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Research Article

WSN CONTROLLED INSECTS MONITORING: IDENTIFICATION OF ONION THRIPS

Tanuja Jha and Rashid Hussain*

Department of Electronics and Communication Engineering, Suresh Gyan Vihar University, Jaipur (Raj.)

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ABSTRACT

Agriculture is an essential component of sociality nowadays. Indians are the biggest concern of farmers, in front of farmers because of the low amount of rainfall it has to face the problem of dry areas of India. Due to flooding, due to the accumulation of excessive rainfall in the same area, the crop becomes a waste. Due to the poor quality of seeds, poor results are found in the yield of crops. It is also a waste of time, money and hard work. The impact of agricultural production, and affects, health, water quality and quantity, ecosystems, biodiversity, economy, and energy use and supply. We can monitor such parameters using wireless sensor networks. Most of the population in India is dependent on farming, hence agriculture is the main business here, but our business is in loss due to some reasons. This farming is the biggest harm to pests. There are also insects in vegetables harmful for us. So, today i am going to show my project to identify "Insects in onions" also called "Onion thrips".

INTRODUCTION

Wireless sensor networks (WSNs), sometimes referred to as wireless sensor and actuator networks (WSANs), are spatially distributed autonomous sensors for monitoring physical or environmental conditions such as temperature, sound, pressure, and their data through the network A major position. Modern networks are bi- directional, also allows control of sensor activity. Development of wireless sensor networks was motivated by military applications such as battlefield surveillance. Today such networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on. The impact of agricultural production, and affects, health, water quality and quantity, ecosystems, biodiversity, economy, and energy use and supply. We can monitor such parameters using wireless sensor networks. As shown in figure 1 below.

Wireless sensor networks include small devices, called nodes. There is power supply, sensor and a small computer in each node. Here we use electricity supply like a battery, in which there is a small solar panel also to charge. There may be one or more different types of sensors present in the same node. As we can see here an example, for the seismic speed and how much temperature it comes, we use the temperature sensor in the vibration sensor or the greenhouse. Here the computer transfers information from the sensor to the other nodes, because the computer listens to the sensor.

Corresponding author:* **Rashid Hussain
Department of Electronics and Communication Engineering, Suresh Gyan Vihar University, Jaipur (Raj.)

The computer is a low-power, low-cost device. Now any information that the nodes receive, by the computer, the nodes sends it to a point like the central computer or central computer server. The size of the nodes here is designed in millimetres [1], and the experts work to carry it from millimetres down to the micrometres, which means the size of the nodes is shrink. The cost of nodes is low, and as the technology is improving in the field of the same, the prices of the nodes are falling.

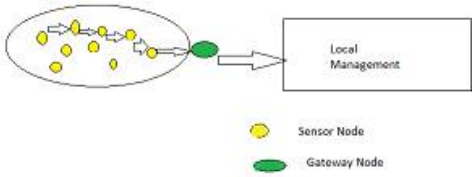

Figure 1 Wireless Sensor Network

Wireless sensor networks that work mostly work as conventional wireless networks, in which nodes create a link between each other one by one. As we can see here in the picture below, a node inside the transmission range creates a link with each node. There is only one difference in wireless sensor networks and conventional wireless networks, operated by the Communication Protocol in Conventional Wireless Networks and here we are doing the same. We are specially designed the protocols for sensor network operation[2]. In WSNs, the amount of data is generally low, so there is only one low bitrates is spoken again. Communications must be reliable so that the end user gets the correct data. The most important requirement for WSN protocol is that it should be full of energy. Nodes never waste their energy on unnecessary data-transmission because there is very limited energy in the

nodes. If there is a bad situation then there will be a need to be able to re-transmit the nodes and it will consume energy immediately, for the protocol to be reliable. On the other hand, if the nodes cannot re-transmit data in energy-efficient protocol, then communication here cannot be reliable. Here the need for an agreement is between the reliability and energy-efficiency[3].

Nowadays, it is easy to monitor the sensors sitting in the house for the farmers, in addition to this, they can scrutinize soil moisture, temperature, water flows or more in fields in a very quick and easy manner. These are examples of how we are moving forward in the field of agriculture with the help of WSN[4].

Today, we are witnessing a new culture revolution caused by the adoption of new technologies shocking: satellites, high precision positioning systems, intelligent sensors and the range of applications along with high-tech engineering.

Insect Identification

For the past two decades, Onions-Thrips, Thrips-Tabasi Lindeman has become a growing concern. There is distortion of blotches and undersized bulbs happen cause of T. tabaci feeds directly on leaves. There is a 50% loss due to the production of T. tabaci, but if this iris produces yellow spot virus then there is more damage[5].

Indians are the biggest concern of farmers, in front of farmers, because of the low amount of rainfall it has to face the problem of dry areas of India. Due to flooding, due to the accumulation of excessive rainfall in the same area, the crop becomes a waste. Due to the poor quality of seeds, poor results are found in the yield of crops. It is also a waste of time, money and hard work. Even if the crops are kept in cold storage, crops are also damaged as there is possibility of insects, moisture, running water, due to the release of the crop in the open[6]. Most of the population in India is dependent on farming, hence agriculture is the main business here, but our business is in loss due to some reasons. This farming is the biggest harm to pests[7]. Iris yellow spot virus for onion-thrips is a very effective virus, which is an organism that transitions infections from one host to another host. IYSV is a tospovirus, due to which the yellow color disease onion emerged in 2004 for the first time in Washington. IYSV symptoms can be seen on onion leaves and scamps, dry, brown and white-brown spots [8]. When I was studying the onion thrips we knew their thrips life cycle. There is a complete life-cycle of onion-thrips as shown in figure 2 below.

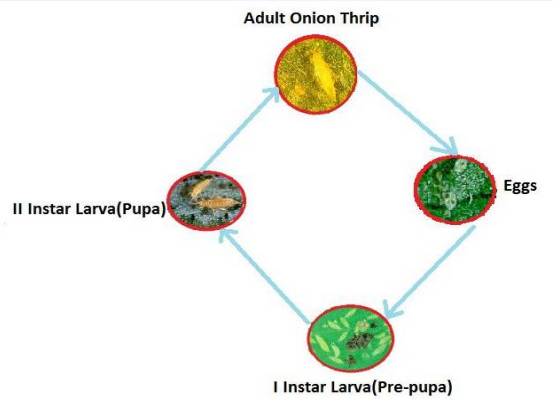

Figure 2 Complete Life-Cycle of Onion Thrip of 1 Year

The development of the onion thrips has three stages: adult, eggs, larvae. As we know, adult thrips feed has the impact and sucking behavior that can remove chlorophyll from onion plants. Adult thrips length of 0.06 inches, with yellow and brown body, two pairs of wings. Onion thrips, Bemisia tabaci is an important pest in most of the world's onion production areas. The juvenile and adult thrips fed with the removal of leaf chlorophyll caused by white to silver markings and stripe of the impact and sucking behavior.

The thrips grow rapidly in hot and dry conditions, which may lead to poor crop failures. The early bulb growth stage of onion growth is most sensitive to thrips feeding. Pesticides have always been the main strategies for their management; however, repeated applications often lead to thrips population resistance, natural enemy repression and unsustainable management [4]. The life history features of the onion thrips to enhance their pests and diseases include short reproductive times, high reproductive potential, female asexual reproduction (parthenogenesis) and the occurrence of protected non-feeding life stages. Adult life span is about 1 month; pre-oviposition period (time before egg-laying begins) is 1 week and females will lay eggs for about 3 weeks. There are Eggs are protected and at Non-Feeding Stage. It has color White to yellow; and in shape of kidney-bean shaped; and microscopic in size. At Larva Developing Stage; There are two Stages; Feeding & Non-Feeding. There are two larvas as called Instar I & Instar II are active and at feeding stage, which have length of (0.02-0.04 inch; 0.5-1.0 mm). And two Instars III & IV as also called Pre-pupa & Pupa are inactive & at Non-Feeding Stage. Which has length of (0.04-0.05 inch; 1.0-1.2 mm long). Recent studies have shown that most of the onion thrips plant is in a non-feeding stage (60-75% of the total number of onion plants in late June to August) and is therefore not exposed to pesticides and other inhibitory strategies. Onion thrips have a wide range of hosts, including grass and broad leaf. They are crops, family gardens, landscapes and greenhouse pests. Main vegetable hosts include onions, garlic, leeks, cabbage, rape, beans, tomatoes, cucumbers and asparagus. Common crop subjects include alfalfa, Small particles and cotton. They may damage bedding and some water [9].

Hardware to Identify Onion Thrips

Now, we will discuss about a “HARDWARE” used for Detecting Insects in Onions. Here, we are using “LDR SENSOR”, which has 3 parts; Sensor, Detector, Controller.

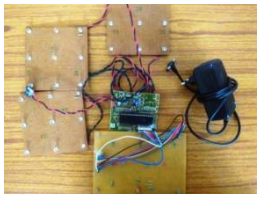

Figure 3 A Complete View of LDR as Sensor, Detector, Controller.

Input: In this project, our work is to identify the onion thrips. As we know, onion thrips attract by yellow lights. Therefore, we use the LED bulb here to attract the insects to the bulb, attracted by the yellow color rays coming out from the bulb. We have considered here the yellow light bulb as input.

Processing: As we know, the onion insects are attracted towards yellow light. If expanded, then we focus on the work of our input here, we have considered here the yellow light

bulb as input. Here is just one reason to use the yellow light bulb that we have to bring the onion insects near the sensor somehow, which we have planted near the bulb. As soon as the onion worms are attracted to yellow rays of light, they come in the range of sensors, our sensor recognizes these insects.

Output: As we know, the onion insects get attracted to the rays of yellow light and come in the range of sensors. A sensor is a device that detects some kind of input from the physical environment and responds to it. Specific input can be any one of the light, heat, speed, humidity, pressure or any other environmental event. Here we have taken the yellow light as input which is coming out of the bulb. As soon as insects come in the range of sensors, the sensor detects these insects. Now let us look at how we will know if insects have been detected by sensors. As we know, we have 8 resistors with 8 sensors corresponding and we have 3-set up LEDs for each sensor and resistors. Here we have taken 3-set up LEDs as output. When the sensor detects the insects, LEDs begin to glow light. It shows us that insects have become identify.

Idea: As we know, we are using a new idea in this research to identify the onion insects. Now, let us look at what we have used Idea. We have installed a sensor near the yellow light bulb so that the light of the bulb is on the sensor. We are using here I/P LDR which have 8 ADC sensors with 8 resistors on PCB corresponding to 3-set up LEDs using as O/P. When yellow light falls on LDR(sensor), onion thrips attracted toward yellow light and come in range of sensor. As soon as insects come in range of sensor, there are 3-set up LEDs are automatically glow-up. There is proposed system is shown in fig.4 below;

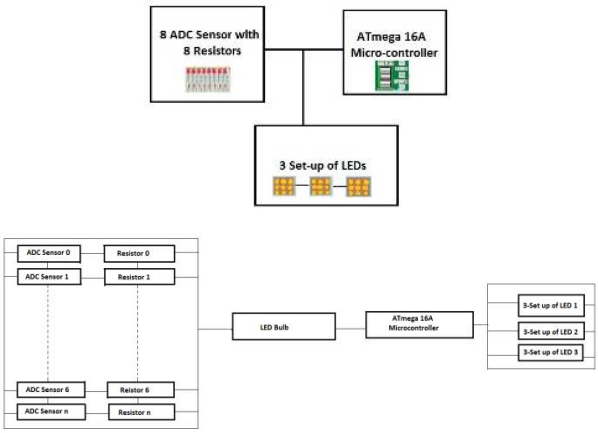

Figure 4 Block Diagram Proposed System

We do our coding in C, there is a flowchart of our C code as shown below;

This is the graphical representation of our C coding. We have also algorithm representation of our coding as shown in below;

We fixed a value 800, it means if our value is below than 800 as; LDR0<800 (it means LED Bulb is Off) and if our value is more than 800 as; LDR>800 (it means LED Bulb is On). As shown below, we have shortcreen of our coding;

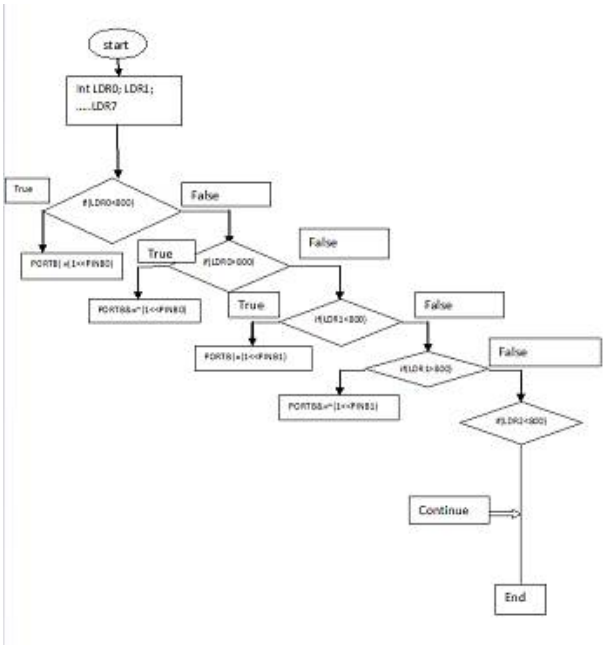

Figure 5 Flowchart of C coding.

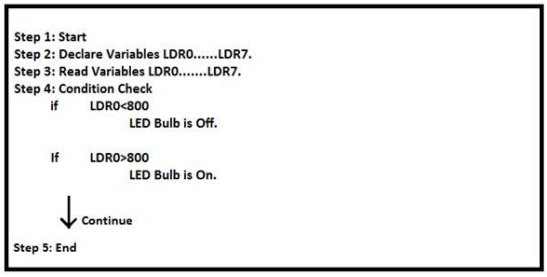

Figure 6 Algorithm of C coding.

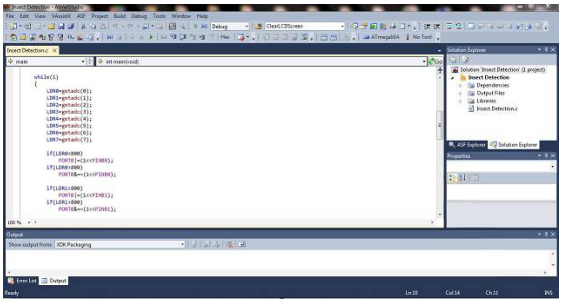

Figure 7 Short screen of C coding

CONCLUSION

Identification of insect through WSN a new research trend for engineers and Agriculture technology. As behaviour of insect vary which damages our crops identified through sensor technology. Onion thrips identified through colour attraction. In future research can continue for other insects according to their behaviours and damages.

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