



IOT BASED SYSTEMATIC DETECTION OF ELEPHANTS

DR.M.YUVARAJU*

ASSISTANT PROFESSOR, DEPT OF EEE, ANNA UNIVERSITY REGIONAL CAMPUS, COIMBATORE
- 641 046

AKSHAYA.N

UG STUDENT, DEPT OF EEE, ANNA UNIVERSITY REGIONAL CAMPUS, COIMBATORE – 641 046

CLARA.J

UG STUDENT, DEPT OF EEE, ANNA UNIVERSITY REGIONAL CAMPUS, COIMBATORE – 641 046

SELVANAGARAJAN.M

UG STUDENT, DEPT OF EEE, ANNA UNIVERSITY REGIONAL CAMPUS, COIMBATORE – 641 046

KALAISELVAM.G

UG STUDENT, DEPT OF EEE, ANNA UNIVERSITY REGIONAL CAMPUS, COIMBATORE – 641 046

INNIYAVAN N K

UG STUDENT, DEPT OF EEE, ANNA UNIVERSITY REGIONAL CAMPUS, COIMBATORE – 641 046

ABSTRACT:

Human-Elephant Conflict (HEC) takes loads of human and elephant lives, each year. Though there are many strategies and systems deployed in African and Asian countries to, mitigate this battle, none of them have supplied efficient solutions. The achievement of a contemporary HEC mitigating device heavily depends on its capability to detect the presence of an elephant. In most of the present structures, their advanced accuracy of detecting an elephant's presence is constrained through sure conditions along with the ability to seize a good nice picture containing the elephant. On this paper, we advise an opportunity elephant detection system which makes use of Odour of elephant urine and the ear flap sound as detection parameters and additionally aid. For that reason, the proposed gadget is much more superior over the present elephant detection systems and can be a powerful tool to mitigate the HEC.

KEYWORDS:

HUMAN-ELEPHANT CONFLICT, DETECTION, WARNING, WIRELESS SENSOR NETWORK.

INTRODUCTION

Elephas Maximus, usually known as the Asian elephant, is one of the 3 dwelling species of the most important land animal on the planet. In addition to the other two species, the Asian elephant is likewise an endangered species. Its habitats variety from south Asia to southeast Asia. Asian elephant is tightly linked to the records, culture, faith and mythology of many countries in south and southeast Asia for over 2500 years. Tamed Asian elephants were used inside the transportation and agriculture, in the beyond. But ,most of the people of the Asian elephant populace is still restricted to the wild. As a result of latest human sports consisting of deforestation, immoderate farming, huge scale land and infrastructure development and segmentation of elephant habitats have paved the way to the downfall of this large.

The elephant population in Asia has been reduced from 100,000 to 40,000 within the duration of a few decades. Furthermore, restricting the elephant habitats and habitat segmentation in Asian international locations have now not most effectively fulfilled the demise of the elephant population but additionally, the concord between people and elephants has been hindered for the duration of the latest years. Minimizing human-elephant struggle to lessen the chance of life of both people and elephants is of utmost significance. Elephant conservation issues may be divided into two distinct categories:

(1) Activities that have an effect on elephants immediately such as hunting/ poaching and seize.

(2) Developmental sports and human activities main both to the lack of elephant habitat or its qualitative degradation.

The facts were collected from the Coimbatore forest branch internet site and Interviews with village people stricken by elephants and relevant literature. Coimbatore district is richly endowed with hills, forests, rivers, and natural world. Geographical region of the district is 74,433.72 sq. Km with a wooded area vicinity of 693.48 sq. Km (9.33%). The wooded area of Coimbatore district is split into two divisions. South of Palghat hole lies inside the Anamalai wildlife Sanctuary, which has been precise as a Tiger Reserve in 2008. North of Palghat lies inside the Coimbatore forest division.

This division is bounded inside the north and northwest by Sathyamangalam, Erode, Nilgiris North, and Nilgiris Southforest divisions and within the west and southwest via Palghat woodland department of Kerala.

Coimbatore forest area division is unfold over 693.48 sq. Km in six tiers, of which four hundred sq. Km is battle inclined. The division has 58 villages and 315km of woodland boundary. Six elephant corridors in the Coimbatore forest division are proven. Particularly,

Jaccanari-Vedar colony (Corridor 1) in which the period of the hall is ready 12 km and width degrees from 0.2 to at least one.5 km. In Kallar-Jaccanari (corridor 2), the length of the hall is 7 km and width stages from zero.2 to 1.5 km. In Kallar-Nellithurai(corridor 3),the period of the corridor is 10.8 km and width degrees from 0.25 to 3 km. In Anaikatti-Veerapandi (corridor 4), the length of the corridor is 21 km and powerful width ranges from 0.1 to 1.5 km. In Maruthamalai-Thanikandy (corridor 5), the length of the hall is 13 km, and effective width tiers from 0.4 to 1.5 km. And in Kalkothi-Walayar (corridor 6), the duration of the hall is 21 km the effective width ranges from 0.2 to 0.9 km.



FIGURE 1: MAP SHOWING STUDY AREA OF THE COIMBATORE DISTRICT IN TAMIL NADU.

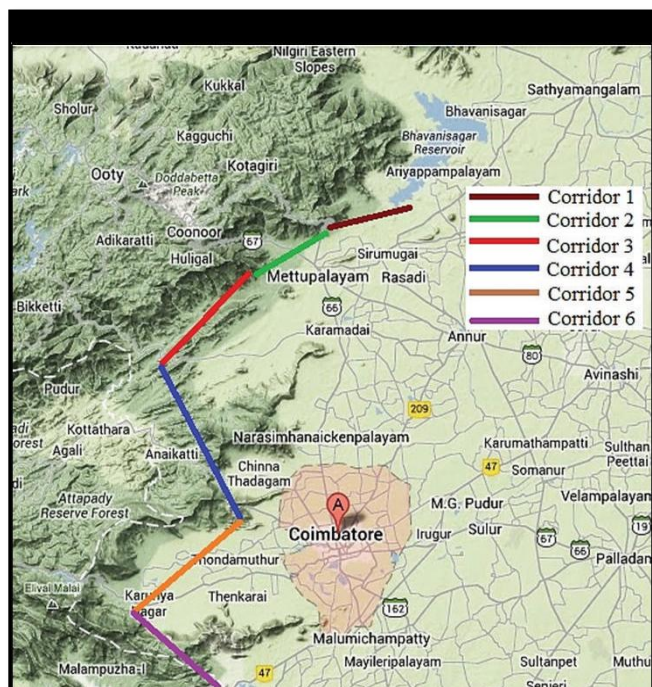


FIGURE 2: CORRIDORS USED BY ELEPHANTS IN

THE FOREST BORDER AREA OF COIMBATORE.

And our college ANNA UNIVERSITY REGIONAL CAMPUS COIMBATORE is also located nearer to the Maruthamalai which is placed in corridor 5.

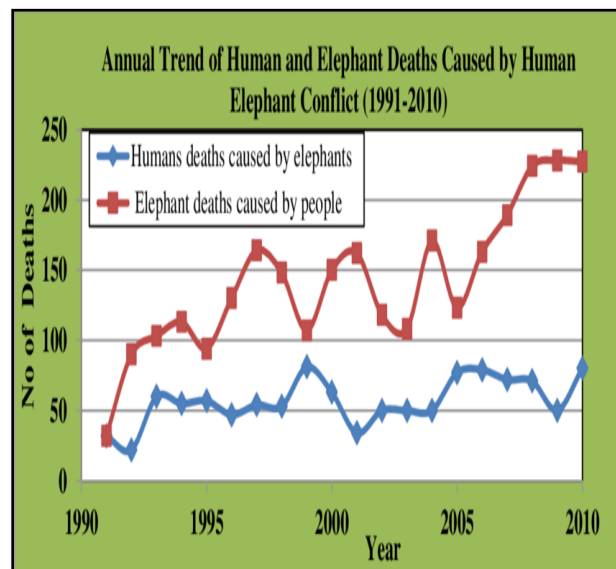


FIGURE3: GRAPH SHOWING ANNUAL TREND OF HUMAN AND ELEPHANT DEATHS

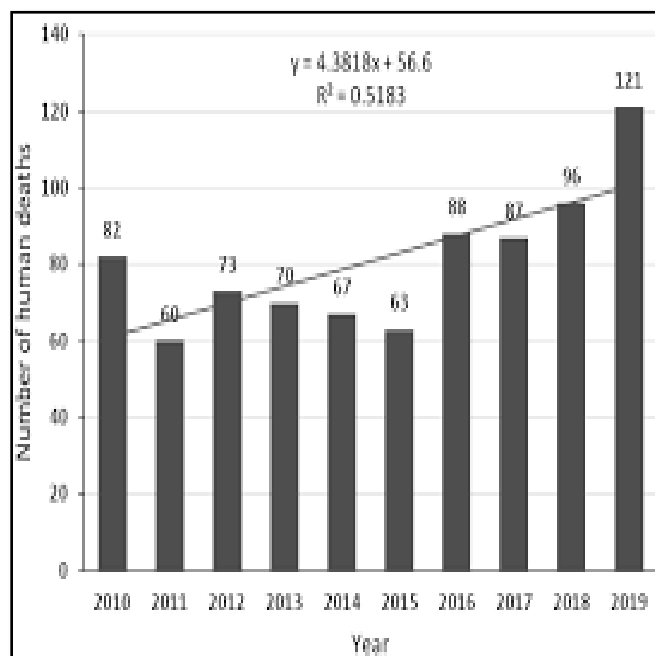


FIGURE 4: GRAPH SHOWING ANNUAL HUMAN DEATH.(2010 - 2019)

In total, there are eighty-five km of elephant hall within the district desires to be covered from human-elephant warfare. The place is likewise a part of the crucial elephant corridor on this vicinity [4] amounting to a total of 691-914 elephants discovered on this region. The elephant is one of the most battle prone natural world species in India, inflicting large-scale damage to crops and human lives. Every year, almost four hundred people and 100 elephants are killed in war associated instances in

India, and almost 500,000 households are affected by crop harm. Several motives which includes habitat fragmentation, degradation of habitat quality, lack of woodland cover, laxity in control of physical boundaries, deaths because of elephant attack.

EXISTING SYSTEM:

In the current framework, Acoustic Sensor is utilized to recognize the vocal recurrence of the elephant. It manages existing strategies through their viability in observing elephant sound without make any mischief them. The sound source is energized utilizing a wide band motion with characterized band width and the flag is caught by every one of the acoustic sensors. An acoustic flag proliferates in a timberland and open zones with a great deal of outer elements that influences the sound spread. The essential target is to decide the acoustic source Direction of Arrival, which is spoken to by the source vector that focuses from the sensor to the source. The auxiliary objective is to distinguish the diverse outer elements that influencing the sensor organize scope region and furthermore gauge the blunder examination report and mistake amendment techniques. With a specific end goal to defeat these issues. Seismic Sensor is utilized to identify the development of elephant successfully and precisely.

PROPOSED SYSTEM:

In this system, we are recognizing the problems of detecting animals in our campus using different sensors. The main objective of the system is to alert and protect the people around the campus. Once the animal is detected across a particular range, it is sensed and a SMS and email notification are sent to forest officials and staff members. in this system we used sensors like PIR(recognizes infrared light emitted from nearby objects), seismic sensors(sense the vibrations of the earth), elephant urine odour sensor(senses the odour of elephant urine), ear flap detection sensor(enables to detect ear flapping sounds).

METHODS AND MATERIALS:

1) PIR SENSOR:

A passive infrared sensor (PIR sensor) is an electronic device that measures infrared (IR) light radiating from objects in its field of view. Apparent motion is detected when an infrared source with one temperature, such as a human, passes in front of an infrared source with another temperature, such as a wall. PIR sensor detects a human being moving around within approximately 10m from the sensor. This is an average value, as the actual detection range is between 5m and 12m Power is usually up to 5V.



FIGURE 5: PIR SENSOR

2) SEISMIC SENSOR:

Elephants are thought to detect seismic vibrations either through sensors embedded in the skin on their feet and/or through bone conduction of vibrations to the inner ear. Seismic sensors could detect single elephant movement from a distance of approximately 20m.



FIGURE 6: SEISMIC SENSOR

3) ELEPHANT URINE ODOUR SENSOR:

On average, an elephant urinates more than fifteen times a day and the amount of urine passed at a time may range even up to nine litres. It is also observed that during urinating, a considerable amount of urine is stuck on the elephant's body parts. Hence, even when the elephant moves to a different location, the elephant emits a considerable odour of urine. The main chemical substance in the urine of any mammal is Ammonia which is very high in elephants compared to other mammals. In order to verify the response of an Ammonia to animal urine, several tests were conducted.. It is clear that the odour of urine is very much high in elephants than all the other animals, having a considerable odour even at the maximum tested 35 m distance.

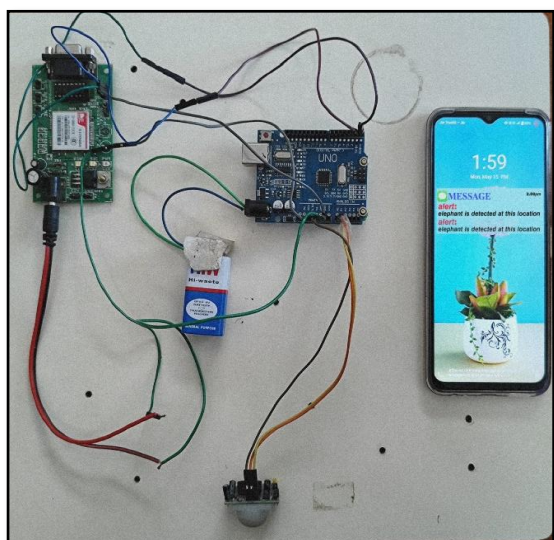


FIG: PROTOTYPE OF PROPOSED SYSTEM(USING ONLY PIR & GSM)

4) EAR FLAP DETECTION SENSOR:

Having a body mass ranging up to five tons, elephant's body generates a very high amount of heat. In the absence of sweat glands, the primary mechanism of the elephant's excess heat dissipation is through the ears. Elephant ears are equipped with a large surface area and an extensive vascular network to facilitate this process. Thus, the elephant periodically flaps the ears which generates a periodic sound signal, and it can be heard even at a considerable distance away. The ear-flap sound has been identified to be in the frequency band 300 Hz-500 Hz. As the second parameter measurement, we develop an earflap sound capturing circuit. The aforementioned circuit consists of three principal components, namely, the microphone (Mic), low noise amplifier (LNA) and the bandpass filter (BPF). To cater for the specific frequency range under consideration, we selected a special Mic module, MAX4466, which has a good response in the frequency band of interest and also a very high load resistance of 100 k Ω .

5) GSM 900A:

GSM is a modem interface. This is used to send sms and operates over a subscription to a mobile operator just like a mobile phone. It is a wireless modem that sends and receives data through radio waves. GSM has wide range of applications in transaction terminals, weather stations etc. Modem low power consumption of 0.25 can be used for GSM based voice communication and network leads for easy debugging.



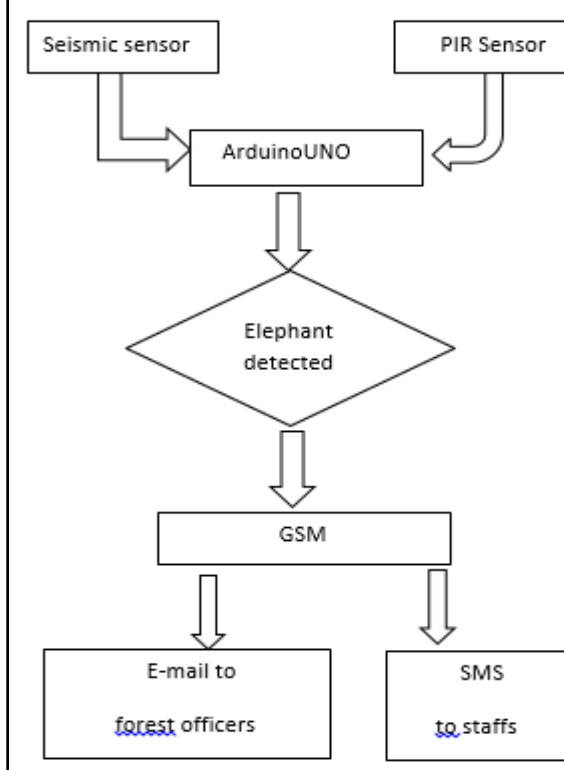
FIGURE 7 : GSM 900A

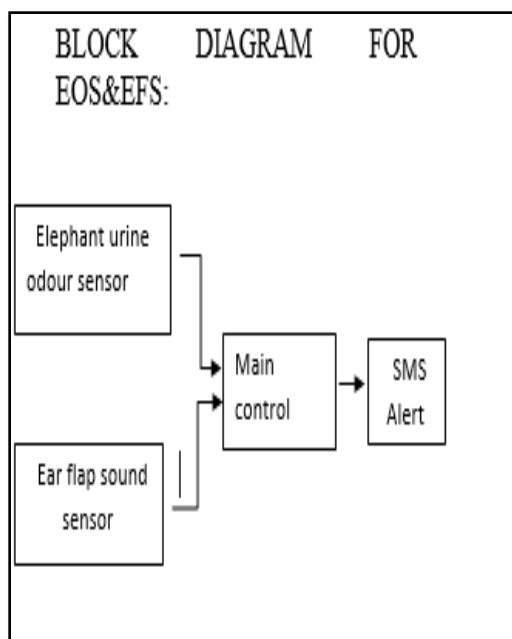
SOFTWARE ARCHITECTURE:

ArduinoUNO:

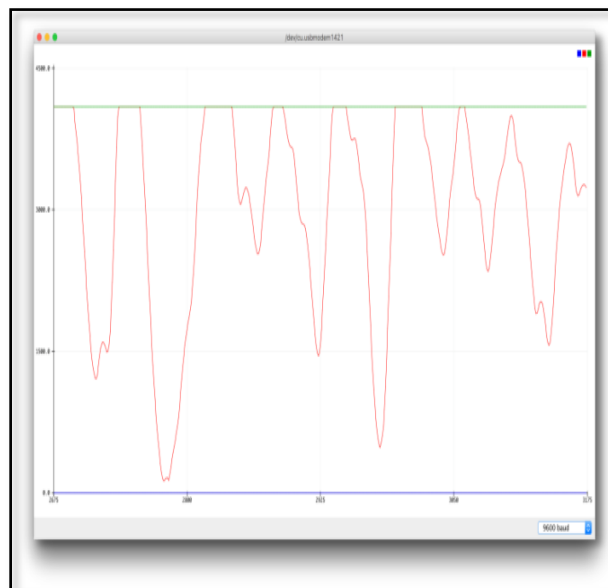
ArduinoUNO is a microcontroller based on ATmega328. ArduinoUNO is powered via USB connection. It has digital inputs, analog inputs, crystal oscillator. ArduinoUNO is an open source platform based on easy to use hardware and software. It differs from all boards in that they do not use FTDI USB to serial converter. Instead, it is programmed as a USB to serial connector. The ArduinoUNO can be programmed with Arduino software. The Arduino has a number of ways to communicate with a computer, other microcontroller. They operate at 5 volts. Lead from the battery connected in Vin or Gnd of pin header of power connector. Arduino UNO has a serial monitor.

BLOCK DIAGRAM:

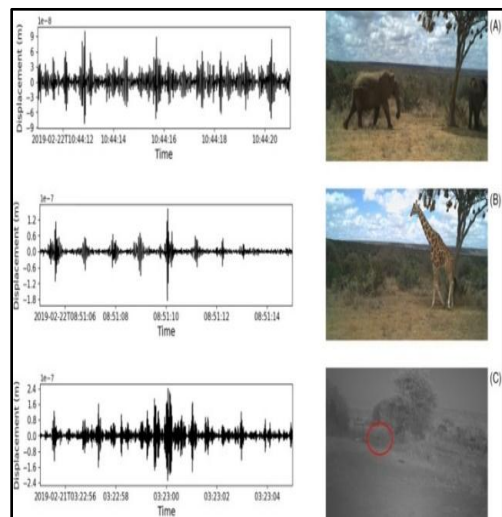




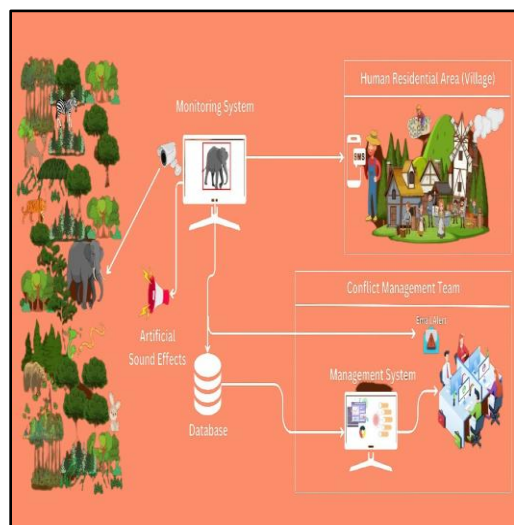
c) Output from PIR Sensor:

**RESULTS:**

a) Output from Seismic sensor:



b) Workflow of proposed system

**CONCLUSION:**

On this paper, we've got given the details of implementation of elephant intrusion detection device, the elephant is detected with the assist of an aggregate of sensors noted above and is shown by means of the outputs displayed. If the elephant's presence is shown, an alert message is sent that shows that the elephant is spotted. Because the end result of the alert, the desired movements are taken. Our results display the importance of identifying elephants in human dwelling areas and offering early caution about the elephant access into the habitat.

REFERENCES

1. R.Newlin Shebiah, B.Deeksha, and S.Aparna "Early warning system from threat of wild animals using Arduino" (March 2017) ISSN: 2348-8549.
2. Dr.M.Prabu, "An efficient surveillance system to detect elephant intrusion into forest borders using seismic sensors" 2016, E-ISSN 0976-3945
3. Matthias Zeppelzauer and Angela, S.Stoegaer, "Establishing the fundamentals for an elephant early warning and monitoring system", IEEE International conference on image processing (4 September 2015).
4. S.J.Sugumar and R.Jayaparvathy, "An improved real time image detection system for elephant intrusion along forest border areas" current science, vol.104, PP.1515-1526, 2014.

5. Xiaoyuan Yu, Jiangping wang, Roland Kays, Patrick A Jansen, Tianjiang Ang and Tomas Huang "Automated identification of animal species in camera trap images", EURASIP Journal on image and video processing (4 September, 2013) 2013:52

6. Fernando, P.Leimgruber, T.Prasad and J Pastorini Proble-elephant translocation: Translating the problem and the elephant? plos one,vol.7.10.1371/journal.pone.0050917 (2012).

7. Lahiri M, Tantipathananabdh.C, Warungu.R,

Rubenstein D, Berger-olf T, "Biometric animal databases from field photographs: Identification of individual Zebra in the wild". In: Proceedings of the first ACM international conference on multimedia retrieval. NewYork: ACM (2011)