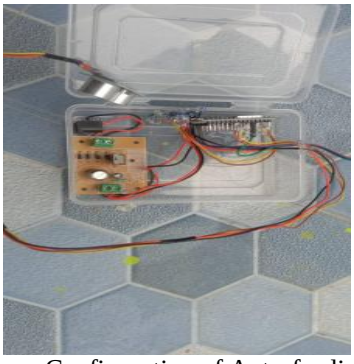

Fig. 4: Hardware Configuration of Auto-feeding for Animals

Fig.5: When the timer is off food will not feed

Fig. 6: When the timer is on food will feed

VI. CONCLUSION & FUTURE SCOPE

The relationship between humans and physical gadgets and items is becoming more and more important. Innumerable research projects have attempted to develop a method that is both natural and intuitive for requesting help. It's interesting to see the current trend of integrating pet control and IOT technologies. The smart pet door and pet feeder are also referenced in the planned system. The results show that the IOT technology's pet monitoring system can suit the needs of pet owners, as well as the system's essential enhancement. There may be a new operational strategy, new ways of connecting devices, or even an entirely clean-slate approach to the "Internet of Things (IoT)". Even if the operational definition is complete, there are still a slew of unresolved research questions. The next phase will be to fully connect our system with additional pet care devices, such as litter boxes, pet cameras, and so on. As a result, pet owners' varying demands can be satisfied, and their pets' interests in terms of health, safety, and amusement can be met as well. With the cloud

concept in place, the next question is how to connect all of these different networking devices. In the future, our focus will be on IOT gateway research and pet long-distance detection.

We were able to combine the programmes we already had and the various components into a process that performed exactly as we had hoped it would thanks to the suitable libraries and codes. We were able to develop an Automatic Pet Feeder that provides food and water at the appropriate times after a series of troubleshooting and code tweaking sessions. There are still a slew of issues with automatic pet feeders. They can add more features to our Automatic Pet Feeder, such as a camera, to better track whether or not a pet is consuming its meal, in order to conduct more in-depth study. Additionally, an RFID tag can be added to the pet's collar so that he or she can access the automatic food dispenser at any moment simply by approaching it.

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