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Artificial Intelligence Based Safety System for Poultry

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ABSTRACT: Snakes are one of the deadly and ruthless predators of chickens. They can bite, kill and eat live chickens and also eat their eggs. It means that if a snake enters the pen of chickens, the aftermath would definitely be an economic loss because you will lose a good number of your birds and/or eggs. For example, if a snake enters a layers pen, it will first eat as many eggs as possible and finally bite any layer chickens that serve as a threat. Snakes can gain entry into a chicken house, coop or pen through holes or cracks in the roof, wall or floor. They are also capable of crawling underneath, over and through any mesh fencing. Safeguarding your pen from snakes is highly compulsory if you are a serious poultry farmer. To prevent snakes from entering a chicken house, coop or pen, do. Snake bites on a poultry farm can pose a threat to both the poultry and the farm workers. Snakes may enter poultry houses seeking shelter, warmth, or prey. While many snake species are harmless, some can be venomous and cause serious harm. Here are some steps to consider if a snake bite occurs on a poultry farm. Implementing a camera system for snake detection in a poultry farm can be an effective way to enhance security and quickly identify potential threats. Here's a general guide on setting up an IoT camera system for snake detection. Monitoring for snakes in poultry farming is crucial to ensure the safety of both the poultry and the farm workers. In this paper on the integration of deep learning techniques, specifically Convolutional Neural Networks (CNNs), in the realm of poultry farming for the purpose of snake detection.

I. INTRODUCTION

Poultry farming involves the raising of domesticated birds such as chickens, ducks, turkeys, and geese for the purpose of producing meat, eggs, or both. Poultry farming is a significant and widespread industry worldwide, providing a major source of protein for human consumption. Poultry houses, also known as chicken coops or poultry sheds, provide shelter for the birds. The design of the housing depends on the type of poultry being raised and the farming method (free-range, cage, or floor systems). Poultry require a balanced diet to ensure proper growth, egg production, and overall health. Advances in technology, such as automated detection system, climate control, and data analytics, are increasingly integrated into poultry farming to improve efficiency and productivity. Image processing is the process of transforming an image into a digital form and performing certain operations to get some useful information from it. The image processing system usually treats all images as 2D signals when applying certain predetermined signal processing methods. A digital image is a representation of a two dimensional image as a finite set of digital values, called picture elements or pixels. Improvement of pictorial information for human interpretation. Processing of image data for storage, transmission and representation for autonomous machine perception.

This system encounters between humans and wildlife often lead to injuries, especially in remote wilderness regions, and highways. Therefore, animal detection is a vital safety and wildlife conservation component that can mitigate the negative impacts of these encounters. Deep learning techniques have achieved the best results compared to other object detection techniques; however, they require many computations and parameters. A lightweight animal species detection model based on YOLOv2. It was designed as a proof of concept of and as a first step to build a real-time mitigation system with embedded devices. Multi-level features merging are employed by adding a new pass-through layer to improve the feature extraction ability and accuracy of YOLOv2. In this system focused only on the animal detection subsystem with the additional goal of identifying the species. In classic object detection, windows of different sizes are moved over the image to obtain the region proposals, and the features of each proposal are then

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extracted using feature descriptors such as Haar, Histogram of Oriented Gradients (HOG), and Scale Invariant Feature Transform (SIFT). Subsequently, these features are fed into a classifier, such as Support Vector Machine (SVM).

Identifying snakes by using their bite marks may help the doctors to diagnose the victim with proper anti venoms for saving patients. It is very important step for doctors to help the patients who suffered by snakes bites. Hence here a study was done on processing images to classify them as different family of snakes using CNN (Convolution Neural Network) model in Deep Learning techniques. The CNN model needs different snakes and their bite marks images to classify them as venomous and non-venomous snakes and by processing venomous snakes bite marks images it can able to find the venomous snakes family. To give accurate results the proposed Deep learning model has to be trained periodically with all possible different images of same snake's family and different snakes' families. The performance of the CNN model is on its knowledge and finding patterns on the input images to find the family of the snakes. If the input images are huge in numbers and size then the system may take time to give results. That has to be considered to give results in less duration execution time. They are more and more in the side of the agricultural land to catch the rats. But unfortunately when farmers are attacked by the snakes it is a tough problem to doctors because of which kind of snakes bite the formers at the moment has to be noted for treating the patients by doctor.

Recently, automatic wild animal detection methods using deep learning for taken images by camera traps have been reported. Energy consumption is important for edge devices that include deep learning because such devices are required to use outside where commercial power is not supplied. In this paper, we propose energy reduction methods for a wild animal detection device. The proposed methods are sensitivity adjustment for the motion sensor, attachment of a hat, motion detection by a frame difference method, and separation of functions on the device. The sensitivity adjustment for the motion sensor reduces the number of taking images by the camera. The attachment of a hat reduces the number of sensings by the motion sensor. The frame difference method reduces the number of inferences by deep learning. The separation of functions on the device reduces the power consumption in both operation time and idle time. In the experiments, we evaluate the effect of the proposed four methods by applying them to a wild animal detection device which we proposed previously. We compare the energy reduction ratio when each method is applied and all methods are combined. Compared to the device without the proposed methods, we can reduce the energy consumption by more than half when we combined all methods.

This paper investigates issue of animal attacks is increasingly concerning for rural populations and forestry workers. To track the movement of wild animals, surveillance cameras and drones are often employed. However, an efficient model is required to detect the animal type, monitor its locomotion and provide its location information. Alert messages can then be sent to ensure the safety of people and foresters. While computer vision and machine learning based approaches are frequently used for animal detection, they are often expensive and complex, making it difficult to achieve satisfactory results. This paper presents a Hybrid Visual Geometry Group (VGG)−19+ Bidirectional Long Short-Term Memory (Bi-LSTM) network to detect animals and generate alerts based on their activity. These alerts are sent to the local forest office as a Short Message Service (SMS) to allow for immediate response. Animal detection using Convolutional Neural Network (CNN), and the author proposed animal detection using Iterative Embedded Graph Cut (IEGC) techniques to form regions over images and Deep CNN features and machine learning classification algorithms for classification purposes. Although these models verify the extracted patches are background or animal, still need improvements in classification performance. Object Detection using deep learning methods attained new heights in computer vision applications.

This system involves techniques based on Image Processing, Convolution Neural Networks and Deep Learning to achieve the mentioned purpose. CNN has been highly used in automatic image classification system. In most cases, extracting features and utilizing them for classification. Deep learning successfully achieves recognition of objects in images as it is implemented using artificial neural networks. Image classification tasks have seen a rise with the introduction of deep learning techniques. So far, no automated method for classification has been suggested to categorize snakes. The system that would be developed will be useful to recognize snake species correctly and thus take necessary action. The combination of a pretrained. Densenet model with the classifier shows good accuracy in classification of snake species. It can also be observed that with the help of the transfer learning technique, we can save time and computation resources. As there are millions of snake species around the world, this system could easily be adapted by training a greater number of snake species images to recognize them. Thus, a part of the future work would be to construct a larger database with a variety of images and apply distinctive techniques for recognizing the species.

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II.EXISTING SYSTEM

Manual snake detection in poultry farming involves the use of human observation, physical barriers, and proactive measures to identify and manage the presence of snakes on the farm. While technology-driven systems can be effective, manual detection remains a valuable component of snake management. Here are some manual snake detection methods for poultry farming. Train farm workers to be vigilant and observant while working in and around poultry houses. Encourage workers to report any snake sightings promptly. Train selected farm personnel in safe snake handling and removal procedures. Establish protocols for safely relocating non-venomous snakes and contacting professionals for venomous snake removal. Additionally, safety precautions should be less when implementing manual snake detection measures, especially in regions where venomous snakes are prevalent.

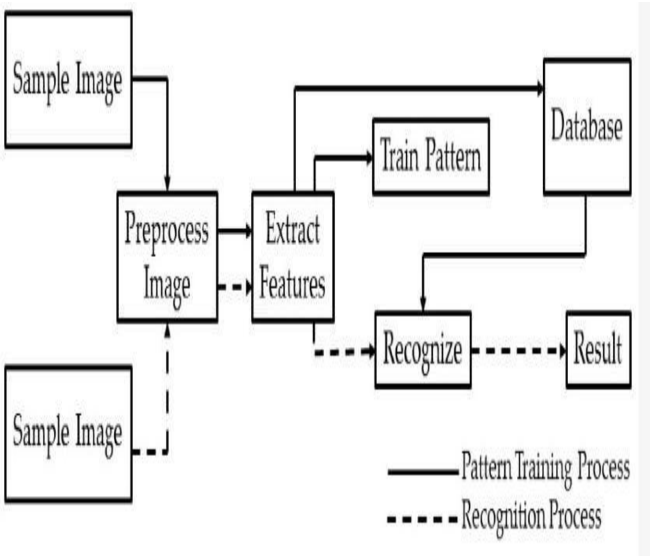

Figure.1: Existing Block Diagram

III.PROPOSED SYSTEM

Implement an IoT camera system with motion detection and image analysis to identify snake presence. Utilize CNN algorithms to distinguish between snakes and other nonthreatening movements. Establish a centralized monitoring system for real-time surveillance of the entire poultry farm. Integrate motion-activated lights for enhanced visibility during low-light• conditions. Develop an alert system that notifies farm workers or security personel when a snake is detected.

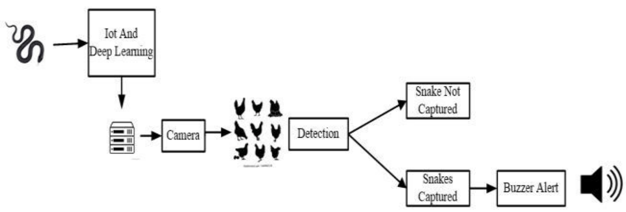

Figure.2. Proposed Block Diagram

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Arduino NANO

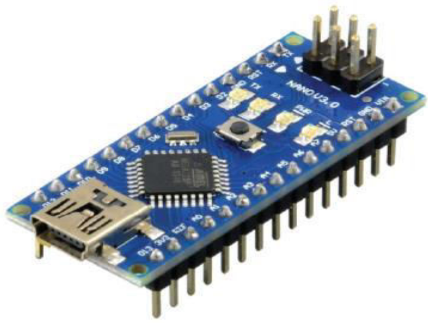

Figure.3. Arduino Nano

The Arduino Nano is an open-source breadboard-friendly microcontroller board based on the Microchip ATmega328P microcontroller (MCU) and developed by Arduino.cc and initially released in 2008. It offers the same connectivity and specs of the Arduino Uno board in a smaller form factor. The Arduino Nano is equipped with 30 male I/O headers, in a DIP-30-like configuration, which can be programmed using the Arduino Software integrated development environment (IDE), which is common to all Arduino boards and running both online and offline. The board can be powered through a type-B mini-USB cable or from a 9 V battery.

Ultrasonic Sensor

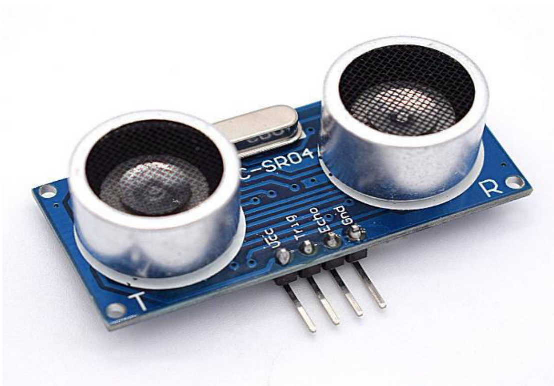

Figure.4.Ultrasonic Sensor

Ultrasonic transducers and ultrasonic sensors are devices that generate or sense ultrasound energy. They can be divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound.

Buzzer

Figure.5. Buzzer

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A piezoelectric element may be driven by an oscillating electronic circuit or other audio signal source, driven with a piezoelectric audio amplifier. Sounds commonly used to indicate that a button has been pressed are a click, a ring or a beep.

LCD Display

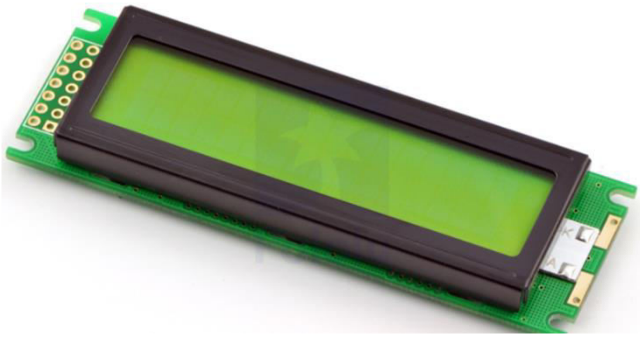

Figure.6. LCD Display

LCDs are used in a wide range of applications, including LCD televisions, computer monitors, instrument panels, aircraft cockpit displays, and indoor and outdoor signage. Small LCD screens are common in LCD projectors and portable consumer devices such as digital cameras, watches, calculators, and mobile telephones, including smartphones. LCD screens have replaced heavy, bulky and less energy-efficient cathode-ray tube (CRT) displays in nearly all applications. The phosphors used in CRTs make them vulnerable to image burn-in when a static image is displayed on a screen for a long time, e.g., the table frame for an airline flight schedule on an indoor sign.

IP Camera

Figure.7. IP Camera

IV.HARDWARE IMAGE

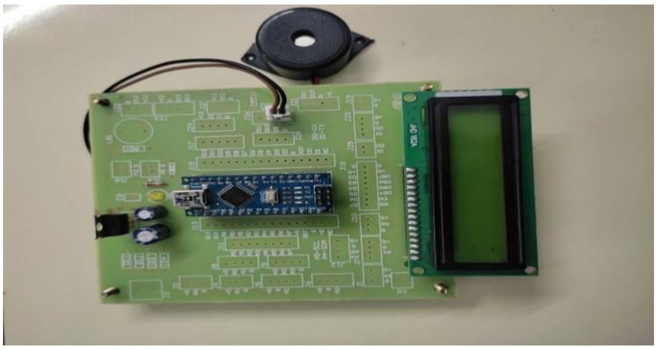

Figure.8. Hardware Image

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V.CONCLUSION

In conclusion, the implementation of a snake detection system in a poultry farm is a critical and proactive measure that significantly enhances the safety, productivity, and overall well-being of the farm. By leveraging technology, education, and preventative measures, poultry farmers can effectively manage and mitigate the risks associated with snake presence. The benefits of snake detection in a poultry farm extend to various aspects of farm management and contribute to the sustainable and successful operation of the business. Snake detection systems provide an early warning mechanism, allowing farmers and workers to take prompt action in response to the presence of snakes. This enhances overall safety and security on the poultry farm. The early identification of snakes reduces the health risks associated with snake bites for both poultry and farm workers. This preventative approach is crucial in minimizing the potential for venomous snake-related injuries. Timely detection and management of snakes help prevent economic losses caused by poultry mortality, reduced egg production, or other snake-related disruptions.

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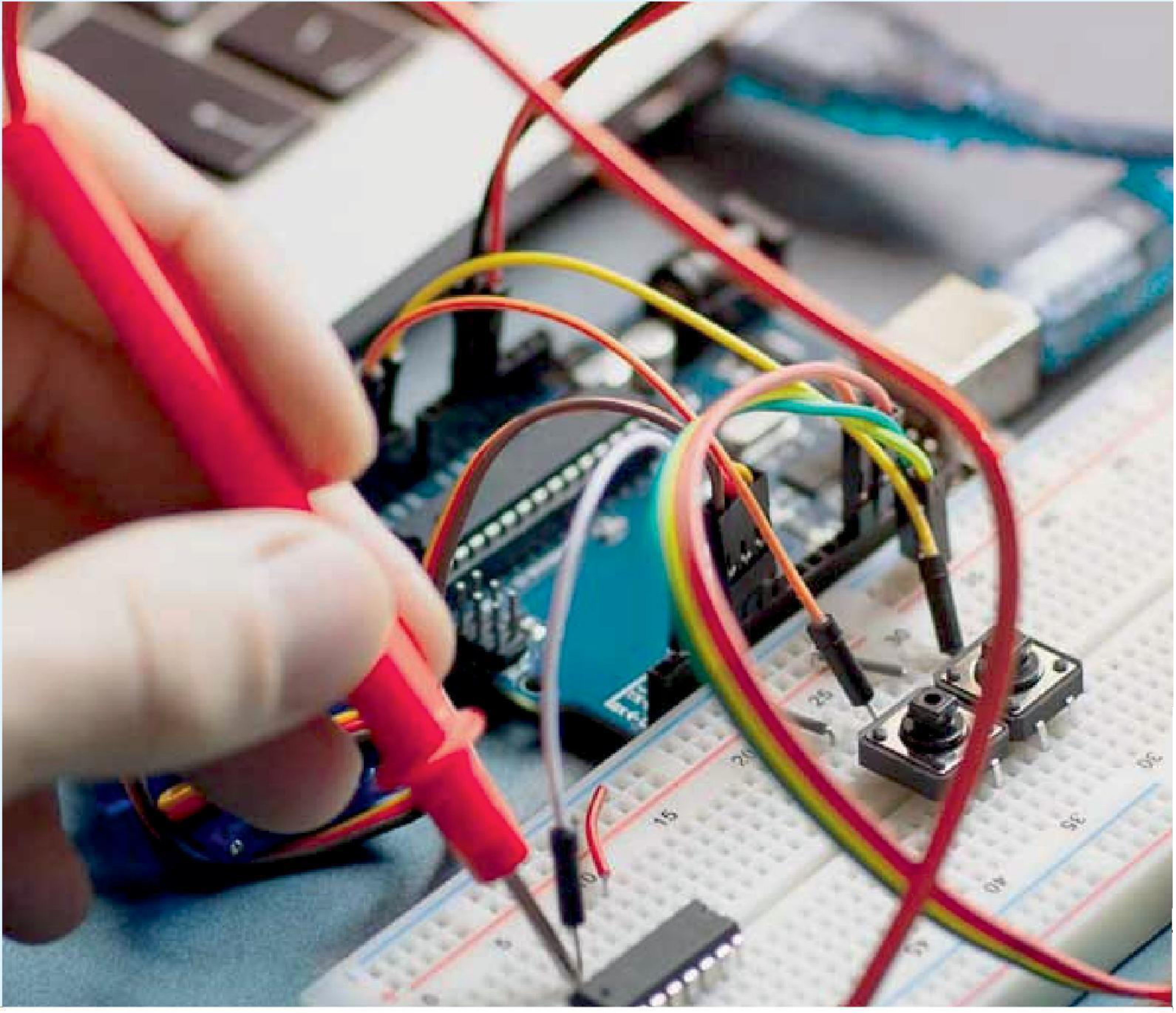

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