Declaration

I, hereby declare that the research work presented in this Summary entitled **"AI and IoT based deep learning approach for monitoring the production, health, and welfare status of the Poultry birds",** was carried out by me under the supervision of **Dr. Deepika Ajalkar**, **HOD, Department of CSE (Cyber Security and Data Science), GHRCM, Pune Associated with G. H. Raisoni University, Amravati** from June 2021 to November 2024. This work is based on original research and has not been submitted to any other University/Institution for the award of any diploma or degree.

Date:
Place: G H Raisoni University, Amravati

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Certificate

This is to certify that the research work presented in this summary of thesis entitled **"AI and IoT based deep learning approach for monitoring the production, health, and welfare status of the Poultry birds",** is the own work of **Ajay Gopichand Barsagade** conducted in the Computer Science & Engineering, G H Raisoni University, Amravati under my supervision. I further certify that this work has not been submitted earlier in any University / Institution for any research degree to the best of my knowledge.

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This is to certify that **Ajay Gopichand Barsagade** has submitted the thesis on November 2024 and presented his seminar successfully on the topic titled **"AI and IoT based deep learning approach for monitoring the production, health, and welfare status of the Poultry birds"** in the Computer Science & Engineering, G H Raisoni University, Amravati.

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ABSTRACT

The poultry business in contemporary India is one of the most important and rapidly expanding sectors of the country's agricultural economy. Increases in chicken production can be attributed to better manufacturing methods and more efficient agricultural methods. The importance of automation in the current world cannot be overstated, and neither can the rapid development of the Internet of Things (IoT) idea with Artificial Intelligence (AI). Using a certain method, manual tasks may be made fully automatic. Poultry farms can benefit from IoT-based operations when remote monitoring and repair are required, transforming them from traditional to cutting-edge operations that make extensive use of automation. In order to maintain and enhance chicken health, it is necessary to constantly check for changes in a number of variables. Also, when compared to conventional ways for poultry disease identification, manual methods are time-consuming, labor-intensive, and error-prone. Also, experts' knowledge is usually necessary for making sense of the results. These restrictions raise the danger of the disease spreading across the flock and make it more difficult to diagnose diseases in a timely manner, both of which can have devastating effects. For a long time now, farmers have relied on specialists to identify and diagnose chicken illnesses. Consequently, many domesticated birds end up in the hands of farmers who suffer from either unreliable specialists or delayed diagnosis. The most prevalent chicken illnesses may be quickly recognized from pictures of chicken droppings using the techniques that are already accessible from artificial intelligence (AI) based on computer vision.

In this study, AI and IoT based deep learning approach presented for monitoring the production, health, and welfare status of the Poultry birds. There are two ways by which poultry birds the production, health, and welfare status monitored. Initially, a low-cost Internet of Things (IoT)-based system for monitoring environmental factors proposed and constructed in a chicken farm in real time, including temperature, humidity, ammonia levels, and light intensity. Information gleaned via sensors and continuous monitoring. By putting the planned system into action, we were able to evaluate its viability. Temperature and humidity levels, as well as their management, are the most important climatic parameters for a poultry farm's output. The purpose of this project is to automate the operation of a chicken farm by utilising Internet of Things (IoT) technologies. Chicken health is maintained by careful monitoring of environmental conditions like temperature, humidity, light, and ammonia gas, as well as through the supervision of routine

tasks like feeding, watering, and cleaning. Chicks' cycles are tracked and owners are notified when there is a problem. Later, a deep learning approach offered that uses a pre-trained Convolution Neural Networks (CNN) model to determine which of the three categories best describes chicken excrement and offer a method for identifying and categorizing poultry illnesses. The EfficientNet-B3 model was utilized in the development of the system. Coccidiosis, Salmonella, New Castle Disease and Healthy were the four health problems that were classified using the segmented picture by the deep learning model. The models were trained using standard benchmark database images of excrement from chickens. The outcomes of experiment demonstrate that the proposed method for identifying and categorizing chicken illnesses may accurately identify three prevalent poultry diseases. Consequently, this approach has the potential to be an invaluable resource for farm veterinarians and poultry producers.

Keywords: Poultryfarm, Sensor network, Internet of things, Poultry management, Machine Learning, Deep Learning, Wireless sensor networks, Environmental monitoring, Artificial Intelligence, Chicken Disease, Convolutional neural network, Fecal images, Image classification.

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List of Abbreviations

Sr. No	Abbreviation	Meaning
1	ML	Machine Learning
2	SVM	Support Vector Machine
3	IoT	Internet of things
4	DL	Deep Learning
5	KNN	K-Nearest Neighbour
6	NB	Naive Bayes
7	CNN	Convolutional neural network
8	Bi-LSTM	Bidirectional long short-term memory
9	AI	Artificial Intelligence
10	CV	Computer Vision

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