

# Automated system to protect the farm land from wild animals

BILLI BHARGAV<sup>1</sup>

<sup>1</sup>Student, Dept, of Electronics and Communication Engineering, Madanapalle institute of technology and science, Andhra Pradesh, India

\*\*\*

**Abstract** - Irrespective of usage, Technology plays a major role in everyone's life. whether it is at home, hospitals, schools, public places, farm lands etc., from exploring planets which are far away from earth to finding what's inside of an atom, technology plays a crucial role in helping mankind to make things easier and in many other ways. To develop a country, G.D.P( gross domestic product) plays a key role. Every countries Agriculture G.D.P plays a major role in the growth of the nation. Especially in india, agriculture is the backbone of economy. But, because of animal interference in agricultural lands, there was a huge loss of crops around 30% every year. Elephants, Wild Pigs and other animals coming in to contact with humans, impact negatively in various means such as by depredation of crops, damaging grain stores, water supplies, houses and other assets, injuring and death of humans. This problem causes the farmers leave their areas desolate, which was caused by such a frequent animal attacks. This paper gives a proper solution in keeping away such wild animals from the farmlands as well as provides surveillance functionality. Although, the existing methods like electric fencing and other techniques are not completely efficient in Way out for man animal especially for protection of agriculture crops from wild animals.

**Key Words:** Human – wild animals conflict, attack, ultrasonic sensor, artificial intelligence, frequency.

## 1.INTRODUCTION

Since from the preliminary stage of agriculture, wild animals was a big threat to the human kind and agricultural lands. The incidents of man- animal attacks are very high in crop fields which are adjacent to forests areas. In Himachal Pradesh, every year there was a 30 percent to 40 percent of the crop were being damaged by wild animal [1]. Because of the over population, people are occupying forest areas and are being modified into agricultural and pastoral land. This has led to encroachment into wildlife habitats. This resulted in man-animal conflict over the past years [2]. In Africa, Approximately 80% of the people are highly dependent on agriculture and it is the sole source of profession. In the 21st century, demand for land and the declining productivity of the already cultivated land causes looking for a new virgin land mainly forest areas which alternatively results in the rise in interaction between humans and wildlife as an outcome causes conflict [3]. The existing/current methods used to solve this problem include the use of electric fences, spraying of chemicals or organic substances like rotten egg

smell, others and gas cannons which requires local government permission in most of the cases. Other traditional methods used by the farmers are using shot guns or gas guns, balloons, string & stone etc. these types of solutions are usually cruel and are not completely effective. However, they also require a large amount of installation and remittance cost which poor people can't afford it and even some of the techniques may cause environmental pollution creating effect on both humans and animals [4]. On the other side, the chemical products used to prevent these animals attacks have an implementation cost per Acre of land and their potent depends on weather/climatic conditions, as rain may cause a dilution effect. With assistance of technology, it is possible to overcome these issues with one proper solution. For many years, the rage between man – wild animals as been going on. According to [6], the geofencing technology informs the location of animals to owners through a API (application programming interface).it isn't effective to evacuate the wild animals from farm lands as it just informs the owner about the wild animal location in smart phone. While [7], shows the combination of traditional methods like rotten egg spray unit and electronic fire cracker integrating with micro controller , although these needs to be filled over the time which causes the maintenance cost is high. Although there isn't a effective solution. This paper represents the advanced automated system which helps in reducing the man-animal conflict without causing any harm to wild animals.

### 1.1 Challenges felt

Wild animals are a crucial challenge for farmers. Animals such as deer, wild boars, rabbits, moles, elephants, monkeys, and many others may cause severe damage to crops. They can damage the plants by feeding on plant parts or simply by running over the field and trampling over the crops. Therefore, wild animals may easily cause significant yield losses and provoke additional financial problems. Another aspect to consider is that wild animal crop protection requires a particularly cautious approach. (In other words, while utilizing his/her crop production, every farmer should be aware and take into consideration the fact that animals are also living beings and need to be protected from any potential suffering). Figure – 1.1.(a), shows the depredation of paddy by elephant, this has been a common issue during these days. Figure – 1.1.(b) shows a elephant aggressively destroying the house which is near to the forest area, thereby causing financial problems to poor people.



Figure - 1.1.(a), elephant demolishing of crops.



Figure - 1.1.(b), Elephants destroying houses near to the forest areas.

Table - 1: frequency ranges of wild animals

species	Approximate range(Hz)
Elephant	12k-160k
Tiger	20k-65k
Rabbit	42k-360k
Pig	50k-100k
Deer	30k-250k
Bird	20k-50k
Locust	50k-100k

To solve these kinds of problems in other fields dedicated hardware system including automation and Artificial intelligence tool is employed and system independent software is used to securely connect these hardware units with single or multiple servers. Figure - 2.0.(a), shows the basic working prototype of the proposed automated system which releases the fear frequency which made the animal evacuate the farm lands. Figure - 2.0.(b), shows the picture of wild pig captured with the infrared camera in farm land.

### 1.2 Solution

To protect the crops from damage caused by animal as well as to divert the animal without any harm. Animals motion is detected via ultrasonic sensor and identify the animal using Infrared Camera with the help of deep learning algorithm present in the system which is already programmed and trained. Based on the animal it detects, It diverts the animal by producing the Specific frequency sound through the speaker at different higher frequencies with in audible range which irritates the animal to evict from the Area. Further, this signal is transmitted to IoT Gateway and which gives an alert to farmers and forest department, immediately.

### 2. RELATED WORK

In the recent days the innovation in the agricultural field is getting revolutionized. And the open-sourced software, Hardware and internet connectivity changing the how complex and time-consuming task can be made easy with the help of the AI(Artificial intelligence). The agriculture farming is one of the tough tasks in the agricultural lands ( risk of farming is very high in nearby forest areas). Depredation of crops has been a big issue, irrespective of area. The table-1, shows the frequency ranges to be released with respective to the distance of the animal to the device.

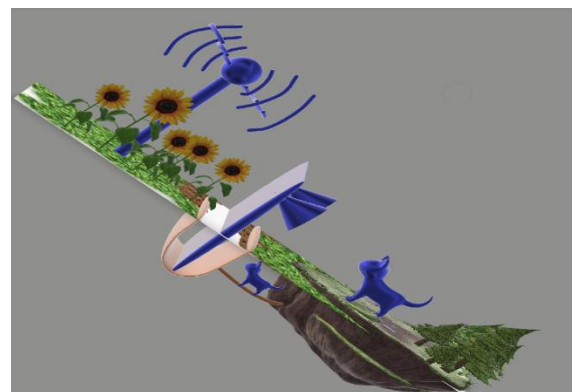


Figure - 2.0.(a), working prototype of the proposed system.



Figure - 2.0.(b), picture captured with infrared camera.

### 3. PROPOSED SYSTEM

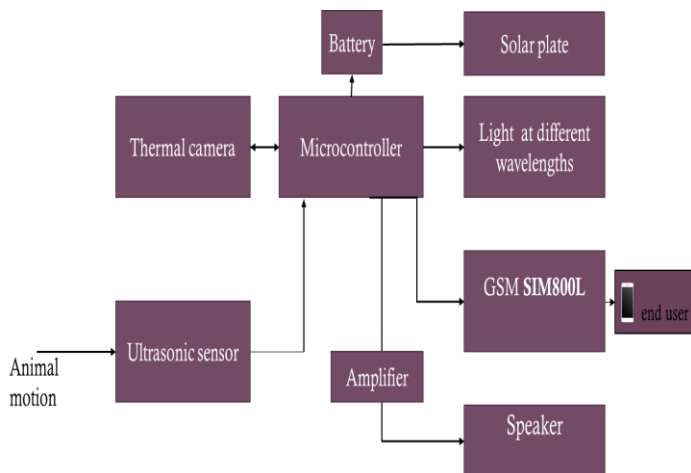


Figure – 3.1.(a), Block diagram of the proposed system

The proposed system uses a microcontroller which operates has a heart of the system, the GSM(global system for mobile communication) is used as some parts of the farmlands locate nearer to the forest areas where internet is not accessible and moreover every one has a keypad mobile which is enough for sending messages.

Every animal has specific frequency spectrum which will make them feel fear, these signals are generated. The specific animals are alerted with these signals of danger and animals will run away.

- When the animal enters into the farm area. The Animals motion is detected by using the ultrasonic sensors.
- After receiving the signal from the sensor the thermal camera will be activated and recognizes the animal by using the deep learning algorithm present in the system which is already programmed and trained(open software and can be modified according to the usage).
- Through ultrasonic sensor, the distance between the animal and system will be calculated.
- Immediately, the frequency will be released to divert the animal, according to the table - 1.
- Parallely, The RGB light will be turned on which will cause a additional layer of security to the farm , which irritates/causes fear to animal to evict from the cultivation farms.
- The GSM SIM800L module is as it less cost and easily available for sending message to the farmer to alert them.
- The design system will not be dangerous to animal and human being, and it also protects farms and crops from wild animals.

### 4. Future scope

1. In addition to the usage in the farm lands/agricultural areas, this can be used in the industrial areas where humans are not allowed with slight changes.
2. In the upcoming years with the advanced technology there will be a scope of having internet in the forest areas too, which helps in designing the IoT to monitor the farmlands.
3. When humans enter into the farm land, it will turn ON the camera and record the presence of the people until they move away and the recording will be stored in cloud through which the owner can see the video via smart device.

### 5. CONCLUSION

Since from the preliminary stage of the human civilization to the current century, man-animal conflict are being the big issue in the agricultural sector and to the mankind. Moreover, it requires an immediate action with an effective solution. Thus, this project works as a ultimate solution in evacuating the wild animals from the farm lands. Accordingly, this automated device can power it up through the solar plates and during night time via the battery , device will work which is also low cost preventing the loss of crops. while, protecting the farm lands from intruders and wild animals which is a big threat to the agricultural areas. This system will also be helpful in protecting houses of farmers and nearer to the forest areas and save them from significant damage to their lives and properties. However, this system help in achieving better yield of crops leading to the development of the nation.

### REFERENCES

- [1] Mehta, P., Negi, A., Chaudhary, R., Yasmin, J., & Thakur, P. (2018). "A study on managing crop damage by wild animals in Himachal Pradesh". International Journal of Agriculture Sciences. Bioinfo Publications, New Delhi, India, 10(12), 6438-6442.
- [2] Yalden, D. W., & Lagen, M. J. (1992). "The endemic mammals of Ethiopia". Mammal Review, 22(3-4), 115-150.R.
- [3] Ajayi, S. R., Osaguona, P. O., Elekhizor, B. T., Oyeleye, D. O., Meduna, P. N., & Habib, A. A. (2019). "Assessment of crop raiding activities of wild animal species in Kainji Lake National Park, Nigeria". Journal of Research in Forestry, Wildlife and Environment, 11(1), 132-140.
- [4] Hamrick, B., Campbell, T. A., Higginbotham, B., & Lapidge, S. (2011). "Managing an invasion: effective measures to control wild pigs".
- [5] Tiedemann, A. R., Quigley, T. M., White, L. D., Lauritzen, W. S., & McInnis, M. L. (1999). "Electronic (fenceless) control of livestock". Research paper PNW-RP-510. US Department of Agriculture, Forest Service, Pacific Northwest Research Station, Portland, OR, USA.
- [6] Ilyas, Q. M., & Ahmad, M. (2020). "Smart Farming: An Enhanced Pursuit of Sustainable Remote Livestock

Tracking and Geofencing Using IoT and GPRS. *Wireless Communications and Mobile Computing*, 2020.

- [7] Bavane, V., Raut, A., Sonune, S., Bawane, A. P., & Jawandhiya, P. M. "Protection of Crops from Wild Animals Using Intelligent Surveillance System".