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Article

A Study on how the use of Internet of Things Technology Can Help in Repelling the Wild Animals which Infiltrate the Farmland and Destroy Crops

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A B S T R A C T

Use of technology has become increasingly common in day to day lives of almost all the strata of society. There has been a surge in the demand of Internet of Things (IoT) in many sectors, which has led the academia and industry to invest time and resources in the research on how IoT can be used to solve the problems faced by the humans in any domain. In the domain of agriculture, the application of IoT has led to precision agriculture, smart farming, crop health monitoring, etc. This paper proposes the development of Internet of Things application for crop protection to prevent animal intrusions in the crop field. The development of an animal repelling and a monitoring system is considered to prevent potential damages in Agriculture, both from wild animal attacks and weather conditions.

Keywords: IoT, Wi-Fi, LED, Infrared

Introduction

Background

The Internet of Things (IoT) is a thought in which adjacent objects are linked through wired and wireless networks deprived of user interference. In the field of IoT, the objects interrelate and discussion information to deliver unconventional intelligent services for users. Due to the new advances in mobile devices prepared with numerous sensors and communication modules, composed with communication network knowledges such as Wi-Fi and LTE, the IoT has increased substantial academic interests.

It is estimated that 10-20% of the crops around the world are destroyed by wild animals. Animals like wild boars, hogs, blue bulls, elephants etc. as well as rodents like rice rats play havoc on the farms incurring huge losses to the farmers by lowering the farm yields. Exploring the use of Internet of Things technology to solve this very old yet prominent problem especially to the small farmers who can't afford the high cost of installing fence to protect their fields. We can improve the well-being of farmers with the IoT based animal repelling and monitoring system. The implementation of such solution helps to prevent the entering of wild animals into the crop fields and thus stop the destruction of crops.

We can have a number of sensors connected to the system and the amount of data collected by these sensors can be influenced to help us plan our resources efficiently and take a step forward towards smart farming. There is no dearth

of the variety of sensors which can be found useful in some or the other area of the farming life cycle.

Problem Statement

Due to the fact that human payment and their farms are expanding in the land which was previously a wild habitat, crop raiding has become a common problem and has caused an antagonizing association between man and the wild. We often use to hear the news of humans hunting animals after they destroyed their crops.

But when the administrations and forest departments established strict rules against hunting to protect the ecological balance, the farmers are left with no option but to find new ways to keep the animals away as hurting them would invoke police action. Farmers claim that after climate change and untimely rainfall, animals are the second biggest reason for destroying their crops.

Chemical repellents are not environmentally sustainable while electrical fencing is considered a brutal solution as it origins severe harm to animals and has also caused harm to humans who were unaware of their presence.

Figure 1.Field

Methodology

In this paper qualitative investigation technique is used, which allows us to understand how this phenomenon is affecting them and what are the solutions that they have tried till date and how effective or feasible those solutions are after hearing the plight of some farmers, we got a clear understanding of their problems and how they tackle it. One farmer said, “Wild boars dig out groundnut seeds. We have to be constantly present at farm even during the nights to keep vigil on our crops.”

Another farmer expressed discontent to the amount of loss these animals cost him and how any stringent step that he may yield in contradiction of these animals will end up in police action against him. Sometimes herds of animals enter the farmland and drawing them out without killing them is the option that is only going to cause the animals run shelter and end up destroying much more crops. The official says, “Yes, the farmers have some problems but individually, they will not be able to bear the fencing costs. That is why. the government is encouraging participatory farming.”

Using the observations about creatures and their behavior towards flashing lights, loud noises and any physical undertaking can be taken advantage of by creating an IoT device that can startle and repel the wild animals away from the farm land. An infrared sensor angle with 110 degrees and a detection range of up to 30 feet should be installed to get the entire farmland perimeter in range. This installation should also be connected to high intensity LED lights to startle the animals when detected by the infrared sensor.

As most wild animals would get habituated to the LED light and associate it to being harmless after several encounters, we need to have more backup plans ready. A speaker can also be part of this installation which can emit some kind of sound that the animals may feel the need to back off. Sounds of a pack of dogs can work in good amount of cases.

For further assurance, some kind of automated physical motion like showering rocks in the direction of possible animal position might scare the animal away. All these installations should be solar powered and centrally controlled by a micro controller. A micro controller on receiving inputs from the infrared sensors can decide the response to veer away the animals by using flashing lights, sounds, some physical response or a combination of those.

Use of scarecrows are decade old practice and should be replaced by much modern solutions. While the advantages of this project can be seen by observing the behaviours of the animals but there are also a couple of hurdles that have to be considered before the project execution. Cost of applying system will definitely shoot up the price as the number of systems needed to cover the farmland depends on the size of the farmland, the maintenance cost for the IoT device due to wear and tear, etc. The more comprehensive the solution the more expensive it will become.

Data and Results

In numerous cases it has been observed that, mounting motion-activated lights will daunt animals from rambling onto an area like farms and houses. In furthermost cases, the light ensures not to wound the individuals unswervingly, but it fixes depiction them. Animals getting sudden exposure from light makes them feel vulnerable and this is enough of a preventive to keep some species, like boars, possums away. Larger animals, however, like deer, blue bulls, will not be deterred by lights indefinitely. They acclimate quite readily to stimuli including loud noises and flashing light if nothing bad happens to them that they can associate with the stimuli. In one piece of research, stimuli such as flashing lights and scarecrows kept the species away for only a few weeks.

However, mixing the action of a floodlight with yelling, throwing objects or the presence of a big, loud, barking dog will make most of the herbivores animals wary about encroaching on a property. Motion-activated lights work best to keep animals out. The suddenness of the light should startle some animals. Similarly, motion-activated lights do not need to be left on all night, saving both the environment and money.

Conclusion

From the analysis, it can be deduced that the use of IoT is feasible and using low powered and open source systems can be collectively used to create an animal repelling and intensive care system for crop for defense of crops against animal attacks. The limitation of this lies in the fact that we need to keep the cost of these repellent systems at a cost affordable and convince the stakeholder that it's an investment that would give them considerable returns in the form of increased farm productivity and minimize crop losses.

Recommendation

Rodents get irritated with the ultrasonic sound with a frequency everywhere 60kHz. Many of the insects are repelled by sounds in the frequency range of 38-44 kHz. These frequencies generate stress on the nervous systems of the insects and rodents which forces them to stay away from the source of the sound. There have been many high pitches ultrasonic sound emitting machines which can be used in conjunction and incorporated with the IoT system.

We also recommend doing thorough testing of the sensors and see whether it qualifies as an all-weather solution. False alarms should not be much of a problem but can be disturbing if the farms are very close to the residential area.

References

1. IoT Solutions for Crop Protection against Wild Animal Attacks Stefano Giordano, IliasSeitanidis and Mike OjoDepartment of Information Engineering,University of Pisa
2. https://homeguides.sfgate.com/outside-lights-deter-animals- 95047.html
3. Top Five Strategies to Protect Crops from Wild Animals - Ines Hajdu Agronomy Expert.
4. Indianapolis Educational Article of the Month - Will a High Pitch Sound Deterrent Machine Repel Wild Animals?
5. Patterns of crop damage by wild boar (Sus scrofa) in Luxembourg over a 10-year period.
6. Scaring as a tool to alleviate crop damage by geese: Revealing differences between farmers' perceptions and the scale of the problem - Caroline E. Simonsen, Ingunn M. Tombre, Jesper Madsen
7. Use of frightening devices in wildlife damage management - Jason.
8. M. Gilsdorf University of Nebraska; Lincoln Scott E. Hygnstrom University of Nebraska-Lincoln; Kurt C. VerCauteren USDA- APHIS-Wildlife Services.