

Smart Crop Protection From Animals And Birds Using Arduino

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Abstract—Crops in farms are many times damaged by animals like buffaloes, cows, goats, birds and wild elephants. This causes major losses for the farmers. Farmers cannot stay on the field for all time and protect it. To overcome this problem, an animal detection system has been designed to detect the presence of animals and it offers a warning and diverts the animal without any harm. The detection system will continuously check for any animal to enter the field. IR (Infrared) sensors and ultrasonic sensor are used to detect animal movement and to give a signal to the controller. Further the animals are being diverted by generating sound and signals, and this signal is being transmitted to GSM and instantly gives farmers warning, so the farmers will be aware of the difficulty and available to the spot just in case the animals do not show off by the alarm. The complete safety of crops was ensured by this system from animals thus protecting the farmer's loss.

Keywords—Ultrasonic Transmitter and Receiver, GSM module, Voice IC, Loudspeaker.

I. INTRODUCTION

In the world, the economy of many countries is dependent upon agriculture. In spite of economic development agriculture is the backbone of the economy. Agriculture is the main stay of economy. It contributes to the gross domestic product. Agriculture meets food requirements of the people and produces several raw materials for industries. But because of animal interference in agricultural lands, there will be huge loss of crops. Crop will be totally getting destroyed. There will be large amount of loss of farmer. To avoid these financial losses, it is very important to protect agricultural field or farms from animal. To overcome this problem, in our proposed work we shall design a system to prevent the entry of animals into the farm. The main purpose of project is to develop prohibitive fencing to the farm, to avoid losses due to animals. These prohibitive fencing protect the crop from damaging that indirectly increase yield of the crop. The develop system will not harmful and injurious to animal as well as human beings. Theme of project is to design an intelligent security system for farm protection by using embedded system. Crops are vulnerable to animals. Therefore, it is very important to monitor the nearby presence of animals. Most of the activities of birds are either advantageous or disadvantageous to the farmers. Birds create negative impact on most of the agricultural activities and some agricultural activities attract birds as special feeding opportunities. The presence of insectivorous birds in crop lands is beneficial to farmers up to some extent. In India, as a common remedy to the problem, attempts are regularly being made by the farmers to reduce crop losses from birds by deploying measures for control of birds either through traditional means or by using bird scaring techniques, devices, and pesticides. Wide varieties of variable crops attract granivorous birds which lead to significant damage to the crop yields globally. However, there are few studies pertaining to the awareness of the problem among the farmers and the magnitude of crop damage caused by the birds in India. Birds can inflict damage to the crops and a loss to the farmers in all the stages of crops right from sowing and planting till harvesting.

II. EXISTING SYSTEM

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 the voltage leak to the display.

III. PROPOSED SYSTEM

In the proposed system, Crop monitoring is done by placing sensors in the agricultural field. In our proposed work, ultrasonic sensor and GSM is used. When animals come near to the ultrasonic sensor and it detects the animal movement. After getting that initial input signal, it will be given to the microcontroller for further processing and the system will be activated immediately, it will on the APR board, and the sound is being played to divert the animal, at the same time it makes a call to the owner. Therefore, ultrasonic sensor detects the presence of birds in all direction. If the ultrasonic sensor is detected, it sends the signal to the controller. Microcontroller block is used for reading the inputs from ultrasonic sensor. The entire process is controlled by microcontroller. The GSM module is used for making call to farmer when movement is detected. It alerts the farmer that some animals or birds try to enter into the farm.

The ultrasonic sensor is used to detect the animal movement in agriculture filed shown in the figure1. After getting that initial input signal, it will be given to the microcontroller for further processing, it will on the APR board, and the sound is being played to divert the animal, at the same time it makes a call to the owner. Therefore, ultrasonic sensor detects the presence of birds in all direction. If the ultrasonic sensor is detected, it sends the signal to the controller. Microcontroller block is used for reading the inputs from ultrasonic sensor are shown in the below figure 1. Whole process is controlled by microcontroller. The GSM module is used for making call to farmer when movement is detected. It alerts the farmer that some animals or birds try to enter into the farm. This proposed smart crop protection system from animals using Arduino Uno.

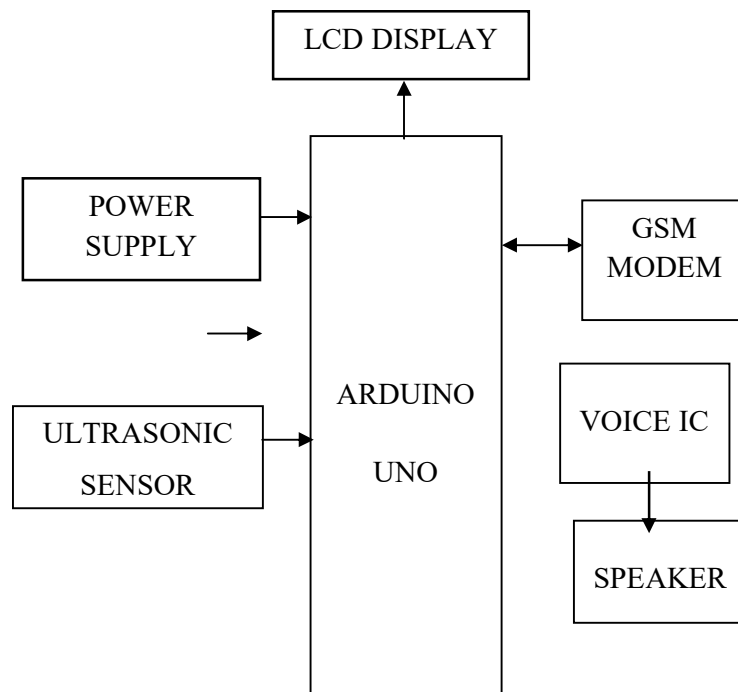


Fig 1 Block Diagram of Proposed System

Ultrasonic transmitter and receiver:

An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity.



Fig 2 Ultrasonic Sensor

An ultrasonic sensor is an electronic device that measures the distance of a target object by emitting ultrasonic sound waves, and converts the reflected sound into an electrical signal. Ultrasonic waves travel faster than the speed of audible sound (i.e. the sound that humans can hear). Ultrasonic sensors have two main components: the transmitter (which emits the sound using piezoelectric crystals) and the receiver (which encounters the sound after it has travelled to and from the target).

GSM Module:



Fig 3 GSM Module

A GSM modem or GSM module is a device that uses GSM mobile telephone technology to provide a wireless data link to a network. GSM modems are used in mobile telephones and other equipment that communicates with mobile telephone networks. They use SIMs to identify their device to the network.

Voice IC:



Fig 4 Voice IC

Voice record and playback ICs are specialized devices that allow implementation of audio record and playback functions with minimal component count and design effort.

Loudspeaker

Loudspeaker, also called speaker, in sound reproduction, device for converting electrical energy into acoustical signal energy that is radiated into a room or open air. The term signal energy indicates that the electrical energy has a specific form, corresponding, for example, to speech, music, or any other signal in the range of audible frequencies (roughly 20 to 20,000 hertz). The loudspeaker should preserve the essential character of this signal energy in acoustical form. This definition of a loudspeaker excludes such devices as buzzers, gongs, and sirens, in which the acoustical signal energy does not correspond in form to the electrical signal.

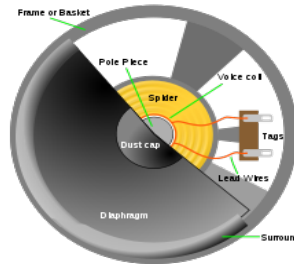


Fig 5 Speaker

The part of the speaker that converts electrical into mechanical energy is frequently called the motor, or voice coil. The motor vibrates a diaphragm that in turn vibrates the air in immediate contact with it, producing a sound wave corresponding to the pattern of the original speech or music signal. Most frequently the motor consists of a coil of wire moving in a strong magnetic field, but the diaphragm may also be operated by electrostatic forces or by the action of a piezoelectric material.

IV. RESULTS AND DISCUSSION

The ultrasonic sensor is used to detect the animal movement in agriculture field shown in the figure 6. After getting that initial input signal, it will be given to the microcontroller for further processing, it will on the APR board, and the sound is being played to divert the animal, at the same time it makes a call to the owner. Therefore, ultrasonic sensor detects the presence of birds in all direction. If the ultrasonic sensor is detected, it sends the signal to the controller. Microcontroller block is used for reading the inputs from ultrasonic sensor shown in the figure 6. Whole process is controlled by microcontroller. The GSM module is used for making call to farmer when movement is detected. It alerts the farmer that some animals or birds try to enter into the farm. This proposed smart crop protection system from animals using Arduino Uno.

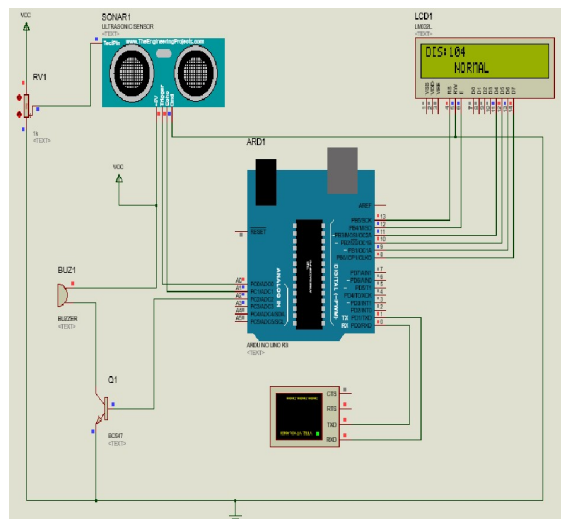


Fig.6. Simulation Result

Once the animal or bird is detected, the speaker will be on and the recorded sound is played for 20 seconds and GSM module makes a call to the farmer shown in the figure 7. Along with the call, repellent system of irritating loud noise like cracker sound is used simultaneously with interval of 4 seconds is used upon the animal. This system works continuously for better effectiveness for protecting the crops from animals.

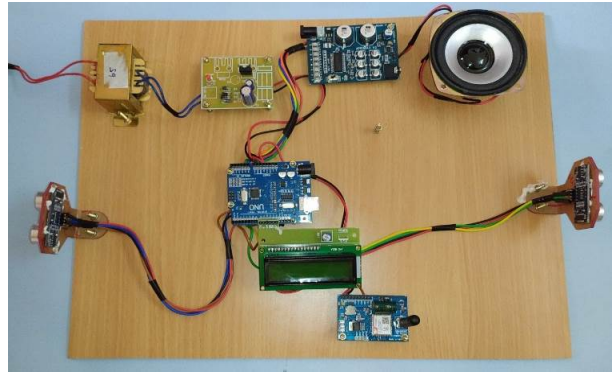


Fig 7 Hardware Result

V. CONCLUSION

Farmers encounter severe animal threats in rural parts of India. It requires urgent attention as no effective solution has come into use till date for this problem. Hence, this venture conveys an incredible social significance as it intends to resolve this issue. The project completely does the needful by reducing the problems faced by the farmers, but it ensures farmers to not suffer from the loss of crops by alerting them in prior about the attack of animals. This will also help them in achieving better crop yields thus leading to their economic wellbeing. It was successfully tested. It is a new approach in social aspects for wild animal death avoidance and accidents prevention. Animal specific frequency spectrum signals are generated. The specific animals are alerted with these signals of danger and successfully ran away. The progress in science & technology is a non-stop process. New things and new technology are being invented. As the technology grows day by day, we can imagine about the future in which thing we may occupy every place.

VI. FUTURE WORK

In the future, there will be very large scope, this project can be made based on Image processing in which wild animal and fire can be detected by cameras and if it comes towards farm then system will be directly activated through wireless networks. Wild animals can also be detected by using wireless networks such as laser wireless sensors and by sensing this laser or sensor's security system will be activated.

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