IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# Crop Protection From Wild Animals Intrusion

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**Abstract-** The aim of every farmer is to yield a potential crop production every year. So, it is the responsibility of the farmer to protect the crop fields from the wild animal's attack. Most of the wild animals often come into contact with the agricultural crops in search of food especially in the night-time. Some of these animals attack those crops which results in the increase of human-wildlife conflicts. As a result, our project attempts to establish an Internet of Things model for protecting crops from wild animal encroachment in order to discover a solution. So, a monitoring system is provided to prevent the potential damages in agriculture from the wild animal's attack. This is achieved by using an Arduino Boards and PIR sensor surrounding the paddy field. The presence of wild animals is detected. In response to the detection of wild animals, lights and alarm will be produced. By the sudden warning, the animals get frightened and run away from the filed leaving the crops undamaged.

**Keywords – Arduino UNO, PIR Sensor, LED, Buzzer**

## I. INTRODUCTION

Agriculture is very important to the economy It is the primary source of nourishment for all living things. As a result, it is well understood that agriculture provides numerous benefits to living beings. As a result, it is the responsibility of each farmer to safeguard such valuable crops. The successful farmer will employ the most effective crop-protection techniques. With the goal of assisting farmers in protecting their crops from animals, our project will develop an animal alarm system prior to their arrival onto farmed area. In the last three years, wild animal invasions have increased dramatically in Tamil Nadu. Farmers suffer significant financial losses as a result of this As a result, our study intends to design a crop monitoring system to provide a solution. Farmers will benefit greatly from this technology, particularly at night. Because the farmers will not be around to defend their crops during the night. The system we suggest will be inexpensive due to readily available components and will be simple to use. As a result, the goal of our study is to create a crop protection system that is safe for both animals and humans.

## II. RELATED WORKS

Maciej A Noras has published an article based on Activity Detection and Recognition With Passive Electric Field Sensors [1]. This article presents the development of electric field sensor which is used to detect the motion and characterization of animals and humans. There is another work related to the animal detection system which was proposed by the authors Davide Adami, Mike O Ojo and Stefano Giordanoin an article called Evaluation of an Intelligent Animal Repelling system for Crop Protection system [2]. They aim at developing a smart agriculture application to protect the crops from ungulate attacks. This system significantly reduces the

production losses through the development of innovative device designed using the Computer Vision and Ultrasound Emission. Recently, deep learning has emerged has key technology in major fields. It is technique that instructs computers to do activities which comes naturally to humans. With the help of this technology Reon Saito @al have proposed an article based on Energy Reduction Methods for Wild Animal Detection Devices[3]. They have proposed combined methods to reduce the energy consumption of devices to detect the wild animals.H.Saito @al have discussed about detecting the animals automatically using the battery powered nodes based on deep learning technique [4]. Another article by A.R.Elias @al have proposed an article for wildlife image processing using IoT and edge cloud systems[5].Senthil Kumar M @al have published an article on Influence of IoT in Agriculture, which explains the importance of IoT in crop protection[6]. These are the articles which are related to the upcoming solutions for the Crop Protection Against Wild Animals Intrusion.

## III. Materials and Methods

The developing module is used to help the farmers to protect their crops from the wild animals. The module that we propose aims at detecting the animals before their entry into the farm field especially during the night time, when there will be no farmers to protect their crops around their land. The materials that we have used are affordable to the farmers and produce a highly efficient module which is absolutely unharmful to the wild animals and also to the other organisms.

There are 4 major components that are used to develop this module. The overviews of the components are discussed below:

### *3.1 Arduino UNO:*

Arduino is a free and open-source electronics platform to use. Arduino boards can detect inputs such as light on a sensor, a finger on a button and convert them to outputs such as turning on an LED, triggering a motor etc., The Arduino Software (IDE) are used to do this. Unlike most prior programmable circuit boards, the Arduino does not require a separate piece of hardware to load new code into the board; instead, a USB cable is all that is required. The Arduino IDE makes programming easier by using a embedded C++. Finally, Arduino offers a standard factor that separates the microcontroller's tasks into a more manageable packaging.

The architecture of the system is given below in the Figure 1.

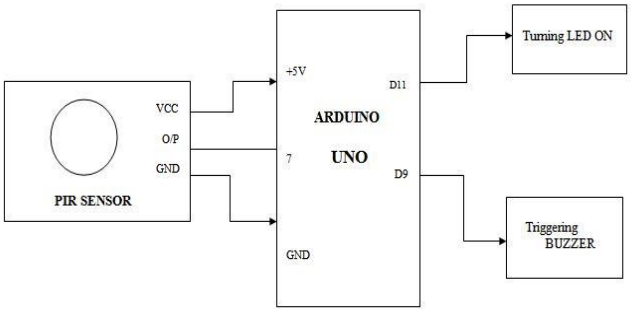


Figure 1. System Architecture

### *3.2 PIR sensor:*

PIR sensors detect motion and are always used to determine whether a human has entered or exited within the sensor's range. They're compact, cheap, and simple to use. As a result, they're often found in home and business appliances and gadgets. PIR is also known as "Passive Infrared". PIRs are made up of a pyro electric sensor that can detect infrared radiation levels. Everything produces low-level radiation, and the hotter something is, the more radiation it produces. When the sensor is turned off, both slots detect the same quantity of IR emitted by the room, walls, or outdoors. It detects a warm body, such as a human or an animal, passing by.

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### *3.3. LED:*

LED is a p-n junction diode which is made up of semi-conductors. When an electric current passes through a LED, it emits light. LEDs use low energy and require a low voltage. LEDs do not require any warm-up time. The LED symbol is similar to a diode symbol, but it has two little arrows that indicate light emission, thus the name (light-emitting diode). Anode (+) and cathode (-) are the two terminals on the LED (-). A diode is a light-emitting diode. When the diode is forward biased, the electrons and holes move constantly combining one another. The electrons merge with the holes as they transition from n-type to p-type silicon, and then they vanish.

### *3.4 Buzzer:*

A buzzer is a signalling device that can be electromechanical, piezoelectric, or mechanical. The main purpose of this device is to convert audio to sound. It is commonly used in timers, alarm devices, printers and other equipment that are powered by DC voltage. It

may produce various sounds such as alert, music, bell, and siren according on the varied designs. It's a gadget that converts audio impulses into sound. DC voltage is frequently used to power it. It is employed as a sound device in alarm clocks, printers etc., It is primarily separated into piezoelectric and electromagnetic buzzers, which are represented in the circuit by the letters "H" or "HA." The buzzer comes in a variety of styles and applications.

*3.5 Software used:* Arduino IDE

The open source Arduino Software (IDE) makes it easy to write code and upload it to the board.This software is used with Arduino UNO board to run the module.It is used to connect the Arduino hardware to upload programs and communicate with them.C++ languge is very appropriate for the embedded work.Hence C++ lanuage is used to control the connections given to the modules.

## IV. BLOCK DIAGRAM OF THE SYSTEM

The major components of our project are Arduino UNO, PIR sensor, LED and buzzer.These components are given proper connections in their respective ports. Then all Arduino UNO board is connected to the laptop to embed the program.Whenever an animals is been detected by the PIR sensor, the input is given to the Arduino UNO.The output from the Arduino UNO is by turning on the LED bulb and triggering the buzzer simultaneously

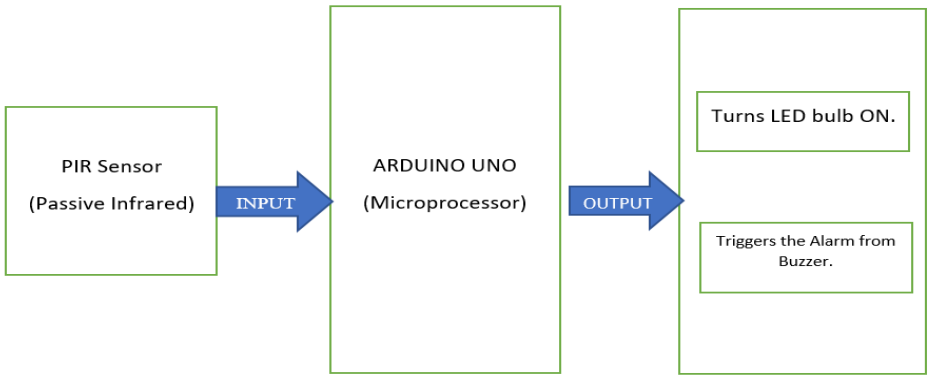


Figure 2. Block Diagram Of Crop Field Monitoring System From The Animals

## V. IMPLEMENTATION

The breadboard is connected to the LED bulb and buzzer. VCC, Ground, and Output pins are all present on the PIR sensor. The pins are connected to the appropriate Arduino UNO ports. The connections are then made and the modules are set aside. The modules are then combined and linked. Using jumper wires in their respective ports, the modules, breadboard, and PIR sensor are linked to the Arduino UNO. Finally, a USB cable is used to connect the Arduino UNO to the laptop. The code is now compiled in the Arduino IDE software to control the provided connections, using the embedded C++ programming language. The code is uploaded to the Arduino UNO board after it has successfully been compiled. When a wild animal has been captured, The Arduino UNO receives an input whenever a wild animal is spotted by the PIR sensor within a certain range. The Arduino UNO activates the components by turning on the LED bulb and buzzer in response to the inputs. The LED bulb begins to illuminate, and the buzzer begins to ring at the same time. The animals are startled by the rapid notification from the animals monitoring system and flee the farmland. In the absence of farmers, we can therefore safeguard crops from wild animal attacks, particularly at night.

Figure 3. represents the final connections given to the modules.

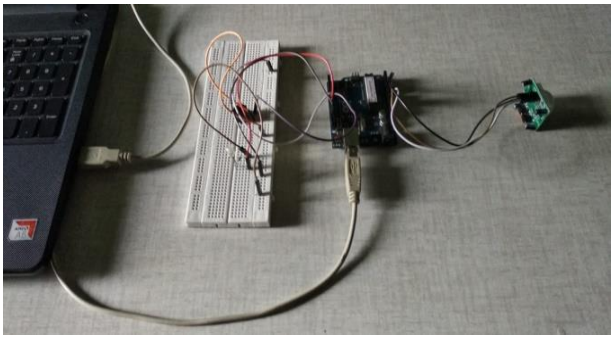

Figure 3. Modules with proper connections

Figure 4. represents the final output by turning on the LED bulb and buzzer.

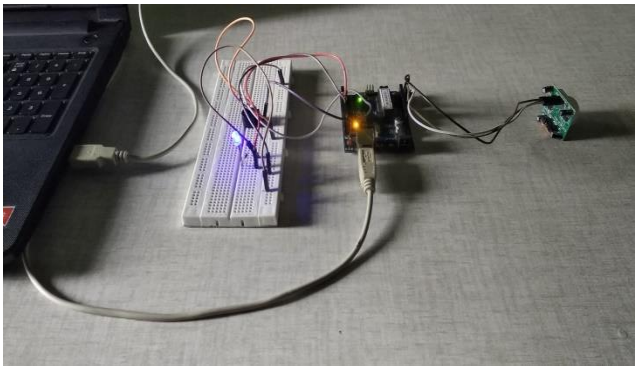

Figure 4. Successful Execution of output

## VI. DISCUSSIONS

The crop monitoring system that we suggest serves to alert animals before they enter the fields. The warning offered by the LED and Buzzer will help to protect both animals and crops. In addition to the LED and Buzzer alert signals, the farmers are also protected. Farmers will benefit from receiving a warning just when an animal is detected during the monitoring of the animals. This can be accomplished by building a system that, in addition to the animal monitoring system, sends an SMS or calls the farmer's cell phone. If such a technique is proposed, we will be able to drastically minimise wild animal access into crop fields. As a result, human-wildlife conflict is reduced

## VII. CONCLUSION

Our suggested project's main goal is to develop a crop protection against wild animal encroachment. The problem of wild animals entering crops has been growing fast around the world. This has resulted in a huge problem, namely human-wildlife conflict. So, in order to address this problem, we created a module that includes a field monitoring system. The main aim of our project is to protect the crops from the wild animals attack. The developed module should be easy to used easily available to the farmers. Therefore, the solution proposed by us provides a cheap and efficient module to the farmers. This will be highly useful to the farmers which can financial losses due to the animals attack and avoid the crops using affordable monitoring system.

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