

“Krishivanam” An Innovation to Prevent the Damages Caused by Fire and Wild Animals to The Agriculture Land

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ABSTRACT

Agricultural fields near forest areas often become the center of human-animal conflict. Due to increased deforestation and destruction of wild-life habitat, animals venture out of forest areas in search of food. Other major consequence of deforestation is forest fire and poaching. As solution to the issues specified, technology can help to detect and warn potential human-animal interference near forest areas. On detection of fire near the agricultural land, pump is turned on automatically to put off the fire. On detection of movement through IR sensor, camera is turned on to identify the animal or human intruder using Objective induction algorithm. If an animal is detected, animal specific sound repellent is played to drive the animal away. If any human with weapons is identified, then an alarm is raised to alert neighbors of possible poacher and intruder. The farmer is alerted by means of an alert message.

Keywords : Animal Detection, Fire Detection, Image processing, Push server notification.

I. INTRODUCTION

The propulsion of industrial developments has led to the conversion of forest areas into human settlements. This has led to the destruction of the wild-life habitat as well as deforestation. As a result of this, agricultural land near forest areas face threat of both animal attacks and propagation of wild fire from nearby forests. This causes scarcity of food and water resources leading to animals wandering in search of food and water. It is extremely difficult to monitor the animals because of

their continuous movement. Invasion of elephants, bears, monkeys and even some domestic animals like cows, sheep which eat crops are also a threat to food security. If destruction is large-scale, so is the loss. Elephants cause maximum damage to infrastructure and inflict injuries to human beings. Farmers and local residents have limited ability to bear the direct costs of these conflicts and any such adverse situations decrease the tolerance towards wildlife and their attitude becomes hostile, which leads to retaliation attacks,

injuries and killing of animals many of which are extremely disturbing incidents.

- **Lack of implementation of modern technology** – Lack of upgradation into modern tools and technology.

II. EXISTING SYSTEM

The current systems essentially give the observation usefulness. Additionally, these systems don't give security from wild animals, particularly in such an application region. They additionally need to make moves in light of the on the kind of animal that attempts to enter the region, as various techniques are taken on to keep various animals from entering such confined regions. Likewise, the rancher's resort to different techniques by raising human manikins and likenesses in their homesteads, which is ineffectual in warding off the wild animals, however is valuable somewhat to avert birds. The other usually involved strategies by the ranchers to forestall the harvest vandalization by animals incorporate structure actual obstructions, utilization of electric wall and manual reconnaissance and different such thorough and risky techniques.

The current systems essentially give the observation usefulness. Additionally, these systems do not give information about the wild propagation of the fire, particularly in such an application region. They additionally need to make moves in light of the kind of fire that damages the region, as various techniques are taken on to keep the farm protected from the propagation of the wild fire in such confined regions. Through the GPS help the location or area the fire is detected and it is sent to the officials for the further action which is taken by the official with the help of the technology.

Disadvantages: There are few drawbacks of existing system which are described below:

- **Maintenance** – If the farming field is larger in area, a challenging task for a farmer is to protect his yield from the wild animals which not possible when the farm is larger in area.

III. PROPOSED SYSTEM

Our project presents a comprehensive survey on various features like image capturing with the help of camera and the images which is captured through the camera is tested with the help of image processing. Image Processing is done through the help of YOLO algorithm which is said to be you only look once. The algorithm which we are using in this model is very useful for getting the correct results with no problem. The data set is which is already stored in the algorithm for the help of the model to process the captured images which animal is detected in the agriculture land. The sensors are deployed for analysing the fire detection in the agriculture land. When the fire and animal is detected in the agricultureland the automatic on of the siren and alert message issent to the officials and the farmer when the animal is detected. And when the fire is detected in the agriculture land the automatic on of both siren and sprinkler with the help of water motor is started to putoff the fire to protect yield from the fire and also the alert message is sent to the farmer and the officials. The proposed model is operated with the help of the Node MCU Wi-Fi model for the processing of the model and the sensors are used to detect the fire int the agriculture land. The alert message is sent through the push server notification for farmer and the officials.

Advantages:

- Restrict the passage of animal into the farm.
- The camera consistently screens the fields and gives the video feed to the farmer at home 24×7 for the entire day.

- No human intervention is there in the process so chance of error is very less.
- Less operational cost.
- Fire detection and animal detection can work day and night with a high accuracy.

Disadvantages:

- Initial setup cost is very high.
- Need high CPU GPU for wild animal detection.

IV. METHODOLOGY

The proposed system uses YOLOv3 algorithm to detect real-time object. YOLOv3 is a real-time object discovery algorithm that distinguishes explicit objects in recordings, live feeds, or pictures. For developing this system we have to collect some dataset. Here our datasets are images of wild animals of different classes. The first step is to run the code for the detection of the animals where with the help of Arduino uno the camera and the motor will be turned on for the working after the detection of the animal and the fire. At the next step when the animal or fire detected the notification and the automatic on of the motor and siren is turned on to notify the farmer and the officials.

Data collection is the initial phase in our project since, as we've established, data collection is its fundamental component. Data was gathered from a number of sources, including kaggle.com and data, world but they weren't sufficient to meet the need for data, therefore data was additionally pulled from a few YouTube movies and some manually downloaded photos from Google. Web scraping has been crucial in the era of data acquisition. Data cleaning, which involves deleting some unneeded and damaged data from the gathered data, was the following stage. The data often had different extensions than those needed,

therefore it has to be deleted to prevent additional problems. □

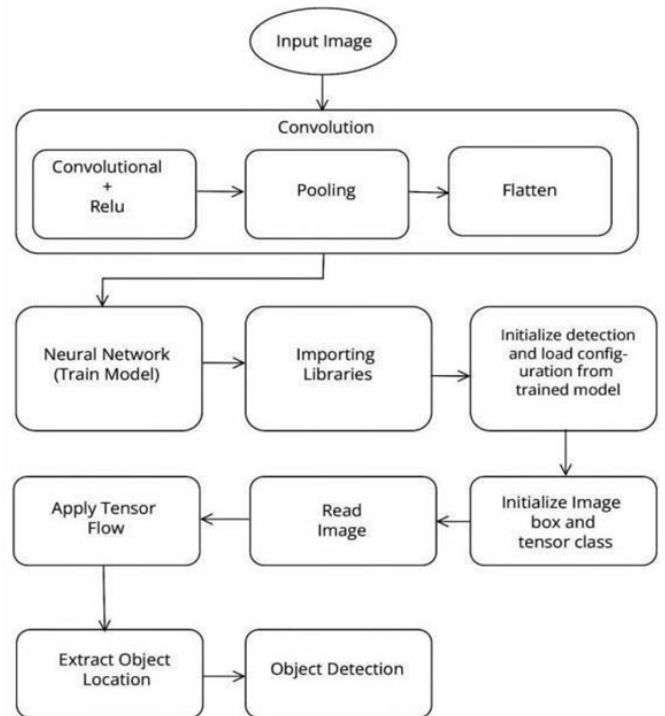


Figure 2.1: Image detection architecture

After collecting the dataset, it will go through an image pre-processing step, it is also called as annotation and we will get our final dataset for training. While the dataset is going through training process it will generate some weights that is later useful for testing. Training process may take approximately hours, but testing can be done easily with the help of those trained weights. While testing the system it will check an image and look for matching class and it will predict an output which have an accuracy near to 1. After that it will send these predicted class name to firebase which is a real-time database, further the class name will be notified to the user's device.

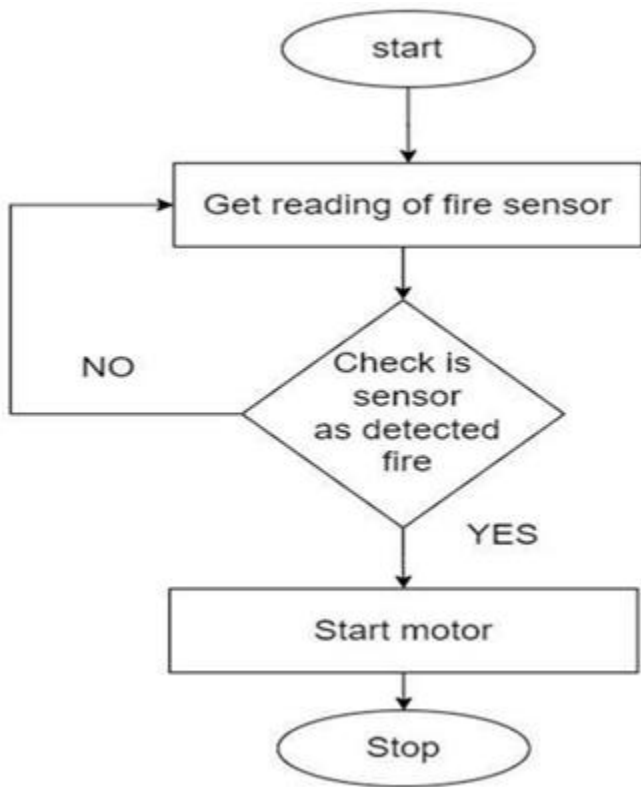


Figure 2.2: Fire detection architecture

The process of the project starts from:

1. Start.
2. Capture image from web camera.
3. Image pre-processing.
4. Using object detection algorithm to detect animals.
5. If animal and fire is detected automatic on & off the alarm and motor is turned on for supply of water to the land and notification will be sent to the farmer and officials.
6. If animal and fire is not detected means the process will be continued till the identification of the intruder.
7. After all this the identification of animals and fire detection the process is stopped by sending the notification and the on off the alarm and motors.
8. Stop.

Our project consists of two part and one is hardware and another is software part. In hardware part we talk about the working process of the

automatic on of the motor when the sensor detects the fire in the agriculture land. After detecting the fire through the sensor, the alert message is sent to the farmer and the officer. In hardware part we use Arduino UNO which acts as a microcontroller and the Wi-Fi model for the working process of the system. We have the supply of power of 5v to the prototype for starting the work and we have the sensor to notify the detection fire in the agriculture land. The sensor sends the signal to the server and the server send signals to the relay to automatic on of water motor for the supply of water to the land when fire is detected.

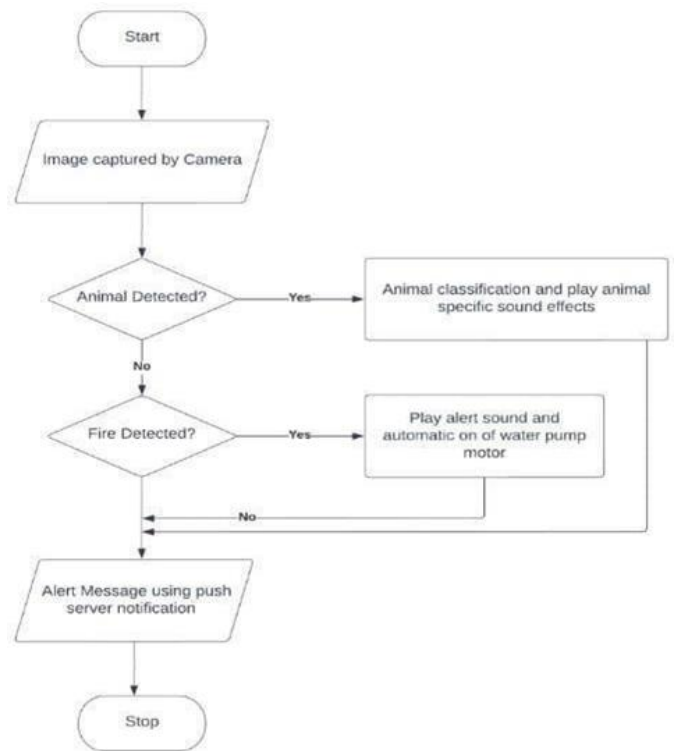


Figure 2.3: Overall process of the proposed system

Above flow chart is the overall working model of the proposed system. Which is helpful to the farmers and the forest officials to track the location of the animals and the location of the occurrence of the fire in the agriculture land. The proposed system will capture the real time object of the animals with the help of image processing the animal is classified which animal is entered to the agriculture land. With the

help of the technology we can get the data and the solution can be found.

V. IMPLEMENTATION

The implementation of the project was divided into two.i.e., software implementation and the hardware implementation.

3.1 SOFTWARE IMPLEMENTATION

In the software part of the project, we required the operating system where we can write the code for the project and to train and test the data sets which we required to specify the animal and fire detection in the agricultural land with the correct datasets we trained and tested in the system.

These are the following steps of the software implementation in the project:

Step 1: We require the correct datasets to detect the intrusion of animal and the fire.

- We should train and test the collected datasets as the input in the program that we get the correct notification without any problem in the detection of the animal and the fire.
- Training and testing of the datasets should be done for every dataset we use for an input we show to the camera or the detection through the camera.
- We pre-process the dataset we collected while testing.

Step 2: We should write the code for the detection of the wild animal and fire in the agricultural land.

- We train the pre-processed dataset in the code we tested.
- The code for wild animal and fire detection should be written in separate file.
- Code of the both animal and fire detection should be run separately without any mistake in the command prompt.
- For the notification to send for the officials and

farmers we should develop the app with that we can get the notification when the intrusion of the animal in the agricultural land and also when the fire is detected.

3.2 HARDWARE IMPLEMENTATION

In the hardware implementation we use Arduino uno for the connection from the laptop to the hardware components like camera, motor and the siren. When we run the code in the laptop the camera will turn on to detect the intrusion of wild animal and the fire in the agricultural land. When there is any intrusion of animal in the farm the camera will detect the animal and send the automatic notification to the intrusion of the animal and also it will turn on the siren beep sound. And when the fire is detected in the agricultural land the automatic on of the motor will supply the water to the farm by reducing the harm caused by the fire and also the notification is sent to the farmer and the officials.

VI. RESULTS AND DISCUSSION

The anaconda command prompt where we run the code to detect the animal and fire in the agricultural land. We use both the code here in the command prompt to run with commands which is used for running the code.

We use both the data sets used for the framework to get the output displayed below.

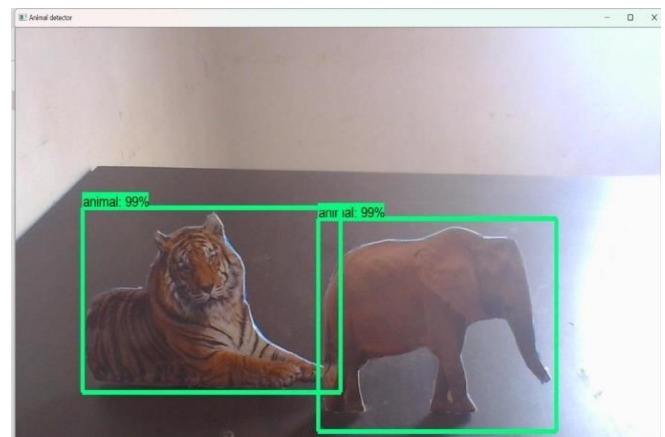


Figure 4.1: Animal Detection

The other main objective of the framework that is the fire detection which we trained and tested by the dataset we used.

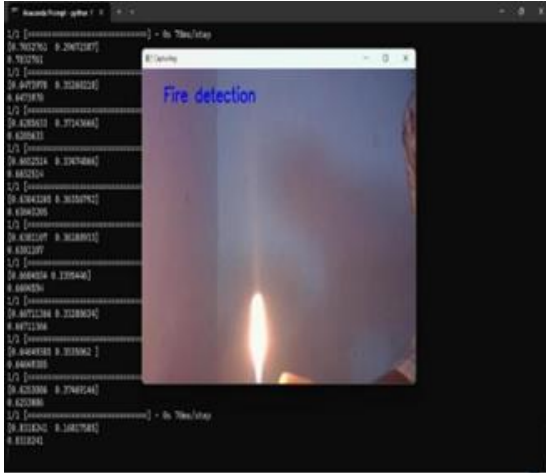


Figure 4.2: Fire Detection

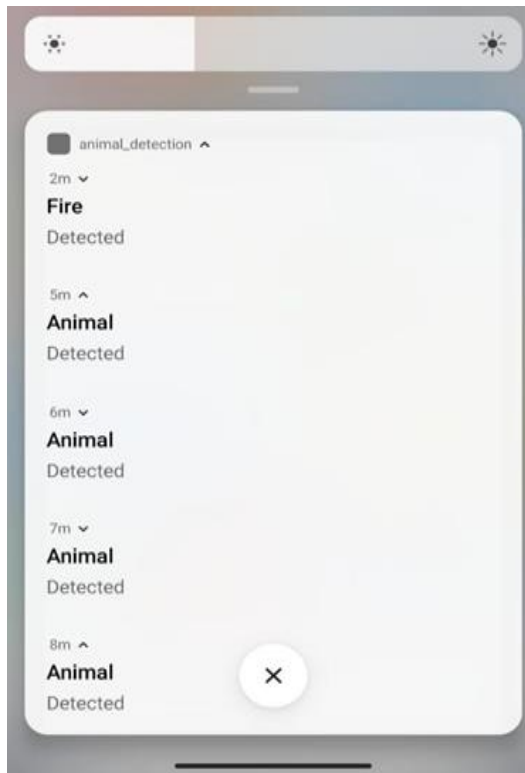


Figure 4.3: Notification appeared in Android app

VII. CONCLUSION

The issue of yield destroying by wild animals has turned into a significant social issue in the current time. It requires dire consideration and a powerful arrangement. Subsequently this project conveys an

extraordinary social significance as it plans to resolve this issue. Thus, we have planned a shrewd installed farmland protection and observation- based framework which is minimal expense, and furthermore consumes less energy. The principal point is to forestall the deficiency of yields and to shield the region from intruders and wild animals which represent a significant danger to the rural regions. Such a framework will be useful to the ranchers in safeguarding their plantations and fields and save them from critical monetary misfortunes and furthermore saves them from ineffective endeavours that they suffer for the protection of their fields. This framework will likewise help them in accomplishing better harvest yields consequently prompting their monetary prosperity.

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