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**Introduction**

Poultry farming is one of the fastest-growing and most essential sectors of agriculture, playing a critical role in meeting India’s food and nutrition demand. India produced 138.38 billion eggs in 2022–23, with per-capita availability ~101 eggs/year, while poultry meat contributed significantly to the country’s 9.77 million tonnes of total meat output in the same year [1]. The 20th Livestock Census (2019) recorded 851.81 million poultry, a 16.8% increase over 2012, underscoring the sector’s rapid expansion [2].

Despite this momentum, traditional farms in India still rely heavily on manual tasks such as feeding, watering, lighting, shed cleaning, and environmental management [3]. These are labour-intensive, inconsistent, and inefficient, leading to problems such as irregular feeding, water shortages, delayed cleaning, and poor hygiene. These conditions increase disease risk, reduce productivity, and cause economic losses [4], [5].

Environmental parameters like temperature, humidity, and ammonia concentration are critical for bird health, but maintaining them manually under Indian climatic conditions is challenging [6]. In rural regions, voltage fluctuations and feeder instability add further difficulty, making automation unreliable without robust electrical design [7].

With the advent of IoT and embedded systems, poultry management can be automated using low-cost controllers (Arduino/ESP32), sensors (DHT22/SHT31, load cells, ultrasonic sensors), and actuators (pumps, motors, relays). Cloud platforms like ThingSpeak or Blynk enable real-time monitoring and remote alerts [8]–[10]. However, most reported systems lack focus on power quality, electrical protection, and sustainable operation under rural Indian conditions.

The proposed project therefore integrates feeding, watering, lighting, cleaning, and environmental monitoring into one system, while incorporating power-conditioning, electrical protection, and fault-tolerant design. This makes the project not only a smart-farming solution but also a core electrical engineering application for agricultural safety and sustainability.

**Rationale**

Conventional poultry management presents challenges such as inconsistent feeding, inadequate water supply, poor hygiene due to delayed cleaning, high labor costs, and inefficient monitoring of environmental parameters. These issues can lead to increased disease risk, lower production, and financial losses. The rationale for automating poultry farming is to:

* Ensure reliable feeding and watering.
* Maintain optimal temperature and humidity levels (60–80%).
* Automate lighting and environmental control for improved bird welfare.
* Include power-conditioning and electrical protection to withstand rural voltage swings
* Reduce labor dependency and operational costs.
* Enable remote monitoring and control via IoT systems.

**Literature Review:**

1. **R. Sasirekha, R. B. Gowda, and S. H. V. Shetty, “Smart Poultry House Monitoring System Using IoT,” in E3S Web of Conferences, vol. 399, ICoNECT 2023, 2023.**

This work investigates the use of IoT to ensure poultry safety and consistent environmental monitoring through automation.

* **Coop Security**: Predator-proof design used IR and PIR sensors to control automatic doors, protecting poultry from external threats.
* **Reliable Monitoring**: DHT11 and water-level sensors provided continuous updates on temperature, humidity, and water supply, which are essential for poultry health.
* **Cloud Connectivity**: ThingSpeak and MyMQTT platforms allowed remote monitoring and control, enabling farmers to manage their farms from anywhere.

1. **Dr G. Ravindranath Kumar, J. Rai, and K. R. Sundar, “Smart Poultry Farming 4.0: IoT-Driven Automation and Edge Computing,” Journal for Educators, Teachers and Trainers, vol. 14, no. 4, pp. 1–10, 2023.**

This research highlights the role of edge computing and AI/ML in improving decision-making and efficiency within poultry farms.

* **Integrated Automation**: The system managed lighting, ammonia levels, weight monitoring, and cleanliness in one integrated framework, offering a complete farm solution.
* **Health Management**: Automated ventilation triggered by ammonia sensors and cleanliness control mechanisms reduced health risks for the birds.
* **User Interaction**: Real-time updates through Blynk apps ensured farmers could track operations remotely and take timely action when necessary.

1. **Mrs.** **R. Sudha, S. Prathima, and M. Kumar, “Automated Poultry Feeding Using IoT and Machine Learning,” International Journal for Research & Technology (IJRTI), vol. 10, no. 5, pp. 1–6, May 2025.**

This article explores how IoT combined with machine learning and computer vision can make poultry feeding more efficient.

* **Intelligent Feeding**: Automated feeders dispensed food based on programmed schedules, reducing the chances of overfeeding or underfeeding.
* **Computer Vision**: CNN models such as Densenet were applied to detect chicken maturity, allowing feeding routines to be adapted for growth stages.
* **Data Logging**: Feeding data was stored in the cloud with SMS and web alerts, creating records for analysis and ensuring more transparent farm management.

1. **Dr. S. S. Shingare, “IoT-Based Smart Poultry Farm: A Promising Solution for Small Farmers,” International Journal of Applied Research in Electronics and Software (IJARESM), vol. 3, no. 2, pp. 23–29, Feb. 2022.**

This research highlights the role of edge computing and AI/ML in improving decision-making and efficiency within poultry farms.

* **Low-Cost Design**: The system used affordable ESP8266 and NodeMCU controllers, demonstrating that even farmers with limited budgets could benefit from automation.
* **Dual Controller Setup**: Splitting responsibilities between two controllers improved reliability and ensured continuous operation even if one controller failed.
* **User Accessibility**: Dashboards built on Blynk and ThingSpeak made system data easy to access, even for farmers without technical expertise.

1. **Prof. Shruthi B Gowda, Rashmitha K, Rakshitha K, Vijaylaxmi, Department of Computer Science and engineering, & Vivekananda Institute Of Technology. (2016). “A Witted Management of Poultry Farm using IoT” (Vols. 5–6) [Journal-article].**

This contribution emphasizes the integration of multiple automation features into a unified poultry farm management system.

* **Integrated Automation**: The system managed lighting, ammonia levels, weight monitoring, and cleanliness in one integrated framework, offering a complete farm solution.
* **Health Management**: Automated ventilation triggered by ammonia sensors and cleanliness control mechanisms reduced health risks for the birds.
* **User Interaction**: Real-time updates through Blynk apps ensured farmers could track operations remotely and take timely action when necessary.

**Objectives:**

The main objectives of the Automatic Poultry Farm project are:

* To integrate sensors and microcontrollers for real-time data collection.
* To monitor and control environmental parameters such as temperature and humidity.
* To automate feeding, watering, and lighting operations.

**Feasibility Study:**

Technical Feasibility: The system uses cost-effective microcontrollers such as Arduino and NodeMCU, sensors (DHT11, load cells, ultrasonic sensors), and actuators (motors, pumps, relays) with IoT dashboards like Blynk and ThingSpeak.  
  
Economic Feasibility: The solution is affordable and scalable, suitable for both small-scale and large-scale poultry farms.  
  
Operational Feasibility: Automation reduces manual effort, improves poultry health, and ensures adaptability via mobile apps and IoT platforms.

**Methodology:**

The system is divided into multiple modules:

1. Feeding Module: A load cell measures feed tray weight, and Arduino-controlled motors dispense feed automatically.
2. Watering Module: Automated pumps supply water at intervals, ensuring continuous availability
3. Cleaning Module: Motorized brushes and waste collectors clean the poultry floor on a timer basis.
4. Environmental Control: DHT11 sensors monitor temperature and humidity, while fans, heaters, and humidifiers are controlled accordingly
5. Lighting Control: LDR sensors and relays manage automatic lighting for day/night cycles.
6. IoT Integration: Data is sent to cloud platforms (ThingSpeak, Blynk) for real-time monitoring and remote access.

Arduino UNO/ NodeMCU

ESP8266

Power Supply

Temperature and

Humidity sensor

Motor Driver

Fan

Motor

Ultrasonic Sensor 1

LDR sensor

LED

Ultrasonic Sensor 2

Heater

Servo Motor for conveyor belt

.**Block Diagram:**

**Fig1.3: Block Diagram**

**Facilities Required:**

**Hardware:**

* Arduino Uno / NodeMCU (ESP8266/ESP32)
* DHT11 temperature and humidity sensors
* Load cells and ultrasonic sensors
* LDR sensors for lighting
* Motor drivers (L298), DC/servo motors, pumps, relays
* Power supply, LEDs, heater, and fan  
  **Software:**
* Arduino IDE for coding
* ThingSpeak/Blynk for IoT integration
* Proteus for simulation

**Expected Outcomes:**

* Automated feeding, watering, cleaning, and lighting operations.
* Real-time monitoring of poultry farm environment.
* Improved hygiene, reduced disease risks, and enhanced poultry welfare.
* Reduced dependency on manual labor and lower operational costs.
* Scalable and sustainable poultry farming model with IoT integration.

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4. *Sasirekha, R., “Smart Poultry House Monitoring System Using IoT,” E3S Web of Conferences, vol. 399, 2023.*
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