International Journal of Future Generation Communication and Networking
Vol. 14, No. 1, (2021), pp. 3693–3702

# Crop Fortification Method by Smart IoT Based Smart Agriculture Protection System

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## ABSTRACT

Agriculture is the fundamental part in the improvement of horticultural nation. In India around 70% of masses depends on developing and 33% of the nation's capital starts from developing. In this paper we are giving a successful answer for agriculturists..

Without any human interpretation the warding off the animals over their crop fields and orchards can be controlled,and the protection of the crop fields is done by using some consequently controlled ultrasonic creature repellent ringers, IR Sensor and Raspberry pi this system is been used.

It will likewise empower them to remotely screen their fields from wherever, in this manner taking out the need of physical nearness of a man in the fields .

Raspberry pi goes about as the mind of the framework. Its work is to deal with every one of the parts of the framework. It is in charge of the preparing the video nourish from the camera and programmed exchanging of the ringers. It will likewise empower the ranchers to screen their fields remotely.

An IR sensor is used to environment We are proposing a system which is based on the Internet of Things to protect the crops from animals.

IR Sensor, which continuously works in the fields for any animal activities.This component is assisted with the camers which provides higher accurate levels. If the camera fails this IR sensor acts as the backup .It provides a message alert system to the owner when animals entered in to the farms.
**Keywords**:Agriculture,IOT,IRsensor, Embedded systems

## 1. INTRODUCTION

The main objective of the paper is to protect the crops by using IOT[2][3] For that we designed a project smart crop protection system. By using this paper the problems what our farmers are facing by the attack of the wild animals on to the farms are been eliminated. Whenever animal attack on their field's automatically the system captures the image send to the farmer.

The problems which are been faced by attack of the wild animals on to the agriculture fields i.e.farms damage is been a very big problem in many of the states,such as himachal pradesh,haryana,Punjab and many more states.The crop vandalization is caused mainly by eating off the flowers,plants and fruits of the farm and also by running over the farms.This is been done mostly by the animals like elephants,wild pigs,mainly cows and buffalo's.The birds also cause a lot of harm to the crop fields by eating all the seeds and all.It results to low yield of the crop.The attack of all these wild animals on the fruit and flower farms demolish all the fruits and flowers pf the plants.All these cases may results in lot of loss to their work and also to their financial status of the farmers and

ISSN: 2233-7857 IJFGCN
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the crop field owners who works on these fields day and night for months.Due to this terrific trouble caused by the animals the farms leave the fields.

When IOT[2][3] is expanded with sensors and actuators, the development transforms into an event of the more wide class of digital physical systems.

The main controlling part of the project isARM-11 Processor, all the module IR Sensor, GSM, Camera, SD Card interfaced to the processor. Whenever any animal entered into the crop IR Sensor detects the animal that will be read by the processor, on that time camera captures the image. The system gives an email alert by sending image of the crop. GSM module alerts the farmer by sending messages.

### 1.1 Methods of Warding off the animals

We have three methods for warding off the animals:

#### 1.1.1 Manual Method:

In India the manual method is the regular method that is used mostly.when ever the animal enters in to fields then owner is going to warding the animals from fields. But here to ward off the animals specially there should be a human intervention is needed.

#### 1.1.2 Automatic Method:

Unlike manual method, it does not use any human. Instead of human, machine is going to detect the obstacle which is going to enter in to the fields.

**Fig.1.1.1 Automatic System**

#### 1.1.3. Surveillance of Electronic System:

This system helps in monitoring their fields from their remote places with out any physical presence of the farmer or the owner of the field.By using some electrical devices which makes lot of sounds like ultrasonic buzzers,hoots warding off the animals over the fields can be protected with out the presence of the farmers.


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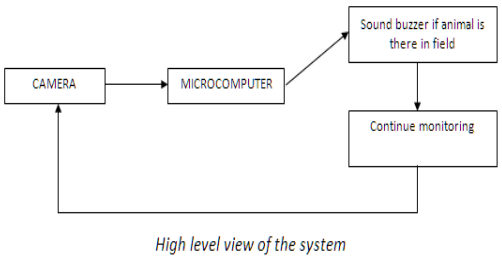


**Fig 1.1.2 Block Diagram**

## 1.2 Embedded Systems:

Theembedded system[4][5][6] is particularly designed to do various tasks such as to control and store data in various electronic systems,to process the task and for accessing.It is the combination of both software and hardware.where as in software this system is known as firmware where it is been embedded into hardware.The main important characterize of this is,that it gives the output in few limits of time.This embedded system supports to do work more perfectly and flexibly .Now a days we are using this system both for complex and simple devices also.We are using the applications of embedded systems in our real life,like we use in devices like microwaves,calculators, Television remote control,traffic control systems etc…

Embedded systems having cameras,displays to detect and control units and these are controlled by the Embedded Systems

## 1.3 Micro controllers:

Micro Controller is a small chip that contains I/O and CPU which is suitable for Embedded Systems.[6][7]

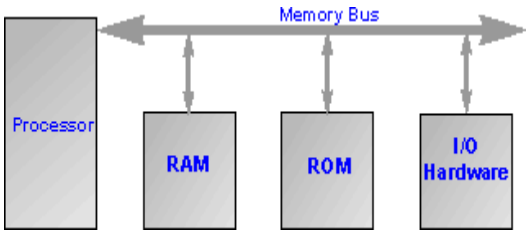


**Fig 1.3.Basic embedded micro-controller system contains the CPU, RAM, ROM, & IO**

As micro controllers are mainly used for low power and low processing applications .Micro-controllers have both the input and output ports where the external devices will be connected.For storing the data and the processed values ,it has its memory i.e.ROM and RAM. At the other end of the scale some MCUs may need much higher levels of performance and may have very much higher clock speeds and power consumption.

In embedded applications their is the major use of the micro-controllers. So,it is very much used in ESS.

1. Detecting the person or any obstacle that entering in to fields .
2. Sending this data to owner through message alert system.
3. Sense and receive the signals from the IR receivers**.**


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4. Sending of the signals to the controller, tooperate the system and then it going to send message to ward of the animals from fields.

### 1.4 IR Sensor Detection:

IR technology addresses a large varieties of wireless applications. The major areas where we use this IR technology is sensing and remote controls.
IR is mainly divided into 3 spectral regions:near,far and mid infrared regions in the electromagnetic spectrum.

### 1.4.1 Working of IR Sensor:

When the animal arrives at the field, the IR sensor detects it and it is going to send signal to Raspberry pi. It controls all process and it sends message to the owner.

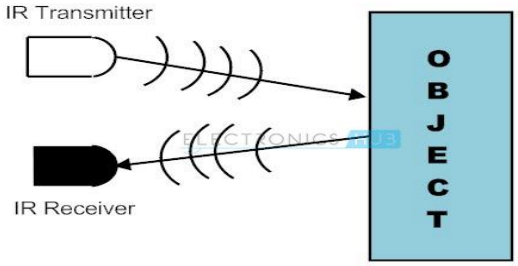


**Fig. 1.4.1 IR Sensor**

## 2. LITERATURE SURVEY

The problems which are been faced by attack of the wild animals on to the agriculture fields i.e.farms damage is been a very big problem in many of the states,such as himachal pradesh,haryana,Punjab and many more states.The crop vandalization is caused mainly by eating off the flowers,plants and fruits of the farm and also by running over the farms[1].This is been done mostly by the animals like elephants,wild pigs,mainly cows and buffalo's.The birds also cause a lot of harm to the crop fields by eating all the seeds and all.It results to low yield of the crop.The attack of all these wild animals on the fruit and flower farms demolish all the fruits and flowers pf the plants.All these cases may results in lot of loss to their work and also to their financial status of the farmers and the crop field owners who works on these fields day and night for months.Due to this terrific trouble caused by the animals the farms leave the fields.[1]

Especially the disaster or harm to the fields caused by the animals like monkeys mainly in the states like Himachal Pradesh.
A very much financial loss is been caused to the farmers by the harm caused to the crop fields by the wild animals .Mostly this is caused by the group of monkeys attacking in places like punjab and himachal pradesh as these are the boarded states.This is same in some of the places like shimal,where this place is famous for apple fields.


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## 3. PROBLEM IDENTIFICATION

### 3.1 EXISTING SYSTEM :

#### 3.1.1.Electric fences all around the crop fields:

Because of the insufferable misfortune to the farmers,farmers chose to set up electric fences all around their harvest fields. This is an exceptionally hazardous thing and illicit activity. This makes wounds creatures and prompts human causalities because of risks.. Wastage of electric power is all their.

#### 3.1.2 Manual surveillance method :

A large portion of the Farmers fall back on manual reconnaissance technique for their harvest fields..For thief they hire the workers to watch their fields all the day and nights,which is most expensive as they need to pay to them.

#### 3.1.3ELECTRONIC SURVEILLANCE SYSTEM

The existing System is totally based on the ELECTRONIC SURVEILLANCE SYSTEM.

It provides the buzzer sound to the animals but it won't provide any message alert to the owner.

### 3.2 PROPOSED SYSTEM :

This structure will enable the agriculturists to guarantee their fields and ranches viably, with no human mediation, by evading the animals with consequently controlled ultrasonic animal anti-agents, by avoiding the creatures with automatically controlled ultrasonic creature repellent buzzers. It will likewise empower them to remotely screen their fields from wherever, thus eliminating the need of physical presence of a man in the fields.

The IR Sensor and the other components are connected to the Raspberry pi which is turned on 24×7 for the entire day. IR sensor alwaysworks in thecrop fields and provides count tothe Raspberry pi.

Raspberry pi as the mind of the framework, the Raspberry pi ceaselessly checks for the movement in the field or plantation. Whenever animal enter into the crop IR Sensor detects the animal that will be read by the processor, on that time camera captures the image. The system gives an email alert by sending image of the crop. GSM module alerts the farmer by sending messages. Otherwise the person should go through the manual process.


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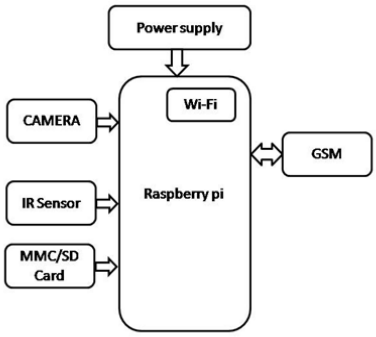
# 4. System Design




## 4.1 ARCHITECTURE DESIGN :

**Fig 4.1 BLOCK DIAGRAM**

**Fig 4.2 PROPOSED SYSTEM**

**Connection Explanation:**

- IR Sensor is associated with the raspberry pi 3 GPIO ping 3 and 5
- Adapter is associated with the raspberry pi 3 in the power input port
- Install OS in the SD card.
- Connect GSM module to Raspberry pi.

**NOTE:**

In the above connection

- Red wire demonstrates output.
- Dark wire demonstrates ground .
- Dark colored wire demonstrates power supply.

## 4.2. MODULE DESCRIPTION

In the proposed system we have two modules

- System Module
- Administrator Module.

**SYSTEM MODULE :**

On the off chance that any sort of movement is distinguished in the field**,** the Raspberry pi checks for the nearness of creatures in the picture. Whenever animals entered into the crop IR Sensor detects the animal that will be read by the processor, on that time camera captures the image. The system gives an email alert by sending image of the crop. GSM module alerts the farmer by sending messages. Otherwise the person should go through the manual process.

**ADMINISTRATOR MODULE:**

In this module IR sensor detects the obstacle and sends signal to Raspberry Pi . The processor will process the system and It sends message to owner. By seeing that message the owner will get reacted. The he immediately warding the animals.

## 5. IMPLEMENTATION

### 5.1 FUNCTIONALITY DESCRIPTION Description of Module:

IOT BASED SMART AGRICULTURE PROTECTION SYSTEM and interfacing of ARM-11 microprocessor is considered.

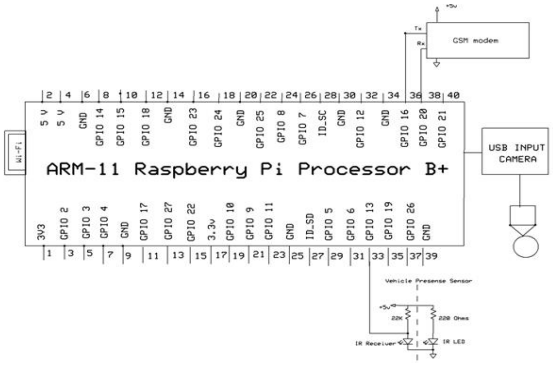



**Fig5.2.1 Diagram for IOT BASED SMARTAGRICULTURE ROTECTION SYSTEM .**

The above schematic diagram **IOT BASED SMART AGRICULTURE PROTECTION SYSTEM** explains the interfacing section of each component with micro processor and input output modules.

### 5.2Implementation Steps :

1.Connecting all the components to Raspberry pi.

**Fig 5.3.1 All devices are connected to Raspberry Pi**

2. IR Sensor detecting an obstacle in the field.

**Fig 5.3.2 Camera Captured intruder's Image and automatically Buzzers gets On**

## 6. RESULTS

The paper“ **IOT BASED SMART AGRICULTURE PROTECTION SYSTEM**“ was designed a smart crop protection system. By using this project what the farmers are facing by the wild animals attacks on the crop fields is removed. Whenever animal attack on their field’s automatically the system captures the image send to the farmer.

- Obstacle founded in the field by IR sensor then it sends signal to Raspberry pi
- Raspberry controls all the process and it sends message to authorised user and captures image and sends image to the Gmail.

**Fig 6.1 Obstacle detected and Message alert to the mobile and Gmail**

**Message Alert :**

- **Message Alert:**When an obstacle or intruder is detected, then it immediately sends message to the user.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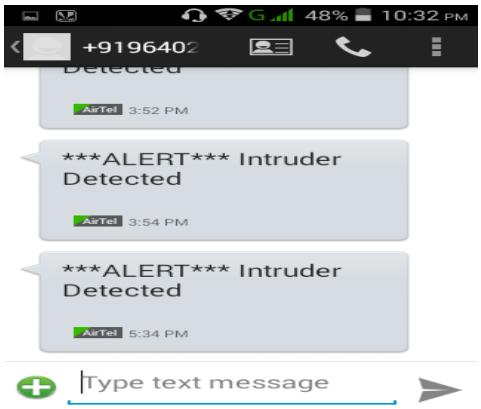


**Fig 6.2 Message Alert Module**

- **Gmail Notification** :

Intruders Image captured and it sends to Gmail.

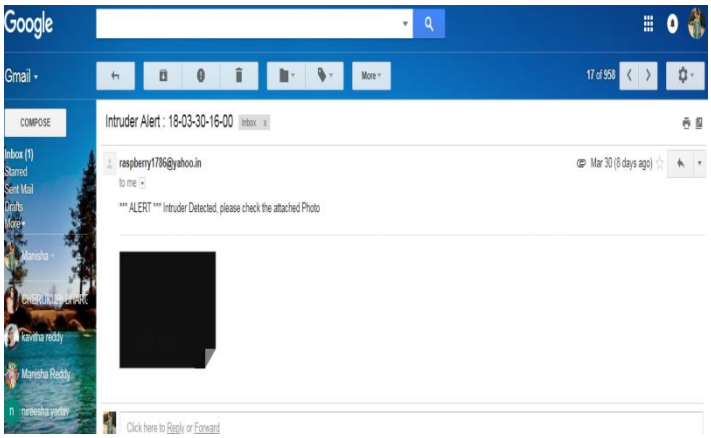


**Fig 6.3 Message Alert in Gmail**

## 7. Conclusion

Incorporating highlights of all the equipment segments utilized have been created in it**.** in this way adding to the best working of the unit.All the modules are set in their particular places,in this way adding to the best working of the unit.Besides, utilizing profoundly propelled IC's with the assistance of developing innovation, the undertaking has been effectively implemented.Hence the paper is been designed and perfectly tested successfully.

## 8. Future Scope:

This paper "**IOT BASED SMART AGRICULTURE PROTECTION SYSTEM**" is used **t**o design a smart crop protection system. By using this project what the farmers are facing by the wild animals attacks on the crop fields is removed. Whenever animal attack on their field's automatically the system captures the image send to the farmer.

The main controlling part of the project isARM-11 Processor, all the module IR Sensor, GSM, Camera, SD Card interfaced to the processor. Whenever any animal entered into the crop IR

Sensor detects the animal that will be read by the processor, on that time camera captures the image. The system gives an email alert by sending image of the crop. GSM module alerts the farmer by sending messages.

The enhancement of this project is done by using very high efficient GPS modules . In case of emergencies the location of the device can be detected by using this GPS module.

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