

<b>1.</b>	<b>PROJECT REFERENCE NUMBER</b>	<b>46S_BE_5289</b>
<b>2.</b>	<b>TITLE OF THE PROJECT</b>	<b>DETECTION &amp; PREVENTION OF WILD ANIMALS IN FARM FIELD BY APPLICATION OF IOT.</b>
<b>3.</b>	<b>NAME OF THE COLLEGE</b>	<b>THE NATIONAL INSTITUTE OF ENGINEERING, MYSURU</b>
<b>4.</b>	<b>DEPARTMENT</b>	<b>MECHANICAL ENGINEERING.</b>
<b>5.</b>	<b>NAME OF THE STUDENTS</b>	<b>LIKHITH K S MUTHURAJU T S MONISH KUMAR K M PRASHASTH RAO</b>
<b>6.</b>	<b>NAME OF THE GUIDE</b>	<b>DR. SACHIN B</b>

**KEYWORDS:**

Iot , Raspberry Pi 4 , Speakers , Agriculture , Detection , Prevention , Webcam , Online Application , Harvesting , Farmers .

# CONTENTS

---

---

Details	Page No.
<b>Title table (information)</b> .....	<b>i</b>
<b>Keyword</b> .....	<b>i</b>
<b>Contents</b> .....	<b>2</b>
<b>CHAPTER 1 INTRODUCTION</b> .....	<b>3</b>
1.1 Introduction .....	3
1.2 Objective .....	4
<b>CHAPTER 2 WORK DONE EARLIER</b> .....	<b>5</b>
2.1 Work done earlier .....	5
<b>CHAPTER 3 METHODOLOGY</b> .....	<b>10</b>
3.1 Methodology .....	10
3.2 Flowchart .....	11
3.3 Materials .....	12
3.4 Expected outcome .....	12
<b>CHAPTER 4 CONCLUSION</b> .....	<b>13</b>
4.1 Conclusion .....	13
<b>REFERENCE</b> .....	<b>13</b>

# CHAPTER 1

## INTRODUCTION

### 1.1 Introduction

Due to over population it occurs a deforestation this results in shortage of food, water and shelter in forest areas. So, Animals interference in residential areas is increasing day by day which affects human life and property causes human animal conflict but as per nature's rule every living creature on this earth has important role in eco-system.

Agriculture is the backbone of the economy but because of animal interference in agricultural lands, there will be huge loss of crops. Elephants and other animals coming in to contact with humans, impact negatively in various means such as by depredation of crops, damaging grain stores, water supplies, houses and other assets, injuring and death of humans.



*Figure 2 Animals destroying harvesting crops*



*Figure 1 Forest vanishing due to over population*

Farmers in India face serious threats from pests, natural calamities & damage by animals resulting in lower yields Traditional methods followed by farmers are not that effective and it is not feasible to hire guards to keep an eye on crops and prevent wild animals. Since safety of both human and animal is equally vital. So, animal detection system is necessary in farm areas.

Farming IoT is a network of monitors, cameras, and computers that can all function together to help a farmer perform his job more effectively. This computer would be self-sufficient so that they will be able to interact with one another without the need for human intervention. To put it another way, the gadgets are pre-programmed with the knowledge of the moment and the motives for communicating with other instruments in the scheme.

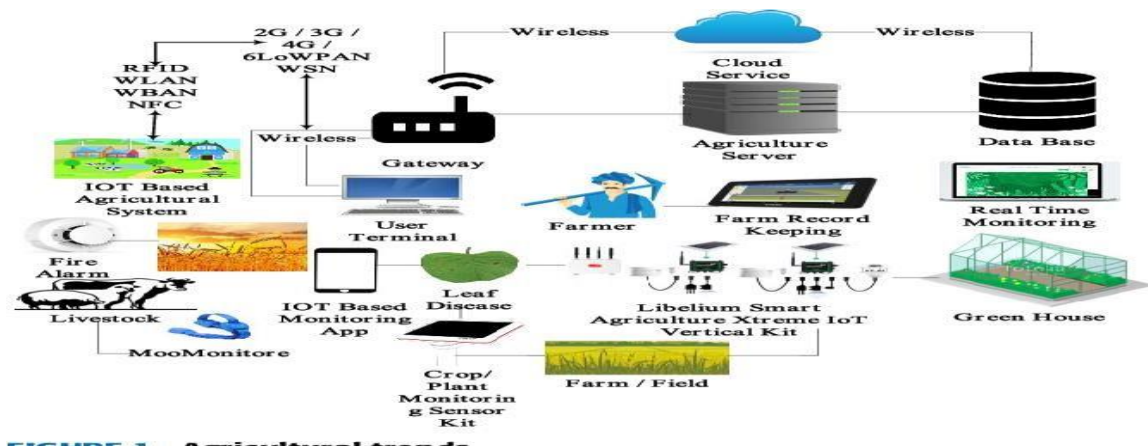


Figure 3 Uses of IOT in agriculture field

Several agricultural industries have switched to IoT engineering for smart farming to increase productivity, performance, global market, and other features such as minimal human interference, time, and cost, among others. The advancement in technology ensures that sensors are becoming smaller, more modern, and more affordable.

The answer to the challenges that this sector is currently experiencing is keen cultivation, which focuses on empowering advancement to agriculture. Much of this can be achieved with the aid of mobile phones and IoT gadgets. A farmer may obtain any need data or information, as well as monitor his agricultural field.

## 1.2 Objective

- ❖ To provide protection from the attacks of the wild animals and thus minimizing the probable crop loss to the farmer.
- ❖ As Indian economy mainly depends on the agriculture by using this kind of a technique we can increase the yield of production and also save the wild animals.
- ❖ If animals are detected, trigger the camera for capturing the photo.
- ❖ To play a repellent sound or high-volume noise, whenever the animal is detected, so the animal runs away.
- ❖ Send a SMS alert for the registered mobile number.
- ❖ Animal detection is done using YOLO object detection system which outperforms all the previous object detection algorithms due to its fast processing capability.
- ❖ Avoiding the usage of electric barriers and instead play a high-pitch repellent sound to scare away the wild animals whenever the animal is detected.

- ❖ There is no point of trenching in the present system which not only harm animals but also risk human lives. One more added feature is the image capture of people who are in the surroundings of the field.
- ❖ The system used here is economical to the farmer and also does not consumes more energy.

## CHAPTER 2 WORK DONE EARLIER

### 2.1 Work done earlier

- ❖ **Title** : Proposed a system using wireless sensor networks to detect the animals in the field.  
**Authors:** Varsha Bapat, Slavomir Matuska, Mansi Parikh and Mrinal Patel.

**Major Points:**

Animal detection using template matching algorithm to prevent animal-vehicle accidents. Histogram gradients of an image calculated and then converted into orientations. Later histograms calculated for these oriented gradients [1].

DISADVANTAGE: But sensor based solutions are costlier due to installing more sensors in the field increase the coverage and makes solution costlier.

- ❖ **Title** : Animal Detection.  
**Authors:** Karen, Norouzzadeh, Saleh, Hossny and Nahavandi, Willi.

**Major Points:**

In this study, VGG -16 is used as the base model to apply transfer learning. VGG – 16 is one of the best computer vision model architecture. CNN represents feedforward neural networks which consist of three layers namely, the convolutional layer, the pooling layer, and fully connected layers [2].

DISADVANTAGE: This takes training time and resource utilization, providing lower levels of accuracy. The amount of prediction is low.

- ❖ **Title** : Animal Prevention.  
**Authors:** Santiapillai, King Douglas-Hamilton and Vollrath, Jayantha.

**Major Points:**

Gunfire and firecrackers keep elephants away. Sometimes, pumpkins were filled with poison and explosives and kept them in the field for the elephants to eat. Buffalos normally move with many groups and the target on paddy, corn, mice, and some herbs. There are some methods such as making barriers using magnet tapes, monofilament threads. Commonly buffalos are scared of sudden lights and thunder sounds [3]. Moreover, usage of honeybees" noise, ultrasound, and sudden flashes are eco (Ecology) -friendly, and cost-effective.

DISADVANTAGE: The usage of the electric barrier is very efficient, but it harms the animals, and death may occur for animals and humans in this method.

❖ **Title** : Iot Based Crop Monitoring From Animals.

**Authors:** K.B. Pavan Kumar, T. Bhavitha, S. Karishma, M. Pavithra, M. Prashanth Kumar.

**Major Points:**

- i. The problem of wild animal attacks on crop fields i.e. crop vandalization is becoming a very common phenomenon in the state of Himachal Pradesh, Punjab, Haryana and many other states. These cause a lot of damage to crops either by running over them or eating them and vandalizing them completely. This leads to poor yield of crops. These animals attack on fruit orchards and destroy the flowerings and fruits.
- ii. A repelling and a monitoring system is provided to prevent potential damages in Agriculture from wild animal attack.
- iii. Electric fences and ordinary fences are used to protect the crops from wild animals. Man power is needed to protect the crop fields. It only sends message to the forest officer but not for the people living in land. Trenching/Digging land to some feets of depth around the fencing wire.

DISADVANTAGE: It may cause harm to human and pet animals due to electric fences. Due to trenching, not only animals but also humans may get affected by falling into it. There is no image capture of the people who are in the surroundings of the filed.

❖ **Title** : Impact of Internet of Things (IoT) in Smart Agriculture.  
**Authors:** O Vishali Priya, Dr R Sudha.

**Major Points:**

- i. One of the benefits of using IoT in agriculture is the increased adaptability of operations. Thanks to real-time monitoring and forecasting technologies, farmers can react quickly to any significant change in weather, humidity, air quality, or the condition of any crop or soil in the field. ii. As a result, smart agriculture is needed. The Internet of Things would assist in the development of smart agriculture.
- iii. IoT is used in various agricultural domains to improve time efficiency, water conservation, crop monitoring, soil management, bug spray and pesticide safety, and so on.

DISADVANTAGE: It also eliminates human labor, deconstructs agricultural methods, and creates a difference in smart farming implementation.

❖ **Title** : Smart Protection System To Manage Crop Vandalization Using Renewable Energy.

**Authors:** Mohini S. Lohakare, Subhash Y. Kamdi, Subroto Dutt.

**Major Points:**

- i. The Problem of wild animal attacks on crop field i.e. Crop vandalization is becoming a very common phenomenon nowadays. These attacks causes a lot of damage to crop either by running over them or eating them and vandalizing completely.
- ii. The proposed automatic crop protection system for farmer is less complex and cheaper Farm Watchman Machine (FWM) Protection system.
- iii. In order to prevent the crop vandalization by animals include building physical barriers, use of electric fences, fire crackles, and manual surveillance various such exhaustive and dangerous methods.
- iv. Once the animal or bird is detected, Speaker will be on and the recorded sound is played for Continuous mode at 15 second interval in between and because of Blynk App application installed on farmer mobile the message travels to the Blynk Cloud and farmer also operate hardware through this app.

❖ **Title** : IoT Based Animal Harm Detection using Sensors by Creating an Alert.

**Authors:** Indushree S V, Nandinishidevi H S, Navya V, Nikitha B M.

**Major Points:**

- i. The Proposed System is to explore the unknown is a longing desire of almost every individual and the most beautiful places always tend to call everyone. Trekking can be either done by a solo person or by groups of people. During trekking people may also explore different kind of Species which may be harmful to the human life.
- ii. In their proposed system, three applications have implemented. These are as follows:
  - Location Sensing
  - Habitual Movement Recognition
  - Health monitoringiii. Human animal conflict is a major problem where enormous amount of resources is lost and human life is in danger. The Wireless sensor network helps to detect the danger from the venomous reptiles. It alerts the concerned person about the danger by sending a message along with the location.

❖ **Title** : Smart Crop Protection System Against Wild Animals Using IoT.

**Authors:** Netra V Deshmukh, Dr Ravindra M Deshmukh, Praveen Likhitkar.

**Major Points:**

- i. The proposed monitoring scheme is to provide an early warning about possible intrusion and damage by wild animals.
- ii. This paper presents the development of Internet of Things application for crop protection to prevent animal intrusions in the crop field. A repelling and a monitoring

- system is provided to prevent potential damages in Agriculture, both from wild animal attacks. Based on the number of animals present, functions such as light or irritating sounds to run out the animals will be executed. iii. The problem of crop protection by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution.
- iv. In this project, we presented an integrative approach in the field of Internet of Things for smart Agriculture based on low power devices and open source systems.

❖ **Title** : IoT-based Wild Animal Intrusion Detection System.  
**Authors:** Prajna P,Soujanya B S,Divya M

**Major Points:**

- i. Objective of their project is to provide protection from the attacks of the wild animals and thus minimizing the probable loss to the farmer.
- ii. The Image Set is used to hold a collection of images. Index Image is used to create an image search index. Index Image is used with the retrieve Image function to search for images. The captured image is given as query image to the processing system.
- iii. 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.
- iv. 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.

❖ **Title** : Agricultural Field Protection from Wild Animal.  
**Authors:** Jitesh Kumar.

**Major Points:**

- i. This paper introduces the development of an Internet of Things crop protection framework for the prevention of animal intrusions in the field of crops. To avoid possible damage to agriculture from wild animal attacks a repelling and monitoring system is provided.
- ii. The use of electrified welded mesh fences, chemicals or organic substances and gas cannons are the latest methods used to tackle this problem. The use of balloons, shot/gas guns, string & stone, etc. is other typical methods applied by farmers. Sometimes, such solutions are cruel and unsuccessful. They often require a significant amount of installation and maintenance costs and some of the approaches impact both humans and animals with environmental emissions. iii. Chemical products used to avoid these animal attacks, on the other hand, have an application cost per hectare and their efficacy depends on the weather, because rain can cause a dilution effect. Technology assistance at various stages of agricultural processes will significantly enhance the crop yield. iv. The purpose of this work is to provide a system of repelling and monitoring against animal attacks and weather conditions for crop protection.



❖ **Title** : Animal Detection System in Farm Areas.

**Authors:** Vikhram B, Revathi B, Shanmugapriya R, Sowmiya S, Pragadeeswaran G

**Major Points:**

- i. Traditional electric fence has been helpful as a guard of crops. However, that system has some problems such as it cannot notify the voltage which occasionally drops. ii. The farmers are able to measure voltage at the fence, and have an ability to show it. The observers transmit the voltage with the direction of the voltage leak to the display.
- iii. From that it is concluded that the design system is very useful and affordable to the farmer. The design system will be slightly harmful to animal, and it protects farm.

DISADVANTAGE: Harmful to animals.

❖ **Title** : Warning System From Threat Of Wild Animals And Eco Balance Using Iot. **Authors:** Mrs Arthi L , Ms. Manushree L , Balaji B, SaranKumaar K, Hariharan S.

**Major Points:**

- i. We use latest advances in technology such as Internet of Things to create an alert system of possible wildlife leaving the forest and also the message will send to the users Mobile to alert them. We use low cost motion detectors and Passive Infrared sensors to achieve this.
- ii. This system can also be used to find out smugglers and people illegally entering in to the forest.
- iii. This system will put the Passive Infrared Sensor in the borders of the location area of the people, alert alarm system will put in the common place in which all peoples can hear, sensors which detect the motion of the animals will send the data to the operational centre and the alert system will activated by them in the centre and also the message will send to the mobile users.
- iv. The proposed solution for wildlife alert system is much cost-effective, reliable and provides technically simple solution. This approach believes that using various such IOT devices, an environmental balance can be achieved by protecting the wild animals from getting harmed.

❖ **Title** : Crop Protection and Animal Intrusion Detection System.

**Authors:** Thanuja S R, B Lekhana, Apoorva S, Bhavana R, Lakshmi Bhaskar

**Major Points:**

- ❖ The purpose is to prevent the damage of crops due to heavy rainfall and extreme weather conditions, rainwater harvesting, to protect the crops against animals, detect the intrusion of the animal and taking suitable actions and notification will be sent to the farm owner and forest officials using GSM. Our main aim is to detect and prevent wild animal attack on the farming lands, villages nearer the forest areas. ❖ The program consists of functions such as Index Image, Image Set and Retrieve Image. The Image Set is used to hold collection of images. Index Image is used to

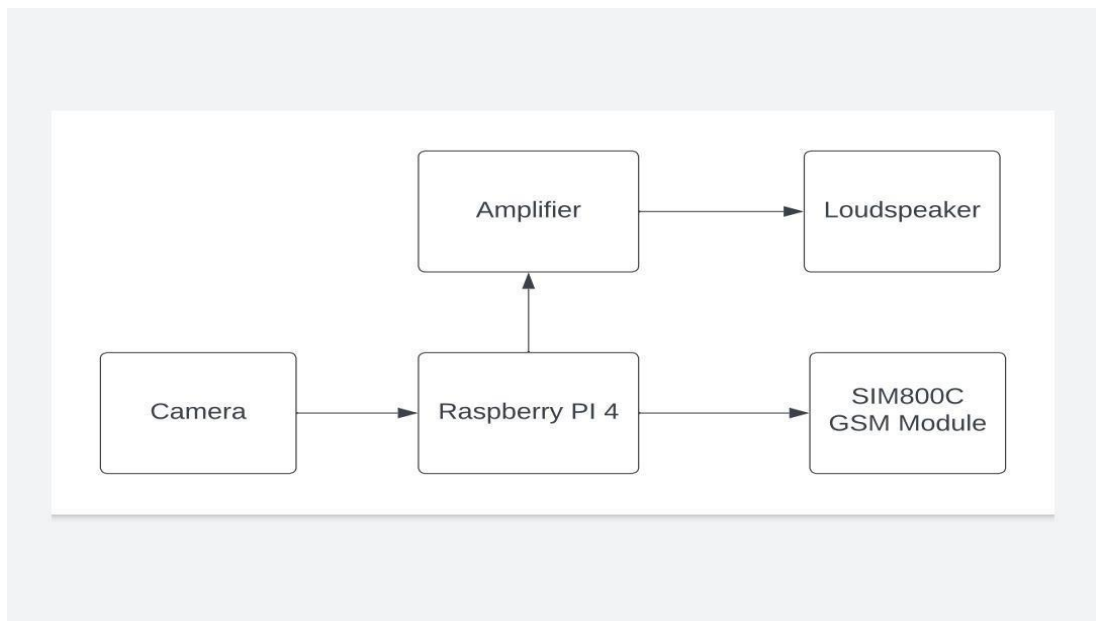
create an image search index. Index Image is used with the Retrieve Image function to search for images IR Sensors and camera act as first round of security where the animal movement is detected using the sensor and the sensor in turn triggers the camera to take the picture of the animal.

- ❖ 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.

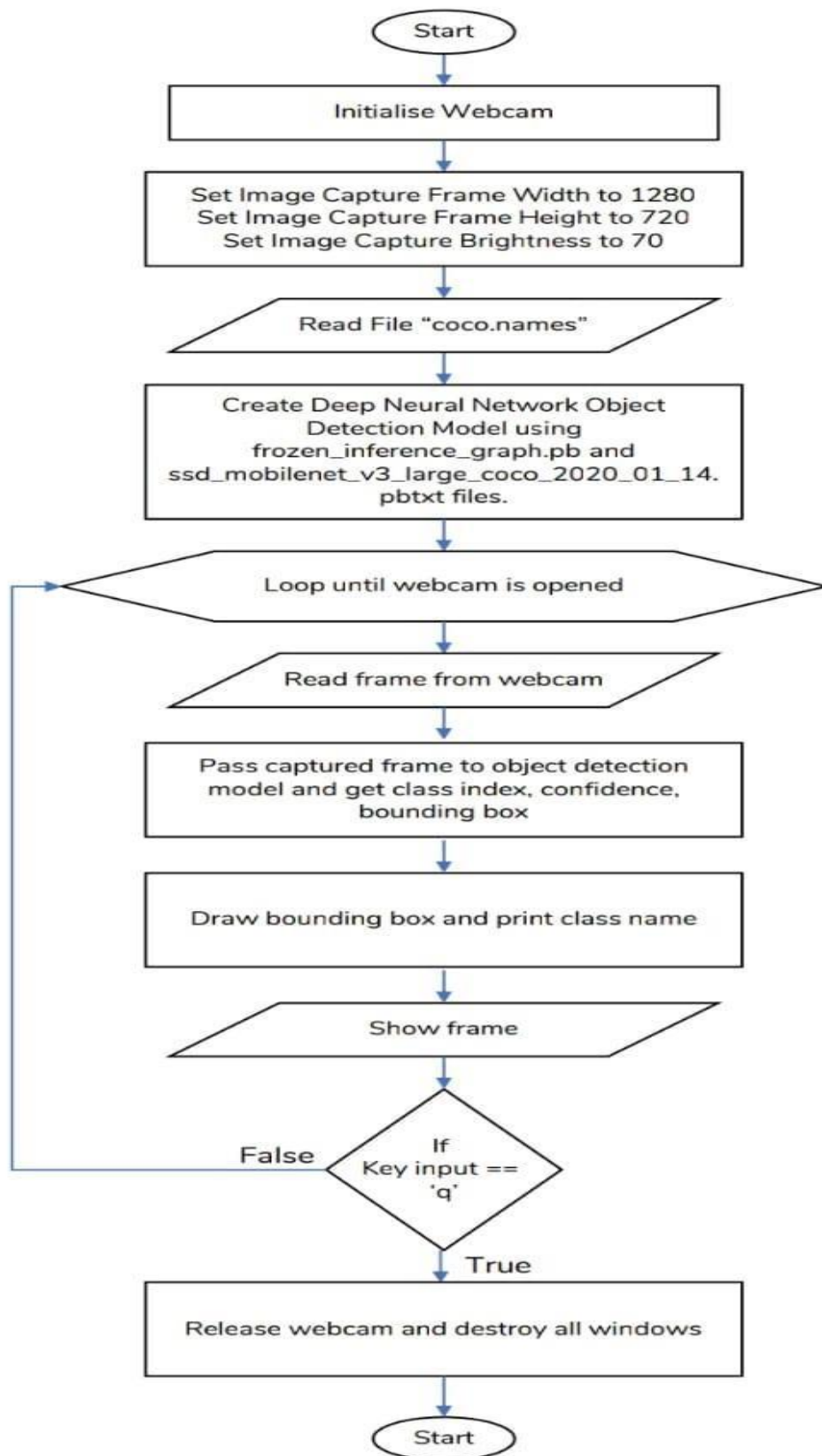
DISADVANTAGE: The system is HIGH cost and also consumes more energy.

## CHAPTER 3 METHODOLOGY

### 3.1 Methodology



## 3.2 Flowchart



- The Raspberry Pi captures a video image using the camera.
- Then using the Open CV module it cuts the video into frames.

- Using Open CV and other modules, it processes the image of detected species and maps it with a category and pre-trained detection model.
- Sending SMS through GSM module, to alert the user.
- Play a repellent sound or loud noise to scare away the animals.

### **3.3 Materials**

- I. Camera.
- II. Raspberry Pi 4.
- III. Amplifier.
- IV. Loud Speaker. V. SIM800C GSM Module.

### **3.4 Expected result**

- A large number of human-animal conflicts have been reported in the past, causing serious damage to the crop, downturn the economy, and mishap the lives of farmers and animals.
- We need to protect the crops from the animals, and to avoid harming the animals.
- When an animal entered the area where the IOT system was placed, it sent a trigger to the camera to capture the image.
- The captured image was sent to the classification model to predict the animal.
- Details of the animals will be sent to the farmer through the mobile application.
- ❖ Our findings indicated that the detection system provided an average accuracy of 77%.

# CHAPTER 4

## CONCLUSION

### 4.1 Conclusion

The problem of crop protection by wild animals has become a major social problem in the current time. It requires urgent attention and an effective solution. In this project, we presented an integrative approach in the field of Internet of Things for smart Agriculture based on low power devices and open source systems.

The main aim is to prevent the loss of crops and to protect the area from intruders and wild animals which pose a major threat to the agricultural areas. Also Save them from significant financial losses and will save them from the unproductive efforts that they endure for the protection their fields. This will also help them in achieving better crop yields thus leading to their economic wellbeing.

### 1. REFERENCES

- ❖ **Varsha Bapat, Slavomir Matuska, Mansi Parikh and Mrinal Patel** focuses on proposed a system using wireless sensor networks to detect the animals in the field. INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) ICRTT – 2018 (Volume 06 – Issue 15) (Accessed: 13 March 2020).
- ❖ **Santiapillai, King Douglas-Hamilton: and Vollrath**, A Case Study of Farm Protection from Wild Animal with Electric Barriers, 16(1), pp. 1–10. doi: 10.3126/njst. v16i1.14352.
- ❖ **K.B. Pavan Kumar, T. Bhavitha, S. Karishma, M. Pavithra, M. Prashanth Kumar**: Iot Based Crop Monitoring from Animals. 2020, International Journal for Research in Applied Science and Engineering Technology IJRASET.
- ❖ **Mohini S. Lohakare, Subhash Y. Kamdi, Subroto Dutt**: Smart Protection System to Manage Crop Vandalization Using Renewable Energy. International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.9, Issue 3, page no.f576-f581, March-2022, Available :<http://www.jetir.org/papers/JETIR2203572.pdf>.
- ❖ **Indushree S V, Nandinisridevi H S, Navya V, Nikitha B M**, 2019, IoT Based Animal Harm Detection using Sensors by Creating an Alert, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) NCRACES – 2019 (Volume 7, Issue 10). 17

- ❖ **Netra V Deshmukh, Dr Ravindra M Deshmukh ,Praveen Likhitkar:** SMART CROP PROTECTION SYSTEM AGAINST WILD ANIMALS USING IOT", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.8, Issue 7, page no.g126-g129, July-2021, Available :<http://www.jetir.org/papers/JETIR2107749.pdf>.
- ❖ **Prajna. P, Soujanya B.S, Mrs. Divya.** IoT-based Wild Animal Intrusion Detection System, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) ICRTT – 2018 (Volume 06 – Issue 15).
- ❖ **Jitesh Kumar:** Agricultural Field Protection from Wild Animal, International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.5, Issue 10, page no.206-208, October-2018, Available :<http://www.jetir.org/papers/JETIREY06044.pdf>.
- ❖ **Vikhram B, Revathi B, Shanmugapriya R, Sowmiya S, Pragadeeswaran G.** A Animal Detection System in Farm Areas, INTERNATIONAL JOURNAL OF ENGINEERING RESEARCH & TECHNOLOGY (IJERT) Volume 09, Issue 05 (May 2020).
- ❖ **Thanuja S R, B Lekhana, Apoorva S, Bhavana R, Lakshmi Bhaskar.** "Crop Protection and Animal Intrusion Detection System", International Journal of Emerging Technologies and Innovative Research (www.jetir.org), ISSN:2349-5162, Vol.7, Issue 7, page no.770-774, July-2020, Available :<http://www.jetir.org/papers/JETIR2007094.pdf>