International Journal for Modern Trends in Science and Technology
Volume 12, Issue 06, pages 30-34
ISSN: 2455-3778 online
Available online at: http://www.ijmtst.com/vol12issue06.html
DOI: https://doi.org/10.5281/zenodo.20573456

Crop Monitoring and Wildlife Alert System using IOT

D. Surendra, Shaik Sharmila, Nallabothula Bhargavi, Kondeti Thanusha, Nalleru Manogna, Siddamreddy Bala Chennuru Gari Samyuktha.

Department of Electronics and Communication Engineering, Gouthami Institute of Technology and Management for Women, Andhra Pradesh, India.

To Cite this Article
D. Surendra, Shaik Sharmila, Nallabothula Bhargavi, Kondeti Thanusha, Nalleru Manogna & Siddamreddy Bala Chennuru Gari Samyuktha. (2026). Crop Monitoring and Wildlife Alert System using IOT. International Journal for Modern Trends in Science and Technology, 12(06), 30-34. https://doi.org/10.5281/zenodo.20573456

Article Info
Received: 12 May 2026; Revised: 30 May 2026; Accepted: 02 June 2026.

KEYWORDS

IoT,
ThingSpeak,
Arduino UNO,
ESP8266.

ABSTRACT

This project introduces an accessible solution for farmers to monitor crops and detect wildlife using IoT technology integrated with the ThingSpeak platform. Key components such as Arduino UNO, ultrasonic sensor, LM393 soil moisture sensor, DHT11 sensor, NodeMCU ESP8266, water pump, PIR sensor, LCD 16x2, buzzer, and ThingSpeak are seamlessly integrated. The system ensures optimal crop hydration by monitoring soil moisture and activating the water pump when necessary. Real-time temperature and humidity data are displayed on the LCD screen for easy observation. Wildlife presence is promptly detected through the PIR sensor, triggering the buzzer to alert farmers. Additionally, the ultrasonic sensor provides precise distance measurements of animals from the crops. Leveraging ThingSpeak, the system enables remote monitoring and data analysis, empowering farmers with actionable insights to manage crops effectively and mitigate potential threats. This user-friendly solution simplifies crop management and enhances agricultural efficiency for farmers of all levels.

1. INTRODUCTION

Farm crops are often attacked by local animals such as buffalo, elephants, goats and some type of birds. The farmer loses a lot because of this.

Deforestation occurs as a result of overcrowding, which leads to food shortages, water shortages, and protection in forest areas. As a result, the involvement of animals in the domestic environment is growing daily, posing a threat to human health and property, resulting in conflict between humans and animals. However, according to the laws of nature, all living things on our planet play an important role in the ecosystem.

Elephants and other animals that come in contact with humans are affected in a variety of ways, including the destruction of crops, damage to grain reserves, water, buildings, and other objects, as well as injuries and deaths. India's economy is based on agriculture. As the world's population grows rapidly, agribusiness is

increasingly important in solving human problems. It plays a vital role in the country's economy and the growth of farmers. It also provides a large number of job opportunities for the general public.

The Automated Smart Agricultural Protection System assists in the construction of a safety system to protect the farm and prevent the entry of animals.

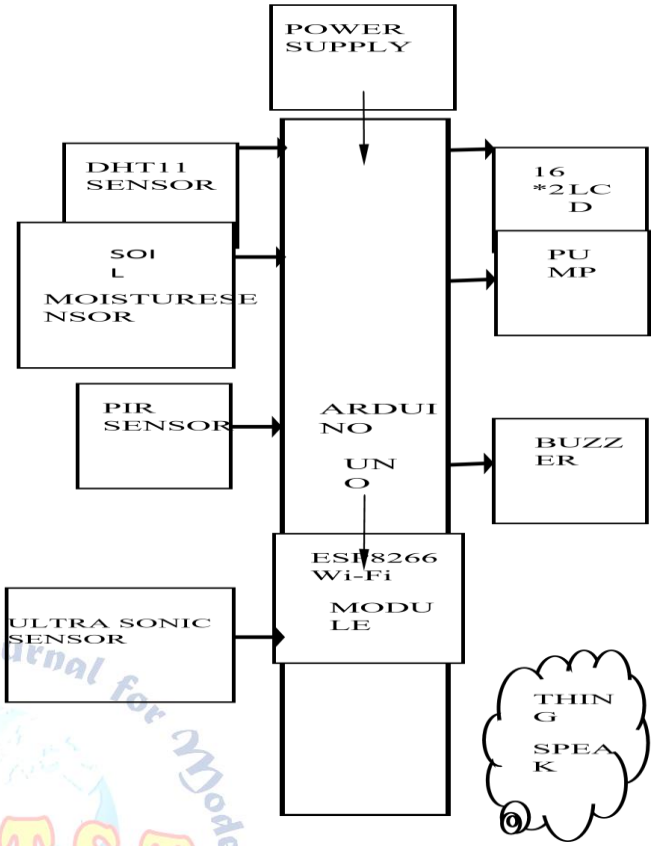
The system uses an IoT module to inform the farmer. It also helps to protect plants from wildlife. The system prevents the alarm from being triggered by a person's presence within the arena or by any random movement.

II.EXISTING SYSTEM

The existing crop field protection model integrates a GSM module for seamless communication and an ultrasonic sensor for deterring wild animals. By leveraging the GSM module, farmers gain the ability to remotely monitor and control their fields, receiving vital updates on environmental parameters promptly through cellular networks. This empowers them to make informed decisions and implement necessary measures to safeguard their crops against potential threats. Concurrently, the ultrasonic sensor assumes the crucial role of proximity detection, swiftly notifying the system of any wild animal presence nearby. However, it's essential to acknowledge that while the ultrasonic sensor is effective in many scenarios, it may encounter limitations in eliciting a strong visual deterrent effect on animals, potentially necessitating additional strategies for comprehensive crop protection.

III.PROPOSED SYSTEM

In the proposed model, we introduce a transformative system that redefines crop monitoring and wildlife alert mechanisms by leveraging IoT technology, specifically incorporating ThingSpeak for data visualization and analysis. Departing from conventional GSM-based approaches, our system harnesses the power of an IoT module alongside advanced sensor technologies. By integrating components like the Arduino Uno, ESP8266 Node MCU, PIR sensor, and ultrasonic sensor, our model offers unparalleled precision and versatility. Including the PIR sensor enhances wildlife intrusion detection capabilities, while the ultrasonic sensor provides accurate distance measurements. ThingSpeak integration facilitates real-time data visualization and analysis, empowering farmers to make informed decisions based on comprehensive insights.



This holistic approach not only enhances crop protection but also promotes ecological balance by facilitating proactive measures to mitigate human-wildlife conflicts.

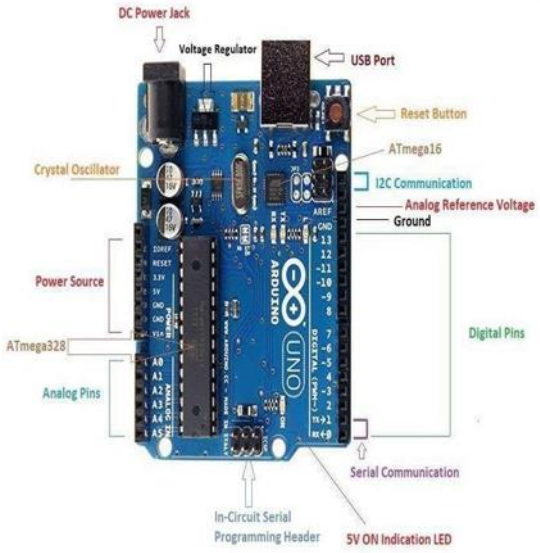


Fig 1: Arduino uno

Arduino is a tool that receives feedback from different detectors and performs calculations on board issues. Microcontroller development board for writing software for tackle circuit. Includes AVR Atmega328 microcontroller. It is a powerful 8-bit CMOS

microcontroller based on the RISC advanced AVR Armature Armature. It has 14 digital I / O legs, 6 analog input, 16 MHz oscillator demitasse, USB connection, power connector, ICSP header, and reset button. It contains everything you need to support your microcontroller. Just connect it to your computer with a USB cable or connect an AC plug or battery.

ESP8266

Fig 2: ESP2866

The ESP8266 is a powerful Wi-Fi module renowned for its versatility and affordability, making it a popular choice for IoT projects. With its integrated TCP/IP stack, this module enables seamless connectivity to Wi-Fi networks, allowing devices to communicate and exchange data over the internet. Its compact form factor and low power consumption make it ideal for embedding into various electronic devices and sensors. Equipped with a robust set of features, including GPIO pins for interfacing with external sensors and peripherals.

Sensors

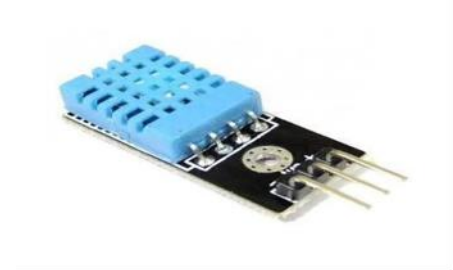


Fig 3: DHT11 Sensor

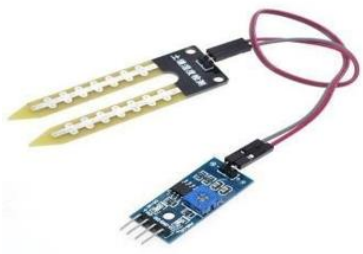


Fig 4: Soil moisture sensor

Fig 5: PIR Sensor

Fig 6: Ultrasonic Sensor

The ultrasonic sensor is adept at measuring distance by emitting sound waves and calculating their return time. Meanwhile, the DHT11 sensor offers reliable temperature and humidity readings, crucial for climate control and weather stations. Complementing these, the passive infrared (PIR) sensor detects motion through changes in infrared radiation, widely used in security and occupancy detection systems. Finally, the soil moisture sensor provides insights into soil moisture content through electrical conductivity, indispensable in agricultural and gardening contexts for optimizing irrigation and promoting healthy plant growth.

Arduino IDE software

To write the code for our Arduino boards, we need to download and install a piece of software called the Arduino IDE (Integrated Development Environment) on our computers.

The code is one that we can upload to our Arduino board. It features an integrated library manager that is also very user friendly, and it supports all Arduino boards. It is quite simple to use. A cross-platform tool called Arduino IDE allows a large number of users to build and upload programmes to an Arduino board. It can write programmes for Windows operating systems such as MAC OSX and Linux.

Thing speak

Thing Speak, developed by MathWorks, is an IoT platform designed for real-time data collection, analysis, and visualization from sensors or devices. It offers a cloud-based infrastructure for managing IoT data and supports various connection protocols such as HTTP,

MQTT, and its own REST API. Users can create customizable dashboards and visualizations to monitor and analyze data trends effectively. Integration with MATLABenables advanced data analysis and processing using MATLAB scripts.

ThingSpeak alsosupports IoT analytics and machine learning algorithms for tasks like anomaly detectionand predictive maintenance. Overall, it provides a comprehensive solution for a wide range of IoT applications, from environmental monitoring to industrial automation.

V.EXPERIMENTAL SETUP

The overall hardware assembly with entire experimental setup is shown in the figure

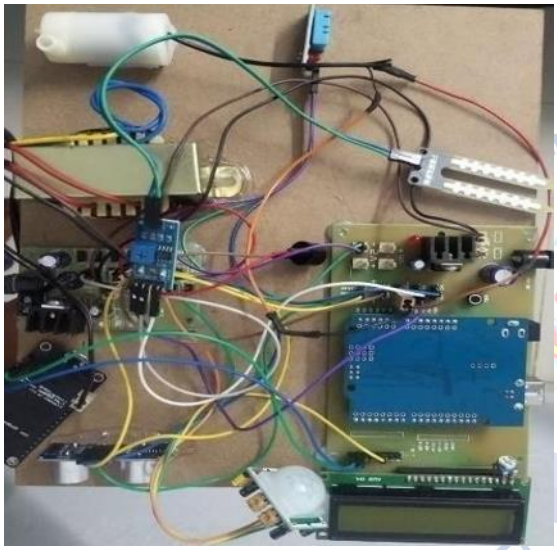


Fig 7:Complete setup of Proposed System

VI. RESULT

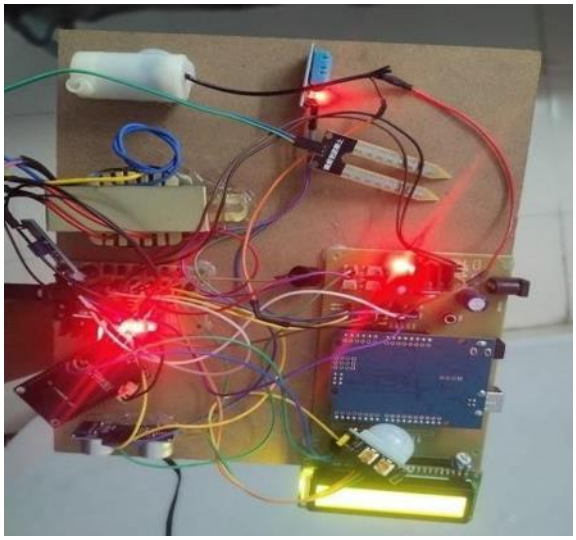


Fig 8: Experimental setup

15T06:18:33Z","entry_id":56,"field1":"SOME_ONE_TRIED_TO_ENTER_INTO_FARM"},
{"created_at":"2024-02-15T06:18:49Z","entry_id":57,"field1":"distance5.24cm"},
{"created_at":"2024-02-
15T06:19:21Z","entry_id":58,"field1":"SOME_ONE_TRIED_TO_ENTER_INTO_FARM"},
{"created_at":"2024-02-
15T06:20:30Z","entry_id":59,"field1":"SOME_ONE_TRIED_TO_ENTER_INTO_FARM"},
{"created_at":"2024-02-

Fig 9: Alert Signal on Thingspeak API

Fig: Wet Alert Pump Off

Fig: Temp and Humidity

Fig: Distance of animal

Upon turning ON the power supply, the DHT11 sensor immediately assesses humidity and temperature, relaying the data to the LCD for real-time monitoring. Meanwhile, the Soil moisture sensor diligently checks soil moisture levels, activating the pump when dry conditions are detected to ensure optimal irrigation, if the moisture is low then pump will turn ON and“DRY ALERT PUMP ON” is displayed on LCD else “WET ALERT PUMP OFF” is displayed and the pump will go OFF. The PIR sensor stands vigilant for any motion, promptly alerting the LCD with the message "ANIMAL DETECTED," while triggering the buzzer for immediate attention. Simultaneously, an alert is sent to ThingSpeak, indicating "SOMEONE
TRIED TO ENTER INTO FARM."

Additionally, the ultrasonic sensor diligently measures animal proximity, showcasing the distance on the LCD for precise situational awareness. This integrated system empowers farmers with comprehensive monitoring capabilities, promoting proactive crop protection and mitigating potential threats effectively.

VII.CONCLUSION

The implementation of our crop protection system represents a significant step forward in safeguarding agricultural fields. With the integration of IoT technology and various sensors, we've provided farmers with effective tools for monitoring environmental conditions and detecting potential threats. By enabling real-time alerts and proactive responses, our system empowers farmers to protect their crops more efficiently, ultimately leading to improved yield and sustainability in farming practices.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

REFERENCES

[1] V. Bavane, A. Raut, S. Sonune, A. Bawane, and P. Jawandhiya, "Protection of crops from wild animals using intelligent surveillance system."

[2] R. Vigneshwar and R. Maheswari, "Development of embedded based system to monitor elephant intrusion in forest border areas using internet of things," International Journal of Engineering Research, vol. 5, no. 7, pp. 594–598, 2016.

[3] T. Day and R. Mac Gibbon, "MultipleSpecies Exclusion Fencing and Technology for Mainland Sites.", Project Report published by National Wildlife Research Centre, 2007.

[4] Anju Agnihotri Chaba, "Farmers oppose revised hunting rules, fear significant crop losses", The Indian Express article. [5] Joaquín Gutiérrez, Juan Francisco Villa-Medina, Alejandra Nieto-Garibay, and Miguel Ángel PortaGándara, "Automated Irrigation System Using a Wireless Sensor

[5] Network and GPRS Module", IEEE Transactions on Instrumentation and Measurements, 0018-9456,2013

[6] Dr.V. VidyaDevi, G. Meena Kumari, "Real- Time Automation and Monitoring System for Modernized Agriculture",

[7] International Journal of Review and Research in Applied Sciences and Engineering (IJRRASE) Vol3 No.1. PP 7-12, 2013.

[8] Meonghun Lee, Jeonghwan Hwang, Hyun Yoe, "Agricultural Protection System Based on IoT", IEEE 16th International Conference on Computational Science and Engineering, 2013.