IOT BASED CROP PROTECTION SYSTEM FROM WILD ANIMALS ATTACK

A PROJECT REPORT

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ABSTRACT

Our India is an agricultural land, crop vandalization is that the foremost problem faced by the farmer, where massive amount of resources is vanished and human life is at risk. Wild animals like monkeys, cows and buffaloes, wild pigs, wild dogs, bison's, elephants, deer and even birds like parakeets cause plenty of harm to crops either by running over them or eating them and vandalizing them completely. This ends up in poor yield of crops. With regards to the matter, project was designed to shield the agriculture lands from the wild animals attack and alert

the farmer and forest department. During this project, ultrasonic sensors are placed round the first boundary to detect the presence of animals and alert message given to the farmer. If the animals cross the second boundary AI camera will capture the animal’s image and send the image and call to the owner and forest department. If animals cross the third boundary siren will on which divert the animals from the crop land and also it alert the encircling people through buzzer sound.

CHAPTER 1

1. INTRODUCTION

The population of wildlife is greatly intimidated by the changing human behavior by means of vigorous natural resource accession and topographical changes. There has also been an increase in conflicts between human beings and wildlife. As a result of this a lot of resources have been compromised and need for compensation has increased. This has created a major hurdle for effective management of resource as well as wildlife conservation. In addition, theft of farm produce and livestock and farm equipment is at rife. Hence, a system to identify the culprits and to alert the owners of presence of intruders is essential. Be it wild animals or human intruders, the proposed system provides an apt solution. Property, human lives and wildlife conservation can be achieved by means of the proposed virtual fence system. Various methods have been adopted previously to ward off wild animals and intruders in Indian farmlands. Some of them were rifle-guns, and electric fences, beehives with live bees and scarecrows, out of which, many caused large scale destruction to human as well as animal lives. As technology improved, many bloodless solutions have been realized. Among them many were ineffective as they did not take physical, technological, climatic factors into consideration. Particularly, since elephants are large in size, it is difficult to protect ourselves against them. So a psychological understanding of their behavior is important. As a simple solution to all these problems and as an amalgamation of systems to provide a single system to protect farmlands from wild animals as well as from intruders, we have come up with the concept of virtual fences.

CHAPTER 2

LITERATURE SURVEY

2.1 Smart animal repeller Anay Anil Shetgaonkar ; Vinayak N Shet

Principal: Normally camera traps are the typical devices that are used in the field for the study of wildlife species in deep and remote forests but here using the basic idea of camera trapping, we are trying to reduce the damage or the man animal conflict, that is coming up these days, everywhere on a massive scale, that is we are using the principles of bioacoustics and image processing, in order to reduce the problems or damages caused by wild animals to

the farmers, hence considering this fact that since humans, day by day have encroached into the forest and thereby since there is a reduction in green cover which in turn reflects in the migration and transit pattern of animals thereby animals land up in human habitation. Hence we make use of high frequency and high intensity sound waves to drive away the animals, which cause harm or loss. Similarly some birds can imitate calls of other birds, these calls are emitted with a motive of food competition. Similarly we are trying to make use of sound waves but here it's not just sound waves that we make directly use of but instead we use the parameters of sound that is frequency and intensity. Now since each animal is having its own auditory field hence the hearing range of each animal would be different so the frequency that is emitted, would be specific for every animal hence, therefore it is necessary to identify each animal. Now Identification of the animal would be carried out, such that camera would be placed in the path where the animal would come. Once image is clicked by camera it would be processed and further, it would identify a particular animal and hence would ease the task of emitting that particular band of frequencies which are most sensitive to that particular animal.

2.2 A Self Induced Warning System for Wild Animal Trespassing Using Machine Vision System Aswin. V.P. Ram ; A. Sarath Prakash ; A. Irshath Ahamed ; K. Anirudh; M. M. Arvindh ; N. Nithyavathy: In India an increase

in human population caused by industrial and agricultural growth has led to the conversion of the forest lands into human settlements. Animals that wait near forest-village borer for nightfall particularly to eat crops have been known to kill or harm people. Therefore there is a necessity to safeguard human livelihood without endangering the animal population by developing a suitable monitoring system. The development of a monitoring system for elephant intrusion can help to track the presence of animals over forest prone areas and avoid the chance of interference or harm of animal to human life. Animal is identified by matching the present captured image through vision based camera with the template image available. The pattern matching is done for identifying specific parts of the elephants such as ivory, trunk, ear etc. The platform used for processing is Machine Vision using LabVIEW based image processing algorithm. Cameras are fixed at places where animals usually used to enter the villages, and images are sent for processing through a wireless system. If the pattern matches with the template warning signals are produced. This system reduces the time required to detect animal presence. Thus this system becomes effective and preferable to implement. An early warning is sent to the forest officials as well as the villagers about the

arrival of elephants towards forest-village prone areas. Thus, this system provides a solution for an unsupervised process for individual species identification specifically for elephants.

2.3 Animal intrusion detection based on convolutional neural network Wenling Xue; Ting Jiang; Jiong Shi: The conflict between humans and animals is seen across the country in a variety of forms, including monkey menace in the urban areas, crop raiding by wild pigs and so on. Providing effective solutions for human-animals conflict is now one of the most significant challenges all over the world. In this paper, a wireless sensor network based on UWB technology is used to deploy intrusion detection. By analyzing the characteristics of Ultra wide band (UWB) signals, convolutional neural network is used to learn the characteristics of UWB signals automatically. And finally the SVM or Softmax classifier is used to classify human beings from animals. Several experiments are tested in corn field and the experimental results show that the method proposed in this paper can detect human and animal intrusion very effectively and improve the accuracy of detection by nearly 16% compared to the traditional manual extraction.

2.4 A Study on Sensor Based Animal Intrusion Alert System Using Image Processing Techniques S. Jeevitha **;** S.Vengatesh Kumar: Image processing and

IoT based monitoring network has taken the sensors to a completely different level. The conflicts between human and animal become a major problem in the agriculture field by resulting the human life in danger and loss of huge quantity of resources. To overcome these challenges, an animal intrusion alert system is designed by employing wireless sensors for sending an automatic alert message to both the landowner and forest officials with an image. This can make an early warning notification to take a suitable action based on the type of intruder. The sensor will detect the movement of the animal and the camera will capture the image, then the image is classified via a microcontroller, and further the GSM module will send the alert notification SMS to the forest department and the landowner.

2.5 Protection of orchard from wild animals and birds using USN facilities Seung You Na; Daejung Shin; Joo Hyun Jung; Jin Young Kim: Orchard

fruits are vulnerable to wild birds and animals. One peck on fruit results in critical damage to the produce. Therefore, it is very important to monitor the nearby presence of birds and animals. Then the actuation of various devices should follow to repel the hazardous animals.

Traditional methods have been widely applied depending on the kinds of produce and imperiling animals. In this paper, we propose a method to protect orchard produce from wild animals and birds via ubiquitous sensor network devices, which is applied to orchards along with traditional methods to improve the protection performance. Microphones and camera modules are added to the basic sensors on the USN nodes. Camera images are analyzed for a wide area monitoring. Audio signals from microphones are used for nearby monitoring around a node. Infrared motion sensors are utilized mainly for the detection of animal intrusion from the outside of orchards.

2.6 A Line Model based approach for monkey intrusion detection S. Md. Mansoor Roomi; P. Rajesh; R. Jyothi Priya; M. Senthilarasi : Animal

intrusion detection is a major application in human habitats like institutions and agricultural fields to ensure safety and security to the life and assets of human. In this paper, a new image processing method is proposed to detect the presence of animals using Line Model Approach based on their skeletons. In this new frame work, the simple Background subtraction followed by a fast Star Skeletonization algorithm is performed to obtain the skeleton of the object. A novel Line Model is derived from the skeleton of the object. Based on the Line Model, the object is classified into animals and human. Since, the proposed method works on the low quality images and performs faster on intermittent frames, it finds application in real time animal intrusion detection scenario.

2.7 Human Crawl vs Animal Movement and Person with Object Classifications Using CNN for Side-view Images from Camera Tarun Choubisa; Mohan Kashyap; Kodur Krishna Chaitanya: An optical camera-

based intrusion classification system (Light Intrusion DeTection system named as acronym LITE) for an outdoor setting was recently developed by a superset of the authors. The system classified between human and animal images captured in a side-view manner based on the height. Based on the system and algorithm design, most probably human-crawl would be classified as animal by the LITE. In this paper, classification between humancrawl and animal is addressed. In addition to this work, classification of person with weapon versus person with vehicle is also addressed (referred as person with object) to provide more information about the type of intrusions. A Convolutional Neural Network (CNN) based approach is used to solve the above stated two problems. In the case of "person with object" classification, a study of different CNN architectures was carried out and analysis corresponding to that is presented.

In case of human crawl vs animal movement, performance results corresponding to only the best architecture model is provided among the many tried models.

2.8 Comparing chirplet-based classification with alternate featureextraction approaches for outdoor intrusion detection using a pir sensor platform Tarun Choubisa; Mohan Kashyap ; Sampad B. Mohanty ; P. Vijay Kumar

Prior work by a subset of the authors led to the development of a Pyroelectric Infrared (PIR) sensor platform for the purposes of distinguishing in an outdoor environment, between human and animal intrusion while rejecting false alarms arising from wind-blown vegetation. This resulted in a platform that, under the tested conditions, resulted in high classification accuracy, in excess of 95%. The current paper is aimed at determining the extent to which the classification accuracy could be attributed to the use of the algorithm employed. These fifteen algorithms correspond to the different possible pairings obtained by selecting from among 5 feature-vectors and 3 classifiers. The results show that the chirpletbased feature extractor to play a major role in achieving high-accuracy classification, easily beating the performance of the other feature extractors, particularly in terms of the more challenging task of separating intrusion from vegetative clutter.

CHAPTER 3

SYSTEM ANALYSIS

3.1 EXISTING SYSTEM

In the existing system the PIR sensor is used on the roadside to detect the movement of the animal by the infrared light radiating from the object. Boundary walls and solar fences around the sensitive areas are built to prevent the wild animal attacks. But this system doesn’t allow the animals to have a large living range and in-dependence of movement. The various systems are being used by the research institutions to monitor the movement of lions, tigers, elephants, olive turtles, and other wild animals to understand their movements and their use

pattern of the habitat. The major drawback of IR sensor is it not only detects the wild animals but also detects the movement of small birds and even human being. The installation of the system becomes difficult as it is of high cost and is not always possible.

3.2 PROPOSED SYSTEM

Our Intrusion detection system detects the movement of the elephants using the vibration sensor. The vibration sensor senses the elephant's vibration and feeds it to the raspberry pi. When the vibration matches with the actual value range, the camera catches the

elephant's image. Then image processing is done. The recorded image is compared with the images of the elephants that are stored already. This is done with the help of Google Image processing API. Once the image matches with the stored images, the alert message is sent to the forest department with the help of Google messaging API.

A. **Vibration Detection Module**: This module will have to be initialized only at the start. It will run in an endless loop. The module will check the value from the connected vibration module and compares it with the threshold value we set. If the value crosses the threshold, it will initialize the image processing module as a separate thread and it will keep on doing its work of checking the vibration. Once the vibration detected the camera will capture the image.

B. **Image Processing Module:** After being initialized by the vibration module, it will instantiate the raspberry pi camera. Then it will take the photo of the surroundings. Using the latest google API service called Google vision, it sends the photo to the cloud and gets back the JSON object file. This JSON object file contain all the possible case for the intruder. From those cases, we compare our current target i.e elephant in our case. So if the possible cases contain elephant and its possibility exceeds a certain value (70% in our case), we call and initiate the alert messaging module and stop its execution and wait for the vibration detection module to initialize it again.

C. **Alert Messaging Module:** After initialized by image processing module, this module will call one of the bulk messaging API available in the market. As this is the case, we use Text Local messaging API. Through this API, we send a specified message to the prescribed phone numbers. Then it stops its execution.

3.3 BLOCK DIAGRAM

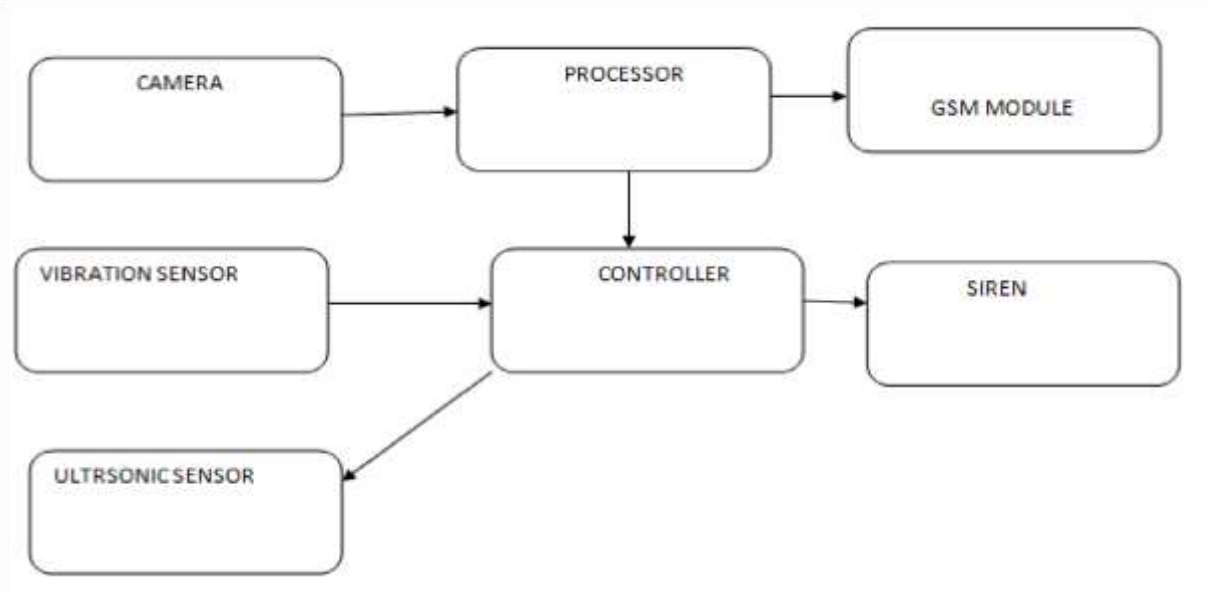

Fig 3.1 Block diagram of IOT Based crop protection system

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