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DESIGN OF AUTOMATED FISH FEEDER USING IOT

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Abstract : Aquaculture provides most of the seafood needed in the globe, but it also need better agricultural methods. This paper presents an Automatic Fish Feeder (AFF) system driven by the Internet of Things (IoT). The AFF system uses a range of sensors, including those that assess ambient conditions, fish activity, and water quality, to collect data in real-time. Microcontrollers process the data and wirelessly transmit it, enabling fish farmers to remotely monitor the conditions of the aquatic environment. Using an intuitive smartphone application, farmers can plan and adjust feeding schedules, amounts, and mixes based on the specific needs of each species of fish. The system's sophisticated algorithms analyse the collected data to optimise feeding schedules, ensuring that fish receive the proper nutrition while minimising feed waste. Furthermore, the AFF system promotes sustainability by reducing overfeeding, which can lead to ecological imbalances and water contamination. This study demonstrates how aquaculture enterprises can effectively use IoT technology to boost output, reduce operational expenses, and promote environmental stewardship. The study's findings provide important new information for the aquaculture industry and pave the way for the widespread use of Internet of Things-based technology to improve fish farming practices.

Keywords: IoT, Relay, Arduino Uno, Wi-Fi Module, Water Level Sensor, Temperature Sensor, Oxygen Sensor.

I. INTRODUCTION

In the era of Internet of Things innovation, technology and aquaculture have come together to provide innovative solutions. This study explores the subject of smart fish farming by developing an IoT-based automated fish feeder. This gadget uses advanced sensors and internet connectivity to revolutionise traditional feeding methods. By ensuring that feeding schedules are precise, adaptable, and timely, it promotes sustainable practices and improves aquatic health. By offering practical answers and promoting a more connected and ecologically conscious future, this design serves as an illustration of how the Internet of Things may change the fish farming industry. As hobbyists, aquarium enthusiasts, and others, the Internet of Things-based Automatic Fish Feeder provides a creative and efficient solution to the challenges involved in feeding fish. Furthermore, commercial fish farms strive to provide the best possible care and nutrition for their aquatic companions. Provide a basic UI that enables basic configuration and tracking. By doing this, user-friendly interface and smooth integration with existing fish farming installations would be guaranteed.

II. LITERATURE REVIEW

This body of literature demonstrates how IoT technology is starting to play a bigger role in aquaculture's automated fish feeder systems. Because IoT-based systems can monitor and operate remotely, make data-driven decisions, and integrate with environmental sensors, they increase the productivity and sustainability of fish farming operations. Data security and system stability concerns need to be fixed, nevertheless, if adoption and acceptance within the sector are to become more commonplace. It is anticipated that as technology advances, IoT-enabled automatic fish feeders will become increasingly crucial to modern aquaculture practices. Even more inventive methods of sustainable fish farming are expected to result from further research and development in this area. While they seem to offer advantages, IoT-based automatic fish feeders have disadvantages. Concerns concerning upfront implementation costs, system dependability, and data security are some of them. For the sake of fish farmers and the aquaculture industry as a whole, it is imperative to safeguard the confidentiality and privacy of the data that is collected. Water quality monitoring, feed management, and resource optimisation are still problems facing the rapidly growing aquaculture industry. Fortunately, these challenges are being addressed with the introduction of IoT technology in aquaculture. Aquaculture systems, which include automatic fish feeders, may be remotely controlled and monitored thanks to real-time data collected and transferred by Internet of Things (IoT) devices like actuators and sensors.

III. Problem statement

When a fish owner is away from home or has a hectic schedule, it can be difficult to manage the feeding and care of their fish. The outdated and uneven ways that fish are traditionally fed result in waste, overfeeding, and damaged aquatic health. Manual feeding plans are susceptible to mistakes made by humans and changes in the environment. There is no original strategy that can guarantee

accurate, adaptable, and long-lasting feeding operations. The lack of real-time data limits the industry's capacity to make informed judgments on feeding techniques, environmental adjustments, and overall aquaculture management.

IV. METHODOLOGY

4.1 Determine Needs

Establish the exact requirements, including the feeding schedule, portion sizes, sensor accuracy, and connectivity range, for the automatic fish feeder.

4.2 Part Choice

Pick the appropriate Internet of Things (IoT) parts, such as motors, temperature and oxygen sensors, Arduino Uno microcontrollers, water level sensors, Wi-Fi modules, and motors.

4.3 Coding

Select the proper Internet of Things (IoT) components, including motors, water level sensors, Arduino Uno microcontrollers, temperature and oxygen sensors, Wi-Fi modules, and motors.

4.4 Internet of Things Interaction

The Arduino Uno and a nearby network should be connected via Wi-Fi. To guarantee efficient communication between the user interface and the fish feeder, implement the MQTT (Message Queuing Telemetry Transport) protocol.

4.5 Examining and streamlining

Conduct thorough testing under various environmental conditions to ensure the feeder operates reliably. By making the code more efficient, you can lower power consumption and reaction time. Address any mistakes, issues, or performance hiccups discovered during testing.

4.6 Implementation

In the desired location within the pond or fish tank, place the automatic fish feeder. Verify that the device is securely fastened and that the sensor's exposure to the water is appropriate. Connect the fish feeder to a dependable power source to ensure it is operating properly.

4.7 Upkeep and Observation

Check the fish feeder's performance and information on a regular basis by using its user interface. Perform regular maintenance, like cleaning and inspecting sensors for damage. If new features or bug fixes are needed, update the software or firmware.

4.8 Block Diagram

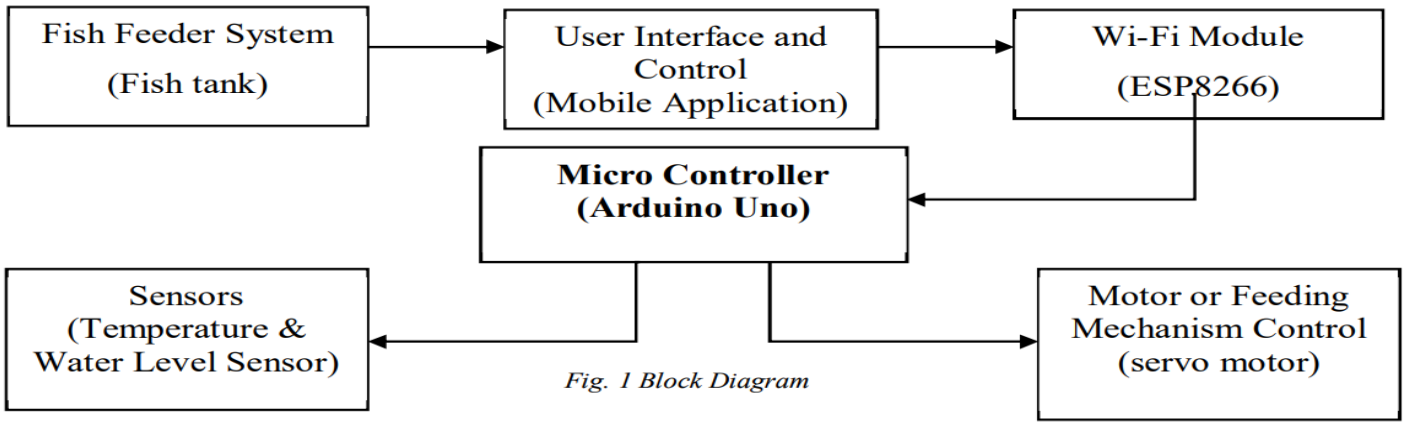
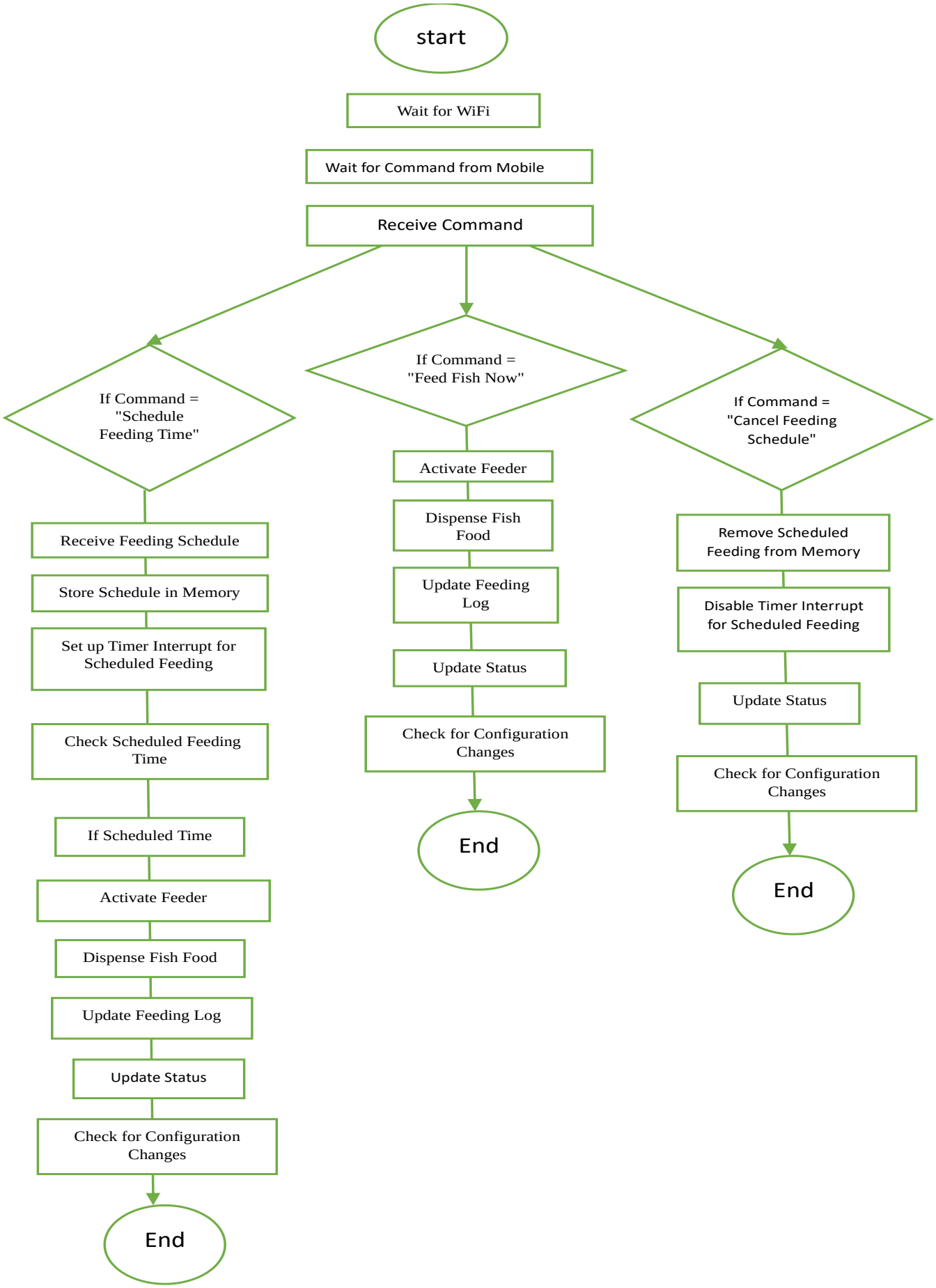
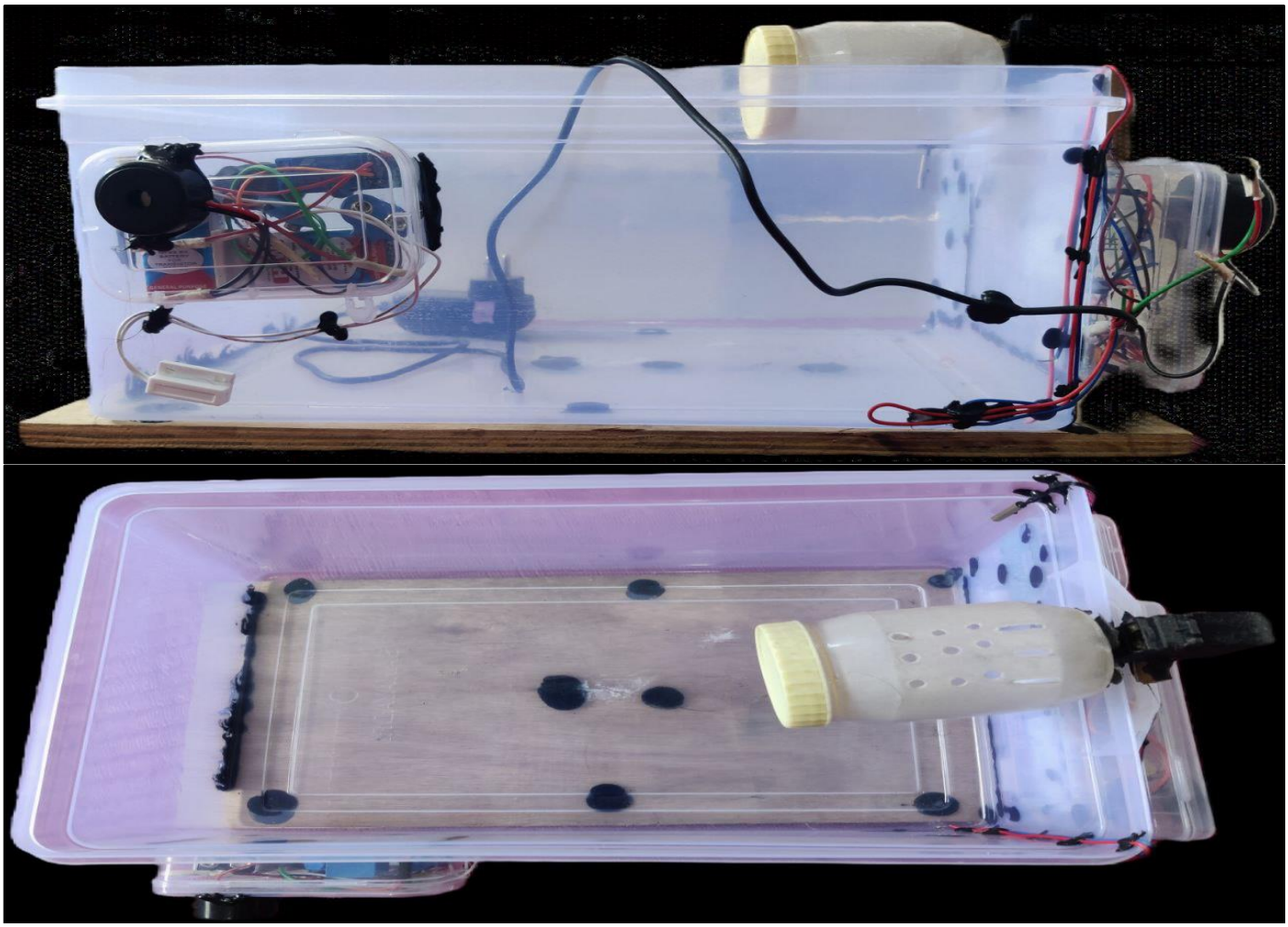


Fig. 1 Block Diagram

V. FLOWCHART


start
Wait for WiFi
Wait for Command from Mobile
Receive Command
If Command = "Schedule Feeding Time"
If Command = "Feed Fish Now"
If Command = "Cancel Feeding Schedule"
Receive Feeding Schedule
Store Schedule in Memory
Set up Timer Interrupt for Scheduled Feeding
Check Scheduled Feeding Time
If Scheduled Time
Activate Feeder
Dispense Fish Food
Update Feeding Log
Update Status
Check for Configuration Changes
End
Activate Feeder
Dispense Fish Food
Update Feeding Log
Update Status
Check for Configuration Changes
End
Remove Scheduled Feeding from Memory
Disable Timer Interrupt for Scheduled Feeding
Update Status
Check for Configuration Changes
End

VI. MODEL



VII. BENEFITS

- Accurate nourishment: ensures accurate and consistent feeding schedules, preventing overfeeding and promoting the healthiest possible growth for aquatic animals.
- Decisions based on data: It is possible to maintain a healthy aquatic environment by utilising sensors to collect data on temperature, water quality, and feeding patterns.
- Fish farmers may focus on other important aspects of aquaculture management when the feeding process is automated, saving them time and labour.
- Guarantees steady feeding even in the absence of carers, which is helpful in situations where regular supervision might not be available.
- Economy of scale: Economy of scale Long-term savings are realised through improved feed utilisation and decreased fish mortality rates, making it financially profitable over time despite initial setup costs.

VIII. DRAWBACK

- Reliance on technology: The system's reliance on technology makes it vulnerable to software bugs, network failures, and other difficulties that could disrupt the feeding cycle and jeopardise aquatic life.
- Difficulties with Maintenance: Regular maintenance of motors, sensors, and communication is essential. Any issue or wear and tear could result in improper feeding, requiring continual attention and a skilled initial setup.
- Depending on Power: The automatic feeder requires a dependable power source to operate. Fish health may suffer if the feeding procedure is stopped due to power outages or malfunctions that are not promptly fixed.

IX. CONCLUSION

In conclusion, The Automated Fish Feeder, which applies IoT technology to fish farming, is a shining example of aquaculture innovation. It converts conventional techniques into effective, long-lasting, and flexible solutions by ensuring exact feeding schedules, remote monitoring, and data-driven decision-making. this design not only improves the well-being of aquatic life but also lays the way for a time when intelligent technology works in harmony with nature, changing the way that fish farming is done

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