Design of an automatic fish feeder using RTC 1307 Timer

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Abstract- In the technology of Aquatic ecosysytems and aquaculture management the integration of automated technologies has become increasing pivotal one such innovation is automatic fish feeder, an innovative system maintains the health of the fish and reduces the human error. The system offers the common challenges that owners of fish tanks and aquariums encounter when trying to keep their aquatic creatures on a regular feeding schedule. This automation improves health by providing proper nutrition and avoids overfeeding. With a user-friendly interface, the system aims to save users time and effort while promoting ease of use. Majorly three components make up the Automatic Fish Feeder: a servo motor, an Arduino board, and programmable interface. The Arduino board, which performs the preprogrammed feeding schedules and takes human input via the interface, serves as the core control unit. The servo motor accurately feeds the fish food at scheduled intervals. In the absence of a continuous power source, a real time clock module (RTC) maintains accurate timing for the system and allows it to maintain feeding schedules. By automating the feeding process of their aquatic pets, the initiative aims to increase the convenience for owners of fish tanks or aquariums.

Keywords—***Fish Feeder, servo motor, RTC1307, Arduino board***

I. INTRODUCTION

The system ensures fish to receive proper nourishment even when their owners are not there, by letting users to set up regular feeding schedules, improving the fish's health. The Automatic Fish Feeder automates the feeding process by using Arduino's capabilities. Users may design a unique feeding plan to ensure fish consume at particular intervals. This helps to provide a more stable and controlled habitat for aquatic life and maintaining the fish tanks becomes easier for the owners. Hardware for this system usually consists of an Arduino board that can be programmed, a dispenser that runs on a motor, and a fish food container. Scheduled timings are used by the Arduino to regulate the dispenser's motor, which releases a certain amount of food into the fish tank or aquarium. Software part ensures the versatility and customers may precisely adjust feeding intervals and portion quantities according to their specific needs.

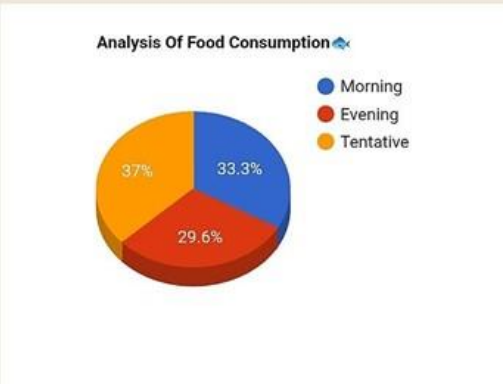

Fig. 1 Analysis of Food Consumption

II. LITERATURE SURVEY

[1] R. Swarnakar, A.Jayaranjan, Pradhan Swastik. Developed semi-automatic fish feeding system makes use of an IOT-based mobile application system. The system allows for the regulation of feeding times, enabling users to set specific times for meals to be dispensed to the fish in the aquarium. This could be achieved through the Real-Time Clock module, which can be manually configured via the mobile application The system controls the amount of food delivered to the fish

[2] Hasim, Ramalingam, Ernawan ,Puviarasi. Have Suggested that the fish feeder system utilizes a Raspberry Pi as its central component, connecting the online interface to the feeder. The system includes a webcam for monitoring functionality, a servo motor responsible for feeding, and Users can input their phone number to receive SMS alerts, and feeding times are set using five buttons on the device. Additionally, SMS notifications are triggered when the food is low.

[3] M. A. Ali1, M. M. Rahman, M. N. Hasan and S. M. Galib. proposed the Design of an automatic fish feeder specifically tailored for aquariums. The design and implementation of this feeder are carried out using AutoDesk Fusion 360, a 3D modeling software, and for it fabrication .In terms of design,basic demands of local users, balancing both cost-effectiveness and essential features. This ensures that the product remains accessible and affordable and reliable functionality.

[4] Ahmed Mohamed El Shal, Faisal Mohamed El Sheikh ,Atef Mohamed Elsbaay. Proposed design and development of cost-effective automatic feeder prototype tailored specifically to the needs of developing-country fish farmers it aims to provide precise feeding intervals and amounts, thereby enhancing the efficiency and productivity of farming operations.affordability of the prototype, making it accessible to fish farmers with limited resources.

[5] Izzeldin I. Mohd, Nurul Hikmah ,Binti Azizan Proposed the development of water quality monitoring system based fish feeder designed to meet the increasing demands for efficient monitoring in rapidly growing fish farming industry. By advanced algorithms to regulate food dispensing and detect crucial water quality parameters. Through a mobile application interface, health risks to the aquatic ecosystem. The parameters calculated and monitored by the system include temperature, phenyl, ammonia level, oxygen, nitrate levels.

III. SYSTEM ARCHITECTURE

The system design consists of a Arduino uno board, It is connected with various several components. The Arduino microcontroller, which carries out the programmed commands and acts as central component. It is user-friendly for programming and interacting with other hardware elements is provided by Arduino. The system is connected through the power adapter for the stabilization of the power supply.

A dispenser is used to discharge food into the aquarium. The servo motor is responsible for the dispenser, turns it on in accordance with the feeding schedule that has been specified. And the food is stored in the small container with the small openings, so that it is responsible for the food to drop into the fish tank

The Arduino programming language is used to program the feeding schedule. This schedule specifies the amount of food to be delivered, when it should be released from the dispenser and stored in the Arduino's memory.

The ultrasonic sensor is responsible to calculate the distance from the dispenser to the water level. Distance and time are displayed on lcd screen and while dispensing the food it displays as “Fish feeding” along with the time and distance.

The system was scheduled using the RTC 1307 timer module to enhance the consistency. After the CPU analysed the timer's data, it used that information to control the servo motor that opened and closed the fish feed.

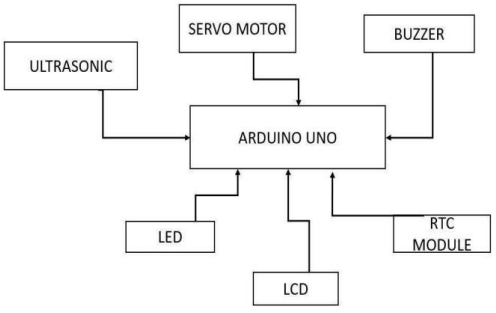

Fig.2 Block Diagram

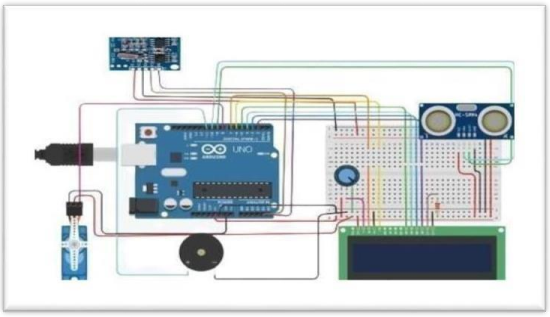

Fig.3 Schematic Diagram

IV. METHODOLOGY

Determining the feeder's precise specifications, feeding schedules, serving sizes, and any extra features like user interfaces or remote monitoring is the first step in the process. The appropriate hardware components must be chosen in the next phase. This consists of an Arduino board, a food container, a power supply, a motorised dispenser, an RTC module, and sensors or communication modules that are based on requirements. A crucial step in the process is assembling these parts, which include mounting the food container above the tank, connecting the motorised dispenser, and integrating the RTC module to enable precise timekeeping. After that, wiring connections are made to guarantee that the Arduino, motorised dispenser, RTC module, power supply, and any other components are all properly connected. For the system to function as a whole and to prevent confusion, the links must be arranged rationally. The Arduino is then configured to manage the feeding schedule and communicate with the hardware.

The code has the ability to compute feeding intervals, read time from the RTC module, and turn on the motorised dispenser in accordance with the results. A number of parts are included in the system to automate the feeding procedure. Fish food is dispensed by the system using a servo motor on a timetable that is managed by an RTC DS1307 timer. The water level is tracked by the ultrasonic sensor, which makes sure that feeding only happens when the water level is within the target range. User contact is improved by the LCD display's real-time information on the water level and feeding schedule. A buzzer is further covered to notify users when the feeding procedure starts. The circuit creates an effective and user-friendly automated fish feeding system by merging precise timing, water level monitoring, and user input.

Three feedings each day are scheduled into the RTC timer module. If the fish is fed at 7 a.m., 1p.m., and 8p.m., everyday and find them waiting at these times, the fish will learn to follow a routine. Thus, meals are taken in morning, in the afternoon and in the hours between evening and night.

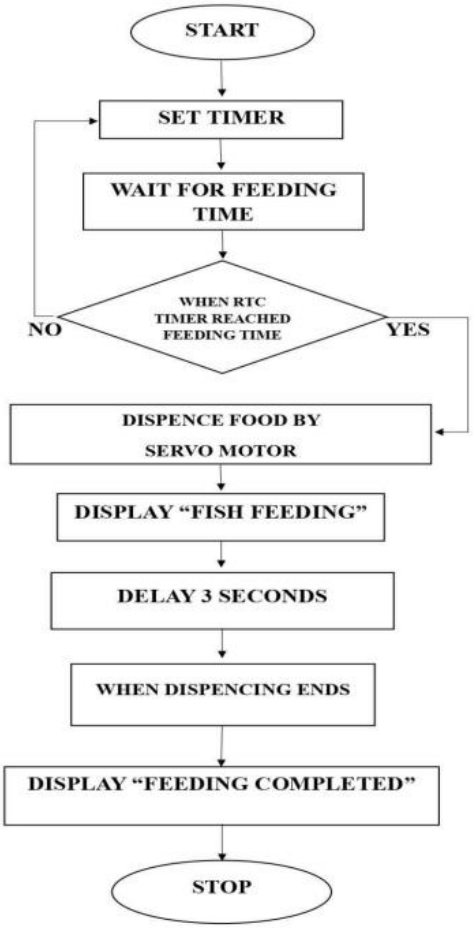

Fig.4 Flow Chart

V. RESULT

Fig.5 Prototype

A number of essential elements are included in prototype to guarantee accurate and effective feeding. The fish food is dispensed by a servo motor, which powers the entire apparatus. In order to avoid overfeeding and possible water pollution, an ultrasonic sensor keeps an eye on the water level and makes sure that feeding only happens when a sufficient water level is found. The feeding routine is more consistent when the RTC1307 timer is used to offer precise timing for planned feeding periods. The time of fish while feeding and the distance of water level in the aquarium. During the time of feeding the LCD display shows as fish feeding schedule in real time.

Furthermore, a buzzer is incorporated to deliver auditory notifications, the users are instantly notified when feeding occurs. The device seeks to provide fish with an effective and self-operating feeding method.

Fig.6 LCD Output

Fig.7 LCD Output

S.no.	Water Level	RTC	Status
1	4cm	7am morning	Feeding Done
2	5cm	9am morning	No Feeding
3	5cm	1pm afternoon	Feeding Done
4	5cm	5pm night	No feeding
5	5cm	8pm night	Feeding Done

Fig.8 Data Analysis of System

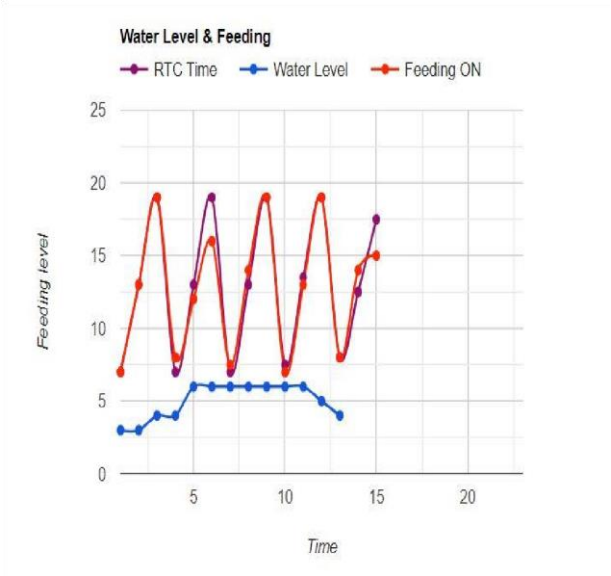

Fig.9 Time-Dependent Variation in Feeding Levels

The above image represents a detailed graph showcasing the relationship between water level fluctuations and feeding times within a given duration. Divided into two primary sections, the graph's upper portion illustrates the changes in water level over time, labelled "RTC Time" and "Water Level." Meanwhile, the lower section specifically highlights feeding occurrences denoted by "Feeding ON" and "Feeding level." The vertical axis features numerical values ranging from 5 to 25, presumably representing either water level or feed quantity, while the horizontal axis denotes time, suggesting a monitoring period. The graph employs lines and plot points to visually depict the data, facilitating easy presentation of the correlation between these two factors. Text annotations are placed to provide guidance, ensuring clarity in comprehending the graph's purpose and findings. This graph serves as a valuable tool for understanding the timing and

VI. CONCLUSION AND FUTURE SCOPE

A trustworthy and practical method of feeding pet fish is what the automatic smart fish feeder system aims to achieve. With the help of this technology, fish owners may plan regular feeding times, keep an eye on feeding amounts, and even operate the feeder from a distance using a laptop or smartphone app. Set up your electronic fish feeder so that fish are automatically fed at predetermined times of the day. By doing this, you

can make sure that your fish are always nourished. To rapidly start pouring food, you can outfit the fish feeder with potentiometers or manual control buttons. By using this method, you can feed fish at any time of day, with this level of control, you can better oversee their nutrition. Constructing an automated fish feeder using Arduino allows one to learn about software development, automation, and electronics. Combining software and hardware knowledge could produce an entertaining and educational task. An automated fish feeder manageable way to feed your fish. The equipment can be tested and carefully build to ensure your aqua pet's safety.

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