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Pest Control Management System in WSN – A Review

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Abstract*:* Farming has increasingly become dependent on chemical pesticides to have power over the pests that injure the crops. Discriminating concern over the environmental effects of pesticides, coupled with increased pest resistance and secondary pest out breaks, severely limits the effective pesticides available to farmers. At least cost and environmentally positive integrated intelligent pest control along with IOT while recognizing the pests by Wireless Sensor Networks (WSN), globally raise the productivity of crops and increase benefits to both producers and consumers.

Keywords—Agriculture, Irrigation, Internet of Things, Wireless Sensor Networks, Quality of Service

1. INTRODUCTION

With the widespread deployment of networked, intelligent sensor technologies, an Internet of Things (IoT) steadily evolving, which increases the production of high quality crops; improvement in profitability for both raw producers and reduction in damage to the environment. The idea overcomes computerized irrigation method which reduces human being involvement in the paddy fields. It creates a scheme which ensures good irrigation. It prevents the unfavourable belongings of over irrigation which leads to decrease in crop promotion. Monitoring pest insect populations is a fundamental issue in agriculture and forestry protection. One of the most popular methods to monitoring pests is by means of a set of traps strategically distributed across the desired monitoring area. To gather catch data, classically, human being operators visually check the traps and annotate the number of captured individuals with a frequency of 15 to 30 days. A main drawback which is takes for the drawbacks of labour intensive and therefore costly, monitoring of synchronized to measure the target pest population. The higher scalability being able to deploy in small monitoring areas or green houses. In large plantation extensions, by means of low-cost wireless image sensor less than 100 € per sensor can be used. It is good option to use WSN with IOT and screened by Digital Image Processing Methods.

Intelligent pest control system which is growing demand for real time services Quality of Service (QoS) based routing has emerged as an attractive research topic. Most Internet applications focus on providing information, interaction for humans. However, with the widespread deployment of networked, intelligent sensor technologies, IoT steadily evolving, much like the Internet decades ago. It increases the production of high quality crops; improvement in profitability for both raw producer and reduction in damage to the environment.

The system develops new target-oriented environmentally compatible pesticide formulations with different image processing techniques and WSN with IOT. The goal of this survey along with IOT was to reduce the health risks of pesticides through their sound management by facilitating the detection and control over it .The control of pesticides has been intensifying d in the past decade, relying to a substantial degree on the action of chemical pesticides to control vector populations or reduce disease transmission [1-3] . Pest control system which is growing demand for real time services QoS [6, 14] based routing has emerged as an attractive research topic. But involvement has QoS guarantee in wireless sensor networks raises important challenges [5]. Intelligent pest control system is an effectual way gets better small scientific civilization quality of the farmers, since the expert unable to go to the field to supervise the crop growing illness and insect pests. This survey introduces disease and insect pest control [8], which includes farming illness and insect pest control system, collecting disease and insect pest information using sensor nodes, data processing and mining with some image processing techniques etc. Intelligent pest control system using is WSN [9] and

along with some image processing methods were discussed. The system can make available a new way to access farming information for the farm to rural places.

The structure of paper is represented as follows: Section II deals with the related work. Section III presents the pest control techniques. Section IV presents the pest monitoring methods and Section V gives the conclusion to the work.

2. RELATED WORK

Extensive literature is taken care in the field of agriculture using WSN technology. The on-going developments in new miniaturized, low cost imaging devices and in wireless communication technology could give a valuable contribution in facing automatic monitoring of pest insects by establishing a wireless network of sensors able to remotely assess the adhesive traps captures in the field.

In order to overcome the problems associated with traditional irrigation procedures, WSNs based irrigation controlling mechanisms were presented in literature. Although, these methods were useful and solved most of the problems but each of these methods carries some limitations as well. For example, WSNs developed functions of tested and implemented in vineyard monitoring system which may work fine for vineyard but the same network cannot work for Maize crop field, because of different crop and circumstances. Although, these methods are useful in a sense that it reduces labours overhead, save time, reduce load on farmer, and regulate irrigation but these systems do not solve over irrigation, under irrigation, need based irrigation and water wastage.

WSN technology has several benefits as well as limitations. Controlled irrigation and proper use of fertilizer can reduce wastage and preserve resources. Proper use of pesticides could reduce our loss and maintain and improve quality of product and boost profitability. WSN has various issues which include limited power, physical security of hardware and software and security issues in routing operations; they are all still need to be addressed. This issue is turning into a modern science with the help of wireless sensor networks and other technologies. In future, this deals and takes care of following branches of agriculture science with technology orientation.

Environment Shield: It helps to reduce Nitrogen, Methane and Carbon and other dangerous gases and liquid emission.

Crop Surveillance: Primarily focus is to monitor and understand needs of crops according to weather and managing available resources.

Proficient Resource Distribution: WSN can help to reduce wastage, preserve precious resources and effective utilization them. In results efficiency has been improved, efforts decrease and boost economy [10]. Farmers will use this WSN technology for their benefits in future. Many agricultural areas could benefit if used properly. Some agriculture areas are still in research and among researchers like pest monitoring and control, immediate need of pesticides, monitor need of water and fertilizer [11, 12, 13].

3. PEST CONTROL TECHNIQUES

Following are the pest control mechanisms using WSN technology.

- Pesticides spraying
- Decision support system
- Using traps for pest removal
- Using of alarm signals
- Usage of correct chemicals for affected areas [14].

Using image processing concept, the captured image are processed in a better way for pest control methods. Various techniques applied on the images are given as follows.

- Image conversion
- Denoising of images
- Edge detection
- Two dimensional convolutions

4. PEST MONITORING METHODS

i. Monitoring of pest insect traps using image sensors and dspic:

The various kinds of pest insects can be observed using WSN technology. Image sensors have been used for tracking the images and transfer them to the remote station. Zigbee transceivers are used for communication. The system is based on a distributed imaging machine operated through a wireless sensor network using WiFi, WiMax, 3G / 4G. The station evaluates the insect density evolution at different farm sites and produces an alarm when insect density goes over threshold [15].

ii. Micro controller based auto irrigation and pest detection using image processing:

The method of image investigation is lengthily applied to agriculture science to give utmost protection to crops which can finally show the way to better crop organization and production [16].

iii. Monitoring pest insect traps by means of low power image sensor:

An independent monitoring system based on a low-cost image sensor that it is able to capture and send images of the trap contents to a remote control station with the periodicity demanded by the trapping application [17].

iv. Pest monitor and control system using WSN:

The system uses an acoustic device sensor which monitors the sound level of the pests and gives a sign to the farmer all the way through an alarm when the noise crosses a threshold [18].

v. Energy aware routing in WSN for pest detection in coffee plantation:

Propose an Energy aware Routing in WSN for Pest Detection (ERWPD) for transmitting the information of CWSB being during the Coffee Arabica plants through Cluster-Heads (CHs) to the sink node (a nodal center) [19].

vi. Pest detection and control techniques using WSN:

The pest detection and control methods include non technological techniques such as pesticides, biological control and natural chemicals. Technological control methods include genetic control and WSN technology [20].

vii. Microcontroller Based Adaptive Irrigation System Using WSN For Variety Crops And Development Of Insect Avoidance System For Better Yield:

Microcontroller Based Adaptive Irrigation System can be achieved by implementing the system using PIC 16F877a at the field area. This unit can communicate with remote PC via Zigbee module interfacing. Soil moisture sensor, Humidity sensor and Temperature sensor can be interfaced with PIC16F877a which has inbuilt ADC, and the data can be sent to PC serially via RF Zigbee module [21].

5. CONCLUSION

The increasing levels of insects in farm field have spoiled the agricultural outputs of growing crops of farmers. Therefore security these crops are major area of concern to be notified. Checking the pest insects has been done using WSN technology in this work.

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