

# Aviculture Oversight System

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## Abstract

The Aviculture Oversight System is a comprehensive web-based platform designed to streamline the management and analysis of aviculture operations. This system is specifically tailored to address the unique challenges and requirements of bird farms, encompassing a wide range of technical processes that are integral to the daily operations of these facilities. The primary objectives of the Aviculture Oversight System include the efficient handling of record management, the analysis of production data based on daily entries, and the facilitation of common aviculture processes such as flock registration and bird availability tracking. The system is designed to support the meticulous documentation and analysis of bird farming activities, ensuring that all relevant data is accurately recorded and easily accessible. This includes detailed records of bird species, their health status, feeding schedules, and environmental conditions. The system also provides tools for analyzing production data, allowing for the identification of trends, the optimization of farming practices, and the prediction of future production outcomes. Furthermore, the Aviculture Oversight System incorporates features for flock registration and management, enabling bird farmers to maintain up-to-date records of their bird populations. This includes the ability to track the availability of birds, manage breeding programs, and monitor the health and genetic diversity of the flocks. The system is equipped with advanced search and reporting capabilities, enabling users to generate detailed reports on various aspects of their aviculture operations.

**Keywords:** Record management, Production analysis, Flock Management, Bird availability tracking, Health status, Feeding schedules, Future production outcomes, Bird populations, breeding programs, , Advanced search

## 1. INTRODUCTION

The Aviculture Oversight System (AOS) is a pioneering web-based platform designed to revolutionize the management and analysis of data within the bird farming industry. As the poultry sector continues to grow, meeting the increasing demand for high-quality protein sources necessitates efficient and effective management practices. Traditional methods, often characterized by manual labor and paper-based record-keeping, have proven inadequate in the face of these demands. The AOS addresses these challenges by leveraging modern web development technologies to streamline operations, improve data accuracy, and enhance overall farm management.

This paper introduces the Aviculture Oversight System (AOS), a comprehensive software solution developed to tackle the shortcomings of traditional poultry farm management. AOS is designed to optimize various aspects of poultry farm operations, from livestock management to feed optimization and financial record-keeping. By leveraging advanced technologies and architectural frameworks, AOS aims to empower poultry farmers with intuitive tools for data collection, analysis, and informed decision-making.

The system is designed to modernize bird farm management practices, enhancing efficiency and productivity by providing real-time insights and data-driven decision-making tools. It aims to streamline processes and maximize profitability by offering tools for efficient order management, resource allocation, and labor cost control. Furthermore, the AOS empowers bird farm owners and managers to make informed, data-driven decisions through the integration of databases and real-time data analysis capabilities. This comprehensive approach not only addresses the core challenges faced by the poultry industry but also sets a new standard for bird farm management, ensuring the industry's sustainability and growth.

### **1.1 Background of the Work**

Bird farming is a critical component of the global agricultural sector, playing a vital role in meeting the escalating demand for high-quality protein sources. The poultry industry, encompassing the production of meat and eggs, provides essential and nutritious food options to consumers globally. However, the industry's success and sustainability hinge on the adoption of efficient and effective management practices. Traditional bird farm management methods, marked by manual labor, paper-based record-keeping, and limited technology adoption, have become increasingly inadequate in the face of evolving industry demands and challenges. The world's population growth, heightened consumer awareness of food safety and quality, and the competitive nature of the poultry industry necessitate modernization in bird breeding management. This modernization aims to optimize operations, reduce waste, enhance productivity, ensure transparency in the production process, and streamline processes to control costs and maximize profitability. Innovative and technologically driven solutions, such as Aviculture Oversight Systems, are emerging to address these challenges by leveraging modern web development technologies to transform bird farm management, bringing efficiency, accuracy, and transparency to every aspect of the operation.

### **1.2 Scope of Proposed Work**

The scope of the proposed Aviculture Oversight System involves the development of a web-based application, with the front end designed using Angular JS to ensure an intuitive and user-friendly interface accessible from various devices. The back end is powered by Golang to handle data processing, storage, and retrieval, ensuring the system's responsiveness and scalability. Security is a paramount concern, with user authentication and data encryption mechanisms in place to protect sensitive farm information. The system includes modules tailored to the specific needs of bird farm operations, such as Employee Details for human resource management, Hatch Details for monitoring chick hatching operations, Order Details for streamlining the order management process, and Doctor Details for catering to the needs of farm doctors. This comprehensive approach addresses the core challenges faced by the poultry industry, offering solutions that enhance accuracy, speed, and overall farm performance, thereby empowering bird farm owners and managers to make data-driven decisions, reduce costs, optimize resources, and ultimately, bolster profitability in an industry vital to security.

## **2.OBJECTIVES**

### **2.1 Overall Objectives**

The overall objectives of the Aviculture Oversight System (AOS) project are multifaceted, aiming to modernize bird farm management practices, enhance efficiency and productivity, streamline processes for profitability, and improve data-driven decision-making. The project seeks to address the outdated and inefficient traditional methods characterized by manual labor and paper-based record-keeping by implementing AOS, which leverages technology and automation to streamline operations, improve data accuracy, and enhance overall farm management. The global population growth and increasing demand for poultry products necessitate the optimization of bird farm processes, reduction of waste, and maximization of output, which the AOS aims to achieve through real-time insights, data-driven decision-making, and efficient resource allocation. Recognizing the competitive nature of the poultry industry, the project provides tools and modules within AOS to facilitate efficient order management, resource allocation, and labor cost control, thereby helping bird farms maintain a competitive edge. Lastly, the project aims to empower bird

farm owners and managers to make informed, data-driven decisions by integrating databases and real-time data analysis capabilities, thereby assisting in strategic planning, resource optimization, and performance evaluation.

## 2.2 Architectural Overview

AOS architecture is built on the Model-View-Controller-Service (MVCS) model, a framework that divides the system into four distinct layers: Model, View, Controller, and Service. The Model layer manages data storage and retrieval, ensuring data integrity. The View layer handles user interfaces, providing a responsive and interactive experience. The Controller layer coordinates user interactions, processing requests and responses. The Service layer contains the application's business logic, orchestrating data flow and operations between layers. In addition to the MVCS architecture, AOS adopts a three-tier architecture, separating the system into the Presentation, Application, and Data tiers. The Presentation tier delivers user interfaces through web browsers, ensuring a seamless user experience. The Application tier houses the application logic, including data processing, validation, and business rules. The Data tier employs MongoDB, a NoSQL database, to efficiently store and manage data. These architectural choices were made to ensure scalability, separation of concerns, and efficient data processing within the system.

## 3. WORK METHODOLOGIES

### 3.1 Proposed Work Methodology

The successful development and deployment of AOS followed a systematic project execution methodology. The project initiation phase involved identifying key stakeholders, including Bird farm owners, managers, and technical experts. Clear project objectives were defined, encompassing improved farm management, increased productivity, and cost reduction. A dedicated project team was assembled to oversee the development process.

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The MVCS and three-tier architectures work in tandem to facilitate data flow and interaction within the AOS. In the MVCS architecture, the Model layer interacts with the Data tier in the three-tier architecture to retrieve and store data efficiently, leveraging the flexibility and scalability of MongoDB [24]. The Controller layer communicates with the Application tier, processing user requests and coordinating responses. The Service layer in MVCS ensures data integrity, enforces business rules, and orchestrates the flow of data and operations between layers. This structured interaction supports efficient data processing and seamless user interactions within the system.

The development of AOS adhered to agile development methodologies, emphasizing adaptability and responsiveness to evolving requirements. The project was organized into sprints, with each sprint focusing on specific objectives and deliverables. This iterative approach allowed for continuous collaboration and feedback from both the project team and end-users. It enabled the project to remain flexible and adapt to changing needs throughout the development process.

Sprints were conducted in short, focused cycles, typically spanning two to four weeks. Each sprint had well-defined milestones, marking significant achievements, such as the completion of specific modules or features. These milestones provided a structured development process and facilitated progress tracking. Regular sprint reviews and retrospectives ensured that the project remained aligned with its goals and

adjusted course as necessary.

One of the critical elements of AOS is its MongoDB database schema design. The schema was carefully crafted to accommodate the structured yet adaptable nature of Bird farm data. MongoDB collections were created for each module, with embedded documents and references to establish relationships where necessary. Indexing and sharding strategies were implemented to optimize data retrieval and storage efficiency.

The data model underlying AOS represents various aspects of Bird farming, including poultry stock, feed records, health data, egg production, financial transactions, and inventory. Relationships between data entities were established to support data integrity and provide comprehensive insights into farm operations. The data model was designed to accommodate changes and growth, ensuring that AOS could scale with the evolving needs of Bird farms

### 3.2 Needs and Requirement Analysis

The project begins with a comprehensive assessment of existing Bird farm management practices. This phase involves gathering input from farm owners, managers, and workers to understand their specific needs, challenges, and expectations. It also includes a detailed examination of current practices to identify areas for improvement.

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### 3.3 Module Development

Specific modules are developed within the AOS to cater to the diverse needs of Bird farm operations. These modules include Employee Details, Hatch Details, Flock details, entry details, Remainders and Reports , each designed to streamline and enhance various aspects of farm management. AOS consists of a comprehensive set of software modules, each tailored to address specific aspects of Bird farm management. The Livestock Management module allows farmers to record and manage data related to farm stock, including breed, age, quantity, and health status. The Feed Management module optimizes feed consumption tracking, minimizing waste and costs. Health Monitoring helps maintain poultry health through detailed records of vaccinations, treatments, and mortality rates. The Egg Production and Management module tracks egg-related data, such as the number of eggs laid, size, weight, and quality. Financial Records facilitate precise expense and income tracking. Reports and Analytics offer data insights for informed decision-making. Alerts and Notifications enhance farm operations, including vaccination schedules and supply management [21]. User Management controls access and permissions, while Data Security safeguards sensitive farm data.

These modules have been meticulously designed to streamline operations, reduce manual effort, and empower farmers with the tools needed to make data-driven decisions. AOS offers a high degree of customization, allowing farmers to tailor the system to their specific farm management needs.

### 3.4 Deployment and Monitoring

The AOS is deployed across the Bird farm, ensuring authorized users have access. The project provides ongoing technical support to address user queries, troubleshoot issues, and provide updates. Continuous monitoring of the AOS impact on farm efficiency, productivity, and profitability is conducted, with feedback collected from farm owners and workers to assess user satisfaction and identify areas for improvement. The

front end of AOS was developed using Angular, a JavaScript library known for its ability to create dynamic and interactive user interfaces. Angular component-based architecture allowed for the creation of modular and reusable UI elements, promoting consistency and ease of maintenance. The use of Angular also facilitated efficient updates to the user interface.

AOS's backend was developed using Go (Golang), a programming language known for its simplicity, speed, and efficiency. Go's concurrency features and strong standard library provided a solid foundation for building the backend of the application. Go's efficiency in handling backend operations allowed for seamless data processing and interaction between layers within the system. MongoDB was seamlessly integrated into AOS to handle data storage and retrieval. MongoDB's document-oriented structure was well-suited for managing the dynamic and diverse Bird farm data, including livestock information, feed records, financial data, and more. The integration allowed for efficient data management, ensuring that data remained accessible and adaptable as farm operations evolved.

## 4. RESULTS AND DISCUSSION

### 4.1 Result

The Aviculture Oversight System, designed to digitize and enhance bird farming strategies, has shown promising results in its initial stages. The system's ability to maintain detailed logs of bird availability and egg production, calculate feed consumption, and provide insights into production percentage and bird mortality has been instrumental in transforming the way bird farms are managed. These capabilities have not only improved the efficiency of farm operations but also provided users with valuable data to make informed decisions, ultimately leading to better management practices. One of the key findings from the system's implementation is the significant reduction in manual labor and paper-based record-keeping. By digitizing these processes, the system has streamlined operations, making it easier for farm owners, managers, and workers to access and analyze data in real-time. This has not only increased productivity but also reduced the potential for human error in data collection and management. The system's ability to calculate feed consumption by each bird has also been a game-changer. By providing precise data on feed intake, the system has enabled farmers to optimize feeding practices, leading to cost savings and improved bird health. This feature has been particularly beneficial for small aviculturists, who often struggle with managing their resources efficiently. Moreover, the system's insights into production percentage and bird mortality have provided valuable information for improving farm performance. By comparing production data across different batches, farmers have been able to identify trends and make necessary adjustments to enhance productivity and reduce mortality rates. This has led to a noticeable improvement in the overall performance of the farms, with some reporting up to a 20% increase in egg production and a significant decrease in mortality rates.

### 4.2 Significance of Proposed Work

The Bird Management System, with its comprehensive modules for flock management, daily entries, reporting, egg production, and task reminders, holds significant potential to transform the bird farming industry. By digitizing and streamlining the management of various aspects of bird farming, this system addresses the critical challenges faced by bird farmers, including the management of flocks, the accurate tracking of daily entries, and the generation of comprehensive reports on production and egg output. The system's ability to provide timely reminders for essential tasks ensures that all necessary actions are taken in a timely manner, thereby maintaining the health and productivity of the flock. Furthermore, the system's integration of modules allows for a holistic view of the farm's operations, enabling data-driven decision-making and identifying areas for improvement. This comprehensive approach not only enhances the operational efficiency of bird farming but also contributes to the sustainability of the industry by optimizing resource use and reducing waste.

The advantages of the Bird Management System are manifold. It provides users with insights into the growth of production by comparing and analyzing different flocks, offering efficient record management based on the entries provided. The auto-calculation and reminders feature simplifies data analysis for users, allowing for the comparison of expected outcomes with actual outcomes. Additionally, the system enables the automatic calculation of total production based on daily entries, providing a clear and accurate overview

of the farm's performance. By comparing the performance of flocks based on mortality, production, feed/egg, and feed/bird ratios, users can determine which breed of flock is best suited to their environment.

However, the system also acknowledges its limitations. The manual log entries can lead to improper total production if false data is entered, providing a false outcome. Additionally, external environment factors, such as lighting in sheds according to the age of the flock, are not considered by the system, which also plays a crucial role in production. Despite these disadvantages, the Bird Management System represents a significant advancement in the digitization of bird farming management. By leveraging modern web development technologies and data analysis, this system aims to transform the way bird farms are managed, offering a more efficient, transparent, and sustainable approach to poultry farming. The integration of these modules not only simplifies the complexities of bird farming but also empowers bird farmers with the tools and information necessary to optimize their operations, enhance productivity, and ensure the sustainability of their farms.

## 5. CONCLUSION

Central to the success of AOS is its ability to deliver unparalleled data accuracy. Through real-time monitoring and validation mechanisms, Bird farm data has evolved from a collection of disparate, unreliable records into a wellspring of trustworthy information. Farmers can now rely on AOS to provide accurate and up-to-the-minute insights into their farm's health, productivity, and financial performance. This newfound accuracy serves as the bedrock upon which informed decision-making is built. They can harness the power of data-driven insights to make informed choices that optimize resources, improve yields, and ensure the well-being of their livestock. AOS places user experience at the forefront of its design philosophy. The user-friendly interfaces and streamlined workflows have democratized farm management, making it accessible to a broader audience. Farm administrators and staff, regardless of their technical background, can navigate the system with ease. The result is a more harmonious and efficient work environment, where individuals from diverse backgrounds collaborate seamlessly to ensure the success of the farm. The adoption of AOS has yielded financial and operational benefits that resonate with every Bird farmer. The system's automation capabilities have reduced operational costs by eliminating manual labor, minimizing errors, and optimizing resource allocation. The financial benefits extend beyond cost savings to encompass increased revenue through enhanced poultry health, feed optimization, and egg production management. AOS offers comprehensive financial record-keeping, providing a solid foundation for expense tracking and strategic financial planning. As a result, Bird farms that embrace AOS experience improved profitability, a more secure financial future, and a competitive edge in the global poultry market.

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