Protection for Farmland from Intrusions of Wild Animals based on IoT

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ABSTRACT - In several areas, surveillance plays a significant role, whether at home, hospitals, schools, public places, farmland, etc. It allows us to track a certain area and avoid theft and also gives proof of evidence. In the case of farmland or agricultural land surveillance, it is very critical that unauthorised people are prevented from entering the region and that the area is protected from animals. In everyone's daily lives, technology plays a central role. In several industries, there has been a rise in demand for the Internet of Things (IoT), which has received considerable research interest from both academia and industry. The implementation of loT has led to smart farming, precision agriculture, just to name a few, in the agriculture sector alone. This paper introduces the development of an Internet of Things crop protection framework for the prevention of animal intrusions in the field of farmland. To avoid possible damage to agriculture from wild animal attacks a repelling and a monitoring system is provided.In this we are using a fencing based system, once the wild animal enters the farmland the system will automatically send the information to the farm owner as well as provide mild electric shock to the animals.

I.INTRODUCTION

The rapid growth in the human population and the continuous economic development are causing over-exploitation of mineral deposits, causing fast, novel and remarkable changes to ecosystems. The large amount of land surface has been converted by human action, making changes in wildlife population, habitat and their behaviour. Which results in a more serious thing that is many wild animals on Earth have been driven to extinction, and many species have entered into new areas where they can disturb both natural and human systems. Therefore, observing the wild animals is essential as it provides evidence to the researchers to inform conservation and management decisions for maintaining diverse, balanced and maintainable ecosystems. In agriculture, one of the main social issues that is existing in the present is the damaging of the crops by the wild animals. Wild animal intrusion has always been a persisting problem to the agriculturalist. Some of the animals that act as a threat to the crops are monkeys, elephants, cows and others. These animals may feed on crops and also they run around the field in the absence of farmers and thus can cause damage to those crops. This may result in significant loss in the yield and will cause additional financial protection to the farmer in order to deal with the aftermath of the damage. Every farmer, while utilising his production, should also be aware of the fact

that animals also live in the same place and they need to be secured from any probable suffering. This problem needs to be attended to immediately and an effective solution must be created and accomplished. Thus, this project aims to address this problem which is caused by farmers. Farmers need technical support, hence the project proposes technical solutions by using GSM (global system for mobile communication) and WSN (Wireless sensor networks). A PIR sensor is used to identify animals when they enter near crop fields. The total model will be perfected using the micro controller integrated with the sensor, with a focus on four different animal species in particular: pigs, goats, cows, and elephants. The project's potential for agriculture is what makes it significant. An extensive and well-annotated dataset, comprising pictures of the target species, is first gathered. Careful data preprocessing is then done to improve the quality of the data. Convolutional Neural Networks (CNNs) are used to automatically identify pertinent features and classify objects accurately.

I.LITERATURE SURVEY

1)Siddhant Kumar, Gaurav Chaudhary, VenkannaUdutalapally, Debanjan Das and Saraju P. Mohanty,“ gCrop: Internet-of-Leaf-Things (IoLT) for Monitoring of the Growth of Crops in Smart Agriculture”, IEEE International Symposium on Smart Electronic Systems (iSES) (Formerly iNiS), 2019.

In this existing system, GCrop: Internet-of-Leaf-Things (IOLT) for Monitoring of the Growth of Crops in Smart Agriculture. The paper proposes a smart solution, gCrop for tracking the growth and production of leafy crops and for updating the status in real-time using IoT technology, image processing and machine learning. However, The results of this system lack to capture the growth phase of longer times due to unavailability of sufficient datasets. Whereas in the proposed system we take the datasets in Real Time.

2)G. S. Nagaraja, Avinash B Soppimath, T. Soumya and Abhinitha “IOT Based Smart Agriculture Management System”, 4th International Conference on Computational Systems and Information Technology for Sustainable Solution (CSITSS), 2019.

In this existing system they have developed an IOT Based Smart Agriculture Management System. The paper is designed to help the farmers increase the yield of crops. The method also helps minimise resource wastage by implementing a methodology called precision farming. But this system lacks in monitoring the crop health and to predict soil type, and thus recommend crops more efficiently. But in the proposed system we have handled these drawbacks.

3)GeorgeSuciu, Cristiana-IoanaIstrate and MariaCristinaDiţu, “Secure smart agriculture monitoring technique through isolation”, Global IoT Summit (GIoTS), 2019.

In this existing system Secure smart agriculture monitoring technique through isolation. The paper aims to demonstrate how Big Data processing and the concept of decentralised cloud activity will respond to the demands of IoT applications in agriculture and how intelligent farming can help farmers operate more efficiently and more securely. However, this system is very Expensive compared to our proposed system

4)G. Sushanth and S. Sujatha, “IOT Based Smart Agriculture System”, International Conference on Wireless Communications, Signal processing and networks (WiSPNET), 2018.

In this system IOT Based Smart Agriculture System. The system development that can track temperature , humidity, moisture and even animal movement that can kill crops in the agricultural field by using Arduino board sensors and, in the event of any discrepancy, send an SMS notification as well as an application notification created for the same purpose to the farmer 's smartphone using WiFi/3G/4G. However, The system lacks as Continuous internet connectivity is required. This can be overcome by extending the system to send suggestions via SMS and Email to the farmer directly to his mobile phone instead of mobile app. Which is developed in the proposed system.

IV.EXISTING SYSTEM

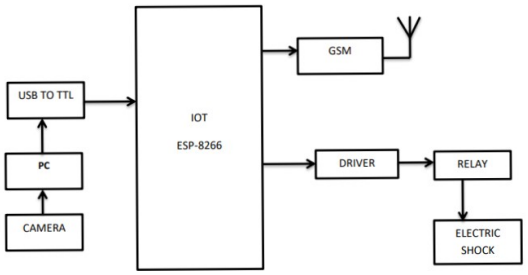
The existing system they have describes how the use of the IOT and ML techniques can be combined to make the irrigation smart .The system saves time avoiding problems like constant vigilance over the field by using IOT devices, crop prediction helps the farmers to grow suitable crops depending on the soil parameters by the use of machine learning techniques and it also helps in prevention of the intruders like wild animals into the field. It also helps in water conservation by supplying the plants / field with a minimal amount of water automatically through the help of sensors depending on the water requirements. and finally, SMS and Email

notifications will be sent to the farmer's mobile phone during the abnormal conditions of his farm. The existing system can be used for taking edge decisions in real time.

V. SYSTEM PROPOSED

The main aim of our project is to protect the crops from damage caused by animals as well as divert the animal without any harm. when the animal enters the farm area. A camera which will be recording the surroundings throughout the day. With the help of a deep learning model, we detect the entry of animals. The microcontroller then informs the user by an automated notification using GSM. an effective combination of real-time hardware connection via USB to TTL technology and sophisticated animal detection via deep learning. It provides a flexible solution that may be used in a range of fields, such as security, agriculture, and wildlife conservation. For accurate animal detection, a deep learning model—typically a Convolutional Neural Network (CNN)—is used fundamentally. By serving as a bridge, this interface transforms USB signals into TTL-level signals that are capable of controlling hardware. To guarantee smooth interaction, the system establishes a communication protocol, and a feedback loop verifies that activities are carried out successfully.

VI.BLOCK DIAGRAM



VII.MODULES DESCRIPTION

1.IMAGE DATASET COLLECTION: For this project, we must gather every image that makes a car appear to be stealing sand. This is the project's most crucial step. Therefore, all of the visuals that we see come from real-time . The following procedures can be taken after we get the data.
2.IMAGE PREPROCESSING: After gathering all the images, pre-processing is required. Thus not all images can convey information clearly. So that we may prepare the images by renaming, resizing, and labelling them. Once the procedure is complete, we can use the images to train our deep learning model.
3.IMPORTING MODULES : Following that, we must import all of the required library files. Library files are collections of functions and small execution codes. These library files will assist us in performing all of the necessary steps of object detection and image processing. We use important library files such as Tensor Flow, opencv, keras, and others in this project. These libraries will aid in making our deep learning model more efficient and adaptable for processing real-time images.

4. CAPTURING THE IMAGES OF ANIMALS: For this project, we must gather every image that makes an animal crop. This is the project's most crucial step. Therefore, all of the visuals that we see come from real-time. The following procedures can be taken after we get the four animal datasets.

5. CAMERA INTERFACING: One of the most important steps in image processing is computer vision. As a result, we must connect the camera to our deep learning model. Because the computer will see all real-world objects through the camera. Motoring of all kinds of medium can be done using a camera. The captured animal detecting can be produced as the main source of proof if needed

VIII.HARDWARE DESCRIPTION

POWER SUPPLY: Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU. The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.Power supplies for electronic devices can be broadly divided into linear and switching power supplies.

Linear Power supply: An AC powered linear power supply usually uses a transformer to convert the voltage from the wall outlet (mains) to a different, usually a lower voltage. If it is used to produce DC, a rectifier is used. A capacitor is used to smooth the pulsating current from the rectifier. Some small periodic deviations from smooth direct current will remain, which is known as ripple. These pulsations occur at a frequency related to the AC power frequency (for example, a multiple of 50 or 60 Hz)

Rectifier: There are several ways of connecting diodes to make a rectifier to convert AC to DC. The bridge rectifier is the most important and it produces full-wave varying DC. A full-wave rectifier can also be made from just two diodes if a centre-tap transformer is used, but this method is rarely used now that diodes are cheaper. A single diode can be used as a rectifier but it only uses the positive (+) parts of the AC wave to produce half-wave varying DC.

PASSIVE INFRARED SENSOR(PIR SENSOR): A Passive Infrared sensor(PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. PIR sensors are often used in the construction of PIR-based motion detectors (see below). Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall. All objects emit what is known as black body radiation

IX.APPLICATIONS

The agriland animals of Cow, Elephant and tiger are commonly raised on agricultural land for their meat, milk, and eggs. Animals such as cows, pigs, and chickens produce manure, which can be used as fertiliser to improve soil fertility. can help to control pests like rodents and insects on agricultural land. Bees are important for pollinating crops, and many farmers keep bees on their agricultural land to improve crop yields.

ADVANTAGES

By detecting animals that may be grazing or feeding on crops, farmers can take proactive measures to prevent crop damage, such as using scare devices or relocating the animals to other areas.

Animal detection can help farmers more efficiently monitor their land for potential threats or problems, allowing them to take action quickly and prevent potential losses.

Crop damage and improving efficiency, animal detection can help farmers save money in the long term by avoiding the costs associated with lost crops or wasted resources.

X.RESULT DISCUSSION

The implementation of this advanced smart animal detection and repellent system has yielded exceptional outcomes. It has demonstrated its ability to efficiently monitor agricultural lands, detect animal intrusions, and respond intelligently to safeguard crops. The system consistently identifies animal movements using the PIR sensor, ensuring that intruding animals are promptly recognized. Through the application of Artificial Intelligence and machine learning techniques, the system accurately distinguishes between different animal types, including common agricultural pests such as deer, rabbits, and birds. When potentially harmful animals are detected, the system triggers an immediate alert through the GSM module, allowing farmers to take swift action to protect their crops. The system activates a deterrent buzzer to repel intruding animals, providing an additional layer of protection. The smart animal detection and repellent system has proven to be a highly effective and versatile tool for enhancing agricultural security, improving crop yield, and reducing losses due to animal intrusions. It offers a cost-effective and intelligent solution that empowers farmers to proactively protect their agricultural investments.

XI.CONCLUSION

The project solves the problem related to the crop damage caused by wild animal attacks and is among the main hazards in recent years. The major concern in the project is that the farmer should be able to save the crops from damage and also consider the fact that animals should not be harmed or killed. This issue is one among the major concerns and it is essential to find the appropriate solution. The project here carries the great social relevance were the farmers can protect their yields and save them from the huge financial loss by using the suitable algorithms and methods we detect the animals and produce sound to drive away animals

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