Intruder recognition in a farm through wireless sensor network

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ABSTRACT

To implement intruder detection in fields, a Wireless sensor network-based system is developed. Motion sensors are placed at numerous locations around the farm. These sensors ceaselessly sense the movement and communicate to the organizer through Radio-frequency transceiver. The organizer on detection raises an alert and a call is made to the farm owner mobile through Global System for Mobile. Further, to differentiate between authorized and unauthorized entries Radio-frequency identification tags are used. WSN has been utilized in several applications such as habitat monitoring, building monitoring. Wireless Sensor Networks accommodates detector nodes deployed in an exceeding manner to gather data concerning surrounding atmosphere. Their distributed nature knowledge forwarding to the farmer. Intrusion Detection Systems will play a vital role in detective work and preventing security attacks. This paper presents current Intrusion Detection Systems using WSN technology.

Keywords: *WSN, RFID, GSM.*

1. INTRODUCTION

In India thefts in rural farm, areas are common. The farm owners struggle lots for top yield in varied ways in which but, their yield is curtailed due to the interference of animals and unauthorized humans. The unauthorized humans enter the farm and steal the farm merchandise or cause some harm to crop. Whereas farm animals cause harm to the crops either by overwhelming or damaging them. These end in poor yields that in turn reduce their gain. Fencing the farm (electrical fencing) is not straightforward and affordable, particularly once the sector is giant in space. Albeit enclosed, unauthorized human entries area unit still doable. Moreover, farmers need to sleep infield area to save his crops which he might even lose his life if the wild animals attack the field. If animals spoil the food, by chance if the crops or vegetable if by mistake they are gone to the market it will cause the infections to the buyer also due to the animal poison. Hence, it is much essential to monitor the boundaries of the farm to discover movement of unauthorized entries into the farm.

Wireless Sensor Network (WSN) has been emerging within the last decade as a robust tool for connecting the physical and digital worlds. The good interest of WSN intended many applications in several domains, like tending, emergency responses, intelligent control, and military applications. The sensors on the devices extract physical information from the surrounding environment, like temperature through a temperature sensor, noise through a microphone, an image through a camera or thermal camera. The collected information then is shipped over to the management desk for further process. In this paper, we will present, WSN employed in border surveillance and intrusions detection, it might be very important associate rising area because of an oversized vary of applications.

Numerous animal detection ways and warning systems are units used for indicating the presence of animals on the roads or residential district. Safety of each human and animal is equally vital. We are trying to implement some reasonably warning system to create positive human and wild animals live safely. The role of WSN in border surveillance as in most WSN application focus on an operation from numerous sorts of sensors, such as aseismic, camera, thermal camera, and motion detectors. Some advanced WSN process this information and send an abstracted alarm or aggregate data to the management center, in which it takes the suitable defense action. There are several researchers from completely different organizations have instructed solutions for border surveillance issues.

2. LITERATURE SURVEY

Haidi Ibrahim and Boon Tatt Koik proposed system using digital image processing mainly for locomotion behavior of animals for animal detection. Using power spectral they are trying to test animal presence in the image will affect the power spectral or not. Power spectral can be defined as the frequency domain as the signal amplitude. Using Fourier transform by transforming from spatial domain to frequency domain. The drawback of this method is that this method cannot be suitable for fast detection of animals. They have also mentioned one more approach which is Animal Detection Based on Thresholding Segmentation Method in which if the threshold is greater than a pixel of gray that value is set to white and others are set to black. The drawback of this method is that this method that calculating threshold is difficult for periodically changing images. [1]

R. Newlin Shebiah, B. Deeksha, and S. Aparna proposed a method for combining the classifier into the cascade is done which statistically guarantees the background extraction and pictures only the object of interest. The proposed system is tested with animal database and if the wild animals are detected, then the messages are sent through the GSM. The camera continuously records the scene and once the motion is detected, then it captures the images and makes use of the classification methods to distinguish its characteristic features. Thus, once the animals are identified as dangerous using the classification methods, the instant messages are sent to the farmers and the concerned people to safeguard themselves and their agricultural lands. The drawback of this method ids that it cannot be best suited to cover a large area of land and is not likely possible for detection and tracking of the motion of multiple or groups of animals. [2]

Mriganka Gogoi and Savio Raj Philip proposed that surveillance of video that deals with the monitoring of transient and persistent in a specific environment in real time. The mainly focuses on the manifest atomization of scenes and foretell the various interactions. First get input video and slit it to frames then background subtraction is done for the object and morphological features are extracted and passed to SIFT algorithm for feature extraction and then using Euclidean distance classification is done. The drawback of this system is that if the training dataset is not proper this may give wrong results. [3]

Nidhi Daxini, Sachin Sharma, Rahul Patel [4] stated that real-time animal detection system will reduce animal intrusion and collision using Viola and jone algorithm for facial feature detection. The video is taken from a camera and is converted into a frame. Identifying different images, the database is created has Positive and negative. Positive images have detected animals and negative images have non- detected animals. Haar-like feature extraction method and later testing the classifier. Even this may produce the wrong result if feature extraction is not done and if we don't have a huge training set.

3. EXISTING SYSTEM

There are various projects on intruder recognition. Traditional methods of detecting animals in farms include the use of human eyes to witness animal movements. Which costs very high when it is done with large farms because it is not possible for human beings to monitor animal movements continuously throughout the day. The attack of animals in the farm or theft of crops by humans causes a heavy loss in cultivation. Wildlife intrusion in areas with high human mobility is proved to be lethal for both human beings and animals. The surveillance and tracking of the wild animals are difficult due to their size and nature of the movement. Due to lack of detection system leads to attacks kill villagers and destroy their crops. The farm is destroyed due to the frequent interference of animals. Many algorithms have also been developed by human beings related to this. An approach which is mostly used by the farmers is electrical fencing. In this method, it requires huge money for electrical fencing if the farm is very big and it consumes more electricity. Moreover, animals will be dead due to the electric shock, where the animal's lives are also equally important. Many projects are in motion to modify this problem and a few of them are quite feasible. however, current network forensics continues to be unable to totally MONITOR AND ANALYZE computer network traffic to collect the pieces of evidence of malicious attacks or intrusions. the early industrial automation systems that had used data technology were comparatively safe, but most of the commercial automation systems became a lot of sophisticated and complex they need to be controlled and monitored by the systems at intervals by the producing sites and alternative operation management systems from outside remotely which further can be used by human intruder to attack the systems or application. Many traditional systems and applications were developed while not security in mind. In different cases, systems and applications were developed to figure in a totally different atmosphere may become vulnerable once deployed within the current atmosphere. As a result, certain intruder recognitions may not be as effective as expected. Drawbacks of existing System:
There are many cons in existing methods for intruder detection in the farm

- Intruder detection using image processing, where it can be time-consuming and expensive for a farmer to afford it.
- It may not worth to use this approach if we want to quickly notice the animal.
- A human can't waste his time by looking at the farm during night times and there will be an animal threat.
- More electricity is wasted in terms of Intruder recognition or avoidance through electric fencing.

4. PROPOSED SYSTEM

Animals interference in farms is increasing day by day which causes loss of crop yield and human life. Elephants and other animals entering fields will impact negatively in various means such as by depredation of crops, damaging grain stores, water supplies, injuring and death of humans. Here we are proposing an idea using WSN technology where motion sensors are used. A system is implemented to detect intrusion of animals in farms using wireless sensors and buzzers which detects the animals and produce acoustic sounds. At various locations around the farm, motion sensors are placed where certain distance is maintained between them and one of the motion sensors is made as the centralized from where we can operate all other sensors. The sensors

which are present frequently sense the movement and pass it to the Coordinator through RFID. An Arduino board is placed near the centralized sensor to which GSM module is interfaced along with buzzers and RFID transmitter. Animals are being detected by the motion sensors in the agricultural area. When an animal or human is being detected by the sensors in the agricultural area the sensors are activated through RFID transmitter and system produces sounds through the buzzer and will give a very minor shock to the animal. This sound irritates the animals and they cannot accommodate at that place and due to minor shock animals will fall. Through Global System for Mobile module alert, messages are sent to the farmer. Thus, the destruction caused by the animals in the agricultural fields can be avoided. This can help to track the intruder.

In the below figure we have given a brief idea about the system. Intruders can be birds, wild animals and can be human also. In figure1 the entire proposed system is explained. An Arduino board is placed near the centralized sensor to which GSM module is interfaced along with buzzers and RFID transmitter. Through RFID transmitter, the farmer will get to know about intruder through his phone.
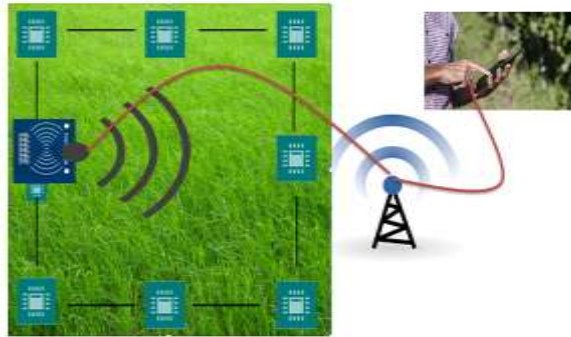

Figure1. Intruder detection using Sensors

5. CONCLUSION AND FUTURE SCOPE

Agriculture is one of the most important occupations because the food is needed for every individual. Hence the agriculture must be a serious consideration to be taken. Most of the people depend on farming for their livelihood. Most of the agriculture fields are damaged by wild animals due to their intrusion into fields. They damage the crops and will even cause harm to the farmer who fights against. WSN is most widely emerging technology used for many applications. While using different technologies for animal detection many animals are getting harmed. Using WSN technology animals cannot be harmed and it is very cheap to implement and effective for use. Motion sensors and buzzers are cheap and the method can be easily implemented and GSM is used for sending warnings to the farmer. In future project can be improved for video processing also. It can also be improvised by improvising methodologies and the technologies used in this project for heavy blowing wind and some destructions to the materials used in the project. It can also be improved by using Raspberry Pi with a camera and different sensors interfaced to the board.

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