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Automated Protection of Lives from Wildlife

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ABSTRACT: Low productivity of crops is one of the main problems faced by the farmers in our country. This can be because of two main reasons. Crops destroyed by wild animals and because of bad weather condition. This paper provides a solution to the destruction of crops by animals. The main aim of our project is to protect the crops from damage caused by animal as well as divert the animal without any harm. Image processing technique is used to detect the presence of animal and offer a warning. In this project, LDR, PIR and temperature sensors are used to detect the movement of the animal and send signal to the Raspberry Pi is used as the processing unit of the system and sound buzzers are used to emit the ultrasound frequencies. It diverts the animal by producing sound according to the kind of animal and signal further, this signal is transmitted to GSM and which gives an alert to farmers and forest department immediately.

KEYWORDS: Raspberry pi, PIC 18F4520, PIR sensor, ultrasonic sensor, image processing etc...

I. INTRODUCTION

Due to over population, it occurs a deforestation this results in shortage of food, water and shelter in forest areas. So, Animal's interference in residential areas is increasing day by day which affects human life and property causes human animal conflict but as per nature's rule every living creature on this earth has important role in eco-system. 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. Farmers in India face serious threats from pests, natural calamities & damage by animals resulting in lower yields. Traditional methods followed by farmers are not that effective and it is not feasible to hire guards to keep an eye on crops and prevent wild animals. Since safety of both human and animal is equally vital. So, animal detection system is necessary in farm areas.

Traditional electric fence has been helpful as a guard of crops. However, that system has some problems such as it cannot notify the voltage which occasionally drops. Furthermore, the owners of the fence have to check the voltage but they cannot know it without going there. An electric fence management system we develop uses wireless communication, and it enables the owners to know the voltage and the state of the electric fence and monitor it from remote locations safely. It describes a demonstrative experiment in a mountainous region, and suggests an approach to resolve some problems. An electric fence system using wireless network technology has been developed. The system consists of several observers and a display, the farmers are able to measure voltage at the fence, and have an ability to show it. The observers transmit the voltage with the direction of voltage leak to the display. The display shows the received data and the owners can know the state of the electric fence.

II. RELATED WORKS

1. Sneha Nahatkar et al, proposed a home embedded surveillance system which evaluates the development of a low cost security system using small PIR (Pyroelectric Infrared) sensor built around a microcontroller with ultra-low alert power. The system senses the signal generated by PIR sensor detecting the presence of individuals not at thermal equilibrium with the surrounding environment. On detecting the presence of any unauthorized person in any specific time interval, it triggers an alarm & sets up a call to a predefined number through a GSM modem. After the MCU sends the sensor signals to the embedded system, the program starts the Web camera which then captures the images which can be viewed and analysed later

V Nainwal, et al Sensors are used to detect the presence of objects in the surveillance area and the information is collected over time to extract the event of interest. The information gathered by the surveillance camera i.e., video or still images could be used for further analysis and detection of the intruding object. This system does not utilize advanced techniques for alerting the owner of that area.

Jayprakash D Sonone, Dattatray A. Patil, and Kantilal P. Rane, "irritating and hearing frequency identification and generation to avoid animals accident", proposed a method which protects the animals from vehicle accidents. The system uses a PIR sensor with an ARM7 processor and audio frequency generator to run away the animals. The PIR sensor detects whether there are animals on the road. The motion is recognized by the ARM7 processor and corresponding ultrasonic signals are generated using an audio amplifier. The audio amplifier is used to amplify the frequency and this Ultrasound is produced through a soun buzzer.

III. EXISTING SYSTEM

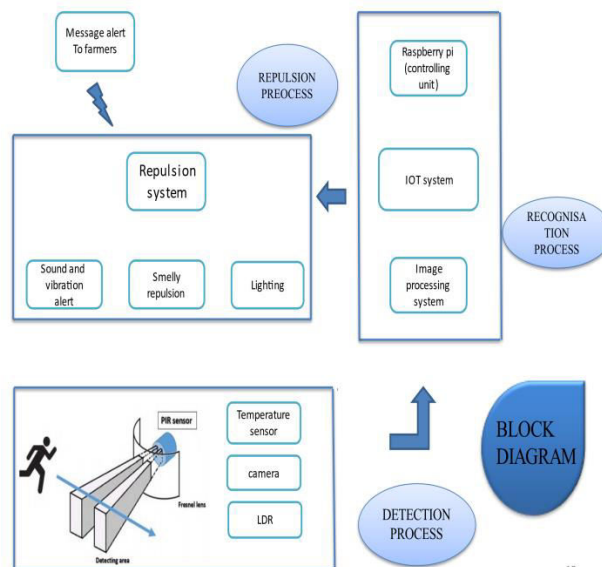
The existing systems mainly provide the surveillance functionality. Also, these systems don't provide protection from wild animals, especially in such an application area. They also need to take actions based on the on the type of animal that tries to enter the area, as different methods are adopted to prevent different animals from entering such restricted areas. Also, the farmers resort to the other methods by erecting human puppets and effigies in their farms, which is ineffective in warding off the wild animals, though is useful to some extent to ward off birds. The other commonly used methods by the farmers in order to prevent the crop vandalization by animals include building physical barriers, use of electric fences and manual surveillance and various such exhaustive and dangerous methods.

IV. PROPOSED SYSTEM

OVERVIEW:

The system comprises three modules. Module 1 is detecting the animals using a PIR sensor, temperature sensor, LDR and capturing the image using the camera. (5m to 12m (avg. -10m) and cover around 120 degree) The captured image is transferred to the IoT system and image processing to identify the animals is done in module 2. The information about the detected animal is transferred to the Raspberry Pi In module 3 ,Ultrasound frequencies are produced through the sound buzzer .Also the warnings are produced according to the animals. The alerts are sent to farmers via GSM.

PROCESS FLOW[1]:



PROCESS FLOW:

PIR SENSOR AND CAMERA:

PIR Sensors are known as "Passive infrared sensor" or "Passive infrared detectors". It is an electronic sensor which measures infrared light radiating from objects. PIR sensors are commonly used for Motion Detection. It doesn't radiate energy for detection of objects. PIR sensors have two slots which are sensitive to IR.

When the system is idle both the slots will measure the same amount of IR. When the animals are passed in front of the sensor, one half of the sensor is intercepted. Which creates a positive differential in both halves. When the animal moves away from the sensor, the reverse happens and it creates a negative differential. This change in the pulse is used for the detection of animals. When the changes occur, the camera is activated

RASPBERRY Pi:

Raspberry Pi is a single board computer or a microcontroller which can be used for basic computer programming. it is cost-efficient and Linux is used as the basic operating system. it consists of all the necessary ports like USB, Ethernet, SD card slot, etc. In this system, Raspberry Pi is used as the main processing unit where PIR sensor, ultrasound speakers, ultrasound detectors and frequency generators are connected and operated.

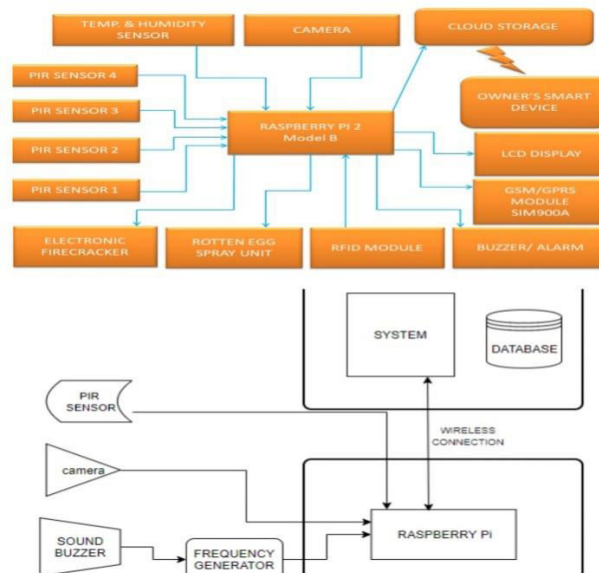
BASIC SYSTEM FLOW The system comprises a PIR sensor for detecting the animals and cameras are used for live recording. The image processing method is used to classify the animals. Raspberry Pi is used as the central processing unit where, Ultrasound transducer, Ultrasound detector, PIR sensor, camera and frequency generator is connected and operated. Specified irritating frequency is emitted through ultrasound speaker. Ultrasound detectors are used to detect emitting frequencies. The animals get irritated when the frequency is higher to their hearing range.

SYSTEM ALGORITHM:

The system comprises three modules. Module 1 is detecting the animals using a PIR sensor and capturing the image using the camera. The captured image is transferred to the system and image processing to identify the animals is done in module 2. In module 3 the information about the detected animal is transferred to the Raspberry Pi and ultrasound frequencies are produced through the sound buzzer. Fig.3 Shows the Architecture Diagram of the system. • PIR sensor detects the movement of animals towards the field and turns on the night vision camera to active mode.

The real-time data captured are directly transferred to the server system. The server system uses Image Processing to classify and identify the animal. Then repulsion is initiated according to the classification of animals. Then, the message is sent to the farmers and forest department.

OUTLINE OF THE PROJECT[2]:



MERITS AND FEATURES:

This system is very effective and carries following features and merits in comparison to the other solutions that exist in the current time. 1. Effective, accurate and adaptive: -

This system is very effective in driving off the animals from the fields and keeping them away. It accurately determines the presence of animals in the fields and sounds the buzzer. It does not sound the buzzer due to the presence of a human being or due to some random motion. The ultrasonic buzzer is very effective against animals and causes no noise pollution.

2. Requires no human supervision: -

This system requires almost no human supervision, except for the task of switching the system on and off. The system is capable of turning the buzzers on automatically and warding off the animals thus protecting the fields from any damage.

3. Economical: - This system is economical as compared to many of the existing solutions like electric fences, brick walls and manual supervision of the fields. Thus it saves a lot of money of the farmer.

4. Real time monitoring: - This system works in real time to detect the animals in the fields. The system enables the farmer to have a real time view of his fields from any place via internet and even provides manual buzzer controls if the need arises to use them. Thus the farmer is in effective control of the system and can manually sound the buzzer if needed.

5. Causes no harm to animals and humans: - This system is totally harmless and doesn't injure animals in any way. It also doesn't cause any harm to humans. Also this system has a very low power requirement thus reducing the hazards of electric shocks.

V. RESULT

In the proposed system we used Raspberry Pi as the main processing unit. The PIR sensor, camera, frequency generator, and the sound buzzer was interfaced to the Raspberry Pi. Once the PIR sensor detects the motion of the animals, the camera will be activated and the image will be captured along with video recording. The Raspberry Pi then transfers the images to the server. For our experiment, we fed the server with a prerecorded video of animal activity. The system captured the objects, ie the animals from the video. The image was processed in the server by the TensorFlow image processing method [7] to identify the type of animal. Once the class of animal was identified, repelled by repulsion system containing sound alarms, lightning effect, voice alert.

VI. FUTURE ENHANCEMENT

In future, the proposed system is also used for theft control in both urban and rural area by involving authorized and unauthorized person detection and also stored to cloud for further use and maintenance of records of human-wildlife conflicts.

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