

# IoT-based Wild Animal Intrusion Detection System

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**Abstract**— suffers electrocution with intense pain cause animals to In forest zone and agricultural field human animal conflict is a major problem where enormous amount of resources is lost and human life is in danger. due to this People lose their crops, livestock, property, and sometimes their lives. So this zone is to be monitored continuously to prevent entry of wild animals. With regard to this problem, we have made an effort to develop the system which will monitor the field. That is at first it will detect intrusion around the field using sensor, then camera will capture the image of the intruder and classifying them using image processing and then Taking suitable action based on the type of the intruder. Finally sends notification to farm owner and forest officials using GSM.

**Keywords** – Animal detection, PIR sensors, camera, image processing, light emitter, sound generator, GSM module.

## I. INTRODUCTION

India is an agricultural country. Agriculture has always been India's most important economic sector. Though most of the India's population depends on agriculture, there are still a lot many problems faced by farmers. Human animal conflict is a major problem where enormous amount of resources is lost and human life is in danger. In recent times the numbers of these kinds of conflicts are increasing. So this zone is to be monitored continuously to prevent entry of this kind of animals or any other unwanted intrusion. Human-animal conflicts arises due to encroachment and poaching, humans move into the forest to satisfy their livelihood, for claiming of land for agricultural practices and rapid industrialization causes spreading of urban ground and animals enter the nearby villages for water during the summer due to dryness in water body. Elephants or wild boar tramp the vegetation in farm land in need of nutritious food. Need of the animal or human put the other in real danger, in this process, resources are spoiled and sometimes even the life is lost. Human- elephant conflict is more in south Asia and in Africa. Usually farms are protected with electrical fence, animal which tries to enter the field behave in abnormal manner.

## II. OBJECTIVE

The objective of our project is to provide protection from the attacks of the wild animals and thus minimizing the probable loss to the farmer. To detect intrusion around the field. To capture the image of the intruder and classifying them using image processing. Taking suitable action based on the type of the intruder. To send notification to farm owner and forest officials using GSM.

## III. RELATED WORK

Nirit Datta and Souvik Sarkar [1] explains the methodology to overcome the problem of human and animal injury and mortality due to the straying of wild animals out of the national parks and wildlife sanctuaries by the use of automatic tracking and alert system. Automatic tracking and alert system has been implemented by incorporating GSM and GPS technology in the form of a device that would be attached to the body of an animal and would be continuously monitoring the position of the animal with respect to the GPS defined boundaries set up inside a wildlife sanctuary or national park. In case an animal strays out of the GPS defined zone, an alarm system that will be installed in a human populated zone will go off, informing people about the approaching danger. This system is flexible, cost effective and easy to implement and can be beneficial for monitoring wildlife related complexities like poaching, railway and roadway accidents, train delays, destruction of vegetation and threat to human life on the occasion of straying of wild animals out of their habitation zone.

Sachin umesh sharma and dharmesh j. Shah [2] explains a simple and a low-cost approach for automatic animal detection on highways for preventing animal-vehicle collision using computer vision techniques are proposed. A method for finding the distance of the animal in real-world units from the camera mounted vehicle is also proposed. The proposed system is trained on more than 2200 images consisting of positive and negatives images and tested on various video clips of animals on highways with varying vehicle speed. As per the two-second rule, our proposed method can alert the driver when the vehicle

speed is up to 35 km/h. beyond this speed, though the animal gets detected correctly; the driver does not get enough time to prevent a collision. An overall accuracy of almost 82.5% is achieved regarding detection using our proposed method.

R.Shanmugasundaram and S.Pavithra [3] proposed a system to track the location of Animal in the zoo or national parks. This system would include a temperature sensor and PIR sensor. The temperature sensor senses the temperature of each animal and PIR sensor senses the human presence inside the animal boundaries or restricted areas. Generally every animal having particular range of body temperature. If the animal having any wounds or fever the body temperature will be automatically increased. To monitor this, we are using temperature sensor. It continuously monitors the animal's temperature if any variation in the temperature, it will be displayed on the LCD. The PIR sensor is used to monitor the human presence in restricted areas or nearby the animal boundaries. When the human presence is detected, the voice processor will give alert to the people through the pre-recorded voice. The GPS receiver send the location, animal temperature to the controller and it is interfaced with the IOT, It will give the complete information to the website on PC or laptop.

Dr. P. Uma Maheswari and Anjali Rose Rajan [4] proposed the bird intrusion is being detected by the use of wireless sensors and buzzers which produce acoustic sounds. When a bird is being detected by the sensors in the agricultural area the acoustic sounds get activated. This sound irritates the birds. Hence when these sounds are generated the birds will fly away as they cannot accommodate to that sound. Thus the destruction caused by the birds in the agricultural fields can be avoided. These acoustic sounds that are being generated will be produced only when the birds are detected and continuous for a while until the birds are been driven away.

IV.METHODOLOGY

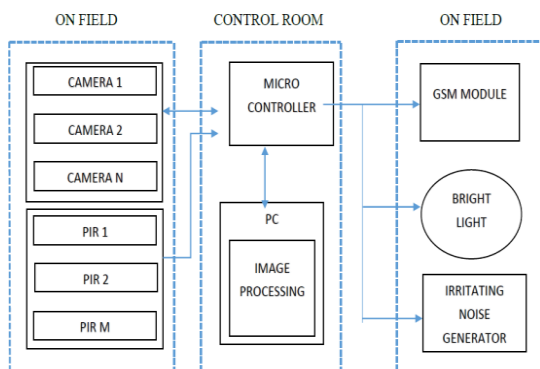


Fig 1 - Block diagram of intrusion detection system

In the current project, PIR Sensors and camera act as first round of security where the animal Movement is detected using the sensor and the sensor in turn triggers the camera to take the picture of the animal and transmit the image

for processing via microcontroller i.e., through WSN. The microcontroller transmits the image from the camera to the PC in the command center where the image processing and classification of animal is done. Once the animal is found to be a threat the PC will send the signal to the repellent system via microcontroller to take appropriate action.

Input

Along the borders of the farm the PIR Sensors and the camera are pole mounted. The number of sensors are relatively twice of that of camera. The sensors have a range of about 30 meters and that of camera is 50 meters. The camera are powered by battery and solar panel. Once an animal is been detected by the sensor, it gives the signal to the camera via microcontroller that takes up the image of the respective scope of area in which the signal has come from. The camera will then send the image for processing and classification of animal whether it is threat or not.

Processing

The images that is sent by the camera is received by the PC for classification of animal. Database is created and the set of sample images are stored in it. The program consists of functions such as indexImage, imageSet and retrieveImage. The ImageSet is used to hold a collection of images. indexImage is used to create an image search index. indexImage is used with the retrieveImage function to search for images. The captured image is given as query image to the processing system. The retrieveImage function takes two arguments, a query image and the image stored in the database. The resultant is the indices corresponding to images within image Index that are visually similar to the query image. The image IDs output contains the indices in ranked order, from the most to least similar match. The value match range is from 0-1. If the value is 0, then the image is not matched. If it is 1, then the query image is same as that of the stored image. If the value is found between that of 0-1, then the query image falls under the category of the stored image i.e., the contents in the query image are same as that of the stored image. If the name of the image matches with that of the regular expression of the image then the animal is elephant otherwise it is a leopard. If the score is in the range of 0.1 to 0.9, then the image is matched with that of the stored image. Once the wild animal is identified then the resulting repellent system is applied. If the animal found is an elephant then the Bright light is emitted. If it is found to be a Leopard, then the irritating loud noise is used. Consequently a SMS is sent to the forest officials and also to the field owner as alert information. If the detected object is not a threat then no SMS is sent. By this way false alarm can be prevented.

Output

Once the animal is classified to be a threat, necessary actions are. SMS notification will be sent to the farmer and the forest official regarding the location of the animal and what type of animal has been trying to intrude the

farm. Along with the SMS notification, repellent system of Bright light and irritating loud noise is used simultaneously with interval of 4 seconds is used upon the animal. The repellent system works continuously for better effectiveness in scaring away the animal.

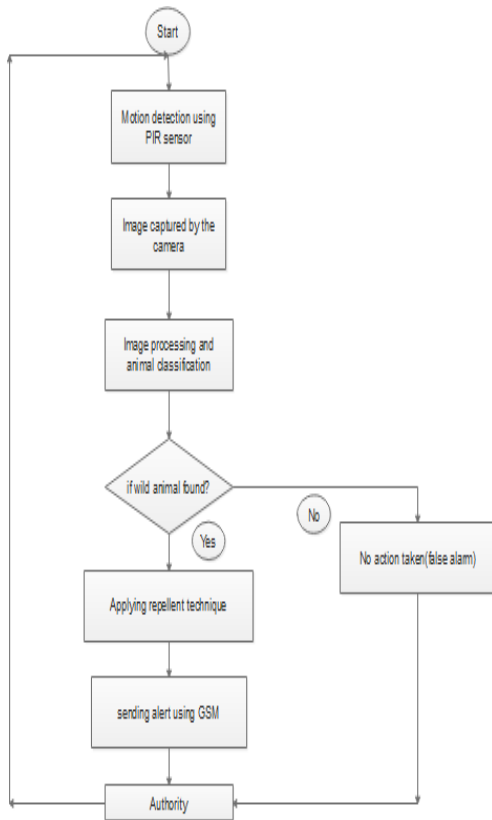


Fig 2 - flow diagram of intrusion detection system

### V. CONCLUSION

The animals, many of which are already threatened or endangered, are often killed in retaliation or to prevent future conflicts. So this zone is to be monitored continuously to prevent entry of wild animals. With regard to this problem, we have made an effort to develop the system which will monitor the field using sensor and camera and captured image of the intruder will be classified using image processing so that suitable action can be taken.

### REFERENCES

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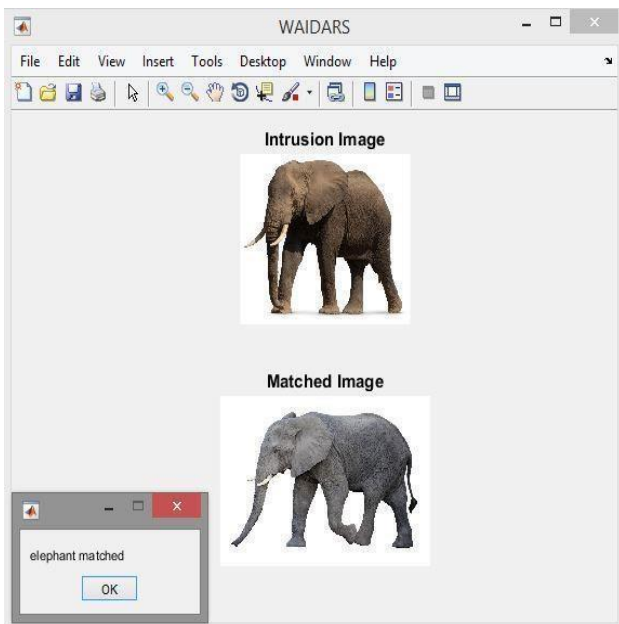


Fig 3 - when the elephant detected as intruder