IoT Based Smart Crop Protection From Wild Animals And Irrigation System

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Abstract— This research paper explores the integration of smart crop protection systems and efficient irrigation techniques for sustainable agriculture. By leveraging technology and innovation, farmers can effectively monitor and deter wildlife encroachment on crops while optimizing water usage. The integration of these systems promotes ecological balance, minimizes crop losses, and enhances water efficiency, contributing to resilient and sustainable agricultural practice.

Keywords—Object detection, Virtual,Raspberry Pi, Bluetooth module, Image Processing.

INTRODUCTION

Agriculture faces significant challenges in ensuring crop protection from wild animals while optimizing water resources. This research paper explores the integration of smart crop protection systems and irrigation techniques as an innovative approach for sustainable agriculture. With the advancement of technology, farmers can employ intelligent systems, such as sensors, data analytics, and automation, to monitor and mitigate the impact of wildlife encroachment on crops. Simultaneously, efficient irrigation systems, including precision irrigation and automated techniques, enable optimal water usage based on crop requirements and environmental factors. This integrated approach aims to minimize crop losses caused by wildlife while promoting water conservation and sustainable agricultural practices. By effectively combining smart crop protection and irrigation systems, farmers can enhance crop productivity, reduce environmental impact, and ensure long-term agricultural sustainability. The benefits of this integrated approach are multifaceted. It enhances crop protection by minimizing losses caused by wildlife, promotes sustainable water management by optimizing irrigation practices, and ultimately contributes to increased agricultural productivity and global food security. By leveraging technology and innovation, farmers can protect their crops from wildlife encroachment while optimizing water usage.

LITERATURE SURVEY

Srikanth N et al.,[1] 2019, developed a model in which the PIR sensor detects movement when animals approach it. After receiving the first input signal, it is forwarded to be processed further. The microcontroller will then be given it. The system will be turned on, and it will send an SMS and make a phone call to the owner at the same moment. The PIR and Smoke sensor inputs are read using the Microcontroller Block. The microcontroller is in charge of the entire procedure. When movement or smoke is detected, the GSM module sends SMS to the farmer. It notifies the farmer that certain animals are attempting to access the farm. For SMS, our LCD data will be displayed.

Navaneetha P et al.,[7] 2020, have suggested a system that detects the presence of an animal using a PIR and ultrasonic sensor and sends an input signal to the controller. The APR board will be turned on, and music will be played. The flash light will be turned on at night, and a message will be sent to the forest department, as well as a phone call to the farmer. Solar panels or a controlled power supply will be used to provide power. The presence of an animal is displayed on the LCD. The GSM module is used to deliver SMS to farmers and make phone calls to them. As a result, it can be inferred that the design system is both practical and affordable for farmers

Tharun Vignesh N et al.,[3] in 2020, Camera, GSM Module, PIC Micro Controller, Buzzer, and PIR Sensor were proposed as part of a system. In the forest, a PIR sensor detects human movement, and the system then triggers a camera, which uses a PIC microcontroller and a built-in machine learning algorithm (OpenCV algorithms and Background Subtraction algorithm are used for image processing) to detect the person and give an alarm when an unauthorized person is present in the forest, as well as sending an SMS to the officials. Finally, when someone enters the forest in a prohibited zone, the forest ranger receives an alarm.

Mr.P.Venkateswara Rao et al.,[4] 2019, They employed an Arduino uno board, a camera module, a GSM modem, and buzzer speakers in the suggested system. Animals destroy crops, which is a major threat to farmers, so they installed cameras around the field to protect the crops from animals. The camera then sends the input images to the micro controller (Arduino uno board), which processes the given input data according to the programmed stored in the processor. If an animal is detected in the crop, the buzzer will ring to attract the animal's attention, as well as sending an alert SMS to the owner's mobile phone.

N. Banupriya et al.,[5] 2020, have proposed a system and suggested a system in which animals are identified, numbered, and described using deep learning and a template matching algorithm technique that which involves identifying a small section of an image with the template image. A deep convolutional neural network was used to train the dataset which based on the behavior of 48 breeds from distinct camera captures used in animal detection.

SUMMARY OF LITERATURE SURVEY:

In Existing method electric fences used to protect the crops from the wild animals. Due to high electricity animals are hurt widely and it is not only affects wild animals it also dangerous to the pet animals and even human beings. The electric fences is used for preventing the crops but in existing method camera was used for detecting the animals which is economically high cost.The indication is available in the system but it send the message only to the forest officer not to the leaving people in the farmland.

METHODOLOGY

• Existing System Analysis: The first step is to analyze the limitations of existing irrigation systems with added protection processes. These systems only warn neighboring areas and lack the ability to capture photos for later reference. • System Design: The proposed design is a security alarm system specifically designed for monitoring isolated fields or home gardens. The system consists of a camera and other components connected to a microcomputer, such as a Raspberry Pi, which remains operational 24x7. The camera continuously monitors the fields or orchards. • Motion Detection: The Raspberry Pi acts as the brain of the system and constantly checks for motion in the monitored area. If any movement is detected, the system proceeds to the next step. • Animal Detection: The Raspberry Pi performs image processing to identify the presence of animals in the captured images. By analyzing the images, the system can detect whether animals are present in the field. • Real-time Photo Access: When an animal is detected, the system captures real-time photos and makes them accessible over the internet. Farmers can access these photos through a web browser on devices such as computers or mobile phones. This enables them to view the situation in the field and take appropriate action. • Alerting Nearby Individuals: In addition to photo access, the system also alerts nearby individuals through buzzer vibrations. This ensures that people in the vicinity are promptly informed of animal intrusion, allowing them to assist the farmer and take preventive measures. • Enhanced Protection in Isolated and Nighttime Conditions: The proposed system addresses the specific challenges faced in isolated farmlands, hilly areas, and nighttime conditions when animal vandalism is more prevalent. By utilizing image capture and real-time alerts, the system provides effective protection to the crops and assists farmers in mitigating potential losses. By following this methodology, the proposed system ensures continuous monitoring of fields, animal detection through image processing, real-time photo access, and prompt alerting of nearby individuals, thereby enhancing crop protection .

Block Diagram

The block diagram showcases the integration of the Raspberry Pi, DHT11 Sensor, Moisture Sensor, LCD Display, and Camera in the system. The Raspberry Pi serves as the central processing unit and controls the overall functioning of the system. The DHT11 Sensor measures temperature and humidity levels in the environment and provides the data to the Raspberry Pi for monitoring and control purposes.The Moisture Sensor is embedded in the soil and measures the moisture content. It transmits this information to the Raspberry Pi for irrigation control and to ensure optimal watering of the crops. Display provides a visual interface to showcase important information such as temperature, humidity, and moisture levels. It is controlled by the

Raspberry Pi and allows the farmer to monitor the environmental conditions.The Camera captures real-time images of the field and sends them to the Raspberry Pi for further processing. It plays a crucial role in animal intrusion detection and provides visual evidence of any unauthorized activity.Additionally, the system may include a buzzer to provide audible alerts or notifications to the farmer in case of any critical events or alarms. Overall, this block diagram demonstrates the integration of multiple components that work together to monitor and control the environmental conditions, detect animal intrusion, and provide visual feedback to the farmer for effective crop protection and irrigation management.

Fig.3

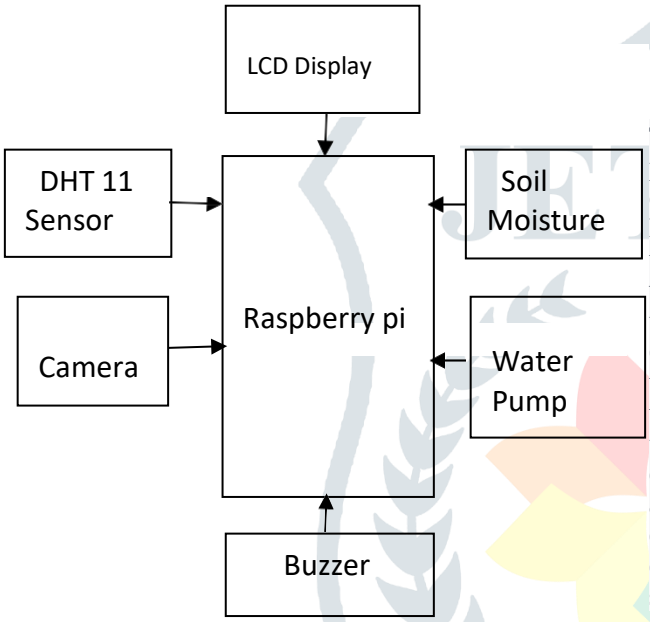

Fig.1

TEST AND RESULTS

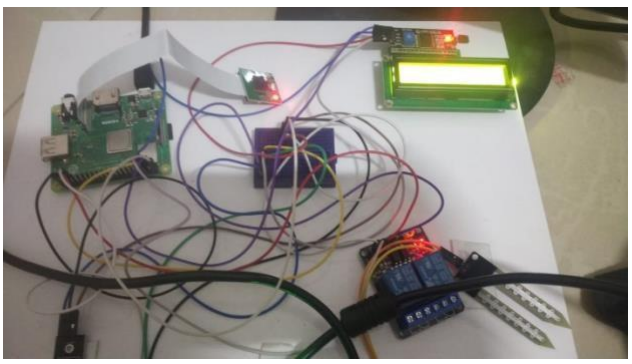

Fig.2

CONCLUSION

The research paper has explored the integration of smart crop protection systems and efficient irrigation techniques as a comprehensive approach for sustainable agriculture. By leveraging advanced technologies and innovative practices, this integrated approach addresses the challenges posed by wildlife encroachment on crops and the need for optimal water usage. The integration of smart crop protection systems and efficient irrigation techniques offers a promising solution to the challenges faced by modern agriculture. By embracing technology, innovation, and sustainable practices, farmers can protect their crops from wildlife encroachment while optimizing water usage, leading to resilient and sustainable agricultural systems. This integrated approach not only enhances agricultural productivity but also promotes environmental stewardship and contributes to global food security in the face of evolving agricultural challenges.

REFERENCES

[1]. Srikanth N, Aishwarya, Kavita H M, Rashmi Reddy K, ‘Smart Crop Protection System from Animals an Fire using Arduino’ (2019), 6, 4, (17-21).

[2]. Keerthi Raju, Kamakshi Kodi, Babitha Anapalli, Mounika Pulla, ‘Smart Crop Protection System from Animals and Fire using Arduino’ (2020), 9, 9, (261-265).

[3]. Tharun Vignesh N, Saravanan M, Satwik Thiruveedhi, V.S Prabhu, ‘Smart Surveillance for Intruder Identification in Forest Areas using Image Processing’ (2020), 7, 1, (69-75).

[4]. Mr. P Venkateswara Rao, Mr. Ch Siva Rama Krishna, Mr. M Samba Siva Reddy, ‘A Smart Crop Protection against animal’s attack’ (2019), 8, 6, (407-410).

[5]. Banupriya N, Saranya S, Swaminathan R, Harikumar S, Palanisamy S, 'Animal detection using deep learning algorithm', J Crit Rev, 7, 1, (434-439).

[6]. Gondal M D, Khan, Y N, 'Early pest detection from crop using image processing and computational intelligence' (2015), FAST-NU Research Journal, 1, 1, (59-68).

[7]. Navaneetha P, Ramiya Devi R, Vennila S, Manikandan P, Dr. Saravanan S, 'IOT Based Crop Protection System against Birds and Wild Animal Attacks', (2020), International Journal of Innovative Research in Technology, 6, 11, (138-143).