Asian Journal of Applied Science and Technology (AJAST)
Volume 1, Issue 1, Pages 93-95, February 2017

Seismic Sensor System to Tame the Human Elephant Conflict

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Article Received: 11 February 2017 *Article Accepted: 19 February 2017* *Article Published: 22 February 2017*

ABSTRACT

The Human-elephant conflict is one of the most severe natural problems in south India. There are rich farmlands near the elephant habitats and elephant raid these farms in search of food. Frequent clashes between wild elephant and villagers have resulted in severe damage to property, as well as lost of lives for both humans and elephants. This has been the main cause for nearly 70 people deaths and over 200 elephant deaths that have been recorded each year in the recent past. To manage the problem, the government has initiated projects that secure the national wildlife parks with electric fences .The electric fence that runs around the wildlife sanctuaries provides a convenient means for data communication. Male elephant hit the ground with their feet causing ground vibrations. Since the feet of the elephants are equipped with very sensitive vibration sensors, it provides them with unique communication ability. Proper calibration of sensors is therefore the biggest challenges in this method. There is an any unconditional times the information are passed through GSM.

Keywords: Seismic sensor, Vibration sensor, GSM, Microcontroller and Electric fence.

1. INTRODUCTION

Animal detection system is to reduce human-elephant conflict and also reduce elephant accident by train. It is also one of the problems in nowadays. Elephants that escape from the wildlife national parks venture into villages creating demolition in their awake. To prevent such problems, a proper system is required to contain and monitor elephants in national parks. Here we describe different approaches to detect elephants and possible ways of monitoring the national wildlife parks. The electric fence that runs around the wildlife sanctuaries provides a convenient means for data communication, Because of all the time electric field fence small birds and animals cause dead due to high level of voltage beyond their resistive power. This avoided by proposed system.

The feet of the elephant are equipped with very sensitive vibration sensor, it provides them with unique communication ability. By placing vibration sensors along known elephant paths, seismic waves can be used to alert the presence of elephants and thereby providing another means of localization. However, the sensitivity of seismic sensors varies from one terrain to another –which means that data gathered from different terrains are unlikely to correlate. GSM system automatically sends information.

Since ancient times, villagers have learned to protect their crops from wild elephants conservation in human-dominated landscapes and there are few empirical studies to demonstrate that electrified barriers are effective in preventing elephants from raiding crops. The factors determining the effectiveness of electric fences are not fully understood. Maintenance of effective non-electrified fences and proximity of fences to areas of high elephant application are significant determinants of fence performance in mitigating elephant crop-raiding [1]. Abstract White-tailed deer may cause more damage than any other species of wildlife. One practical method of controlling deer damage is the use of exclusionary fences [2]. A broad definition of human-elephant conflict is any human-elephant interaction which results in obstructive effects on human social, economic or cultural life, on elephant conservation or on the environment [3]. We explore the types of human-elephant conflict (HEC) that occur and explore their impacts upon rural communities. We then consider who has had responsibility for HEC management through history. By means of case studies we then examine current scheme for elephant management across Africa and identify the key problems facing elephant management [4].

2. SYSTEM ARCHITECTURE

This section describes the conceptual design of seismic sensor based animal detection system (ADS) is shown in (fig.1).The ADS has sensor system, GSM module and electric fence. Sensor system is collection of seismic sensor and vibration sensor. It detects the crossing animals. Microcontroller used to process the input and produce two outputs. One is data send from field to control room. The animal information transmitted and received using GSM technology. Another is an electric fence is barrier that uses electric shocks to deter animals from crossing a boundary.

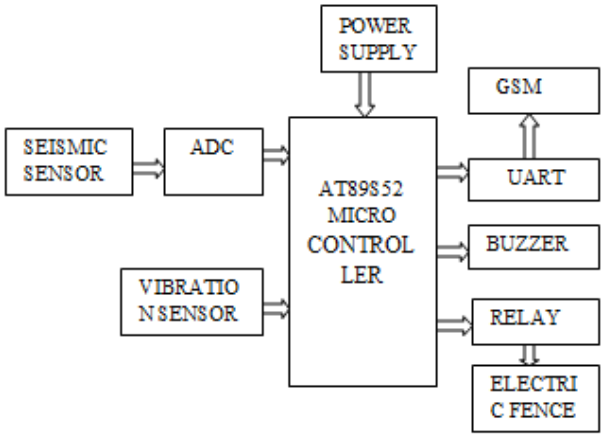

Fig.1. Block diagram

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3. HARDWARE SYSTEM DESIGN

3.1 Microcontroller (Atmel AT89S52)

The AT89S52 micro controller is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is suited with the Industry-standard 80C51 instruction set and pin out. Microcontroller is a powerful which provides a more-flexible and cost effective solution to many embedded control applications. Microcontroller processes the input and produces two outputs. One is data from field to control room .Another is an electric fence barrier that uses electric shocks to deter animals from crossing a boundary.

3.2 Sensor system

Seismic Sensor is devices used to measure seismic vibration by converting ground motion into a measurable electric signal. As the signal is analogue in nature sensors must be linked to a data accession unit to convert its output into a digital format that can be read by computers. Seismic waves are waves of energy that travel through the earth layers.

The principle of operation of a piezoelectric sensor is that a physical dimension transformed into a force acts on two opposing faces of the sensing element. The detection of pressure distinction in the form of sound is the most common sensor application, which is seen in piezoelectric microphones, and piezoelectric pickups for electrically amplified guitars.

3.3 GSM Module

GSM (Global System for Mobile communications) is the most popular standard for mobile phones in the world. GSM send information from the field to control room. This has also meant that data communication was easy to build into the system. GSM users can send and receive data, at rates up to 9600 bps. GSM was intended to be secure wireless system. The advantage of the GSM is, it is more subjective speech quality, Low terminal and service cost support for international roaming, Ability to support handheld terminals.

3.4 Electric fence

An Electric fence is a barrier that uses electric shock to deter the animals crossing a boundary. Electric fences are designed to create an electric when touching by a person or animal. A component called a power energizer convert power into a brief high voltage pulse .one terminal of the power energizer release an electric pulse, another terminal connected to a metal rod implanted in the earth. A Human or animals touching both the wire and the earth during a pulse will compute an electric circuit and will conduct the pulse causing an electric shock. In this paper, the electric fences will turns ON only when the elephant is detected but cannot turn ON while birds or other animals are crossed the boundary.

4. SOFTWARE SYSTEM DESIGN

4.1 KeilµVision4

The keilµVision4 IDE fully integrates Cx51 version 8 and provides control of the compiler, Assembler, Real-time OS, project Manager and Debugger in a single intelligent environment. Keilµvision4 IDE (integrated Development Environment) is a Windows build front end for the C Complier and assembler. Keilµvision4 is used for writing embedded C program. Embedded C is a high level language, which includes many features of the ANSI (American National Standard Institute) C programming language. This software is mainly used to activate microcontroller according to the input received by it. In this project, coding is written for GSM and relay circuit measuring the vibration fall detection of elephant of which is interface with AT89S52 Microcontroller Board at the transmitter end. As per the code embedded in the controller, the interface modules generate appropriate output at the receiving end.

4.2 Proteus

Proteus8 is best stimulation software for various designs with Microcontroller. It is mainly popular because of availability of almost all Microcontrollers in it. After simulating your circuit in Proteus8 software you can directly make PCB design.

Fig.2. Experimental setup

Fig.3.GSM output

5. RESULTS AND DISCUSSIONS

The prototype consists of Microcontroller, Sensor system and GSM module. The sensor system sense the ground motion and sends message in case of high vibration. The elephant detection sensor detect the high ground motion and alert message send to the control room as well as relay is turned

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ON and produces electrical shock. The experimental setup is shown in the fig.2. The mobile communication result of elephant detection system as shown in the fig.3.

6. CONCLUSION

There are two prototype sections one is transmitter and another one is receiver. The transmitter consists of temperature sensor, vibration sensor is sense the vibration of the elephant. The receiver consists of GSM module and electric fences. In existing system, humans or other animals touch the electric fence it produce the shock and other wild animal dies due to digging a pit. 24 hours of electrified fence so that human, birds and other wild animals will get hurted. The electric fence turns ON when the vibration is high. . In this system, to save wild animals and human beings Many loss of wild animals is prevented.

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