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Animal Tracking and Alert System

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Abstract: ***The purpose of this system is to protect animals and human beings. The working of this project starts with when the IR sensor placed in our device that is Raspberry pi detects any animals moving around then enables camera and send the captured image to respective person. This project has its application in various fields like forest, farming, zoo and so on.***
Keywords: Animal Tracking with IOT, YOLO, Database image processing, Animal Alert.

I. INTRODUCTION

Ecology's main mission is to observe wild creatures in their natural habitats. Rapid, new, and significant changes to Earth's ecosystems are being brought about by the overexploitation of natural resources due to the rapidly increasing human population and the never-ending pursuit of economic progress. Human activity has altered a growing portion of the earth's surface, changing the population, habitat, and behaviour of wildlife. Therefore, keeping an eye on wild animals is crucial because it gives researchers data to use in conservation and management decisions that will help keep ecosystems diversified, balanced, and viable in the face of these changes. Forest area has been turned into human settlements as a result of the rapid growth in the human population. The wild creatures suffer from a lack of food and water as a result. However, because of deforestation, which compels them to enter human environments, wildlife is severely distressed. It causes severe losses to both lives and property. Over 1300 people have reportedly died in India over the last three years as a result of tiger and elephant attacks, according to the Times of India. Humans are thus in grave danger, and it will take a very long time for them to recover from their great loss. The connection between humans and animals has the potential to lead to crises for both species, which is why an intelligence monitoring and perceptive system is required. Conflict between humans and animals has escalated more than usual. Elephant habitat structure, weather, animal life, and other elements are among them. Forest fires are a significant risk that occasionally happens as a result of climatic changes, human activity, and other factors. There has been an ongoing rise in forest fires in recent years, which harms both humans and animals and crops. As a result, a network-based wireless sensor is employed to identify forest fires early and with high verdict accuracy. The method focuses on animal detection and uses alarm and GSM to transmit warning messages. The forest's humidity is monitored and maintained. Our work's primary goal is to warn local residents and keep them away from the forest's edges. Monitoring and controlling various activities is the main focus of technological developments. The necessity to meet human needs is becoming more and more important. The majority of this technology is primarily concerned with effectively controlling and monitoring various operations. To keep an eye on their enclosures and to ensure the safety of wild animals in zoological parks, an effective surveillance system is needed. There have been a lot of recent zoo park accidents with animals escaping from cages and harming other animals and visitors, as well as occasionally visitors accidentally walking into animal enclosures and risking their lives. Therefore, a system that can monitor such circumstances was devised in order to keep an eye on them and notify the caregivers when necessary. This technology is used for animal surveillance and security to identify intruders who enter the animal area as well as to determine whether any animals have fled or gone missing from their enclosure.

II. RELATED WORK

Sahana Banu created the "Efficient Face Recognition System" to identify people using their facial patterns for security. Joseph Redmon created the "YOLO V3" model, which is essentially image processing software for better analysis and identification. Michal Maj performed object recognition and image classification in 2018. Prof. Shahshi Rekha, G Harish Babu A, Manjunath S Kautilya K Bhat. [1] detection of particular animal species, the information generated by the tracker can be used to boost the priors in the probabilistic semantic classification of wildlife videos. Animals entering the agricultural areas placed near the forest destroy crops or even attack on people therefore there is a need of system which detects the animal presence and gives warning about that in the view of security purpose. Sk. Nayab Rasool, T. SR.CH.Murthy [2] designed a system that can monitor such conditions. This system is used for surveillance and security of animal to detect the intruder that entered the area of animals and also to detect if the animal escaped or missing from the enclosure.

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III. PROPOSED METHODOLOGY

Many animals in forested areas couldn't be tracked under the existing project's present system. A small number of animals leave the forest, which may result in their demise if they cross roads, etc. A small number of animals will not be in good condition because of a shortage of food and other factors. Many animals will perish since these conditions of the animals won't be known. As a result, there could be no global monitoring of animals or collection of animal data.

To protect people from animal's attack by alerting them. To protect animals from being injured from human. To protect animals from different disasters. A grid of cameras is set up in a forest or nature reserve at predetermined grid points. The raspberry pi module receives the collected photos as input. These images move through the various convolution neural network layers. The photos in the dataset's key identifying features are taught to CNN. When compared to the photographs in the dataset, each layer eliminates a potential result. The animal is finally identified, and if it turns out to be harmful, a warning is delivered to the control room through message, alert call, and email. An IR sensor is used to locate the animal and turn on the camera so that a picture of the wild animal can be taken.

IV. BLOCK DIAGRAM

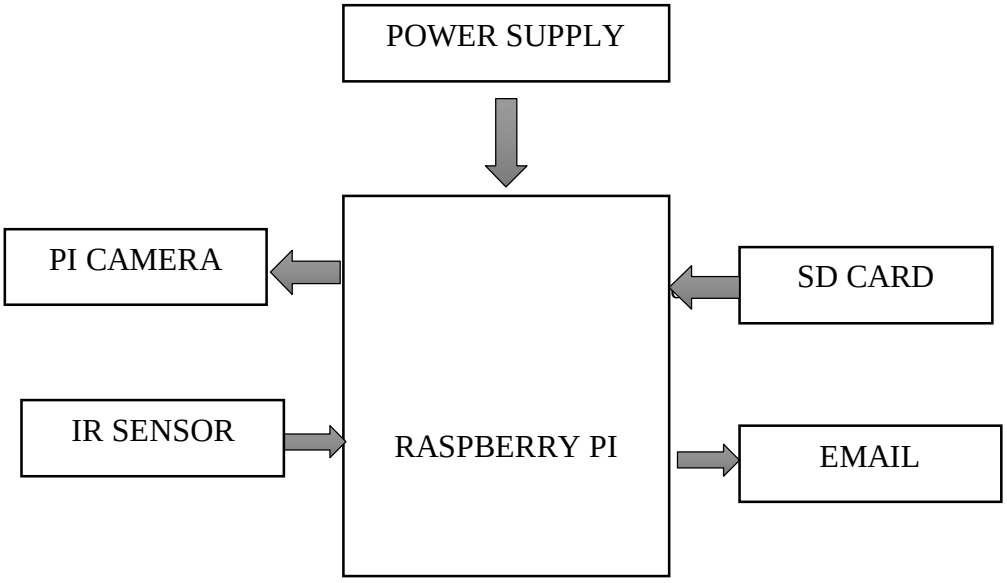


Fig. 1 Block diagram of the model

A raspberry pi is used as a microcontroller to control all the devices. Hardware used in this proposed project is raspberry pi 3b+ - microcontroller, IR sensor to detect any objects in the range, GSM module is used to send SMS to the control room saying that there is a wild animal which us been captured in the premises, pi camera – to record or to take snapshot of the animal. Initially once the power supply given to the microcontroller all the devices connected switches on and starts working according to the program written. Power supply is the basic requirement for any of the microcontroller. Without the power supply no microcontroller can be used. Each microcontroller has its own power ranges basically it may be from 3.3V to 12V it may differ in these ranges. The camera is attached to the device and the pi camera should be enabled in the raspberry pi only then the camera we used works perfectly with Raspberry Pi. Pi camera is mainly used to take snap shots or recording a video or live streaming a video it depends on the programmer how he wants the pi camera to be worked as. Raspberry pi is basically a mini-CPU where in normal CPU we have storage devices to store data in it, same the raspberry pi also works it needs a storage device to store data so an SD card is put in the raspberry pi. IR sensor is mainly used to detect animal presence in the range of the sensor. Once when IR sensor detects the animal then it captures image of the animals detected and sent to the control room using email or SMS with a notification that there is some animal found in the location.

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V. REQUIREMENTS

A. Hardware Requirements

1) Raspberry pi 3b+

Raspberry pi is a mini computer that can be used for various computing works. And this helps a lot when we talk about portability. Now adays lots of people have been working with this device and it is available at very cost effective. It works like a computer and it can be easily programmed . Various types of OS can be installed in this device. Like Raspbian OS , Ark OS, Windows 10 core IOT, and so on.



Fig.2 Raspberry pi

2) Pi camera

Pi camera is a portable hardware device that can be used with devices like Arduino board, raspberry pi, and many other device like Arduino, and some other devices. This is really useful when we talk about external camera to be attached with our device. The camera that we are using in our system is of 5MP and the range of this camera is around one square meter.

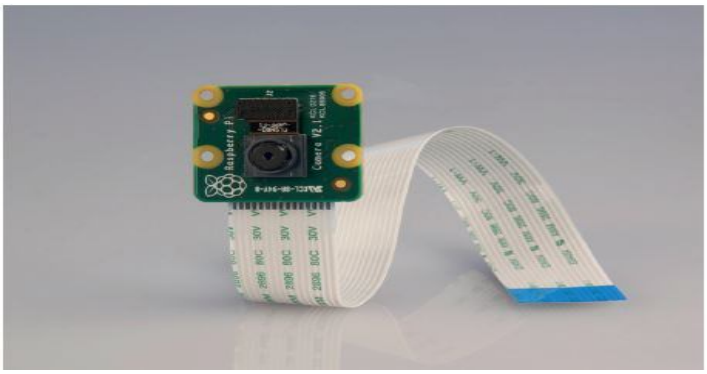


Fig.3 Pi Camera

3) Power Supply

Power supply is a hardware device that helps our system to operate. Basically, all computing device need power to execute and operate. So here power supply comes in picture. With the help of power supply our systems gets the power to operate. There are various types of power supply available in our market. Like AC to DC power supply, DC to AC power supply, and there are some advance power supplies that helps to protect from sudden short circuit. There are many powers supply that are attached with fuse and that fuse helps to adjust the electricity based on the available power volts.

The power delivery of power supply is not that much high but enough to run our system. Nowadays there are lots of available power supply at lower cost and some are based on solar system as well. However, the power supply that we use in our system are totally different from other power supply system. Like power banks are also one type of power supply for smart devices like mobile phones, and so on. The size of this types of power supply are not so big and these are really so portable. These power supplies are only DC. With the help of these types of power supply we can supply certain amount of electricity in forest and other non-developed areas.

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4) IR sensor

IR sensor stands for Infrared Sensor. It is an electrical device that is used for detecting objects in our surrounding by reflecting a infrared light. When that light hits some object then based on the reflection, it identifies the object. It is used in many components like controlling AC cooler, TV, etc. And the application of this device is also in IOT field for example we are using in our project to open our camera after detecting the animals around the device. This sensor ranges from 1m to around 10m of area. This makes really easy to optimize the detection process in many devices and area.



Fig. 4 IR sensor

B. Software Requirements

1) Python

2) Open C V

VI. METHODOLOGY

A raspberry pi is used as a microcontroller to control all the devices. Hardware used in this proposed project is raspberry pi 3b+ - microcontroller, IR sensor to detect any objects in the range, GSM module is used to send SMS to the control room telling that there is a wild animal which us been captured in the premises, pi camera – to record or to take snapshot of the animal. Initially once the power supply given to the microcontroller all the devices connected switches on and starts working according to the program written. Power supply is the basic requirement for any of the microcontroller. Without the power supply no microcontroller can be used. Each microcontroller has its own power ranges basically it may be from 3.3V to 12V it may differ in these ranges. Pi camera is connected to the raspberry pi device and the pi camera should be enabled in the raspberry pi only then the pi camera works in raspberry pi. Pi camera is mainly used to take snap shots or recording a video or live streaming a video it depends on the programmer how he wants the pi camera to be worked as. Raspberry pi is basically a mini-CPU where in normal CPU we have storage devices to store data in it, same the raspberry pi also works it needs a storage device to store data so an SD card is put in the raspberry pi. IR sensor is mainly used to detect animal presence in the range of the sensor. Once when IR sensor detects the animal it is been captured by the pi camera and is been sent to the control room using email or SMS with a notification that there is some animal found in the location.

As we know Power Supply is needed for any electronic Device. The Raspberry Pi 3B+ which is controller used in our Proposed System. The System will be programmed. The Pi Camera will be integrated to the Raspberry pi to take snapshots and video. An IR sensor will be used for sensing to activate camera automatically. An email with captured image of the detected object will be sent on the given email with location.

VII. FLOW CHART

The primary tool for this project's implementation is the Python programming language combined with deep learning methods. The kernel matrix will have the highest feature with regard to performing 3x3 image matrix formation in deep learning, which has several layers for higher analysis. Here, the image matrix formation is taken for further analysis, which is considered to be the input that brings the proper perspective view for the software algorithm to the better analysis, which is crucial in deeper analysis for CNN. Many open-source APIs are available on the internet today, such as Open CV, which can be used to perform image processing operations. Open CV will read the input image and generate specific details, so we must import specific libraries in order to carry out effective operations and provide the output.

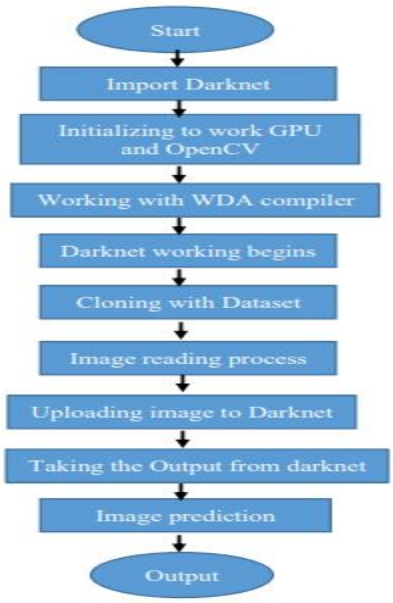


Fig. 5. Flow Chart Of Model

Initializing by the input fed to the software, using darknet, OpenCV, and a specific GPU that functions as a compiler, where the darknet works at the backend, analysing information from the dataset, where certain level of filtration, such as image segmentation and subtraction, is done using darknet at the backend, where the image is identified, where the output is displayed.

VIII. RESULTS

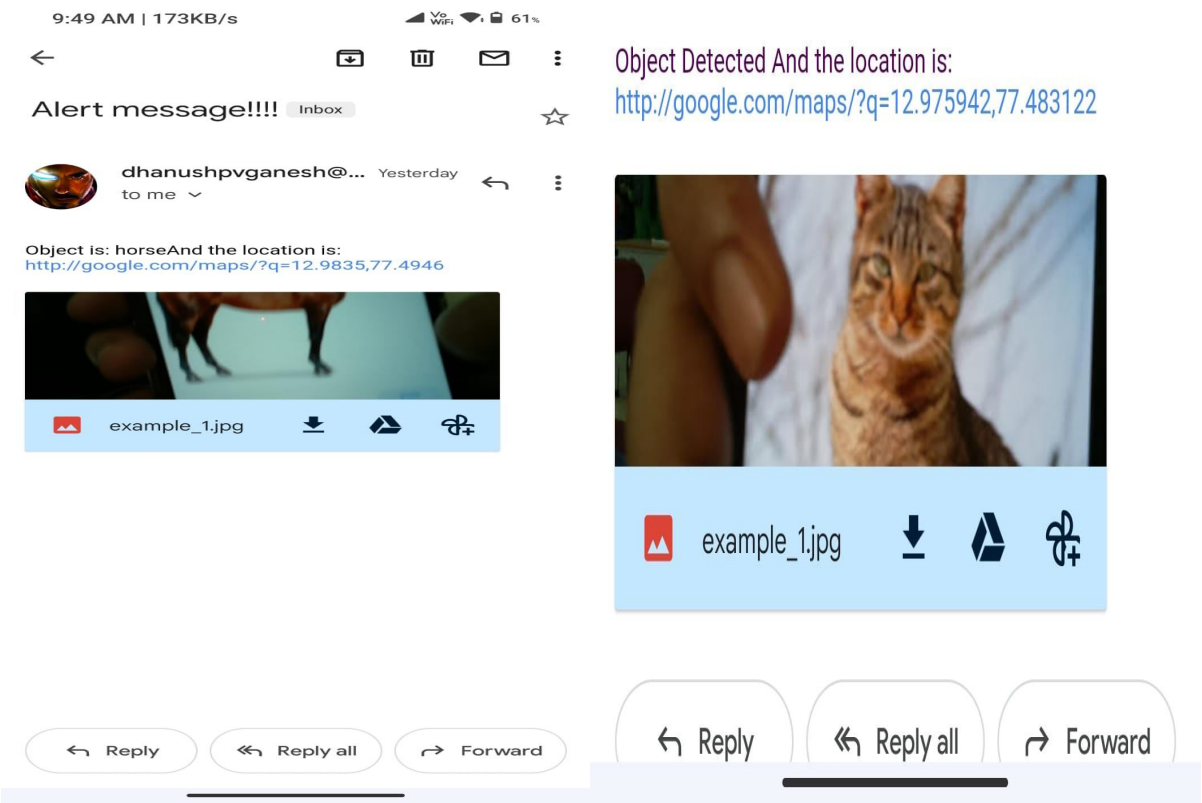


Fig. 6 Obtained Result

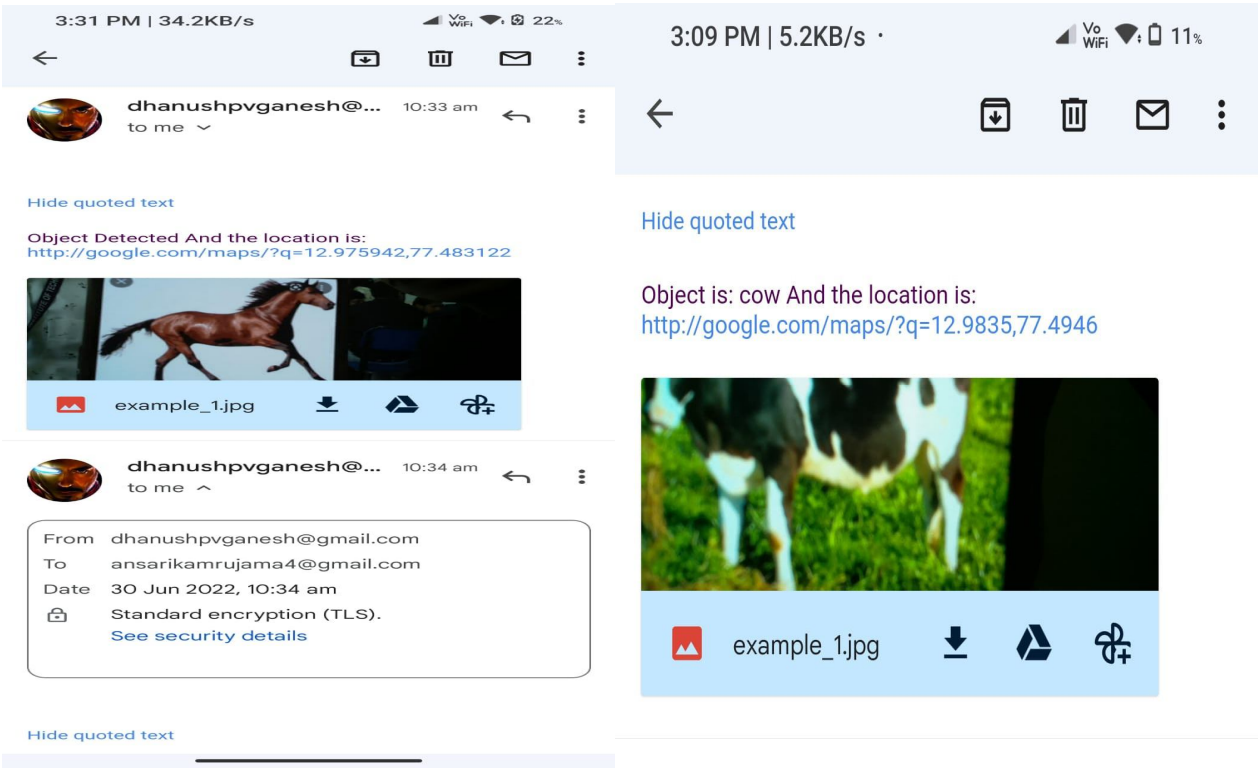


Fig. 7 Obtained Result

IX. CONCLUSION

Our system basically is designed to protect animals and also human being from being hurt by wild animals. But this project can be easily used for various other purpose like protecting farmers field from being damaged from animals of Forest. Our intension of this project is to do social service which is helpful for all human and animal mankind. Still in our project there are lots of things that need to be improved. We have seen many cases where many animals attacked human being and also many human beings killed many animals. So, we need a system to stop these types of cruel works. The investment in this project is also not that much. We can easily implement this in real world. We don't need a person to continuously monitor the area around the device as it will auto detect and notify the person by email and accurate location of the animal.

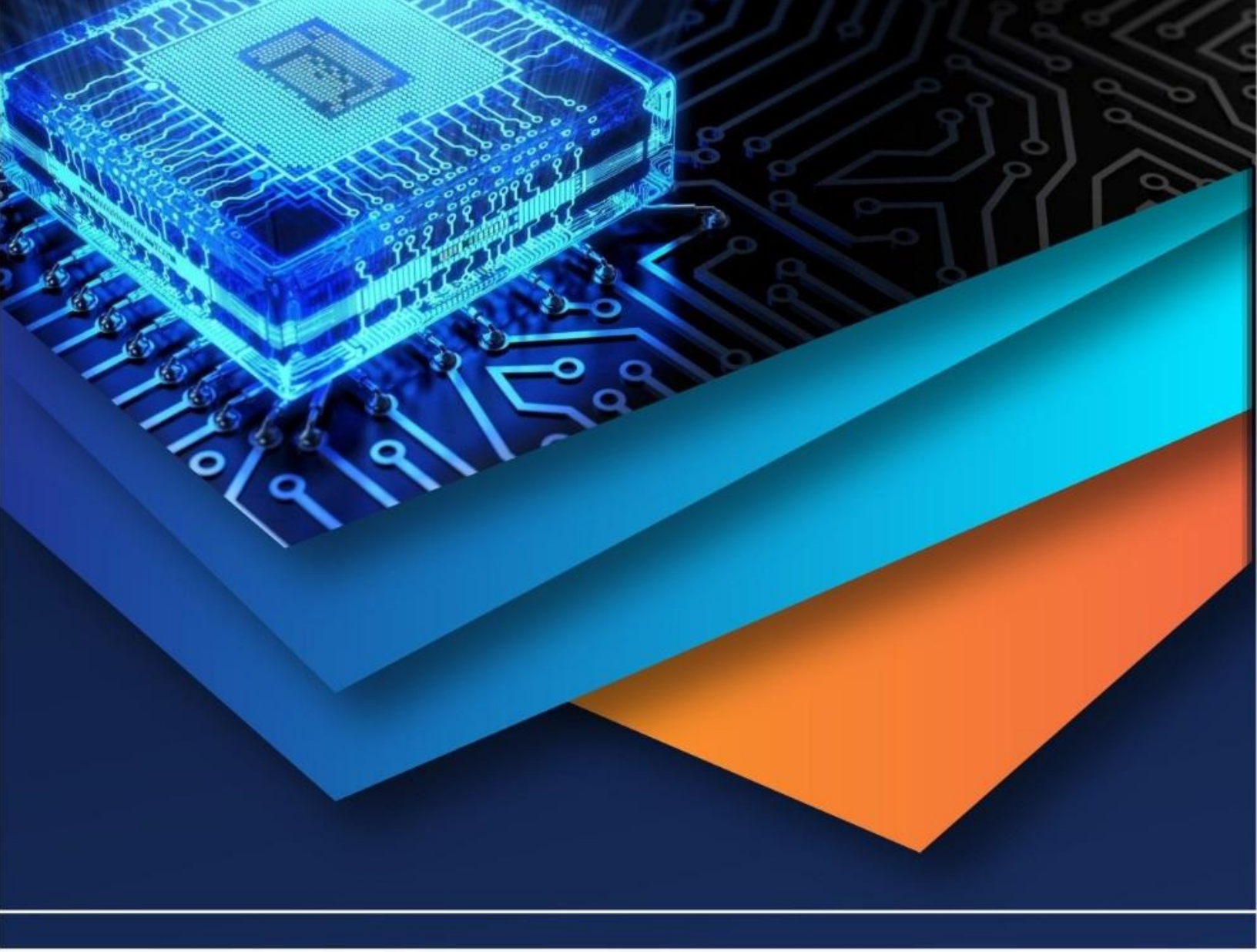
X. FUTURE ENHANCEMENT/ FUTURE WORK

As of now we have not implemented all our ideas regarding this model. However, in future we can do enhancement by adding more advance sensors for sensing the animals around us like ultrasonic sensors, drone cameras, more powerful system, animal's specific buzzer sounds for keeping the animals away from that area, more accurate dataset for identifying large amount of animals, sending mails animals category, sending alert calls along with mails by using GSM, and many more.

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