Automated Fish Feeder: Smart Feeding Made Simple

This project introduces an innovative Internet of Things (IoT) based automation system designed to dispense fish food automatically. Our system ensures precise and timely feeding, combining hardware accuracy with intelligent software for optimal aquatic environment maintenance. It promises zero human dependency, offering convenience and reliability for every fish enthusiast.

Meet our team

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Understanding the Challenge: The Need for Smart Feeding

Ensuring the health and longevity of fish hinges on consistent and accurate feeding. However, modern lifestyles often present significant hurdles:

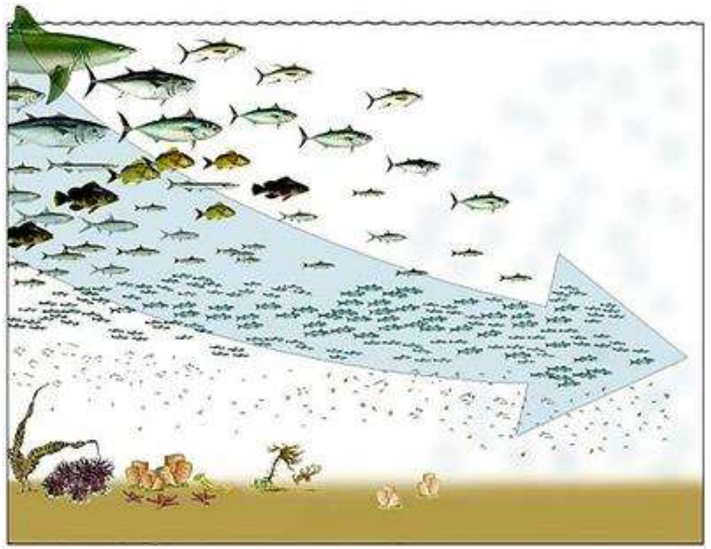
- Busy schedules and frequent travel make it difficult for owners to adhere to regular feeding times.
- Manual feeding frequently leads to inconsistent food quantities and timings, causing stress to fish and potential water contamination.
- Existing market solutions are largely timer-based, lacking the flexibility and connectivity required for contemporary smart homes.

> There is a critical need for a smart, affordable, and remotely controllable fish feeder that guarantees regular, measured feeding without constant human supervision, ensuring optimal fish health and owner peace of mind.

Benchmarking Innovation: A Review of Existing Solutions

Our research delved into current market offerings and DIY alternatives to identify key gaps and opportunities for innovation.

Brands like Eheim and Petlibro offer automated feeders, but these are typically:



Commercial Feeders

- Expensive
- Limited to fixed-time dispensing
- Lack smart integration features

DIY Arduino-based Feeders

While more affordable, these solutions often:

- Operate locally only
- Do not support remote scheduling
- Lack feedback mechanisms

Introducing the Automatic Fish Feeder

Our Automatic Fish Feeder is a sophisticated IoT-driven system designed to automate fish feeding with precision and convenience. It dispenses food based on preset schedules, remote commands, or voice activation, ensuring your aquatic pets are always well-fed.

Core Technology

The system is built around a robust **NodeMCU microcontroller**, which orchestrates the entire feeding process. It precisely controls a **DC motorized feeding drum** via a reliable relay module, ensuring accurate food dispersion every time.

Versatile Control Options

- **Mobile Application:** Intuitive control through platforms like Blynk or ThingSpeak, allowing scheduling and instant feeding from anywhere.
- **Voice Command:** Seamless integration with Google Assistant and Alexa via IFTTT for hands-free operation.
- **Manual Button:** A convenient physical button for immediate feeding when needed.

Project Objectives and Vision

Our project is driven by clear objectives to revolutionize domestic pet care, specifically in the aquatic domain.

Primary Objectives

1 Intelligent Automation

To intelligently automate the fish feeding process, ensuring precision and reliability.

2 Remote Operation

To provide seamless remote control via an IoT network, enhancing user convenience.

3 Voice Integration

To integrate with popular voice assistants for smart home compatibility and ease of use.

4 Feed Consistency

To maintain consistent feed quantities and timings, significantly reducing manual effort.

5 Cost-Effectiveness

To design a low-cost, reliable, and user-friendly system accessible to a wide audience.

Secondary Goals

IoT Application Showcase

Demonstrate practical IoT applications in the realm of domestic animal care.

Scalable Prototype

Develop a prototype that can be scaled for larger applications, including aquaculture industries.

Why Now? The Need and Scope of Our Study

The demand for smart pet care solutions is on the rise, driven by evolving lifestyles and technological advancements.

Critical Need

- **Unreliable Manual Feeding:** Manual methods are prone to human error, leading to inconsistent nutrition.
- **Precise Nutritional Requirements:** Fish thrive on accurate timing and quantity of feed, essential for their well-being.
- **Automated Management:** Automated feeders promote healthy aquatic life and simplify management for all users.

Broadened Scope

- **Diverse Applications:** Ideal for home aquariums, fish research laboratories, and commercial aqua farms.
- **Future Expansion:** Easily extendable with sensors for feed level, water quality, and motion detection, offering comprehensive monitoring.
- **Smart Home Integration:** Seamlessly integrates into existing smart home ecosystems, enhancing convenience.
- **Commercial Potential:** Positions as a viable commercial product in the rapidly growing pet care automation market.

Methodology & Technical Aspects: Building the Smart Feeder

Our Automatic Fish Feeder is engineered with carefully selected components to ensure reliability and cost-effectiveness.

NodeMCU (ESP8266)	IoT microcontroller with Wi-Fi connectivity	450
Relay Module (5V)	Safely switches the DC motor	150
DC Motor	Rotates the feeding drum for dispensing	250
Buck Converter	Steps down voltage for component safety	150
Mobile Charger (5V)	Provides stable power supply	200
Jumper Wires & Connectors	Facilitates circuit connectivity	100
Plastic Waterproof Box	Ensures safe and durable enclosure	300

Total Estimated Cost: ₹1,500 – ₹1,700

1

Power Supply

Operates on a standard 5V DC power from a mobile charger.

2

Communication

Utilizes reliable Wi-Fi IoT protocol for seamless connectivity.

Working Principle: How Our Smart Feeder Operates

The Automatic Fish Feeder integrates seamlessly into your smart home ecosystem, executing feeding commands with precision.

Signal Reception

The NodeMCU receives a signal—either from the mobile app, a pre-set schedule, or a voice command.

Motor Activation

Upon signal reception, the relay module is triggered, activating the DC motor for a precise duration of 2–3 seconds.

Food Dispensation

The motor rotates the feeding drum, releasing a carefully measured portion of fish food into the aquarium.

Controlled Operation

Feeding times and durations are fully programmable and managed through the embedded code, ensuring optimal feeding routines.

System Standby

After dispensing, the system returns to standby mode, awaiting the next scheduled or commanded feeding cycle.

Connectivity and App Functions

IoT via Cloud

Utilizes Blynk/ThingSpeak Cloud for robust IoT connectivity and data management.

Voice Assistant

Integrates with Google Assistant/Alexa through IFTTT for convenient voice control.

App Functions

Includes "Feed Now" button, scheduled feed times, and feed status indicators. Future updates to include data logging and feed-level alerts.

Prototype and Implementation: Bringing the Vision to Life

Our functional prototype demonstrates the robust capabilities and practical applications of the Automatic Fish Feeder.

Prototype Features

- **Integrated Design:** Built with NodeMCU, relay module, and a custom-modified plastic feeder drum.
- **Dual Control:** Operable via a user-friendly Wi-Fi dashboard or convenient voice commands.
- **Compact Housing:** Features a sleek, 3D-printed enclosure for the motor and feed drum.
- **Manual Override:** Includes a physical switch for power control and instant feeding.

Rigorous Test Results

- **Motor Response Time:** Consistently ~2 seconds, ensuring quick and timely feeding.
- **Feed Quantity Consistency:** Achieves an impressive ±5% accuracy in food dispensing.
- **Wireless Range:** Effective operation up to 20 meters indoors, providing flexible placement.
- **Power Consumption:** Ultra-low power usage at < 5 W, ensuring energy efficiency.
- **Performance Repeatability:** Maintained 100% repeatable performance throughout a 7-day test run.

RESULTS AND OBSERVATIONS:

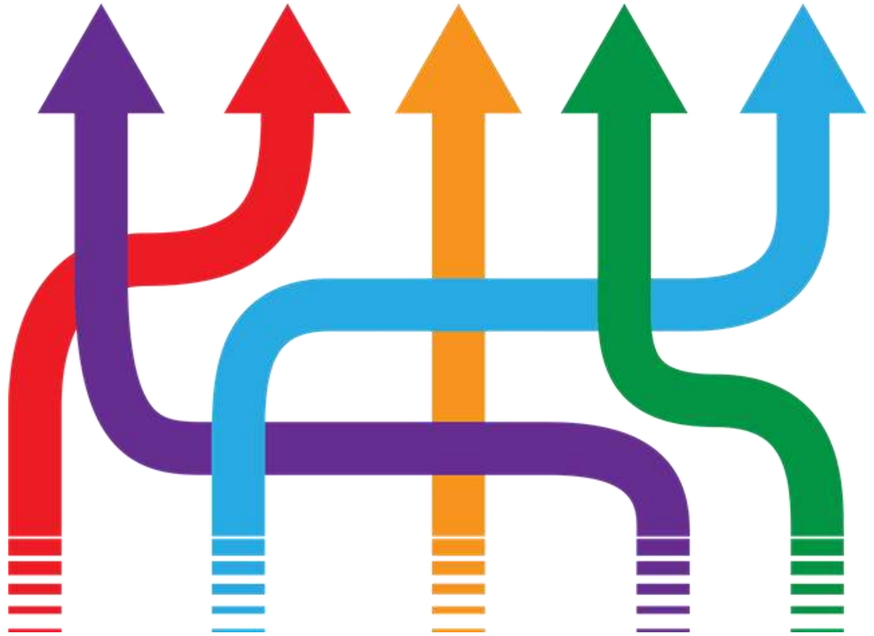
- ♦ IoT connection stable and responsive.
- ♦ Voice control success rate > 95%
- ♦ Feeder dispenses food evenly at every cycle.
- ♦ Minimal power usage and noise.

DISCUSSION(Societal Impact):

- Promotes pet welfare through consistent care.
- Educates about IoT in domestic applications.
- Reduces manual dependency for busy owners.
- Low-cost automation.
- Supports sustainable aquaculture with equal feed distribution.

WAY FORWARD:

- Feed level sensor for low-food alerts.
- Camera module for real-time monitoring.
- Solar power integration for outdoor ponds.
- AI Portion Control for activity-based feeding.



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Thank You !

Smart Fish Feeding – because even your pets deserve automation

Questions are welcome!