Design Of Birds Detector And Repellent Using Frequency Based Repeller By Machine Learning Algorithm

Dr P. P. Priya G Pavankalyan , P Siva Swapnic guptha , Sk Juber Ahamed

Abstract : Among entire globe many Countries people work as farmers to survive their lives . Plants are interconnected to farming and pests which are related to plants, where there are bulk of plants then they lead to farming there must be effect causing animals called pests. Pests are not only animals they may be birds too that damage the plants. One of the example of pests are birds and monkeys that eat plants and its products and cause harm to farmers. In This research technique we has developed and designed a prototype of birds detector and repellent of birds based on frequency. This designed model has a Bird detection and repellent system which detects the bird based on its given python code as well as with the help of some machine learning algorithms and then proceeds further step to a repellent which produces a certain frequency with respective the birds by classificating the birds based on there resonating frequencies, so the bird will be disturbed through the repellent frequency and goes away fron it. This designed model consists of python open cv software as a detector to detect movement from birds and further classifies the type of bird and for that type it give signals to further step to fire certain signal frequency to repeller .The repeller is designed using LC oscillator type colpitts with Piezo Ultrasonic sensor as repeller which produces . The obtained results of the experiment are mainly focussed on Birds with bird detection system, which is capable of working with a detection distance between 2m - 500 m by using sensors to detect bird , and by modifying this model in aspect of sensor we used machine learning algorithm of python open cv it increases the range of detectiong the bird from 500 cm to 500 meters and can continue for further process to repel the birds at a frequency signal of about 60 kHz.

Keywords : Ultrasonic, Colpitts Oscillator, Capacitive component, object detection, feature extraction, class prediction, Computer vision

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1. INTRODUCTION :

Rice is a crop which is widely grown in many of the agricultural countries across globe like south east Asian countries. In those regions of countries Farmers are usually ready to face many challenges to protect crops and its products produced before harvest. This is usually caused by pests like monkeys and birds .let us discuss Birds are one example of pests which cause damages to farmers. Birds would usually found to be in large groups and wanted to attack agriculture land in same way like groups ,the attack will rise to spoil and damage the agriculture products when ever the rice starts to contain. This bird attack is very injurious and cause some harm to farmers because the birds attacked in groups which are among large numbers. Some of the efforts were made by farmers to get rid off the pest like birds by making scarecrows like dangerous fearful statues and others techniques, but all those effects are not up to the mark. An option that we created can be used to repel utilized to repulse winged creatures is by utilizing frequency waves. Fowls are creatures that are delicate to ultrasonic waves. Bird capability of hearing range is about 29 kHz. So to provide solution to this problem with high efficiency we implemented an electronic kit for to prevent pests like birds.

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- *{Students}*
- *Department of ECE, Koneru Lakshmaiah Education Foundation, Guntur, A.P., India*
- *Corresponding author E-mail: putchapoornapriya@kluniversity.in*

The detection module is implemented by a detection module which is a software based bird detection code that can be mainly run by phyton open cv which increases the efficiency of detection of birds is relied upon to help the network in diminishing irritations in the field of farming .and the role of repeler module is a bird repeller that fires a certain frequencyThe normal capacity of human hearing can reach up to 20 kHz. We utilize ultrasonic sensors that produce frequencies over 20 kHz, which will at that point transmit sign to bugs that have hearing over 20 kHz. At the point when a ultrasonic wave is produced then the creature will remember it as a risk. in the event that the creatures are constant at the vortex of ultrasonic waves, the creature will gradually kick the bucket. To deliver these frequencies we plan the LC oscillator circuit. The oscillator circuit is a circuit that produces motions of electrical circuits. The measure of wavering relies upon the segments we use. The swaying yield is spoken to in recurrence. This implemented model aims to make bird repelles with the help of producing ultrasonic wave of different frequencies based on classified in trained data. The ultrasonic waves generated by this prototype are automatically arranged based on classified and clustered birds such as if the bird is detected then their respective arranged frequency is fired by the repeller. This prototype is implemented and the ultrasonic waves created by this model are naturally organized

2. DEEP INTO THE MODEL

2.1 DESIGNING CIRCUIT OF DETECTOR AND REPELLER:
This model implemented in this problem is split into the three modules such as Camera module , Bird detection module and repellent module
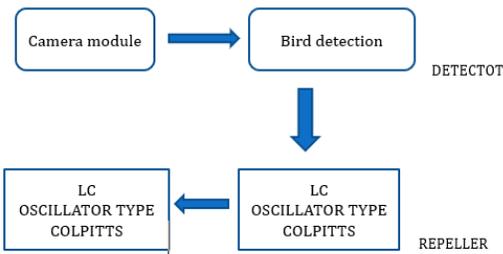
Fig 1. *Block diagram of detector and repellent*

The camera module is a main part which is used to track live data and the continues loop system and the live data is fed continuos to detector module and if bird detected then respected frequency repeller gets activated and respected frequency is firedThe purpose of the prototype is illustrated with a simple flow chart diagram
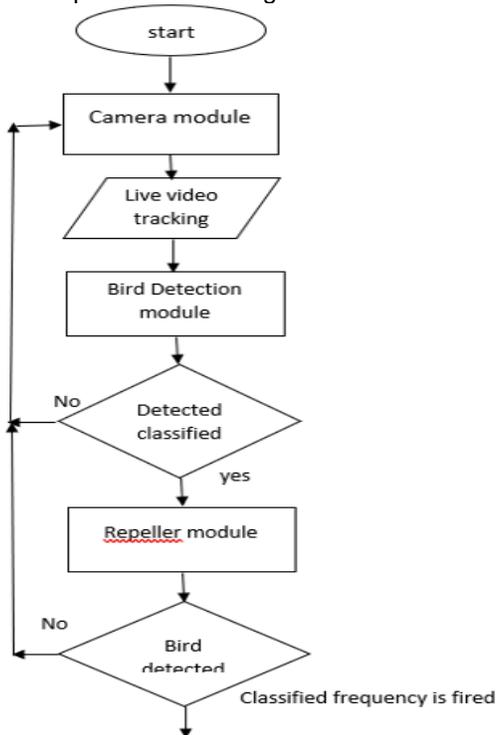

Fig 2. *Flow chart of model*

Fig 3: *360 degree rotating camera*

2.3 BIRD DETECTION MODULE :
• This module can be implemented with best training algorithm to detect birds of live
• We can also implement object detection code to classify and clustering the birds
• This can be implemented by the machine learning code to detect birds this can be implemented good by the data analyst
• If the bird founds and detected then the 3rd module gets activated

2.2 CAMERA MODULE :
• In this camera module camera acts as a human eye to the entire system and it takes the present situation of shooting the entire video
• In our aspect this camera want to cover in 360 degrees like a robot as pests can attack in all directions
• The 360 degree rotation of observing live data is speciality to detect birds in all directions
• The further process is continued by detection module

• This module gets runned under python open computer vision to detect birds based on the trained data set attached to it.
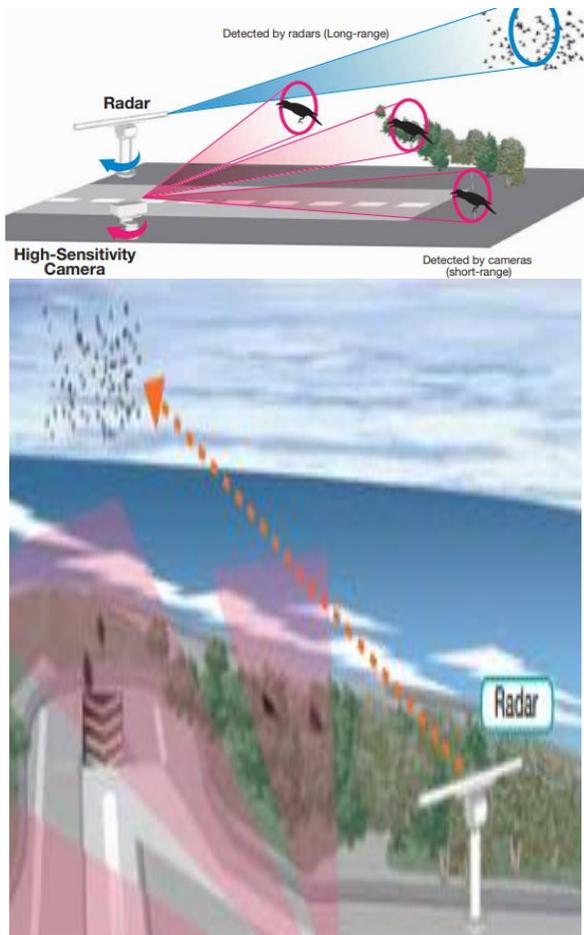
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Fig 4 : detecting birds from large distances

• Bird detection can be done through python algorithms like scipy ,scikit ,tensor flow algorithms used to train the data
• Keras , scipy -numpy ,tensor flow.

2.3.1 TENSOR FLOW :
Many of them among us wanted to do machine learning projects in python then This is a computational library function which is used to for new algorithms . tensors are suitable for n dimensional matrices used to represent the training data.All these plays a major role of machine learning algorithms which have been written in c and c++

Features of TENSORFLOW :
• This is mainly used for optimizing speed for different techniques to implement various operations
• It is flexible ,so that it can stand alone by itself
• This algoritham can be easily implemented and can be easily trained by the cpu and gpu for computing
• It offers pipelining for accurate and efficient sence that can train neural networks.
• Many of them among us uses this algorithm directly or indirectly like voice search and photos linked with google.
• This library is an open source library function that is ,it can be utilized and operated by any one as long as connected to internet .

2.3.2 SCIKIT :

it is one of the most important library used to work with complex data.it consists of several algorithms for implementing this data mining tasks mainly dimensionality and clasification of data ,clustering techniques we have used in our project.

Features of SCIKIT :
• It is most accurate regarding superbised learning model and the data is secured by unseen by algorithm itself
• This is used to identify features or important labelled data called feature extraction
• It consists of large speed algorithms which offers clustering,feature extraction of data in images
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2.3.3 PYTORCH :
It is used by developers as a large large machine learning library to perform dynamic computation and gradient analysis automatically and alsoit offers rich application programming interface for solving related to newral networks

Features of PYTORCH :
• It is very easy to use and flexible for speed ,optimisation and functionalities attached to runtime
• It is used in research and production aspects to perform peer – to peer communication techniques and also for asynchronous data collection operations.
• It is primarily used as a natural language processing in the stream of data analytics and for application oriented

2.3.4 SCIPY :
This library is mainly used by the graduates and researchers for optimization techniques like linear algebra , integration and statistics .and also for solving mathematical functions to solve basic data structure modules for various commonly used tasks in scientificprogeamming.this include calculus,algebra,and differential equations and also signal processing

Features of SCIPY :
• It provides all efficient numerical routines for specific sub modules
• It is a open source library function of python which can be utilised and used by any of us how long he connected to internet.

2.3.5 BOUNDING BOX :
It is usually o rectangular box that is used to locate objects in the target locations and it is determined by coordinates of x and y axis in both upper left and lower right corners as axis coordinates .it is a geomentrical approach of minimum or smallest bounding of variable size which completely shows object lie detection introduces in updating the prediction of bounding boxes using dimensional clusters and anchor boxes. Our network predicts 4 coordinates for each bounding box, kx,ky,kw,kh. If the grid cell is over limiting from the top left of the image by (cx,cy) and the bounding box has width and height pw,ph, then, the prediction results to:

$$Bx = \sigma(kx) + cx$$
$$By = \sigma(ky) + cy$$
$$Bw = pwekw$$
$$Bh = phekh$$

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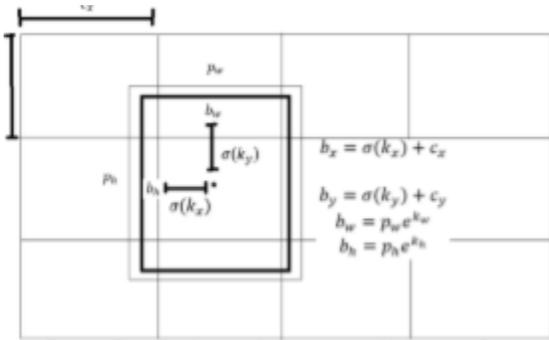
FIG 5: *this is the exact model of representing a bounding box in box classifier.*

2.3.6 FEATURE EXTRACTION :

Feature extraction is a Highlight extraction procedure of dimensionality decrease by which an underlying arrangement of crude information is diminished to increasingly reasonable gatherings for handling. A quality of these huge informational collections is an enormous number of factors that require a great deal of registering assets to process. Utilizing Regularization could unquestionably help lessen the danger of overfitting, yet utilizing rather Feature Extraction systems can likewise prompt different kinds of points of interest

Techniques of FEATUREEXTRACTION :
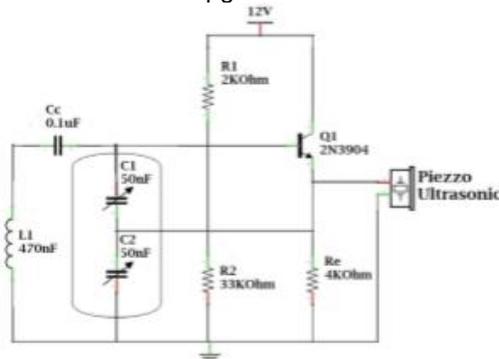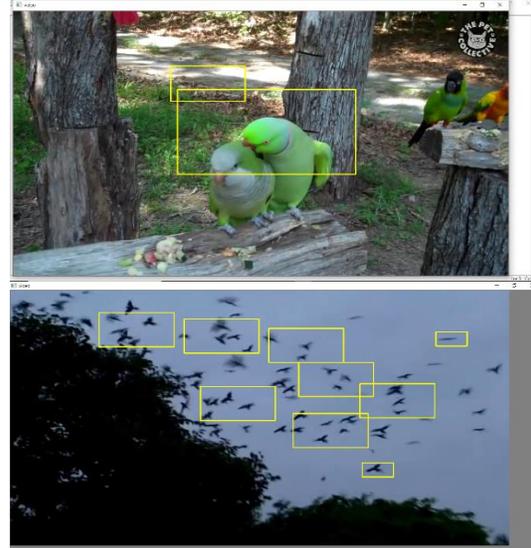
- Precision upgrades
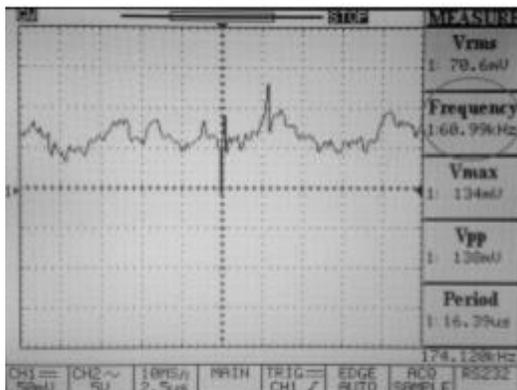

FIG 6: *circuit diagram of repeller*

FIG 7 : *frequency produced by designed circuit*

- Here it is the frequency produced by the designed circuit and verified by digital oscilloscope (DSO)

- Accelerate in preparing.
- Overfitting hazard decrease.
- Increment in reasonableness of our model.
- Improved Data Visualization.

2.4 REPELLER MODULE :

$$f_o = \frac{1}{2\pi \sqrt{L_1 \frac{c_1 c_2}{c_1 + c_2}}}$$

- Here it is the frequency produced by the designed circuit and verified by digital oscillo scop the given range to just get away the birds or pests from there
- The repeller has been designed with the help of LC Colpitts oscillator
- Here the repeller we used is a frequency repeller that produces ultra sonic sounds in
- Capacitences as 18uf and 320 uf.

3. RESULTS AND OBSERVATIONS :

FIG 8 : *Detection out comes*

Here in this model we have trained the dataset to detect the birds and further technique is to classify and clustering techniques and to fire the frequency respected to the detected bird.

4. CONCLUSION:

This model is designed to identify the birds and other related pests detection which in this paper have implemented using python tensor flow library based on the dataset we have trained further involves classifying and clustering of detected data which is fed to repeller , in this paper repeller is designed by a Colpitts LC oscillator circuit to produce frequency by changing capacitencies values.

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