

# IoT Based Wireless Sensor Network for Earlier Detection and Prevention of Wild Animals Attack on Forming Lands

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**Abstract** - Now days the application of Internet of things is spread over most daily life fields such as health, agriculture, home automation, hospitality, theft detection, smart environment, etc. In this paper we proposed a system that helps in both agriculture, forest, and wild animals. In this system we use the IoT and Wireless Sensor Networks (WNS) for preventing the wild animals attack on forming lands that are nearer to the forest. In this system we use motion sensor, sound sensors, web cameras to detect movement of animals near the border of the forest and according to that data we provide the speakers for produce the noise for avoiding the animals by crossing the forest border,. And also it inform the nearer forest office, and also inform to nearer farmers, land owners by providing some signals to take safety precautions

**Key Words:** Forming lands, Forest fire, IoT, Wireless sensors.

## 1. INTRODUCTION

In India agriculture is playing a major role. In other words farmer is the main backbone of our country. More than 50% of Indians are depending on the agriculture. But the formers of India face many problems as per the crops. Among those the forming lands that are nearer to the forests were facing problem of attack of wild animals on the crops. These wild animals attack leads to loss of crops, and also some time it cause death of formers, domestic animals also wild animals. Our main aim is to earlier detect prevent wild animal attack on the forming lands, villages nearer the forest areas.

Applications of the wireless sensor networks and internet of things are growing gradually. Because of their low cost, lesser energy requirements and effective result. These wireless sensor networks and IoT are effectively used in smart agriculture, smart home applications, smart health care applications, also in forest fire detection systems. As in the forest fire detection system in which the sensors are are used to detect the smoke in the forest, to get the level of temperature in the forest early in order to prevent the forest fire. As inspiring from this we got an idea for the earlier detection and prevention of wild animals attack on the forming lands and villages that are nearer to the forest areas.

Here we proposing a system that gives the technical solution for this problem using wireless sensor networks and internet of things. This paper is focused on the detection of wild animals near the boarder of the forest. For this we use

some sensors such as pir motion sensor, sound recognizing sensor , web cameras, some speakers, aurdino and mainly the raspberry pi which acts as master node and collects the data from the sensors intern which sends those data to the server for further processing. The server process the data and based on that data it sends the signals to the speakers according to which it produce the sound in order to stop the animals by crossing the forest boarder, and also sends message to the mobiles of the nearer villagers ,formers, and the forest office to take the safety precautions.

## 2. LITERATURE SERVEY

[1]Salha M.Alzahrani's sensing for the "Internet of Things and is Applications". Which gives the understanding of the IoT concept, components and its applications. In which the technology that allows the different things to communicate through the Internet and understanding the both. To process the collected data from the varius sensors and taking the actions on thoes IoT uses the Artificial Inteligence technology.

[2]S,R.Choury P.A.Amale, N.B. Bhawakar's "IoT based wireless sensor networks for prevention of crop from wild animals".which provides the security for only users forming lands. That is the system is detect the presence of wild animals that are near the forming land which has defect in taking the precautions because in case animals present near the form then its difficult take the immediate actions on them.

[3]S.T.Sugumar, R.Jayaparvathi's "An Improved Realtime Image Detection System for Elephant Intrution Along The Forest Boarder Areas". From this get the information about realtime image detection of elephants was well understood and also the senors and other components used for this are well studied.

### 3. SYSTEM REQUIREMENTS

#### 3.1. Aurdino circuit board

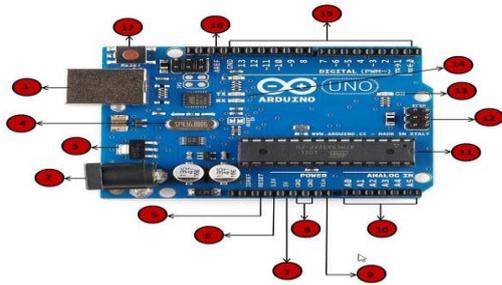


Figure 1. Aurdino board

Arduino boards are able to read analog or digital input signals from different sensors and turn it into an output such as activating a motor, turning LED on/off, connect to the cloud and many other actions. You can control your board functions by sending a set of instructions to the microcontroller on the board via Arduino IDE (referred to as uploading software).

Here aurdino is used to collect the data from the sensors such pir motion sensor, web camera module, and sound reorganization sensors, and to transform those data to zigbee.

#### B. Zigbee :



Figure 2. Zigbee

Zigbee is an IEEE 802.15.4-based specification for a suite of high-level communication protocols used to create personal area networks with small, low-power digital radios, such as for home automation, medical device data collection, and other low-power low-bandwidth needs, designed for small scale projects which need wireless connection. Hence, Zigbee is a low-power, low data rate, and close proximity (i.e., personal area) wireless ad hoc network.

Its low power consumption limits transmission distances to 10–100 meters line-of-sight, depending on power output and environmental characteristics.[1] Zigbee devices can transmit data over long distances by passing data through a mesh network of intermediate devices to reach more distant ones. Zigbee is typically used in low data rate applications that require long battery life and secure networking (Zigbee

networks are secured by 128 bit symmetric encryption keys.) Zigbee has a defined rate of 250 kbit/s, best suited for intermittent data transmissions from a sensor or input device.

#### C. PIR sensor:



Figure 3. PIR motion Sensor

PIR sensors allow you to sense motion, almost always used to detect whether a human has moved in or out of the sensors range. They are small, inexpensive, low-power, easy to use and don't wear out. For that reason they are commonly found in appliances and gadgets used in homes or businesses. They are often referred to as PIR, "Passive Infrared", "Pyroelectric", or "IR motion" sensors.

Here PIR sensors used to sense the wild animals presence near forest boarder.

#### D. Web cameras



Figure 4. Web Camera

A webcam is a video camera that feeds or streams its image in real time to or through a computer to a computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and emailed as an attachment. When sent to a remote location, the video stream may be saved, viewed or on sent there.

Here we use web camera to recognize the real time images of wild animals.

## 4. SYSTEM DESIGN

### 4.1 System Architecture

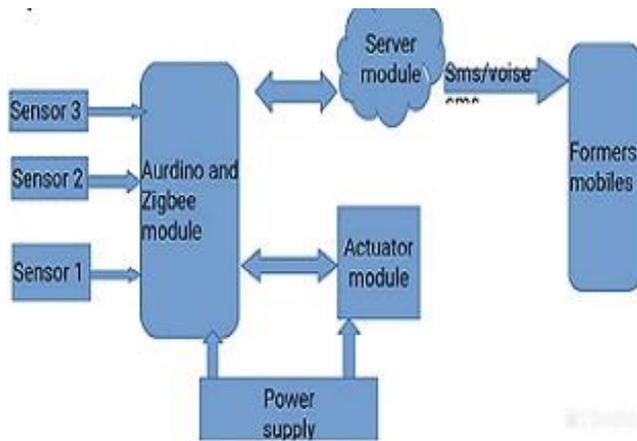


Figure 5. System Architecture

In our proposed system it contains three modules namely the aurdino and zigbee module, server module, and Actuator module.

**Aurdino and Zigbee Module:** In this module Aurdino collects the analog data from the pir motion sensor, web cams and sound recognition sensors and transfer it to the Zigbee. Intern the Zigbee is transfer the data to the cloud server for the further processing.

**The Server Module:** In this module the server collects the data from the Zigbee module and process the data and based on that processed data it sends signals to the actuators to take the required action. and also sends the information message to the formers, villagers and forest office mobiles through voice sms or text sms.

**The Actuator Module :** The actuators are the speakers and the alarms which takes actions on the basis data from the server. Speaker plays the sound as per the produced per animals to stop them from crossing the forest boarder.

### 4.2 Algorithm of System Flow

**Step 1:** if any animals movement was found

**Step 2:** goto step 3, else go to step 9.

**Step 3:** The sensors capture the data and send it to the aurdino.

**Step 4:** aurdino and zigbee collects the data from the sensors.

**Step 5:** send those data to the cloud server.

**Step 6:** server process the data received from the aurdino.

**Step 7:** send the signals to the atuaters, and mobiles of the users.

**Step 8:** the actuators perform the actions based on the data from the server.

**Step 9:** go to step 1.

## 5. CONCLUSIONS

The problem of crop destruction by wild animals has become a serious problem for the farmer. Effective solution and urgent attention is needed to solve this serious problem. To solve the problem of farmer we have designed a smart earlier detection and protection system with the help of IOT. The main aim is to prevent the loss of corps and protect agricultural forming area from wild animals which causes major damage to the agricultural area. As the detection of presence of animals near the forest boarder its very helpful to take early precautions. So our technical approach will be helpful to the farmers in protecting fields and save them from financial losses and also saves them from unproductive efforts that they endure for the protection of their fields.

The proposed system is only limited for a village surrounded area that is near to the forest area. In future can enhance the to a wide range areas also with additional effective sensors.

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