# Smart Agriculture Fencing Using IOT

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**Abstract**- This project present the design of Smart agriculture fencing using IOT to tackle the problems of agricultural sector like animals attack. Animals like wild boars, elephant, tiger and monkeys etc. Cause serious damage to crops by animals running over the field and trampling over the crops. In the crop fields trespassing by animals leads to destruction of crops. The implementation of an IoT-based smart agriculture fencing system for protecting crops against wild animals. The data collected by these sensors is processed using a microcontroller, and the farmer is alerted in real-time via a mobile application or SMS. The system also includes a deterrent sounds to scare away the animals. Overall, the smart agriculture fencing system offers a reliable and efficient solution to prevent crop damage caused by wild animals.

## 1. Introduction

The problem of wild animal attacks on crop fields i.e. crop vandalization is becoming a very common enomenon in the state of Himachal Pradesh, Punjab, Haryana and many other states. Wild animals like monkeys, estray animals especially cows and buffaloes, wild dogs, nigari's, bison's, elephant's deer, wild pigs and even birds like parakeets 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. In both cases, this leads to significant financial loss to the farmers and orchard owners. The problem is so pronounced that sometimes farmers decide to leave the area barren due to these animal attacks. Crop damage caused by animal attacks is one of the major threats in reducing the crop yield. In the agriculture sector alone, the deployment of IOT has led to smart farming, precision agriculture, just to mention a few.

This System 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 from wild animal attack. The current method uses to counter this problem include the use of electrified welded mesh fences (usually 30cm in the ground), chemicals or organic substances and gas cannons. Other traditional methods applied by farmers include the use of Helicities, Balloon's, Shot/Gas guns, String & stone, etc. These solutions are often cruel and ineffective. They also require a vast amount of installation and maintenance cost and some of the methods have environmental pollution effect on both humans and animals. On the other hand, the chemical products used to prevent these animal attacks have an application cost per hectare and their effectiveness is dependent on weather condition, as rain may cause a dilution effect.

Technology assistance at various stages of agricultural processes can significantly enhance the crop yield. Sensor networks express a substantial improvement over traditional invasive methods of monitoring. Our proposed method is based on an animal friendly ultrasounds generator, which does not produce physical or biological harm to the animals nor sounds audible to humans. The Internet of Things (IoT) technology used in smart agriculture fencing includes the use of sensors, which are devices that can detect the presence of wild animals. These sensors can be placed around the perimeter of the crop field and can detect motion, sound, and even body heat of the animals. The sensors are connected to a central hub or a computer that receives and processes the data.

The central hub or computer can analyse the data and determine if the detected object is a wild animal or not. If it is an animal, the system can send a notification to the farmer's mobile phone or computer. The farmer can then take appropriate action, such as activating an alarm or electric fence, to scare away the animal.

Smart agriculture fencing using IoT technology can help farmers save time and money by reducing the amount of physical work required to protect their crops. It can also help to reduce the risk of crop damage and losses due to wild animal intrusion. By using this technology, farmers can better protect their crops and increase their yields, resulting in increased profits.

## 2. Methodology
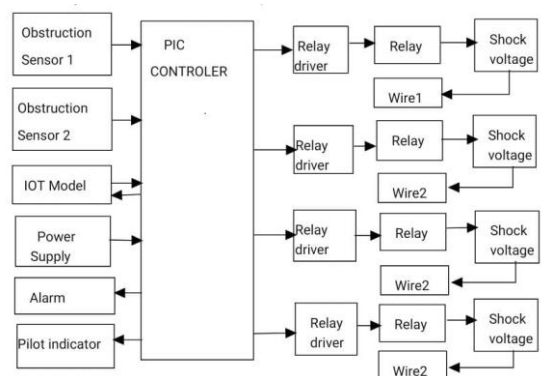


**Fig1. Block diagram**

First we set up this setup in of form, border fencing, ultrasonic sensor is placed near fencing IOT kit set up to which all the fending wire is connected through relay and all the sensor connected with speaker and lights system use 12v dc supply to power the kit and pulse dc for fencing. Now we on our setup and sensors are turned on. First the ultrasonic sensor detect any kind of activity near the border area. When once anything detected the sensor trigger a signal to the sensors main board which send a message to our mobile and alarm sounds. The message says "fault detected" then after this pulse dc supply is given to fencing wire then we can control the activities like turn ON, turn OFF, reset light, alarm etc. through our mobile.

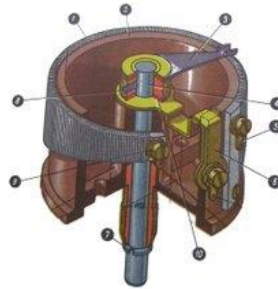## 3. Components
### ESP8266
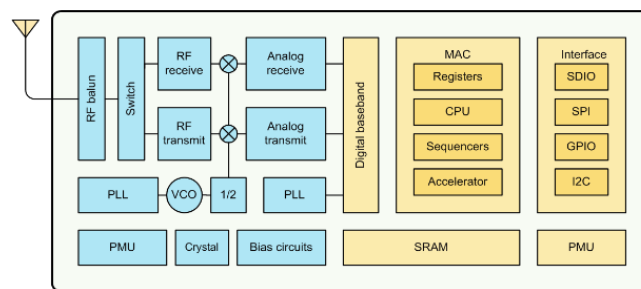


The ESP8266 is a versatile and widely used Wi-Fi microcontroller module designed for Internet of Things (IoT) applications. It combines a 32-bit microcontroller unit (MCU) with a built-in Wi-Fi transceiver, offering a low-cost solution for wireless connectivity.With its integrated Wi-Fi capabilities, the ESP8266 can connect to wireless networks and communicate with other devices over Wi-Fi. It supports 802.11 b/g/n standards and can operate as a client (station), access point,or both simultaneously.Programming the ESP8266 is made accessible through various options. The Arduino IDE with the ESP8266 core library provides a user-friendly programming interface similar to Arduino boards. Alternatively, the ESP-IDF (ESP8266 IoT Development Framework) offers a more advanced programming environment.The module provides general-purpose input/output (GPIO) pins that can interface with sensors, actuators, and other electronic components.

**LED**
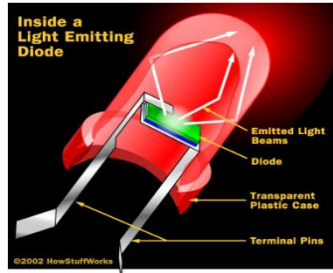


LED stands for Light Emitting Diode, a semiconductor device that emits light when an electric current passes through it. LEDs are highly efficient and long-lasting compared to traditional incandescent bulbs. They are used in various applications, including lighting, displays, indicators, and backlighting. LEDs come in different colors and can be easily controlled to produce different levels of brightness. Their compact size, low power consumption, and durability make them popular in electronics, automotive lighting, and energy-saving lighting solutions

**Potentiometer**



A potentiometer is an electronic component with three terminals used to vary the electrical resistance. It consists of a resistive track and a sliding contact called a wiper. By adjusting the wiper's position, the output voltage can be adjusted, making potentiometers useful for volume controls, brightness adjustments, and other applications.

**Regulated Power Supply**



**Transformer**

A transformer is a device that transfers electrical energy from one circuit to another through inductively coupled conductors without changing its frequency. A changing current in the first or primary winding creates a changing magnetic flux in the transformer core and thus a changing magnetic field in the secondary winding. This changing magnetic field induces a changing electromotive force (EMF) or "voltage" in the secondary winding. This effect is called mutual induction.

**Rectifier**
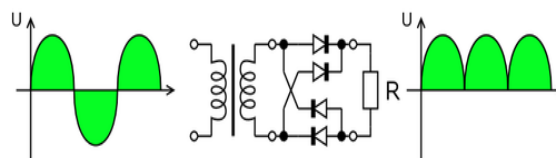
A rectifier is an electrical device that converts alternating current (AC) to direct current (DC), a process known as rectification. Rectifiers have many uses, including as components of power supplies and as radio signal detectors. Rectifiers can be made from semiconductor diodes, tube diodes, mercury arc valves and other components. A device that can perform the opposite function (converting direct current to alternating current) is called an inverter.

**Voltage Regulator**
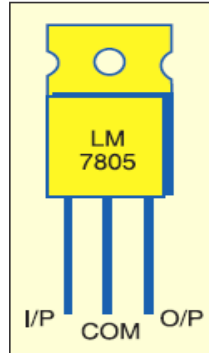
A voltage regulator (also called a "regulator") with only three terminals appears to be a simple device, but it is actually a very complex integrated circuit. It converts a varying input voltage into a constant "regulated" output voltage. Voltage regulators are available in various outputs such as 5V, 6V, 9V, 12V and 15V. The LM78XX series voltage regulators are designed for positive input.

**Hardware used**
1) ESP32 Controller Board
2) Relay
3) Ultrasonic Sensor
4) Pulse transformer
5) Capacitor (1000uf and 100uf)
6) LED
7) Buzzer
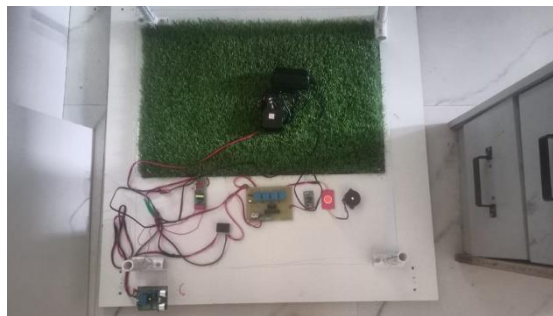
**Fig2. Model of project**

## 4. Results and discussion

The results of the smart agriculture fencing system showed that it was able to detect and alert the farmers of any animal intrusion or tampering within the perimeter of the farm in real-time. The system was able to monitor the perimeter of the farm continuously and send alerts to the farmer's mobile device if there was any intrusion.

The smart agriculture fencing system also provided an easy-to-use interface for the farmer to monitor the status of the fence and the signal strength of the wireless network. This feature allowed the farmer to quickly identify any issues and take corrective action to ensure the smooth functioning of the system.

Smart agriculture fencing using IoT is a technological innovation that has the potential to revolutionize the agriculture sector by providing farmers with a cost-effective and efficient solution to the problem of livestock protection. The system uses IoT-based sensors and a wireless network to monitor the perimeter of the farm and detect any intrusion or tampering.

### 5.. Conclusion

The smart agriculture fencing system using IoT is a cost-effective and efficient solution for livestock protection. The system provides real-time monitoring of the farm perimeter, reliable detection of animal intrusion and tampering, and an easy-to-use interface for the farmer to monitor and manage the system. This system has the potential to revolutionize the agriculture sector and make it more sustainable and profitable.

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