SMART CROP PROTECTION SYSTEM FROM WILD ANIMALS USING ARM7

B. Vijay Kumar, Dr. P. Sreenivasulu M. Tech, Ph.D,
Department of ECE, Audisankara college of Engg & Tech, Guduru-Tirupati (Dist), Andhra Pradesh, India.

Abstract: Surveillance plays a major role in many fields be it at home, hospitals, schools, public places, farmlands etc. It helps us to monitor a certain area and prevent theft and also provides proof of evidence. In the case of farmlands or agricultural lands surveillance is very important to prevent unauthorized people from gaining access to the area as well as to protect the area from animals. Various methods aim only at surveillance which is mainly for human intruders, but we tend to forget that the main enemies of such farmers are the animals which destroy the crops. This leads to poor yield of crops and significant financial loss to the owners of the farmland. This problem is so pronounced that sometimes the farmers decide to leave the areas barren due to such frequent animal attacks. This system helps us to keep away such wild animals from the farmlands as well as provides surveillance functionality.

I. Introduction

In recent years wild animals are special challenge for the farmers throughout the world. Animals like wild boars, elephant, tiger and monkeys etc..... cause serious damage to crops by animals running over the field and trampling over the crops. It causes the financial problem to the farmers. To overcome this problem we give a solution in this paper. This project is used to protect the farmland by using raspberry pi.

In recent decades, the livelihood of many farming communities in the country has come under threat from the attacks of wild animals on crops. Heard of stray animals often enter to fields and destroy the crops which result in loss of crops for farmers. The currently available systems use a different type of methods like using loud noises, alarming conditions and egg spray units to prevent the animals from entering or destroying the crop field. In some systems, the animals are only detected using PIR sensors and notification is sent to the farmers. These systems are not reliable with different types of animals. In this proposed work, we are introducing an IOT based system which is simple, reliable and cost efficient to overcome the problem faced by the farmers. Every animal or group of animals is having a specific range of hearing frequencies. A certain range of frequencies between the hearing range is irritating for animals. The range of irritating frequency of different animals is specified to the system. A frequency generator is used to produce the sounds with the desired frequency. The IOT system can detect the animals by using TensorFlow image processing and warn them by emitting an ultrasonic sound which belongs to their audible frequency spectrum. The basic idea is every animal have a sense of unknown threat. In this proposed IOT system, we use such frequencies to scare the animals away. This IOT based system helps to keep the wild animals away from the crops as well as provide real-time suggestions and information to farmers.

II. Literature Survey

Several methods have been proposed for preventing animals from entering and destroying the crop fields. Most of the system uses loud noise and alarm conditions. Some system uses egg spray units and smoke to prevent animals. But above all these technologies, producing the ultrasound frequencies of animals which is irritating for them is reliable and efficient. These frequencies are different for all animals. We created a prototype of the system which produces Ultrasound frequencies and shows the best result possible.
Jayprakash D Sonone, Dattatray A. Patil, and Kantiil P. Rane, “Irritating and hearing frequency identification and generation to avoid animals accident” [1], 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 sound buzzer.

P. A. V. Deshpande, “Design and implementation of an intelligent security system for farm protection from wild animals” [2], introduced a new system in which the farmland is protected from animals via ubiquitous wired network devices. In this system, the animals are tracked when they get in touch with the fence. Fencing wire is used as the sensor for detecting the animals. An amplifier circuit is also used since the resistance of the wire is high. If any change in fencing wire is detected, it will be amplified and given to the ADC of the micro-controller. Due to the change, an SMS is sent to the farmers using the GSM module.

D. K. Sheela Sobana Rani, M. R. Lavanya, and M. Gayathri, proposed “An automatic repelling system to reduce human elephants conflicts using sensor” [3]. In this system, piezoelectric vibrating sensors are used to detect the elephants. There are three layers in the system in which the first and second layers are deployed with piezoelectric vibrating sensors. By sensing the voltage created by the sensor it detects whether it is an elephant or not. An Arduino microcontroller is used as the processing unit for the sensors. When the elephant crosses the first and second sensor placed in the third layer, it will detect the elephant and smoke valve placed in this system will be activated which emits heavy smoke around that area. The smell created will run away the animals from the area.

P. Divya, P. Usha kiran, and P. Praveen M, “IoT-based wild animal intrusion detection system” [4], introduced a system which monitors the crop filed continuously. The system is used to identify animals and give notification to farmers. The system uses PIR sensors to detect animals. Arduino microcontroller is used as the processing unit of the system. When the animals are detected the camera is activated and the image is sent for processing and identifying the type of animal. Once the wild animal is identified then the resulting repellent system is applied. The repellent system can be of Sound Buzzer or Bright light emitter. The system will also notify the farmers by sending SMS using GSM module.

S. R. Chourey, P. A. Amale, and N. B. Bhawarkar, “IoT based wireless sensor network for prevention of crops from wild animals” [5], proposed a system which uses wireless sensor networks (WSN) and Internet of things (IoT) to prevent the animals from entering the crop fields. Raspberry Pi is used as the main processing unit of the system. The WSN is placed in the farm field and this consist of one master node sensor. The proposed system analyses the data for a minimum of two clusters having 8-10 nodes. The webcam is used to capture the image of wild animals that are detected. By using the GSM module when the animals are detected, an SMS is sent to the farmers. Speaker is also used to produce noise.

III. Existing system:

Several methods have been proposed for preventing animals from entering and destroying the crop fields. Most of the system uses loud noise and alarm conditions. Some system uses egg spray units and smoke to prevent animals. 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.

Proposed system:

The main aim of our project is to protect the crops from damage caused by animals as well as divert the animal without any harm. Animal detection system is designed to detect the presence of animal and offer a warning. In this project, we used PIR sensors to detect the movement of the animal and send signal to the controller. PIR sensors are deployed in the area to detect any motion and hence turns ON a camera when movement is detected, thereby providing real-time monitoring. It involves automation of certain methods used to prevent the wild animals from entering the farmlands and destroying the crops, by making sound using buzzer. If motion of animal detected, a message will be sent to the farmer and also a live video link is sent to authorized person via email. All the sensors and components are interfaced to the ARM7 board. Hence we come up with such a product that can be very useful for farmers, it prevents the loss of crops and increases the yield.
IV. Block Diagram:

![Block Diagram](image)

V. Hardware Description:

ARM7 Microcontroller:

The full form of an ARM is an advanced reduced instruction set computer (RISC) machine, and it is a 32-bit processor architecture expanded by ARM holdings. The applications of an ARM processor include several microcontrollers as well as processors. The architecture of an ARM processor was licensed by many corporations for designing ARM processor-based SoC products and CPUs. This allows the corporations to manufacture their products using ARM architecture. Likewise, all main semiconductor companies will make ARM-based SOCs such as Samsung, Atmel, TI etc.

Features of LPC2148
The main features of LPC2148 include the following.
The LPC2148 is a 16 bit or 32 bit ARM7 family based microcontroller and available in a small LQFP64 package.
ISP (in system programming) or IAP (in application programming) using on-chip boot loader software.
On-chip static RAM is 8 kB-40 kB, on-chip flash memory is 32 kB-512 kB, the wide interface is 128 bit, or accelerator allows 60 MHz high-speed operation.
It takes 400 milliseconds time for erasing the data in full chip and 1 millisecond time for 256 bytes of programming.

![Fig 1:ARM7 Microcontroller](image)

GSM MODEM:

GSM/GPRS module is used to establish communication between a computer and a GSM-GPRS system. Global System for Mobile communication (GSM) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of GSM that enables higher data transmission rate. GSM/GPRS module consists of a GSM/GPRS modem assembled together with power supply circuit and communication interfaces (like RS-232, USB, etc) for computer. GSM/GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires aSIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification.
VI. Result:

VII. Conclusion:

The destruction of crops by wild animals is one of the main problems faced by farmers. Thus this project carries the solution to prevent the animals from entering the crop field. Hence we have designed an IoT based system which is cost efficient and consumes less energy. Since the system uses ultrasound frequencies to prevent the animals from entering the crop field, it won’t disturb the people living in the nearby area. Such a system will help the farmers to protect the fields and also save them from critical financial losses. In the future, this system can be designed more efficiently by using solar powered cameras and sound buzzers, which is cost-efficient and can be used without a wired connection.

REFERENCES


