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Securing Agricultural Crops Against Birds And Wild Animal Attacks.

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Abstract– In recent years, edge computing has become an essential technology for real-time application development by moving processing and storage capabilities close to end devices, thereby reducing latency, improving response time and ensuring secure data exchange. In this work, we focus on a Smart Agriculture application that aims to protect crops from ungulate attacks, and therefore to significantly reduce production losses, through the creation of virtual fences that take advantage of computer vision and ultrasound emission. More specifically, in this work, we deployed and evaluated various edge computing devices. Experimental results show the feasibility of the intelligent animal repelling system through the deployment of the animal detectors on power efficient edge computing devices without compromising the mean average precision and also satisfying real-time requirements.

1. INTRODUCTION

A. Definition

Wildlife tracking involves acquiring information about the behavior of animals in their natural habitat. The primary form of information that needs to be obtained is the location of the animal at certain points in time and this is generally referred to as tracking or radio—tracking. There are remote methods that can be used to track and identify animals visually and through acoustic signals

B. problem statement

- ▶ This Work emphasizes the importance of the protection of crops from its destruction due to forced entry of animals into the plot of lands. The fields are monitored at all times.
- ▶ When the animals enter the field, an image is captured. This is sent to the software tools for the purpose of processing.
- ▶ The animals are recognized as per the stored database and required action (alarms, sounds) is taken upto divert them.

C. History Of The problem

In forest zone and agricultural field human animal conflict is a major problem where enormous amount of resources is lost and human life is in danger. Due to this People lose their crops, livestock, property, and sometimes their lives. So this zone is to be monitored continuously to prevent entry of wild animals. With regard to this problem, we have made an effort to develop the system which will monitor the field. Finally sends notification to farm owner



Though farmers tried several methods, the problem continued. Interestingly, some workers in chick hatcheries noticed that the deer herds do not come near the places where they dispose their hatchery waste; which contains a lot of unhatched eggs," says Dr. Narahari. By observing this, some hatchery workers started spraying the egg contents mixed with water, on their home gardens and noticed that the deer do not come near the plants (sprayed with egg contents), probably due to the pungent odour emitted by the raw egg contents when exposed to the air.



During 2019-20 ,loctus attack was reported in some districts of rajasthan and gujarat. Rajasthan government reported 1,79,584 hectares state was affected by lotus attack .During 2020-21,the loctus incursions were reported in 10 states in India. Some of the states are gujarat,up,mp.

from loctus attack farmers can take precautions in which month they are arriving but they can't kill the species arrives in particular season in between July-October. From our project we can secure agricultural crops against birds and wild animal attacks taking measure of using ultrasonic sensors, fences,noise,flash light, & frequency range to disturb the animals birds .sending an alert msg ,Alarmsto the farmers and forest officials.



B Strategies To Protect Crops From Wild Animals

Electric fences; are constructed to provide an electric shock to animals that come in contact with the fence, thus preventing animals from line crossing the fence. These fences are long lasting and an effective crop protection measure. Costs vary depending on specic type and size of an areaBefore purchasing an electric fences it should be make sure that animals to be entered in an specifice area and region of the field . Additionally, it's recommended that electric fences are marked with an danger symbol and it should be notices with warning to avoid human contact



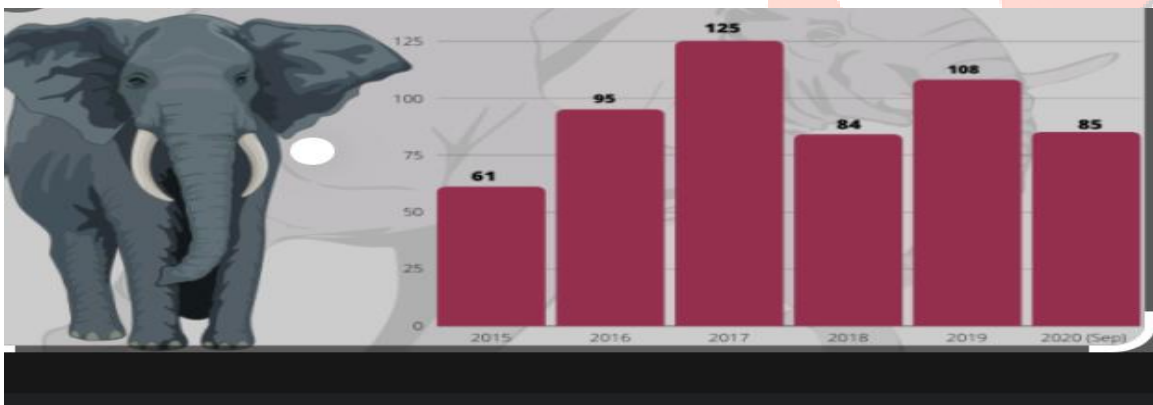
Electric agricultural fences

Ultrasonic and Electronic repellents,

Electronic repellents; effective, long lasting, and eco-friendly method for crop protection that repels animals without harming them. Farmers can make use one of the following two types of electronic repellents: **Ultrasonic electronic repellent;** silent to humans, high-frequency sound waves repel wild animals

Extent of the problem

Modern agriculture is an evolving approach to agricultural innovations and farming practices that help farmers increase efficiency and reduce the number of natural resources like water, land, and energy necessary to meet the world’s food, fuel, and fibers needs. Agribusiness, intensive farming, organic farming, and sustainable agriculture are other names of modern agriculture. Due to this there is a large destroy of forest from this reason animals entering the huan habitat day by day and entering into the roads and causing harm to people lives one of the best example is elephant



Graph showing that animals entering the human habita day by day .A Clear vision showing that due to uncertainty of animals entering the field and destroying the livestocks and farm there is a above graph

Impact of Modern Agriculture on the Environment As we know that modern agriculture improved our affordability of food, increases the food supply, ensured food safety, increases sustainability, and also produces more biofuels. But at the same time, it also leads to environmental problems because it is based on high input–high output technique using hybrid seeds of highyielding variety and abundant irrigation water, fertilizers, and pesticides.

C.Objectives

The main objectives of this paper are to make an efficient and agricultural system to overcome from animals destroying the forest

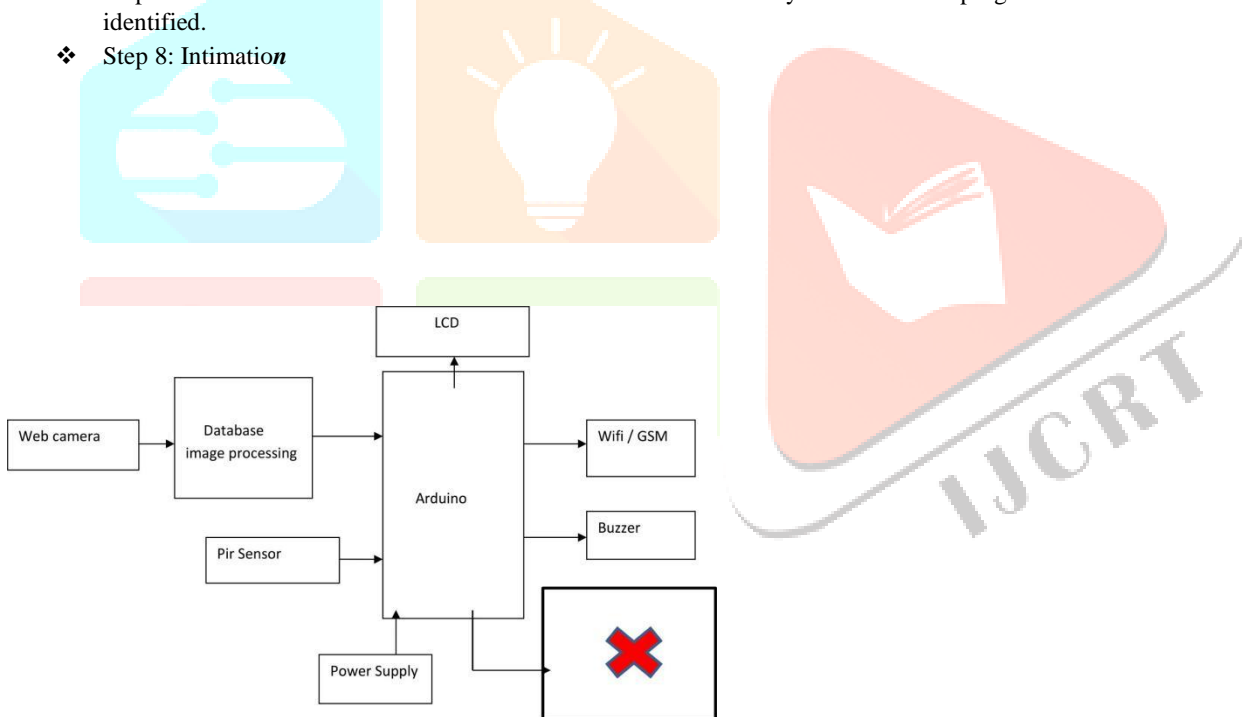
To Capture the image and Classifying Them Using Image Processing

- Input from the camera is processed. Classification of image is done using Convolution Neural Network . Classifying weather the animal is domestic or Wild Animals
- After Image processing and classification. If Wild Animal is detected, processor turns an alarm and intimation alert to Farmer.
- **To send Notification to farmers and Forest Officials**
intimation alert is sent to farmer about animal presence.

2. METHODOLOGY

D.Methodolgy ,

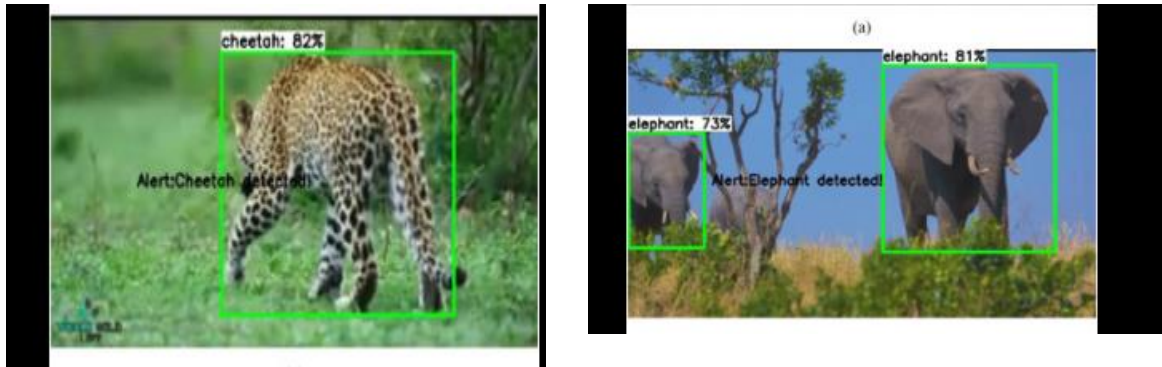
- ❖ Step 1: Image/video acquisition from the camera □
- ❖ Step 2: Convert video to frames.
- ❖ Step 3: Store images of each animal as database which is used as training set for our program
- ❖ Step 4: Compare camera captured frames with the database.
- ❖ Step 5: Use imread function to read the image and Preprocessing is done on that image. Perform Blob detection on the frame and blobs are matched with images from training database images.
- ❖ Step 6: And check if it is matching or not.
- ❖ Step 7: To identification of that animal is desired or not. An array is created and program is written for each animal to be identified.
- ❖ Step 8: Intimation



How the agricultural system works against birds and wild animal system

The modal is represented as shown in below figure

Pir sensor will be connected to arduino. Whenever PIR sensor senses the motion of animal or bird , Camera turn on and classification starts.The image that is sent by the camera is received by the PC/Laptop for classification of birds or animal. Database is created and the set of sample images are stored in it. The program consists of functions such as index Image, image Set and retrieve Image. The Image Set is used to hold a collection of images image Index that are visually similar to the query image. The value match range is from 0-1.If the value is 0, then the image is not matched. If it is 1, then the query image is same as that of the stored image. If the value is found between that of 0-1, then the query image falls under the category of the stored image i.e., the contents in the query image are same as that of the stored image. If the name of the image matches with that of the regular expression of the image then the animal is elephant otherwise it is a leopard. If the score is in the range of 0.1 to 0.9, then the image is matched with that of the stored image. Once the wild animal is identified then the resulting repellent system is applied. If the animal found is an elephant then the Bright light is emitted. If it is found to be a Leopard, then the irritating loud noise is used. Consequently a SMS is sent to the forest officials and also to the field owner as alert information.



Once the animal is classified to be a threat, necessary actions are. SMS notification will be sent to the farmer and the forest official regarding the location of the animal and what type of animal has been trying to intrude the farm. Along with the SMS notification, repellent system of Bright light and irritating loud noise is used simultaneously with interval of 4 seconds is used upon the animal. The repellent system works continuously for better effectiveness in scaring away the animal.

Componentes of block diagram

- Webcamera
- Database image processing
- Arduino
- Lcd
- Pir sensor
- Power supply
- Wifi /gsm
- buzzer

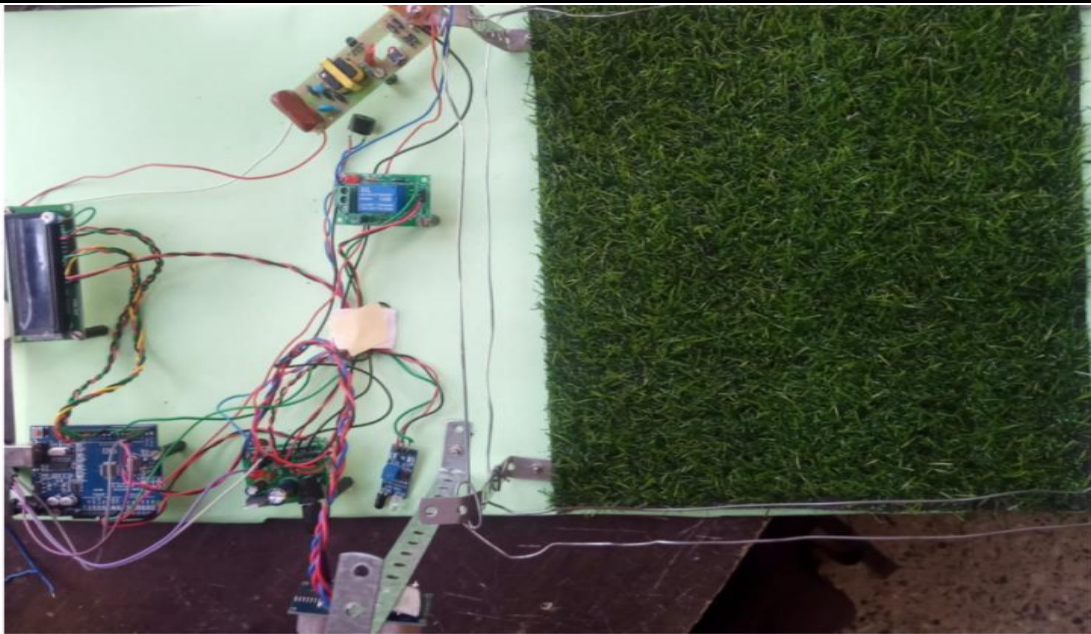
The block diagram shows the working of our project modal securing agricultural ssystem against birds and wild animal attacks. The main aim of our project to protect crops against birds and wild animal attacks

To obtain (correct) predictions from deep neural networks you first need to preprocess your data. In the context of deep learning and image classification, these preprocessing tasks normally involve:

Mean subtraction

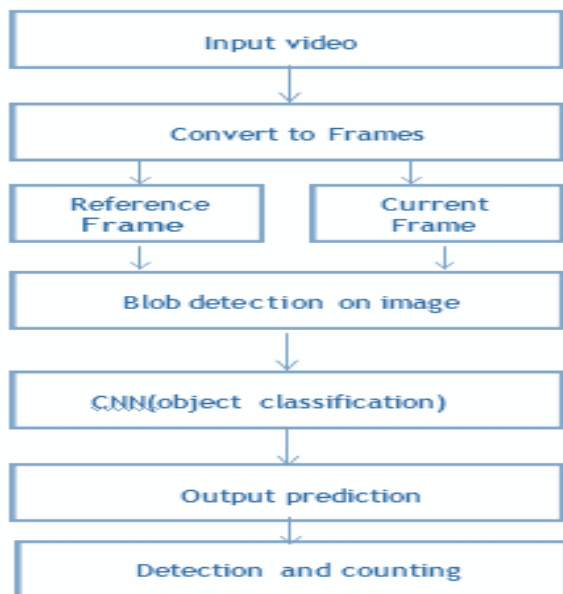
Scaling by some factor

OpenCV's new deep neural network (dnn) module contains two functions that can be used for preprocessing images and preparing them for classification via pre-trained deep lea



D. Securing agricultural crops

In recent years the animal and human conflict is one of the major reason so to overcome this problem we are proposing a survival method to both farmers and wild animals . when the animal entered to the field an animal is detected through web camera by using image processing an input video is captured and convert it into frames based on the reference frames and current frames depending upon the the frequency range 0-1 animal get irritated by using our methods of machine learning and internet of things



conceptual picture of securing agricultural crops.

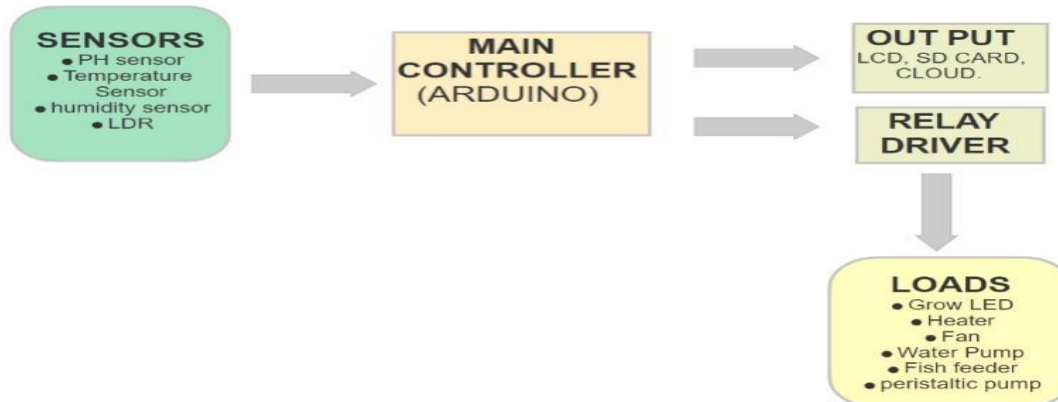
Internet of Things is a new revolution of the Internet. Objects make themselves recognizable and they obtain intelligence by making or enabling context-related decisions through communicating information about themselves. They can access information that has been aggregated by other things, or they can be components of complex services [25].

Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards ('shields') or breadboards (for prototyping) and other circuits.

The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs. The microcontrollers can be programmed using the C and C++ programming languages, using a standard API which is also known as the Arduino language, originated from the Processing language. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) and a command-line tool developed in G

D. hardware development

We first look over into agricultural system and assemble the hardware to automate, Place the web camera in the grow bed and the, and ultrasonic sensor pir sensor. Buzzers are also placed to send an alert messages to both farmers and forest officials.



System architecture of smart agriculture to protect birds and wild animal attacks.

An image is captured based on reference frame and stored image depending upon the frequency electric fences get activated. An ultrasonic sensor is also placed to know when to activate motion of the animals to be detected. The microcontroller used was Arduino.

E. Software Development

1. OpenCV (Open Source Computer Vision) is a library of programming functions mainly aimed at real-time computer vision. OpenCV runs on a variety of platforms. OpenCV is an Image Processing library created by Intel and maintained by Willow Garage.

2. Python (programming language) is an interpreted high-level general-purpose programming language. Its design philosophy emphasizes code readability with its use of significant indentation.

PIR Sensor:

The Passive Infrared Sensor (PIR) sensor module is used for motion detection. It is often referred to as "PIR", "Pyroelectric", "Passive Infrared" and "IR Motion" sensor. The module has an on-board pyroelectric sensor, conditioning circuitry and a dome-shaped Fresnel lens. It is used to sense movement of people, animals, or other objects. They are commonly used in burglar alarms and automatically-activated lighting systems.

Wifi / GSM:

The ESP8266 Serial WiFi Wireless Transceiver Module is a self-contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application process.

This module has a powerful enough on-board processing and storage capability that allows it to be integrated with the sensors and other application-specific devices through its GPIOs with minimal development up-front and minimal loading during runtime.

Buzzer: The buzzer is a sounding device that can convert audio signals into sound signals. It is usually powered by DC voltage. It is widely used in alarms, computers, printers and other electronic products as sound devices.

3. CONCLUSION

The system designed shown in the block diagram performs the detection of the Wild Animals.

The Raspberry Pi is used to make the system portable and affordable.

Here first the image is captured by using a camera and which is then converted to a grey scale image to make it feasible for comparison with the existing data set values.

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