Animal Detection And Alerting System For Rural Areas(OpenCV)

1.INTRODUCTION:

1.1 OVERVIEW:

In the present day in our daily life, we all depend on the Internet for web browsing, e-mail, and peer-to-peer services to fulfill our needs. Today Internet of Things is increasing day-by-day in many aspects It is identified as one of the emerging techniques in the coming years as technology is turning towards the world of the internet and in smart living. The word Internet means Internetworking of things but IoT (Internet of Things) means a physical object that had a feature of Internet protocol address and that will make the communication between the object and other internet-enabled devices. Here to provide security between the communicating devices without any delay is the main important factor[1]. With the help of IOT and computer vision(open cv) we detect animals and human beings based on that we differentiate and generate an alerting system when animal is detected . Opencv means a library was built to provide a common infrastructure for computer vision applications and to accelerate the use of machine perception. In this project, various basic concepts used in object detection while making use of OpenCV library of python 2.7, improving the efficiency and accuracy of object detection are presented[2].

1.2 PURPOSE:

Applications built on detection of animals play a very vital role in providing solutions to various real-life problems. The base for most of the applications is the detection of animals is in the form of video or image. In India that is too in rural

areas people are mostly of low literacy and there is no smart living so when something occurs wrong takes some tome to take action, To provide more security to protect ourselves from animals, we done the project to make such a system here we use Face recognition and detection system for Authentication purposes. Today security place a key role which will be accomplished by using IOT. It has several features that connects humans to a next generation level in order to detect the animals, urban and rural areas are surrounded by cameras all over the region and can be monitored continuously .

2.LITERATURE REVIEW:

Smart objects play the central role in the IoT vision. Equipped with information and communication technology, these objects can store their context, they are networked together, they are able to access Internet services and they interact among themselves and with human beings [3]. Raspberry Pi is a small, powerful, cheap, hack able and education-oriented computer board introduced in 2012 . It operates in the same way as a standard PC, requiring a keyboard for command entry, a display unit and a power supply. This credit card-sized computer with many performances and affordable for 25-35$ is perfect platform for interfacing with many devices. The vast majority of the system's components – its central and graphics processing units, audio and communications hardware along with 256 MB (Model A) – 512 MB (Model B) memory chip, are built onto single component. The Raspberry Pi board contains essential (processor, graphics chip, program memory RAM) and other optional devices (various interfaces and connectors for peripherals). The processor of Raspberry Pi is a 32 bit, 700MHz System on a Chip, which is built on the ARM11 architecture and can be overclocked for more power [4]. Flash memory servers as a hard drive to Raspberry Pi's processor. The unit is powered via the micro USB connector while internet connectivity may be via an Ethernet/LAN cable or via an USB dongle (Wi-Fi connectivity) [5, 6]."face recognition is a very active area in the computer vision and biometric fields as it has been studied vigorously for 25 years and is finally producing applications in security, robotics, human-computer interfaces, digital cameras. Face recognition generally involves two stages: Face detection, where photo is searched to find any face then, image processing cleans up to the facial image for easier recognition. Face recognition when detected a face process data to the cloud and compared to a data to a known faces to detect whether animal or human[8,9]. Face recognition has been a strong field of research since the 1990's.but is a still far away from a

reliable method of user authentication more and more technics are been developed each year.[10].

2.1 EXISTING PROBLEM :

Countries like India have huge population in which half of the population lives in rural areas and villages are the backbone to the country. so we have to take care more care in terms of their security as they are aware of technology we have to implement which can be easily accessed by them. The main problem that exist in rural areas is animal collisions as the people of village or people near by forest are harmed by animals.so to avoid accidents are lose of their life we designed this system.

2.2 PROPOSED SOLUTION:

To avoid the above discussed problem we came up with an solution i.e., animal detection[11,12] and alerting system we designed this system very easily and one can easily understand and to get output one can need not to be make any connections just by installing one camera infront of house is enough. And the concept based on cloud computing ,IOT , OpenCv which is completely software based will generate the output[13]. If the people are unaware of this no need to worry we also used playing sound mechanism which will generate some noise so that people can easily understand and be cautious.

3.THEORITICAL ANALYSIS

3.1 BLOCK DIAGRAM

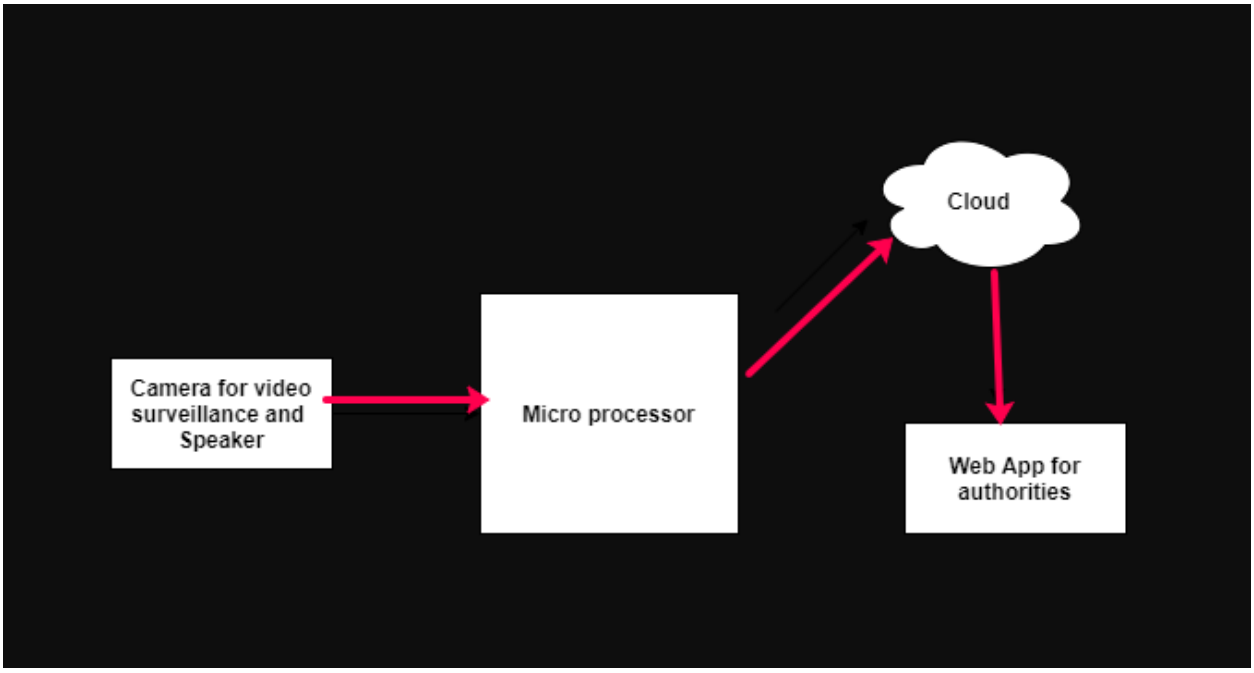


fig:1.1 Block diagram

Camera for video surveillance and speaker: Camera is used to catch the image of the animals and the speakers is used to send a notification .

Microprocessor: A **microprocessor** is an electronic component that is used by a computer to do its work. It is a central processing unit on a single integrated circuit chip containing millions of very small components including transistors, resistors, and diodes that work together.

Cloud: Information and data is stored on physical or virtual servers, which are maintained and controlled by a **cloud** computing provider, such as Amazon and their AWS product. As a personal or business **cloud** computing user, you access your stored information on the '**cloud**', via an Internet connection.

Web app for authorities: Security conscious organizations use SSL so their applications can validate the authenticity of servers and use encryption to secure the communication. IT administrators can create and sign an SSL certificate using their private CA to allow managed devices and applications to validate and access authorized private servers.

3.2 HARDWARE/SOFTWARE DESIGNING

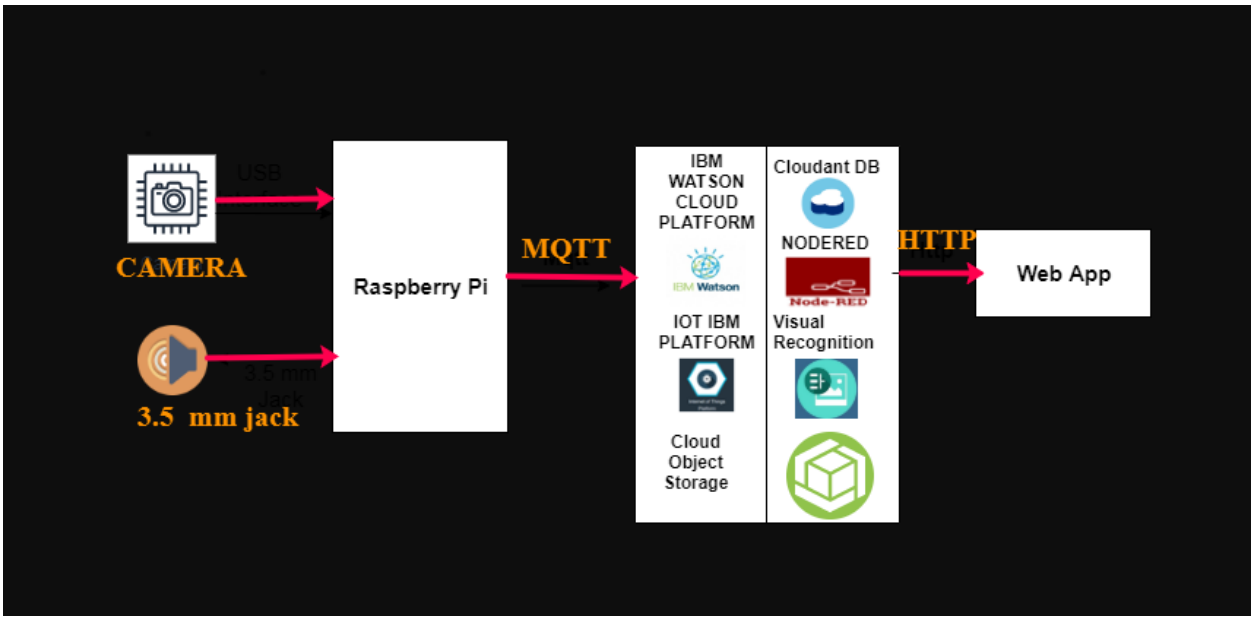


fig:1.2 Technical Architecture

The IBM cloud comes under the Platform as a Service [PaaS] and Infrastructure as a Service[IaaS]. The IBM IoT platform provides many services which can be used without any maintenance of servers and involves less complexity for the developers to build the code or launching any application. The IBM cloud is a public cloud so that the IoT platform can be used by any of the user who have a valid account in IBM cloud. We require IBM cloud because we need to store the data temporarily and display it to the user whenever it is required.

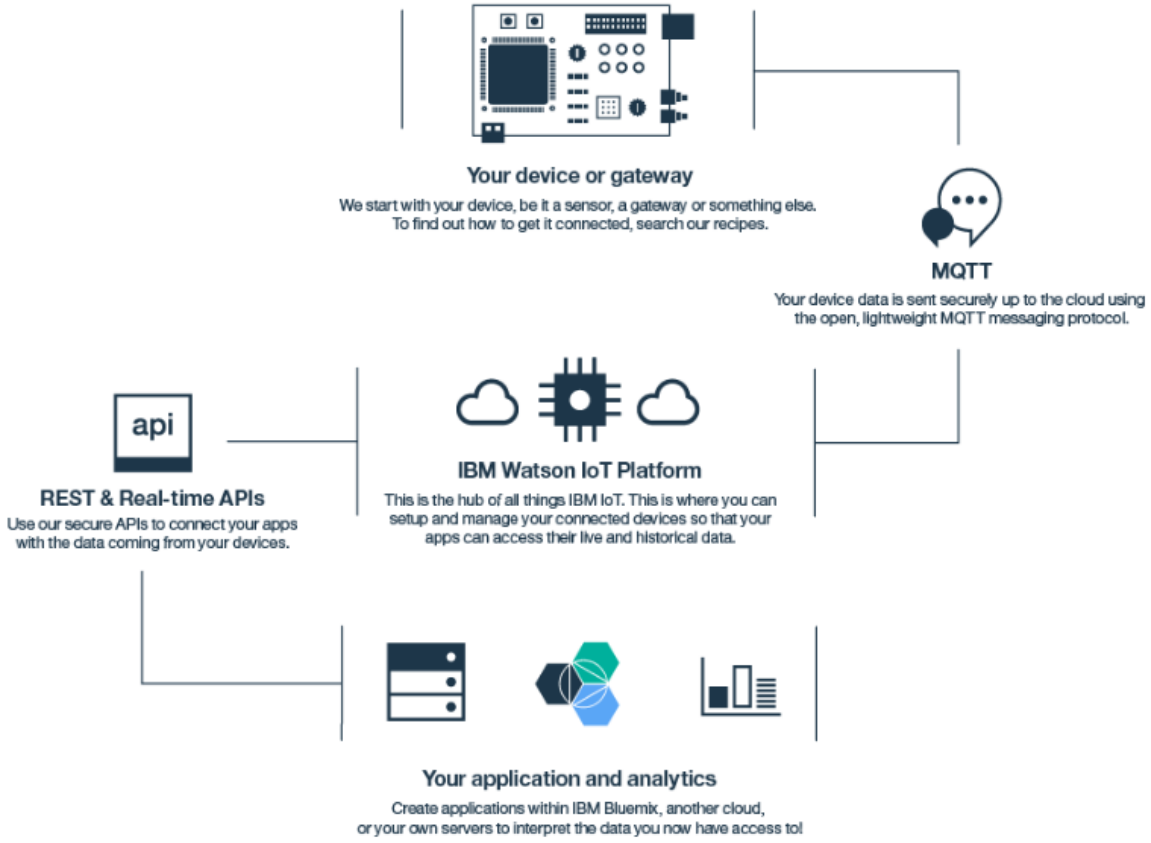


fig: 1.3 IBM IOT PLATFORM

The IBM IoT platform provides a lot of services like Visual Recognition, Text-to-Speech, Speech-to-text, cloudant dB, Node-RED and many more applications. Out of them in this project we are using the Visual Recognition service in which we train the model with two different set of images one class belonging to forest animals and the other belonging to human beings, so that it does not send any alerts when the human being is detected. It sends the alert only when it exactly makes sure that the animal detected is a forest animal with confidence score greater than 0.87.

The next important service we are using is Text-to-Speech service. It is used to send the alerts to the people whenever animal is detected or recognized. It converts the Text message fed as a parameter to it to the voice commands which is stored in

.mp3 format. Then by using play sound library it makes the voice commands whenever any forest animal is detected to make the people of rural area to be aware and cautious of it.

The cloudant dB is a database which stores the data in the json format[9]. The image which is recognized as forest animal will be uploaded into this data base and it stores them in the form of json as the Node-RED mainly deals with the data in json format only. The image of the forest animal is stored with its date and time when ever it is recognized in the bucket created in object storage service of IBM IoT. That .jpg files will be converted accordingly to json format by the cloudant dB so that the Node-RED platform can access the data more precisely.

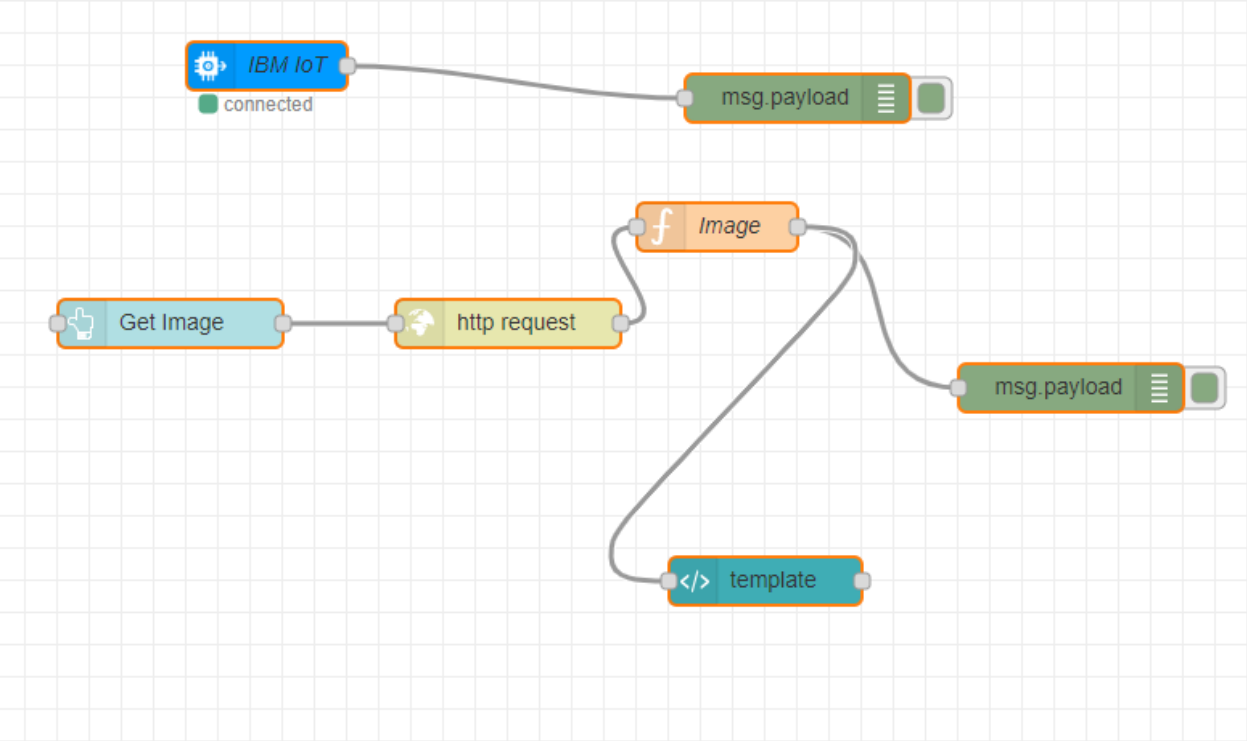


fig:1.4 Node-RED application

The most important and complex task in this project is developing a web application using Node-RED. The Node-RED application must retrieve the image of the animal detected by the Visual Recognition service of IBM IoT. In this application we must add nodes like IBM IoT in and debug node connected to it so

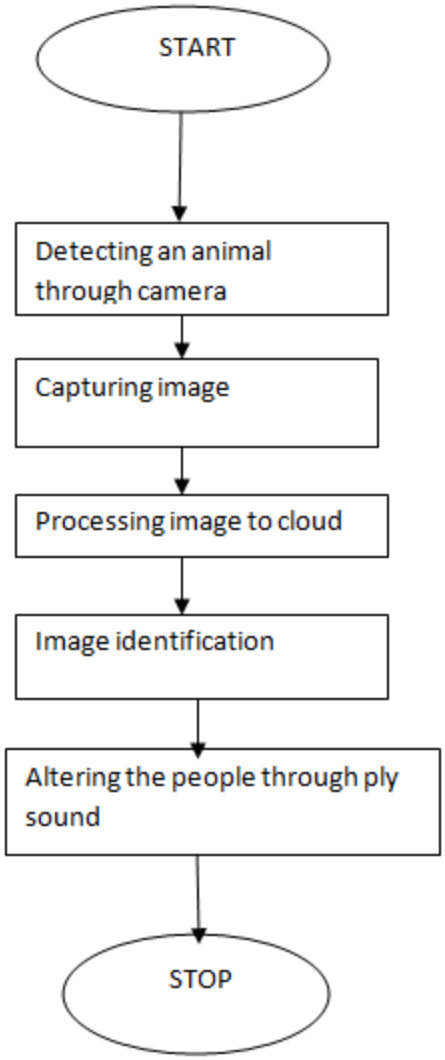
that the data send by the python code whenever an animal is detected will be visible to the forest authorities and they can also make the people aware of the animal.

Then in order to make it as a web application which displays the image of the corresponding animal recognized by the VR service and sent to the database, we must add the a button node, in order to get the image from the provided url whenever the button is clicked. Then we will add the HTTP in node so that it retrieves the data from the URL provided to it. It actually sends the HTTP requests to the URL and returns the response of that URL. Then we have a function node connected to the input of the image node so that it gives one image at a time from the response we get from the requested URL.The template node can be used to create a dynamic user interface element that changes its appearance based on the input message and can send back messages to node-RED. The debug node is added so that it can display the commands or data retrieved from the URL.It actually displays the link of the source where the image has been got from. By providing the cloudant dB URL which retrieves the data in json format to the HTTP IN node, we can obtain the image of the forest animal whenever we have clicked the get image button on the web application.

4.EXPERIMENTAL INVESTIGATIONS

There are several challenges should be done before doing any project. Here we observe challenges regarding IOT and the issues which is need to be understood in detail and employed for security purpose. Based on some situations we design a device for detecting an animal in which continuous monitoring of surroundings is need to be done because we don't know which animal comes from in which direction. For humans it is difficult to detect animal fastly in night time so by using OpenCv concept we identify and alert people. Here OpenCv concept plays a key role in experiment .

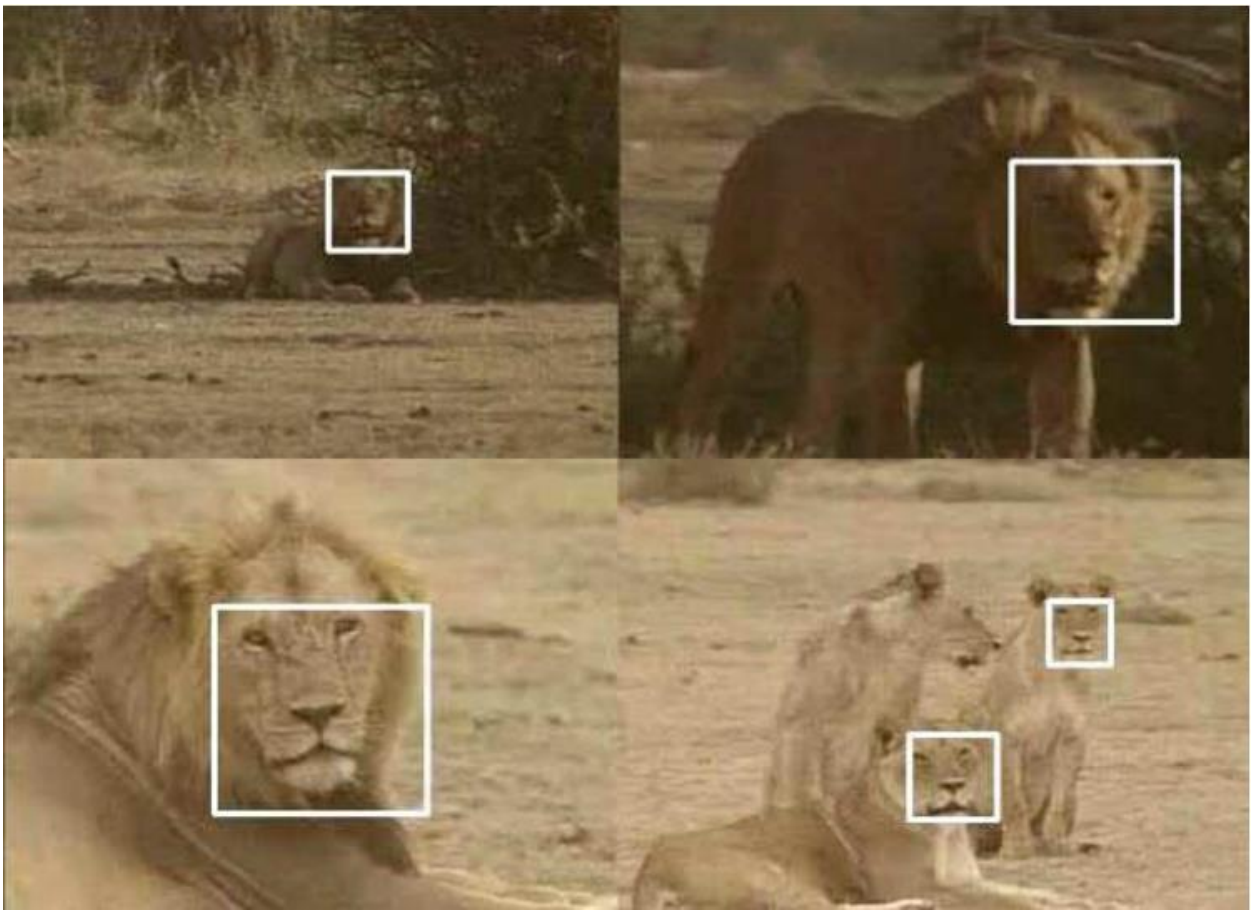
5.FLOWCHART



6.RESULT

The final result of the project produces an image which is captured when animal is detected and the image is stored in cloud it will detect in the form of frames which you will observe in the below figure. In this project we don't need to capture entire animal it captures any part of detected one and differentiate whether it is animal or human and generate alert according to the image identified by the cloud. It

produces a result with some sound also so that when people fall asleep they can wake up and alerted. Finally this project helps to both people and government as we can make with low cost which is affordable to buy.



7.ADVANTAGES AND DISADVANTAGES

ADVANTAGES :

- Alert signals to nearby authorities
- Makes some sound to alert villagers
- Provides security during night time when people sleep.
- Can detect animal even in different posture.

DISADVANTAGES:

- Can’t detect animals if they are very far.
- Night time detection somewhat to be developed more to achieve good output.
- can't capture image properly if the object is moving /running .
- If the device stops working properly it recognize humans as animals and vice versa which cause some disturbances.

8.APPLICATIONS

- This can be extended to driving system to alert drivers in order to reduce animal collisions.
- Wild life may be protected when they are out of forest by alerting to forest agency
- By using this technique we can protect crops from animals as India is mostly based on agriculture.

9.CONCLUSION

The process of identifying animals and alerting is being discussed in the report. As in rural parts of India is mostly of low security which may encounter severe threats such as damage done by animals to their life as well as their source of income. So to overcome this problem in this paper we addressed several challenging issues related to automatic animal detection in villages. so not only that in this project we have designed a system in which sound is also played to alert .An efficient automatic animal detection and an alert system can help villagers to be safe during nights. So it helps people in protecting from animals as the equipment used in this project is very less one can be affordable to buy it. From this it is concluded that the design system is very useful to the villagers. The design system will not be

dangerous to animasl and human beings, and it protects from damages that may cause by animals.

10.FUTURE SCOPE

In the future there may be large scope. This project is done based on cloud storage which is based on software for this we can also add notification part that is being send to mobiles which will help humans even when they are out of village . in this we work in capturing upto images that too when they are very near so it can be extended to in form of video and in long range also so that it helps in detecting animas in advance before occurring any damage.

This software application combined with hardware produce better result by making use of some sensors. if we work further on this in the case of road safety it saves many people life as some of the accidents occur due to animal collisions. so researchers working on this for better outcome .

11.BIBILOGRAPHY

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APPENDIX

A.SOURCE CODE

https://github.com/SmartPracticeschool/llSPS-INT-2529-Animal-detection-and-alerting-system-for-rural-areas-openCV-