



ISSN (Print) : 2320 – 3765  
ISSN (Online): 2278 – 8875

# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016

## Automatic Monitoring of Pest Trap

Mary Monisha Raphael<sup>[1]</sup>, R.Maheswari<sup>[2]</sup>

M.E(Communication Systems), Dept. of ECE, Agni college of B.E, (M.E)Technology, Chennai, India

Senior Assistant Professor, Dept. of ECE, Agni college of Technology, Chennai, India

**ABSTRACT:**It is an important issue to protect the crop by monitoring of pest insect. At farm level insect population monitoring is consistently operated by repeated surveys adhesive traps by a human operator, disseminated through the field, where insects trapped it remains stuck inside the box when attracted by the ultraviolet light. This is a laborious and time-consuming activity, and it would be of great advantage for farmers to have a system performing this task automatically. A system based on capturing image and distributed imaging device that is able to automatically acquire and transmit images of the trapped insects to a remote host station. This paper proposes an autonomous monitoring system based on a low-cost image sensor that it is able to capture and send images of the trap contents to a control station. Ultraviolet light is attached to a square shaped yellow board where the insect get attached to it, according to the time scheduled program in software which is inserted to raspberry pi the camera get captured automatically and sends MMS to the scientist through GPRS server.

**KEYWORD:**Capturing images, trapped insect, transmitting images through MMS.

### I. INTRODUCTION

Agriculture is one of the most important sources for human sustenance on Earth. Not only does it provides the much necessary food for human existence and consumption but also plays a major role in the economy of the country . Millions of dollars are spent worldwide for the safety of crops, agricultural produce and good, healthy yield. It is a matter of concern to safeguard crops from Bio-aggressors such as pests and insects, which otherwise lead to widespread damage and loss of crops. In a country such as India, approximately 18% of crop yield is lost due to pest attacks every year which is valued around 90,000 million rupees. Without gathering information about the insect dynamics it is almost impossible to execute the appropriate pest control at the right time in the right place. Conventionally, manual pest monitoring techniques, sticky traps, black light traps are being utilized for pest monitoring and detection in farms. Manual pest monitoring techniques are time consuming and subjective to the availability of a human expert to detect the same. Sticky traps and black light traps are less effective and also prone to cause harm to environmental friendly insects. As a preventive measure farmers spray pesticides in bulk which are detrimental and hazardous to the ecosystem. In order to address these disadvantages, several present day pest detection and control methodologies exists which include image processing based pest identification. These two methodologies involve several complex image processing algorithms to achieve the same and are limited to a field environment. An average of pests accumulated on the trap on a particular day gives us the density of pest population in the field. Remedial measures can be taken based on the density. Integrated pest management relies on the accuracy of pest insects monitoring techniques.

### II. LITERATURE REVIEW

In this literature section we will discuss some methods which previously used for early pest detection of crops in agriculture field and in greenhouse along with their advantages and disadvantages. The method are explained below with their features and drawbacks.

#### 2.1 Method of detecting pest using Static images.

The method of using static images is published by Sabine Moisan, Paul Boissard. In this method the image capturing is down with the scanner, the next processing is image processing it gives very good result but the main disadvantage is to use scanner for image acquisition also it takes hours for generating the results. When we capture the image there may be capability that the pest may fly away or there may be a chance of blurring of the image. In this method there is possibility of improper false result.

# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016

## 2.2 Method of catching pest using sticky traps.

The method of using sticky traps is published by Olivier Nicolas, Bruno Paris, Sabine Moissan, and Vincent Martin. In this method sticky traps are used to detect the pest, sticky material which is on the sticky traps attacks the pest due to their the main disadvantage is that the development of the pest must be completed by the time it reaches the sticky trap by the time all the crops would have affected and damaged.

## 2.3 Method of identifying the image of pest using image processing.

The method of using image processing is published by Murali Krishna, Jabert.G. In this method the population of the building up pest to be decreased for that an automatic pest detecting algorithm using image processing techniques in MATLAB has been proposed image acquisition device is used for acquire image of plantation at regular intervals. In image processing they will already store some captured images of the pest and they will compare it to the newly captured images to identify the pest . All the images will be in the blocks of black and grey. Later this images are then subjected to pre-processing, transformation and clustering.

## III. PROPOSED METHOD

Method of this study, yellow sheet board have been chosen because the pests get attracted fast in this yellow board with ultraviolet lights. Samples are collected by using a pan tilt web camera with zoom and also can capture in low light in field as show in figure.

Images can be captured according to time setting .Once the image is acquired the next step is to send those captured images to the agriculture office through MMS with two servers such as FTP server (File Transfer Protocol Server) and GPRS server (General Packet Radio Server)

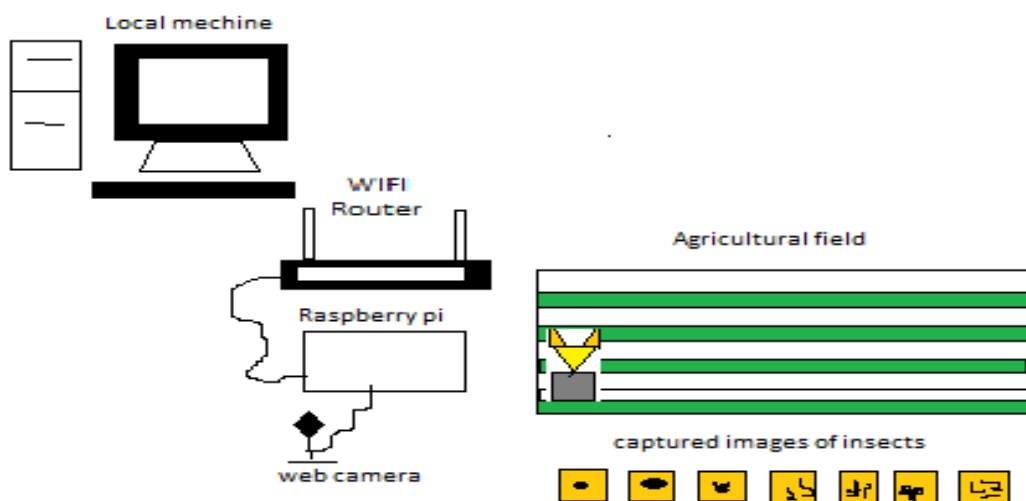


Figure 1: Overview of the system

## IV. METHODOLOGY

Every image processing system application always begins with image acquisition. This image are captured by using two ultraviolet lights on both sides of a square board below this it is connected with a funnel shaped board coloured yellow in which there is a small hole in middle of funnel where all the pest will fall in to pan tilt web camera.

Biological effect of ultraviolet are greater than simple heating effects and many practical applications of ultraviolet radiation derive from its interaction with organic molecules. Flying insects are attracted to bright yellow, blue or white colour. This yellow square shaped board is placed throughout the growing area among the plants, attracts pest. Raspberry pi kit is placed inside which is also called as a mini computer or second low power desktop.

# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016

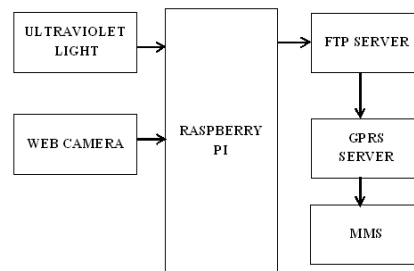


Figure 2: System Design

There is a pan tilt web camera placed inside which is connected to raspberry pi, according to the software program using python coding in Linux the program will be loaded in raspberry pi with the help of a memory card, which will capture images for every time slot and save those captured images in a file in raspberry pi folder.

#### 4.1 Capturing to a file

Capturing an image to a file is as simple as specifying the name of the file as the output of whatever captured () method required. If we are using a picamera the coding will be like with picamera.picamera() as camera:

The files will be saved in the directory, in directory under home, in home under a folder with a file name. If suppose the folder name is picamera and the file name is timelapse then the coding will be like DIR=/home/picamera/timelapse.

Note that the file opened by picamera() will be flushed and closed so that when the capture method returns, the data should be accessible to other processes.

#### 4.2 Capturing resized images

Sometimes, particularly in scripts which will perform some sort of analysis or processing on images, you may wish to capture smaller images than the current resolution of the camera. Although such resizing can be performed using libraries like PIL or open CV, it is considerably more efficient to have the Pi's GPU perform the resizing when capturing the image.

This can be done with the resize parameter of the capture() method, time.sleep(2) camera.capture('foo.jpg',resize=(320,240)). This coding is used for resizing the captured images as smaller as it is or bigger than it size. The resize parameter can also be specified when recorded videos with the start\_recording() method.

#### 4.3 Capturing in low light

Using similar tricks to those in capturing consistent images, the pi's camera can capture images in low light conditions. The primary objective is to set a high gain, and a long exposure time to allow the camera to gather as much light as possible. The shutter speed attribute is constrained by the camera's framerate so the first thing we need to do is set a very slow framerate.

The following script captures an image with a 6 second exposure time. The coding format is camera.framerate=Fraction(1,6), camera.shutter\_speed=6000000,camera.exposure\_mode='off',camera.capture('dark.jpg') in anything other than dark condition, the image produced by this script will most likely be completely white or at least heavily over-exposed.

## V. CONCLUSION

Capturing the image of the pest and processing those images for more information would help the farmer in the field of agriculture. First objective is to detect flies, aphids, on agricultural crops. Here a novel approach is proposed for early detection of pest. To detect objects by using pan tilted web camera with zoom and ultraviolet lights and raspberry pi kit with wifi connection. So without disturbing or killing the pest the user can able to take the image. It illustrates the collaboration of complementary disciplines and techniques, which led to an automated, robust and versatile system.

The prototype system proved reliable for rapid detection of pest. It is rather simple to use and exhibits the same performance level as a classical manual approach. Further research is still needed to improve the robustness of the measurement, to obtain more specific information further have to send MMS to the receiver using GPRS server the captured images is transferred to the host station.



ISSN (Print) : 2320 – 3765  
ISSN (Online): 2278 – 8875

# International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 4, April 2016

## REFERENCES

- [1] AM Shelton, FR Badenes “Concepts and Applications of Trap Cropping In Pest management” published by department Of Entomology, Cornell University, New York State Agricultural Experiment in IEEE2006.
- [2]C. Jongmanetai, "Automatic identification of whiteflies, aphids and thrips in greenhouse based on image analysis", International journal if Mathematics and computers in simulation, vol. 1, pp. 48-53, 2007.
- [3]GeorgiyPekhteryev, ZaferSahinoglu, Ghulam Bhatti, “Image Transmission over IEEE 802.15.4 and ZigBee Networks” published by in IEEE ISCAS 2005.
- [4]G.H. E. L. de Lima, L. C. e Silva, P.F. R. Neto, “ WSN as a Tool for Supporting Agriculture in the Precision Irrigation,” sixth International conference of Networking and Services (ICNS), 2010, pp. 137 – 142
- [5] Jian, J.-A., Tseng, C.L., Lu, F.M., Yang, E.C., Wu, Z.S., Chen, C.P., Lin, S.H., Lin, K.C., Liao, C.S. “A GSM-based remote wireless automatic monitoring system for field information: A case study for ecological monitoring of the oriental fruit fly, *Bactrocera dorsalis* (Hendel).” J. Comput.Electron. Agric., 62, 243–259, 2008.
- [6] K. S. Srinivas, B. S. Usha, S. Sandya, and Sudhir R. Rupanagudi, "Modelling of Edge Detection and Segmentation Algorithm for Pest Control in Plants", International Conference in Emerging Trends in Engineering, pp. 293-295, May 2011.
- [7]K. Yunseop, R. G. Evans, and W. M. Iversen, “Remote Sensing and Control of an Irrigation System Using a Distributed Wireless Sensor Network,” Proc.Of IEEE Transaction on Instrumentation AND Measurement, USA, vol. 57, no. 7, pp. 1379 - 1387, July 2008.
- [8] .L. Ruiz-Garcia a, P. Barreiro a, J.I. Robla b, 8.”Performance of ZigBee-Based wireless sensor nodes for real-time monitoring of fruit logistics” in Elsevier in 2008.
- [9] “Networking wireless sensors” by BhaskarKrishnamacharya, Cambridge University Press 2005
- [10]Philip Lewis, David Gay, 2009.TinyOS Programming. Cambridge University Press
- [11]Shelton, A.M., Badenes-Perez, F.R. “Concepts and applications of trap cropping in pest management”. Annu. Rev. Entomol. 51, 285–308, 2006.
- [12]TokihiroFukatsu, Tomonari Watanabe, Haoming Hu, Hideo Yoichi, Masayuki Hirafuji, “Field monitoring support system for the occurrence of *Leptocorisachinensis* Dallas (Hemiptera: Alydidae) using synthetic attractants, Field Servers, and image analysis”. Computers and Electronics in Agriculture (Elsevier), Vol. No. 80. Pg. No. 8-16, August 2012
- [13]X. Li, Y. Deng, and L. Ding, "Study on precision agriculture monitoring framework based on WSN," international Conference on Anti-counterfeiting, Security and identification, vol. 2, pp. 182185, August 2008.
- [14] Yuee Liu, Jinglan Zhang “Towards Continuous Surveillance of Fruit Flies Using Sensor Networks and Machine Vision” published by the department of networking and mobile computing Microsoft QutEresearch Centre in IEEE2009.
- [15] Y. Xijun, L. Limei, X. Lizhong , “ The Application of Wireless Sensor Network In the Irrigation Area Automatic System”, :International Conference on Network Security, Wireless Communications and Trusted Computing (NSWCTC), vol.1, pp.21- 24, Dec.2009
- [16] “Introduction To Matlab For Engineering Students” By David Houcque North Western University (version 1.2, August 2005)