# INTELLIGENT CROP SYSTEM BASED ON IOT USING GSM

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## ABSTRACT:

*The crop has destroyed by an animal attack is one in every of the foremost threats in reducing crop yields. This ends up in the suicide of the farmers. This paper presents the applying of a crop protection the wireless sensor network to divert animal interventions within the harvest field. The crop field is supplied with PIR sensor, Ultrasonic sensor, and RF module, GSM. The entry of animals within the farm is detected by the sensor nodes installed on the borders and connected to the main board using WSN. The sensor node detects when the object or animals. Upon receiving this information, the nodes send information to Raspberry Pi to generate various sounds such as a machine gun sound, a hawk sound, crackers sound, ultrasonic scarers, and a high frequency sound and diverts the animal to runs away from the crop field. Sending data to the proprietor utilizing IOT and furthermore refreshes data for without fail and the proprietor can see the live video web-based utilizing Webcam however GSM module sends data to the proprietor of the field as a warning.*

*Key Words: Wireless Sensor Network, Internet of Things, Webcam, GSM, Raspberry Pi 3*

## I INTRODUCTION

One of the key goals of this paper are to protect crop fields from animals. Animals have been destroying crops for several years, and protecting this crop field from animals have become a serious problem. When animals (such as pigs, monkeys, rodents, and birds) visit a field, a warning system is required to ensure that crops are not harmed. Farmers is currently dealing with a number of problems, including monkeys attacked the farmers in Narasapuram village and damaging their crops. Hundreds of monkeys have roamed the village, which was located in the Dummagudem mandal of the Bhadradri Kothagudem district, attacking the vegetable and fruit cultivation. Many have abandoned the village, unable to bear the losses. The monkeys, which have been munching on cotton balls, have damaged standing crops across 12 acres in the village, leaving the farmers with no choice but to seek help from the forest department. Farmers in the Jangaon district has petitioned a revenue and forest officials to take an action against a wild boar, which has been damaging crops in their villages. Farmers has also brought the problem to the attention of the government, which has ordered forest officials to take an urgent action. The wild boar has been killing crops in the districts of Bachannapet, Chilpur, Pasarmadla, and Narmetta. Wild boar destruction of crops has increased in the last two years, according to a farmer from Narmetta village. Agricultural pests such as birds and rodents can devastate crops and limit growers' ability to supply agricultural products to the market. Using WSN and IOT, [8] the present method is a fully technological solution for any farm worker to be free of monkeys, wild boars, rodents, birds, and other pests. The subject of this paper is on an application that detects the presence of animals near a crop area. The Raspberry Pi, that could be wide used a platform, and the WSN are the key components of the device. A wireless sensor network could be a set of a self-contained sensor that works together to tracks physical and environmental conditions. Any node may have most of the sensors necessary to sense animal activity so that the actuator will take the proper response, which will cause the animals to leave. The location of the animal is monitored by an ultrasonic sensor and a PIR device, therefore Raspberry Pi informs the voice playback module, that generates various sounds that are captured and sent to the user via IOT. In this case, the GSM module sends data to the farmer's a contact number as an alert, and the farmer can then view a live video streaming in a URL via IOT.

### MAIN OBJECTIVE:

The key goal is to keep animals out of the farm the area's crops. This device will keep a watch out for any animals that reach the area. The crop protection system assists in the creation of a security system for the protection of the farm and the prohibition of an animal entry; the system employs IOT [7] to warns the farmer. The Raspberry Pi collects data from sensor nodes. These intrusion results are being monitored using a variety of sensors for the crop protection and an agricultural land protection. For an example, in any area where the farmland protection is

lacking, the system can be installed and used to meet the requirements. Sensor data will be sent to the Raspberry Pi via RF communication in an order to produce sounds that will cause the animals to leave the area. The data are sent to the farmer via GSM and IoT. PIR, Ultrasonic, GSM, and RF modules are employed in this application. For 1 acre, these modules and Raspberry Pi will cost up to 5000 rupees. For farmers, it is a reliable device.

## II LITERATURE SURVEY

M. Jaya Prabha et.al, The device is set up to search for any animals that might reach the field on a regular basis. In this project, animal activity is detected using infrared and ultrasonic sensors, which transmit an information to the control. The animals also are diverted by the production of noises & messages, which are transmitted to GSM and immediately giving farmers warning, allowing them to be aware of the difficult situation.[1] Shashank H N et.al, build up the system which will screen the field. That is, it will first detect intrusion across the field utilizing a camera device, capture the picture if there is an unauthorized entry, identify them using image processing, and then take appropriate action based on the type of intruder detected. Finally, using Message, sends a notice to the farm owner and forest officials. [2] Dr. M. Chandra Mohan Reddy et.al, This is a microcontroller-based Arduino UNO device. A motion sensor is used in this device to detect wild animals entering the area. A smoke sensor is used to detect a fire. In this scenario, the sensor instructs the microcontroller to function. The microcontroller now sounds an alarm to entice the animals away from the field, as well as sending an SMS and making a phone call to alert the farmer to the issue and enable him to react rapidly if the animals don't leave. If there is smoke, the engine is automatically turned on. This ensures that crops are completely protected from animals and fire, preventing the farmer from making a loss.[3] Srushti Yadahalli et.al, As a result, the focus of this paper is on proposing a system that identifies intruders, tracks any malicious behavior, and then reports it to the system's owner. It functions as an adaptable system that provides farmers with a practical system for ensuring that their farmlands are completely protected from any attacks or trespassing activities. [4] Shanmukhappa Angadi et.al, The proposed gadget employs a Raspberry Pi to identify any suspicious attacks or movement in the land, prompting the Pi Cam to take a photograph of the scene. To recognize the object in the image, the image processing system uses Single Shot sensors and the Mobile nets Deep Learning technique with OpenCV installed on the Raspberry Pi.[5]

## III EXISTING SYSTEM

To protect their crops, the majority of farmers in India utilize an electrical fencing [11]. This gadget, though, has certain problems, such as occasional voltage drops, which necessitate the fence owners checking the power, which they can't do it without physically travelling to the site, and the system is dangerous to the animals. Electronic repellents are a cost-effective, long-lasting, and the environmentally sustainable way to keeps animals away from crops without damaging them. Ultrasonic electronic repellent is high-frequency sound waves repel animals. Farmers has used scarecrows in the field to scare away birds in the past. Scarecrows are commonly built in the form of people and used to scare birds away from crops. Using wireless communication like RF module, ZigBee, GSM and sensors like IR sensor, an ultrasonic sensor to detects the objects and gives information to the farmer.

## IV PROPOSED SYSTEM

Animals harming crops has recently become a major social issue & requires prompt attention as well as a feasible remedy, because it seeks to fix a problem, this project has a lot of social value. The suggested Raspberry Pi-based architecture is noticed to be even more compact, user-friendly, and easy to run. The method is completely automated in this project, and the animal is not harmed during the repellent. We are using a wireless sensor network in this project to detect animals or humans, and if animals reach that area, it will continuously generate different sounds. Animals and birds are frightened by such sounds. Similarly, with IOT technology, the same information is sent to a specific authority individual, and we can track the crop prevention system using this tool. When using IoT, the user must open a browser to access the details, whereas the GSM module sends an SMS to the farmer's mobile phone as a notification. Then, if anyone wants to see what's going on, they can go to the URL for more details as well as live video streaming from the field.

## V MATERIALS AND METHODS

In this paper, we use sensors like Ultrasonic sensor, PIR sensor, Web camera, speakers, IOT, GSM, WSN, 8051 microcontroller and the Raspberry PI which goes about as expert hub and gathers the information from the sensors understudy which sends that information through RF transmitter for additional handling. The RF transmitter communicates the data to the beneficiary which gets the information and dependent on that information it conveys

the messages to the speakers as per that it creates the sound to stop the creatures by intersection the field. It likewise sends message to the proprietor through IOT to avoid potential risk.

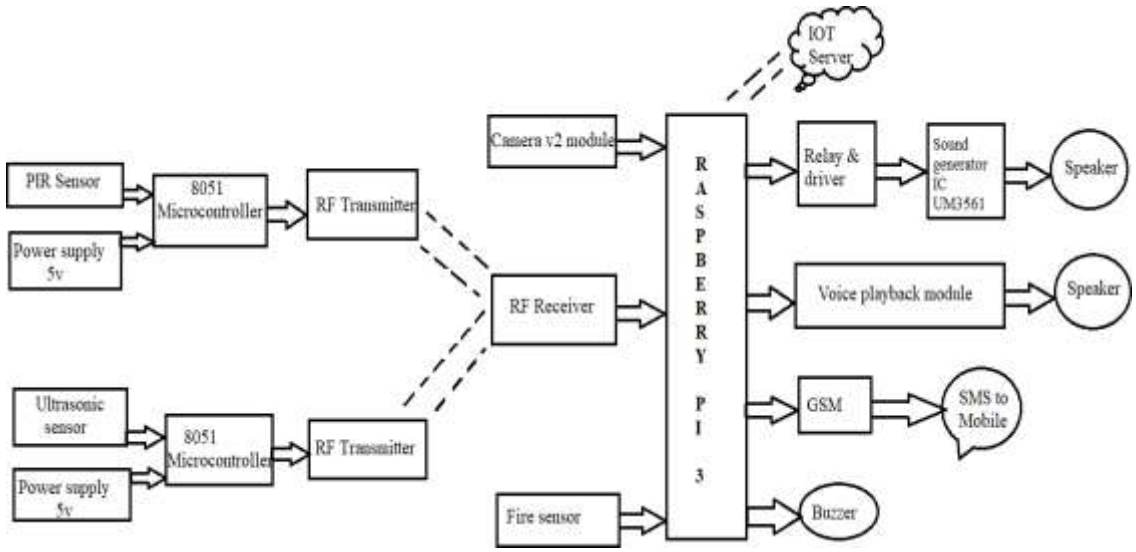


**Fig.1. Proposed Block diagram.**

**Ultrasonic Sensor:**

An ultrasound sensor is a virtual tool that measures the gap of a detail with the aid of using sending ultrasound sound waves, and converting the pondered sound into an electrical signal. [9] Ultrasonic/level instruments, as the name implies, use ultrasonic waves to determine altitude. The sensor head sends out an ultrasonic pulse, which is mirrored by the target. Ultrasonic/level sensors estimate the time between essential quality and collecting to determine the distance to the target. Ultrasonic sensors are suitable for short-range proximity detection up to ten meters and have a variety of reach estimates per second.

**PIR Sensor:**

PIR sensors track motion and are used to determine if a person has entered or exited the sensor's limit. They're lightweight, inexpensive, low-power, easy to use, and they don't wear out. Passive infrared sensors look for heat energy in the environment using a pair of pyroelectric sensors. These 2 sensors are placed next to each other, and they will interfere if the signal differential between them varies. PIR-based motion detectors are used to track the orientation of humans, livestock, and other objects. It's most often used in burglar alarms & automatic lighting systems. They're usually known as "PIR", or typically "PID", for a "passive infrared detector". [6]

**Fire Sensor:**

The presence of a fire or other infrared source is sensed by the IR flame sensor. It can be used in a firefighting robot or a robot that seeks out sun. It has a small and compact format, a threshold value that can be adjusted, and a pair of state binary outputs (logic high and low). The implementation will determine the response to a perceived blaze, but it will require an IoT notification and the activation of a fire suppression device. Because of the methods used to discover the flames, a flame detector can usually respond quicker and more accurately than a smoke or warmth detector.

**RF module:**

The 433MHz wi-fi module is one of the cheaper and easy-to-use gadgets for all wi-fi projects. Only in pairs should these units be used, and only a simple relation is feasible. Since the transmitter can only relay data and the receiver will only retrieve it, you'll only transfer data from point A to point B and not from point B to point A. The

device can cover a minimum of three meters, and the power supply can potentially exceed a hundred meters with the right antenna. However, under traditional check conditions, we are unable to get closer than 30-35 meters.

**GSM:**

GSM technology has been established as a digital interface for collaboration purposes using the TDMA technique. [10] Prior to actually transmitting data beneath a stream of 2 different streams of client information, within each time frame, a GSM recompress and transmit it. It is a digital mobile technology that allows for the transmission of mobile voice & data services.

## VI WORKING METHODOLOGY

The proposed method is a closed-loop perimeter guard system designed to report detection of animal entry into a crop field and is the first issue that needs to be addressed. A crop protection system with the help of technology is required which will be reliable, robust, cost-effective and can be easily adapted by farmers. The experiments performed on WSN node diffusion and animal infiltration detection are superior to the other methods included in our performance comparison.

**ALGORITHM**

**Step 1:** Turn on power supply
**Step 2:** Configuring all input & output devices
**Step 3:** Read all the sensor data from PIR sensor, Ultrasonic sensor, Fire sensor
**Step 4:** If fire sensor detects a fire, then buzzer will beep, otherwise buzzer off.
**Step 5:** If PIR sensor detects the animal, it generates different types of sounds otherwise wait for detection
**Step 6:** If Ultrasonic sensor detects the object or animal, then it generates the different sounds using voice playback module otherwise wait for the detection.
**Step 7:** Weather all the sensor are detect or not, send this information to cloud server (IOT).
**Step 8:** All the information will send SMS to owner mobile through GSM module.
**Step 9:** If farmer wants to see live video stream, has to open URL.
**Step 10:** Stop the system

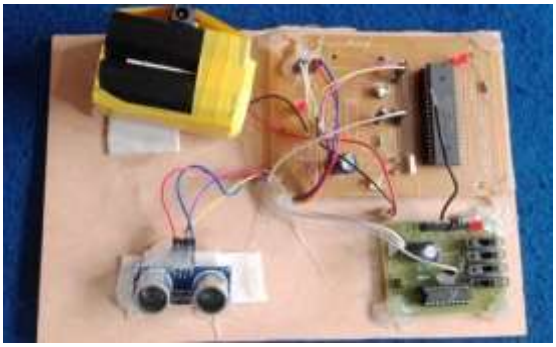

**Fig.2. Ultrasonic sensor with RF transmitter.**

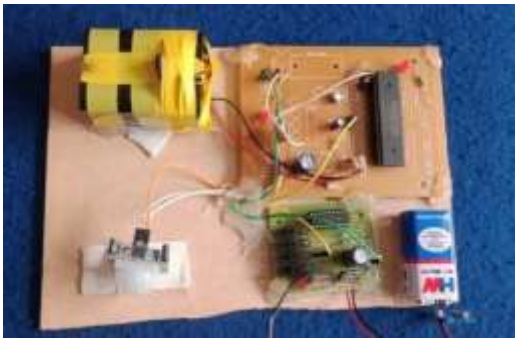

**Fig.3. PIR sensor with RF transmitter.**

The proposed action sensor modules are equipped with an RF module. In the crop field two areas with a distance of D1 and D2 are executed. If sensor nodes detect animals, then give information to the central node to generate different sounds. The central node is located in the middle of the crop field which will monitor the intrusion of animals and thus activate the nearby nodes.

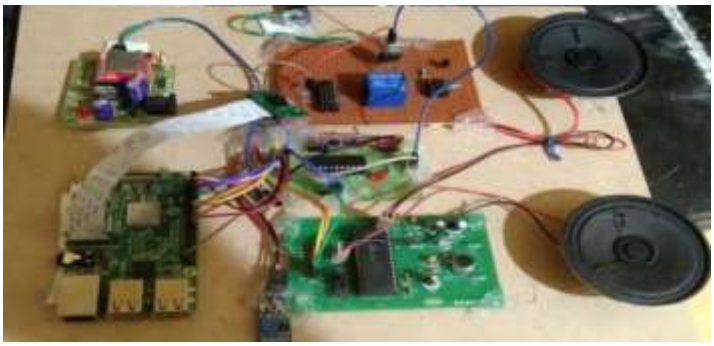

**Fig.4. Raspberry Pi with GSM.**

RF communication is used to transmit data from sensor nodes. The primary processor is the Raspberry Pi, which receives data from the receiver, generates different sorts of noises through the speaker using the voice playback module, updates the data into ubidots, and communicates the information to the farmer using the GSM module.

The information on the ubidots platform will be updated after receiving the output. When utilizing the ubidots website, you can see the most up-to-date information on whether or not the animal and fire have been spotted.


**Fig.5. No animal and fire detection**

Fire, animals were not detected then here we get the information in the terminal by using the putty software tool.

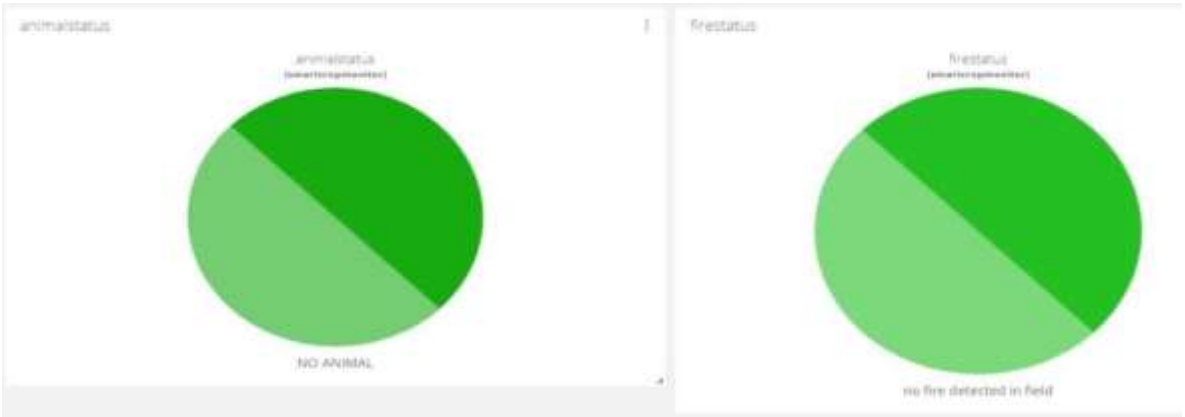


**Fig. 6. No animal and fire detection inIOT**

If no fire or animals are spotted, the information is shown in green on the IOT platform.

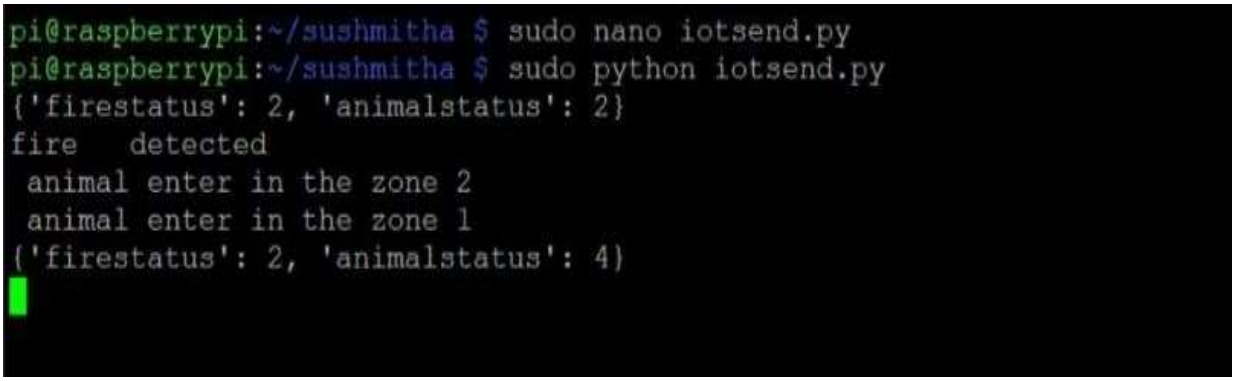


**Fig. 7. Fire and animal detection**

When fire or animals were detected, we used the putty software programme to obtain the information into the terminal.

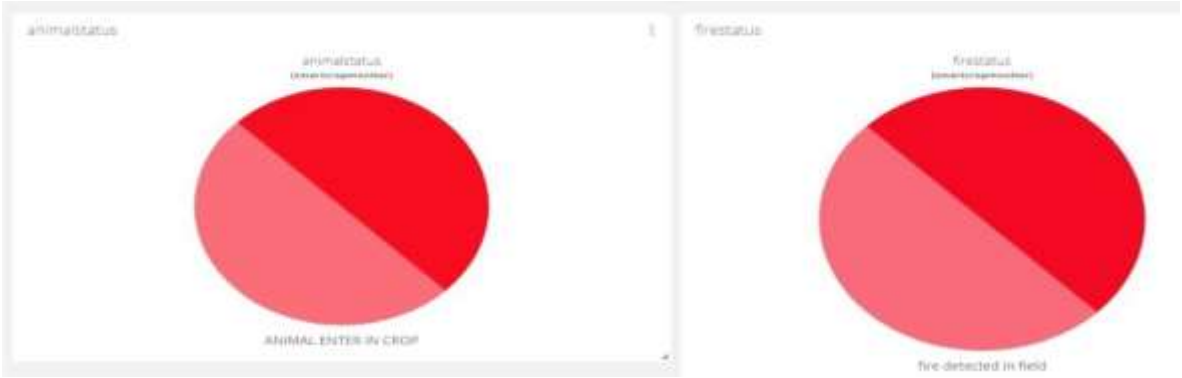

**Fig. 8. Animal and fire detection in IOT**

If fire or animals are spotted, the information is shown in red on the IOT platform. And different types of sound will be generated through speakers using voice playback module.


**Fig.9. Video Streaming**


**Fig. 10. Message sends through GSM**

Sensors placed on the WSN nodes will determine the presence and transformation of the animal by activating sound devices based on location. The central node sends an alert to the farm owner through a live video broadcast. And also gets notification as message from GSM module. Even when the animal exceeds Early Warning Zone 1 and somehow reaches Warning Zone 2, the central node will activate the audio devices connect. Once again, the central node will alert the owner of the corresponding field. The sensor nodes in the near intrusion zone will be activated by the central node while all other nodes are set to sleep to save power.

## CONCLUSION

This project will be helping farmers protect and conserve their orchards and fields. They are from huge financial losses and it will save them of the fruitless efforts they endure for protect their fields. This will also help them achieve better crops leading to their economic well-being. To guard and convey a couple of property surroundings between human and an animal needs the collective effort of the public and also the government. The detection and the diversion of animals can defend crops from animal attacks which are able to maintain ecological balance with the assistance of the WSN and IoT technologies. The Sleep modes can minimize the facility demand of the system where necessary. Currently, the focus is given to the look of an intrusion detection system outside the sphere space to reinforce the system strength and the responsiveness.

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