AN AUTOMATED SYSTEM FOR IDENTIFICATION OF WILD ANIMALS AND REDUCTION OF HUMAN-ANIMAL CONFLICTS USING VARIOUS SENSOR

Ragurama Krishnan. M[1] | Sasi kumar.S[2] | Syed ali mahadeer.A[3] | Bharathidasan.S[4]

[1](UG Scholar, Sree Sakthi Engineering College, Coimbatore-641104, India, raghuteejay@gmail.com)
[2](UG Scholar, Sree Sakthi Engineering College, Coimbatore-641104, India, shravyashashi10@gmail.com)
[3](UG Scholar, Sree Sakthi Engineering College, Coimbatore-641104, India, mahadeer55grey@gmail.com)
[4](Assistant Professor, Sree Sakthi Engineering College, Coimbatore-641104, India)

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Abstract—In the earlier days, the forest areas are very huge. Due to deforestation, all the trees are now built as large buildings. As the human population is still increasing, forest areas are going to be completely destroyed. Human-animal conflict in the society is mainly due to the shortage of food for animals. This automated elephant identification system and the repelling methods are used to provide more security for the people to protect their farms and their belongings from wild animals. Our project automatically detects the presence of wild animals at low cost and it has the capability to make the animal to run back to forest. The piezoelectric vibrating sensors are deployed in three layers to identify the presence of wild animals. The first outer layer gives the warning signal to alert the people around that area. Second layer activates the first repelling system to make the wild animals run back to the forest. If the elephant is still moving forward s towards the conserved area, the third layer activates the second repelling system. As the sensors are deployed in a cyclic manner, it can easily divert the wild animals' attention and there by the huma- elephants conflicts can be avoided.

Keywords— Arduino Controller; Repelling System; Various Sensors
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1. INTRODUCTION

In this paper, we discuss about the elephant intrusion. The existing method for detection and the repelling of elephants in the farm areas and conserved areas is very expensive. Hence a new method is introduced for the identification of elephants and the repelling system to divert the elephants' attention at low cost. This automated system consists of number of vibrating sensors to detect the presence of elephants, one warning system to alert the people around that area and two repelling systems to make the elephant to run back to the forest area. This system can also be used to protect the conserved area from all other animals like bear, tiger and leopard by varying the sensor range and modifying the repelling system

2. LITERATURE SURVEY

Based on the study of previous research works and the field research, we can summarize the factors like lack of protection in farmlands, damage of fences , shortage of food resources, climatic variations, occupying traditional migration paths of elephants improperly constructed trenches, forest fire contributes the intrusion of elephants along forest borders and farm lands. Some of the repelling methods for elephants are air guns, non-electric fences, electric fences, chilli rope fences, loud alarm, chilli smoke, watchtowers, solar power torches, trenches, fire, fire crackers and throwing arrows stones. There are several automated systems introduced and implemented for elephant detection. Some of them are discussed below.
[1] In 2013, Xin Jin proposed a method to detect the target and classifying the target based on its kind by using Seismic and PIR sensors and it has the advantage of higher accuracy in classifying the target wherein it costs high for the real time implementation.

[2] In 2013, the author proposed a model to detect the presence of elephant by using digital Image Processing to avoid human-elephant conflict. It also proposes an optimization method better than Euclidean and Manhattan algorithms. But this method cannot extend its application of tracking other animals.

[3] In 2014, Ramkumar. R and Sanjoy deb proposed an automated system of ASRET with sensor nodes, gate way node and a CPU with a warning unit. The disadvantage of this method is ASRET is temperature dependent. Hence it is very difficult to implement during climatic changes

[4] In 2015, Vinod A.Dhande and Dr.Kantilal. P.Rane proposed a method for animal identification using IRIS recognition which was based on Digital Image Processing. This method is highly accurate but costs high to implement. [5] In 2015, the authors introduced a human detection robot by using PIR sensors and obstacle sensor which detects the human

[5] R. Maheswari (2016),"Development of Embedded Based System to Monitor Elephant Intrusion in Forest Border Area using Internet of Things" presented atthe International Journal of Engineering Research, Volume No.5, Issue no.7, PP.594-598

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3. EXISTING METHOD

- Detection and the repelling of wild animals in the farm and conserved areas is very expensive.
- The system consists of three consecutive layers
- Used to Infrared voice sensor
- Brute Force method has used
- Unattended Ground Sensors (UGS)has used.
- Used to Geophone device.
- The system also optimized distance metric for lesser retrieval time compared to Euclidean and Manhattan algorithms.

4. PROPOSED METHOD

- Identification of wild animals and the repelling system to divert the wild animals move to backward the forest and attention at the low cost.
- System consists of 4   consecutive layers using arduino.

- In this method modern technology efficiently utilized and within conventional solutions
- It will cause no pollution for animals-human in natural environment.
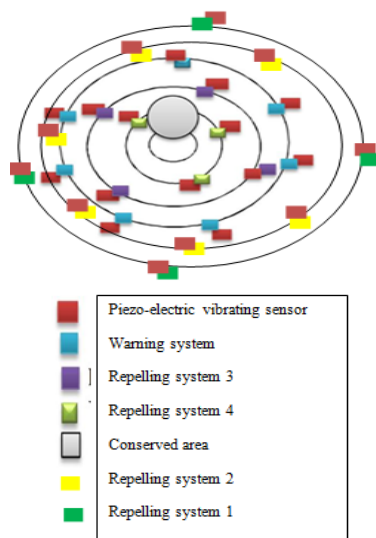- The system also proposed a GSM which is used to message transfer to the forest ranger from repelling system.

5. BLOCK DIAGRAM
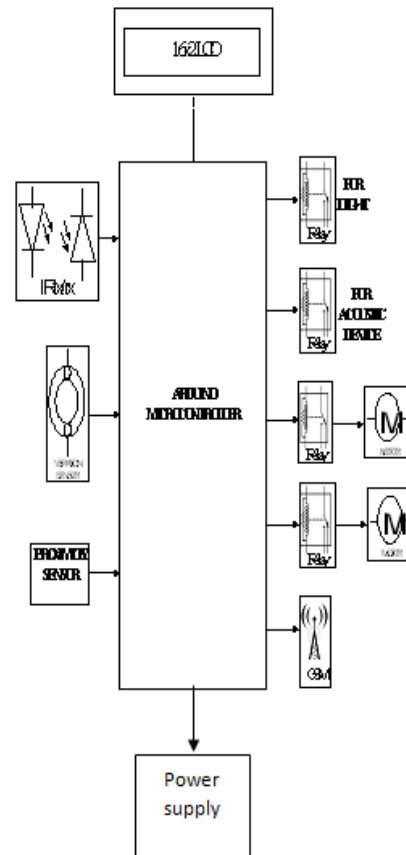
6. WORKING PRINCIPLE

When the elephants move towards the preserved area crossing the first sensor layer, the second layer will begin operating. The piezoelectric vibrating sensor 2 will sense the presence of elephants as like sensor 1 and the LCD will display the status of the elephant. When the particular voltage created by sensor matches the threshold value, the relay for the repelling system 1 will be turned ON.

The sound of the elephants threatening animal is given as the repelling system 1 by which the elephants changed its motion direction towards forest. If the elephants still coming in the same preserved area which is sensed by the third piezoelectric vibrating sensor, repelling system 2 will be turned ON. The smoke valve is placed in the second repelling system through which heavy smoke spreads around that area. The smell created by the smoke will divert the elephants' attention. Hence there will be no chance of elephant intrusion in the preserved area.

7. SENSOR DEPLOYMENT

■ (red)	Piezo-electric vibrating sensor
■ (blue)	Warning system
■ (purple)	Repelling system 3
■ (olive)	Repelling system 4
■ (grey)	Conserved area
■ (yellow)	Repelling system 2
■ (green)	Repelling system 1

8. HARDWARE DESCRIPTION

8.1 Acoustic sensor

An acoustic wave sensor is an electronic device that can measure sound levels. They are called acoustic sensor because their detection mechanism is a mechanical wave. The piezoelectric sensor is used for flex, touch, vibration measurement.

8.2 PIR sensor

A passive infrared sensor is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors.

8.3 Loud alarm

The alarm is a medium beeping sound and too much of loud to be annoying but loud enough to irritate sound in a wild animals.

8.4 Chili rope fences & chilli smoke

The rope coated with chilli powder and chilli smoke used to dc fan to spread the surrounding area.

8.5 Solar power torches

The flashlights powered by solar energy stored in rechargeable batteries. Most of these flashlights use light-emitting diodes lamps since they have lower energy consumption compared to incandescent light bulbs.

8.6 Relay

Relays are switches that open and close circuits electromechanically or electronically in a repelling system it consists of normally open(NO) and normally closed(NC) contacts.

8.7 LCD

A liquid-crystal display is a flat-panel display in monitor process and other electronically modulated optical device that uses the light modulating properties of liquid crystals.

8.8 GSM & GPS

A GPS and GSM tracker utilizes either the global positioning system for mobile communications to determine precise location.

8.9 Power supply

A power supply is an electric power to an electrical load. The primary function of a power supply is to convert electric current from a source to the correct voltage, current, and frequency to power the load and give to the voltage range of arduino is 5v-10v.

8.10 Arduino microcontroller

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board microcontrollers and kits for building digital devices and interactive objects that can sense and control objects in the physical world.

9. EXPERIMENTAL RESULTS
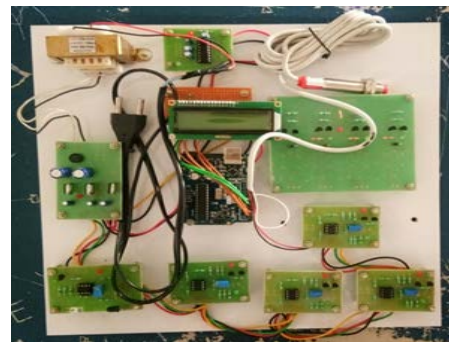
The figure shows all the four piezoelectric plates namely S1, S2, S3 and S4 which are placed at a distance of 0.5m from each over. And all of the piezoelectric sensors are connected to the sensor model which is kept in the conserved area or living area. It consists of vibrating plate, if any animal touching on vibrating plate the sensor will convert the touch into electrical signal as an output. After receiving output from piezoelectric sensor the microcontroller sending message to the forest officer by using RSmax-232 and alerts the people by buzzer alarm. The buzzee is used as a warning system and interfacing with microcontroller. The proximity sensor will find and check for the presence of vehicle or metal.

An IR sensor will detect both human and animal; to identify the animal length of object is compared with the voltage. The sensed voltage is used to operate the relays. The output is consisting of four relays as a repelling system. In first repelling system will spread the solar power torch at that detected area, the animal shall stop and scared. But the possibility of going back to the forest area is lesser and it reaches the next stage. The second repelling system contains noise may frightened to the animal and make it to decide go return to forest. The third repelling system has chillie powder. The chilie powder can be spread on the animal by using DC motor. In fourth repelling system is using trenches when the animal reaching this system the

trenche will be door open and the animal fall down into it. an the animals. Note that any pins from A4 can be used for sensor interfacing since all these pins are dedicated for analog to digital conversion. After interfacing the buzzer with sensor and microcontroller,   vibration is given to the sensor S1.as the sensor deducted the vibration range lesser than 400, the buzzer will produce alert and LCD will display the status as buzzer ON and the voltage produced by vibration. The interfacing of first repelling system. As the wild animal have the nature of oscillating and frightening on hearing the sound of tiger, leopard and other certain animals, hear the sound of tiger is given through the APR module as the first repelling system, Since the sensor is given along with a module, connection can be established directly from the module to the microcontroller. When the vibration range lesser than the 400 is given to the sensor S2, APR module produced the tiger sound and the LCD shows the status as voice ON and voltage produced by sensor. The interfacing of second repelling system with the microcontroller.

To introduce smoke, solenoidal valve unit is connected with the microcontroller of second repelling system. When the vibration range lesser than 400 is given to the sensor S3, the smoke valve will be ON and status was observed in LCD as valve ON and the voltage created by vibration is displayed.

The final prototype of the system which was taken for demonstration. The piezoelectric vibrating sensors are tested with different vibrating obstacle whereas the warning system and repelling systems are tested at all conditions. Thus the entire system is tested and found to be in working condition.

10. CONCLUSION AND FUTURE WORKS

This automated wild animal's identification system and repelling methods are used to provide more security for the people to protect the form land and their belongings from animals. It can automatically detect the presence of animals at low cost. It has capability to make the animal to return to forest area the sensors are placed in consecutive layers and individual sensors are connected to a repelling or warning system the no error and delay will occur in detecting the wild animals and execution of repelling the animals. The noise, torch, chilie powder and trenches make the animals frightened and stop animals to reach conserved area. So this method reaches 95% of output is reached. Because of using GSM this method can also have control and command instructions in future to have impact on our social issues. This can be modified further by SONAR (for detecting animal and conserved area),raspberry pi, IoT.

In future this method can implement in real time. So we can able to save many human habitats and cultivated lands and help them to give a peaceful life and get free from fear of animals.

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Ragurama Krishnan.M. Currently pursuing B.E under the stream of   Electrical and Electronics Engineering at Sree Sakthi Engineering College Coimbatore affiliated to Anna University Chennai.

Sasi kumar.S currently pursuing B.E under the stream of Electrical and Electronics Engineering at Sree Sakthi Engineering College Coimbatore affiliated to Anna University Chennai.

Syed ali mahadeer.A currently pursuing B.E under the stream of Electrical and Electronics Engineering at Sree Sakthi Engineering College Coimbatore affiliated to Anna University Chennai.

S.Bharathidasan is an Assistant professor (S.G) in the Department of Electronics and communication, holds M.E in Applied Electronics. (Karunya University, Coimbatore).He has nearly 10 years' experience in teaching and pursuing Ph.D (Wireless Sensor Networks) in Anna University, Chennai. Presently, he is working as Assistant professor in Sree Sakthi Engineering College Coimbatore, Tamilnadu.