Real-Time Monitoring And Protection From Birds & Animals

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Abstract- *In India, nearly 65% of the people are directly or indirectly dependant on agricultural sector for economic survival. The annual income of farmers is significantly influenced by the yield of the crops, which is continuously decreasing due to natural phenomena and poor technological advancement. However, the particular attention should be paid to the damage caused by birds and animals. While the exact measure of the loss in yield associated with birds and animals are unknown, farmers integrate a number of traditional and conventional techniques to avoid these damages cause by birds and animals. Many of the used methods result in extinction of the rare species. Therefore, there is a need to develop alternative techniques, such that it does not harm birds and animals physically as well as protects the crops, thus we have collected sources from the experts in the fields of ornithology, agricultural sectors and field visits, to avoid irreversible harm to the Indian biodiversity. This research analyzes the loss of yield of crop due to birds and animals, explores repelling techniques adopted by the farmers, and addresses the consequences of damage caused by the bird and animals to field crops in India. This project unveils the use of IOT for Real-time crop monitoring and protection from birds and animals to reduce the loss of crops and thus helps farmers to reduce the risk of crop damage.*

Keywords- Bird species, Losses caused by animals, biodiversity, agricultural yield, repelling techniques, crop yield, using of IOT techniques to reduce crop losses.

I. INTRODUCTION

Wide varieties of arable crops attract granivorous birds which lead to significant damage to the crop yields globally. However, there are few studies pertaining to the awareness of the problem among the farmers and the magnitude of crop damage caused by the birds in India. The problem of crop damage by birds is faced by the farmers and the losses due to crop depredation by birds are significant in terms of the gross crop yield. Birds can inflict damage to the crops and a loss to the farmers in all the stages of crops right from sowing and planting till harvesting.

Most of the activities of birds are either advantageous or disadvantageous to the farmers. Birds create negative impact on most of the agricultural activities and some agricultural activities attract birds as special feeding opportunities. The presence of insectivorous birds in croplands is beneficial to farmers up to some extent. In India, as a common remedy to the problem, attempts are regularly being made by the famers to reduce crop losses from birds by deploying measures for control of birds either through traditional means or by using bird scaring techniques, devices, and pesticides. Due to over population it occurs a deforestation this results in shortage of food, water and shelter in forest areas. So, Animals interference in residential areas is increasing day by day which affects human life and property causes human animal conflict. Agriculture is the backbone of the economy but because of animal interference in agricultural lands, there will be huge loss of crops. Elephants and other animals coming in to contact with humans, impact negatively in various means such as by depredation of crops, damaging grain stores, water supplies, houses and other assets, injuring and death of humans.

Objectives:

- To Reduce the filed losses caused by birds from sowing till harvesting and prevent of killing livestock.
- To Eliminates the labour cost required for this operation.
- To Maintains biodiversity by protecting birds at same time preventing the damage caused by it.
- To provide an effective, safe alternative and use of Advanced technology in Agriculture.

II. LITERATURE REVIEW

Manoj Ashokrao Kale, NandkishorDudhe, Raju Kasambe, and Prosun Bhattacharya (2019) entitled as **"CROP DEPREDATION BY BIRDS IN DECCAN PLATEAU, INDIA**" said that Extent of crop depredation in agricultural fields of groundnut, pearl millet, peas, sorghum and sunflower was assessed in Pune, Akola and Amravati, the three productive districts of Maharashtra, India. The study included interviews with the farmers, identification of the bird species

responsible for the crop depredation and actual field assessment of damage. The problem of crop depredation is severe for the crops mostly during harvesting season. Most farmers were not satisfied with the conventional bird repelling techniques. The sustainable solution for reducing crop depredation is a need for the farmers and also such techniques will help avoid direct or indirect effects of use of lethal bird control techniques on bird species.

Ayyappan, P.K. Agrawal., V. Vasudeva Rao and R.S. Tripathi (2018) entitled as **"HUMAN-WILDLIFE 'CONFLICT TO COEXISTENCE' IN AGRO-PASTORAL LANDSCAPES"** said that Human-Wildlife Conflict (HWC) is defined as any interaction between wildlife and humans which causes harm, whether it is to the humans or wild animals or property (including the destruction of crops). A wide range of species is responsible for conflict, with the principal culprits being primates, rodents, ungulates (including antelope, wild boar, elephant, tiger, lion and leopards). Livestock also perpetrate significant damage, however, there are often locally accepted measures of restitution. Conflict situations can arise anywhere, and are frequently concentrated at the fringes of reserves where wildlife enjoys protection and land is often fertile, leading to a wealth of agriculture. There are other socioeconomic costs associated with human-wildlife conflict which can outweigh the direct costs of agricultural damage and be a major component of the conflict as perceived by local people. The ways in which HWC occurs are Killing of humans: Any species that attack the human being for defence purpose or for food that leads to death; species like tiger, leopard, lion, sloth bear, elephant are involved. Killing of livestock: Any species that preys on the livestock; leopard, lion, tiger and wild dog. Accidental injury: Any species that accidentally attacks humans or livestock for self protection, gaur, nilgai, elephant, leopard, tiger, wild boar and 6 crocodile. Damage to agricultural crops: Due to non-availability of preferred dietary items in the original habitat, the animals are compelled to depend on agricultural crops for food and make enormous damage to the crops; wild boar, nilgai, elephant, rhesus macaque and black buck. Property damage: Species involved in damaging the households or any other structures: elephant, rhesus macaque and bonnet macaque.

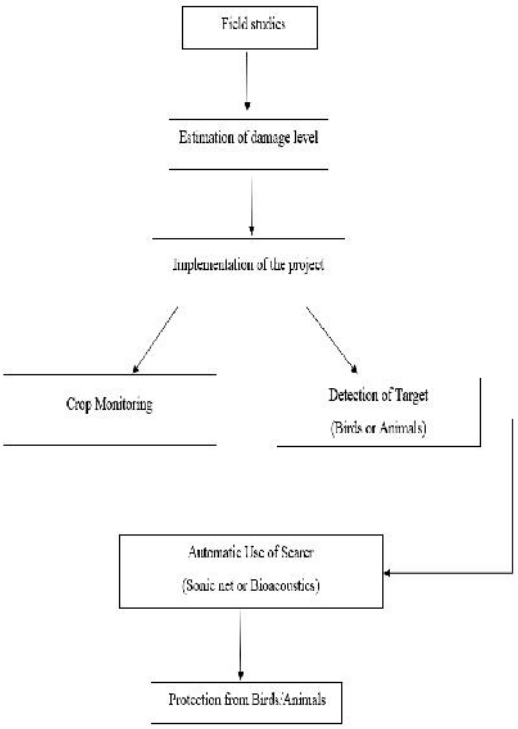
V. Vasudeva Rao and R.S. Tripathi (2016)entitled as "**VERTEBRATE PESTS - ISSUES AND MANAGEMENT STRATEGIES**" said that Human-wildlife conflict has been a well known problem in vicinities of protected and non-protected areas. Incidences of human casualties, livestock depredation and crop damage caused by wild animals e.g. elephant, tiger, lion, sloth bear, leopard, nilgai, deer and wild boar have been widely reported from various parts of India. Keeping in view the severity of the problem associated with the wild animal species, to minimize the crop losses and also farmer - animal conflict in agricultural landscape, ICAR has launched an All India Network Project on Vertebrate Pest Management during XII Plan period.

Bioacoustics:

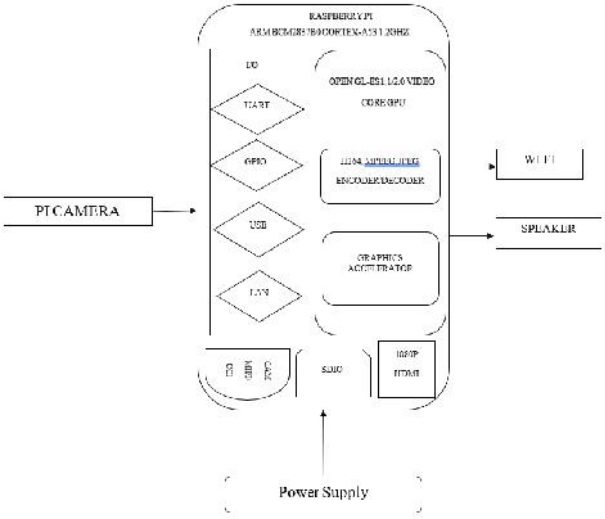
The bioacoustic technology uses only sounds of predators, distress and alarm calls of target and closely related species of target animals. The calls are broadcast in a field by suing an electronic platform with sound drives. Bioacoustic tries to convey the message 'this area is dangerous' to the target animals in their own language. On hearing the sounds, the target animals start avoiding the area, thus saving the crop from being damaged. The sounds are natural and safe on humans, birds and animals. The equipment produces fixed volume of 110 dB at source covering an area of 4-5 acres when ambient noise level is around 42 dB. At 37 dB of ambient noise, the equipment can cover up to 19 acres. The equipment should be ideally installed when the animal damage is beginning. Bioacoustics is 92% effective in dispersing wild boar from the cropped area.

III. METHODOLOGY

Flow chart



Block Diagram



IV. MATERIAL AND PROPERTIES

4.1 Raspberry pi Motherboard

The Raspberry Pi device looks like a motherboard, with the mounted chips and ports exposed (something you'd expect to see only if you opened up your computer and looked at its internal boards), but it has all the components you need to connect input, output, and storage devices and start computing. The raspberry pi mother board is used mainly to control the whole unit and helps in controlling all function done in the system. Through the micro USB memory card wounded with OS in raspberry mother board helps to operate the project by using python 3.87 programming language. All over the world, people use Raspberry Pi to learn programming skills, build hardware projects, do home automation, and even use them in industrial applications.

4.2 Pi Camera

The Raspberry Pi Camera v2 is the new official camera board released by the Raspberry Pi Foundation. The Raspberry Pi Camera Module v2 is a high quality 8 megapixel Sony IMX219 image sensor custom designed add-on board for the Raspberry Pi, featuring a fixed focus lens. The Pi camera module is a portable light weight camera that supports Raspberry Pi. It communicates with Pi using the MIPI camera serial interface protocol. It is normally used in image processing, machine learning or in surveillance projects.

4.3 Monitoring Screen

A Monitoring Screen is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with polarizers. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in color or monochrome. monitoring screens are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as preset words, digits, and seven-segment displays, as in a digital clock.

4.4 Adaptor

This the main for the monitoring system to run and function its duties. An adapter or adaptor is a device that converts attributes of one electrical device or system to those of an otherwise incompatible device or system. Some modify power or signal attributes, while others merely adapt the physical form of one connector to another. An AC-to-DC power supply adapts electricity from household mains voltage (either 120 or 230 volts AC) to lowvoltage DC suitable for powering consumer electronics.

4.5 Speaker

Speaker is an output hardware device to generate sound. The signal used to produce the sound that comes from a sound card. When the speaker receives electrical input from a device, it sends the current through the causing it to move back and forth. This motion then vibrates the outer cone, generating sound waves picked up by our ears. When the pi cameras detect the bird/animal the programming made will automatically start its alarm. The outcome of the alarm (sonic net/bioacoustics) need speaker that efficient produce the sound needed to prevent the birds from the field.

4.6 Voice playback board

The ISD1820 Recording Module Voice Board is the real easy way to add Voice Recording (and Playback) to the project. The Module can be operated directly by using the 3 Push-Buttons or with every microcontroller. A microphone is implemented directly on the board, and connect any 8 Ohm Speaker. our recordings are saved even without power due to the non-volatile storage on the ISD1820. The recorded message is stored in its specialised analogue flash memory that will keep the message stored even when power is removed. The module includes an electret microphone to record your message and push buttons allow for record, partial playback, or full playback of the message.

V. WORKING PRINCIPLE

As the farmers faces many damages in crops from sowing till harvest due to birds and animals, they are directly affected as the yield of the crops are significantly reduced due to these problem caused by birds and animals. Since earlier many techniques were used to prevent birds and animals from the field to avoid damages caused by birds and animals, unfortunately these techniques were not great successful hence we have implement this project to deduct the presence of both birds and animals in same project.

5.1 Field Studies

In order to assess the crop damage in a field, Two important parameters the size of the plot and location of the plot. Birds are commonly attracted at the edges of crop fields as compared to the interior for most of the crops. In this study, plots were selected for estimation of the damage and the data was collected from field covering all varieties of crops. In case of animals, which crops are suspectable to what type of animals are determined in this field studies.

5.2 Estimation of Damage

In most of the crops, the loss was considerably large at the edges of cropland primarily due to the presence of trees, bushes, and fencing along the edge. Although a number of studies on crop raiding are published addressing the problem in different habitats and caused by different species of wild animals, we can utilize this rigorous methods for primary estimation of damage and attempt to cross check or validate the methods.

5.3 Implementation of the project

Once the estimation of crop losses by birds and animals for a field is done, with result of estimation farmers can decide whether implementation of the project is needed or not for the field. The implementation of the Real-time crop Monitoring and protection system will help the farmers protect their crop from birds & animals and prevent the damage caused by them.

5.4 Monitoring Crop

Monitoring is the technology which facilitates real-time crop monitoring via spectral analyses of high resolution images for different fields and crops which enables the farmers to track negative dynamics of crops cause by birds and animals.

5.5 Detection of Birds/Animals

To make the best use of camera surveillance in agriculture field and farmland we have used a new methods of detection of birds and animals in this project. Detection of birds/animals are done using pi cameras.

5.6 Automatic use of scarer

Once a bird is deducted the system sounds loud noise of either sonic net or bioacoustics with respective of a bird or animal to prevent their from the field, this automatic process is done by programming the cameras using python 3.87 programming language to deduct the morphology of the birds and animals when it enters at distance before the field.

5.7 Protection from birds/animals

Thus through this system the birds and animals are prevented even from entering the field. In addition this project can also be implemented in farmlands to protect the livestock from the attack of wild animals.

VI. RESULT AND DISCUSSION

Birds are difficult to control; Wild animals often destroy standing crops and prey on livestock, causing economic losses to farmers. Crop and wildlife damage are becoming serious for many Indian protected areas. Due to the unavailability of any detection system animals even attacks/kill villagers and also destroy their crops. They are intelligent, adaptable and they can get used to certain control methods, so it is important to change the method used, to innovate. The previously developed techniques were inefficient and uneconomical ways to reduce crop loss. Therefore a proper detection system could help save their lives and also to the preservation of crops. Hence we have developed a project in which the crop field is completely motorized using pi camera. This Real-time crop monitoring system are employed with IOT for automatic Detection and once the target (bird/animals) is being deducted the system produces automatic alarm system. we have used a "Sonic Net" technique in case of birds which do not have to be loud and are a combination of wave forms collectively called "colored noise" forming non-constructive and constructive interference with how birds talk to each other. In case wild animals entering the farmlands and destroying the crops, an electronic fire cracker (for bigger animals, like elephant) and bioacoustics (for smaller animals like wild pigs and deer) which have been found useful to ward off the wild animals. Thus this system is used to prevent birds and animals without hurting them physically and preserving biodiversity at the

same time. This “Real-time crop monitoring and protection from birds and animals” is 100% successful and helps farmers to protect their field and livestock completed from birds and animals.

VII. CONCULSION

The presently crop depredation by birds is a serious problem in the agriculture. The traditional bird scaring techniques were not very effective in controlling this problem. Thus we have provided a solution by developing eco-friendly birds specific scaring techniques to minimize crop depredation due to birds for improving the crop yields. It is also found that the techniques like drum sticking, models of scares, reflecting ribbons, crackers and catapult are not efficient enough to manage the problem permanently. In mean while the problem of crop vandalization by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution. Thus this project carries a great social relevance as it aims to address these problem. Hence we have designed a smart embedded farmland protection and surveillance based system which is low cost, and also consumes less energy. The main aim is to prevent the loss of crops and to protect the area from intruders and wild animals which pose a major threat to the agricultural areas. Such a system will be helpful to the farmers in protecting their orchards and fields and save them from significant financial losses and also saves them from unproductive efforts that they endure for the protection of their fields. This system will also help them in achieving better crop yields thus leading to their economic wellbeing. Hence we have concluded that visual estimation of the field can reduce the crops, fruits and grains damage. Thus our technology “Real-time monitoring and protecting from birds and animals” will reduces these damages caused by birds and animals and helps farmers in increasing their yield

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