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IOT Based Insect Detection for Crops using Raspberry Pi

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ABSTRACT: Insect attack on crops is a major problem faced by farmers. This attack starts on small scale from one insect on single crop to whole farm. This leads to damaging of crop and causes huge loss to farmers. To avoid such losses, farmers use the traditional method of spraying pesticides time to time. But excess use of pesticides also leads to damaged and low-quality crops. To avoid such issue, we are proposing the IOT Based Farm Crop Protection from Insects using Raspberry Pi. This is a Raspberry pi controlled system. It uses camera to detect the insect near trap, GSM module for alerting the farm owner through SMS, ultrasonic buzzer for making insects go away from field, rain sensor and soil moisture sensor.
Using the machine learning algorithm, the type of insect is detected and the data is sent. The buzzer turns on to drive the insects away from farm. The additional data regarding the soil moisture and rain is sensed using specified sensor and the data is sent to the owner using GSM module.

KEYWORDS*:* insect detection, crop protection, raspberry pi, agriculture

I. INTRODUCTION

In India agriculture has always been an important part. Approximately 70% of India's population relies on the agricultural sector. Healthy crops are the most important thing to farmer as well to the economy. But the crops mostly get attacked by the different types of insects. This damages the crops and affects the overall growth; thus, it is important to avoid such damages. The objective of this project is early detection of insects in farm and alerting the farm owner so that the damage insect attack can be avoided earliest. The additional objective is to give the type of pesticide to be used for detected insect. It is evaluated that early insect detection can reduce the crop or yield loss for around 40 percent.
In this project we are using raspberry pi as the main controller and CNN (Convolution Neural Network) technique for image classification. This technique is simple and provides the accurate results. This model also includes camera, GSM module, ultrasonic buzzer, soil moisture sensor.

II. PROPOSED SYSTEM

In the proposed system, the crops are monitored using camera and sensors are used to give the information regarding soil moisture and rain arrival. This system also uses GSM Module and ultrasonic buzzer. The camera captures the image of trap at random instances and sends the data or picture for pre-processing. If the insect is present it is detected through the feature extraction and the input is given to the raspberry pi. When the insect is detected, the buzzer is turned on and the massage is sent to the owner using GSM Module.
The soil moisture is checked using soil moisture sensor and the data is given through SMS, similarly the farmer is alerted about the rain when rain detector detects rain.

Fig1. Shows the block diagram of IOT Based Farm Crop Protection from Insects using Raspberry Pi

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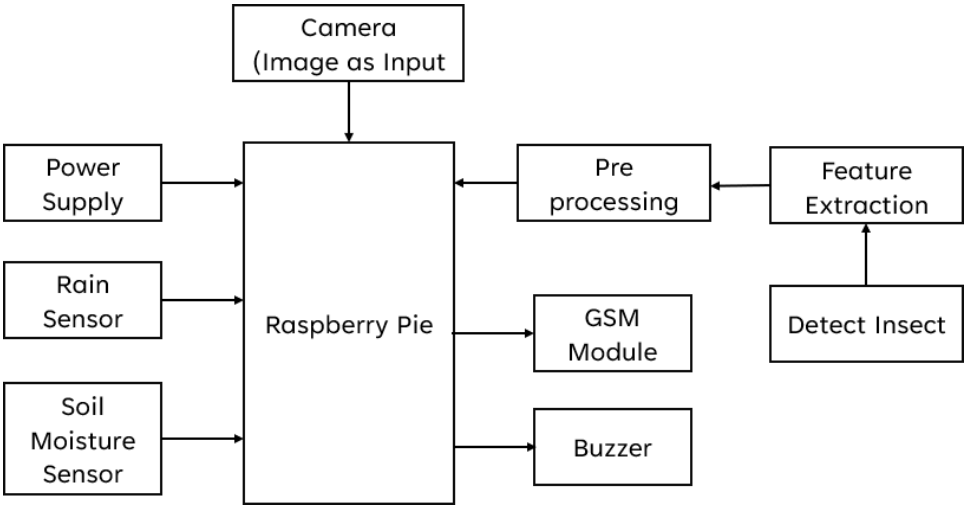

Figure 1 Block diagram

1. Raspberry Pi:

Hardware used

Figure 2 Raspberry Pi

The Raspberry Pi is a range of compact single-board computers (SBCs) that were created in partnership between the Raspberry Pi Foundation and Broadcom in the UK. The primary aim of the Raspberry Pi initiative was initially focused on promoting computer science education in schools and underprivileged regions. The original Raspberry Pi model gained unexpected popularity beyond its intended market, with enthusiasts adopting it for various purposes like

robotics. Its affordability, versatility, and open-source design have made it a popular choice for applications such as weather monitoring. The device's compatibility with standard interfaces like HDMI and USB has also made it a favored option among hobbyists and electronics enthusiasts.

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2. GSM Module

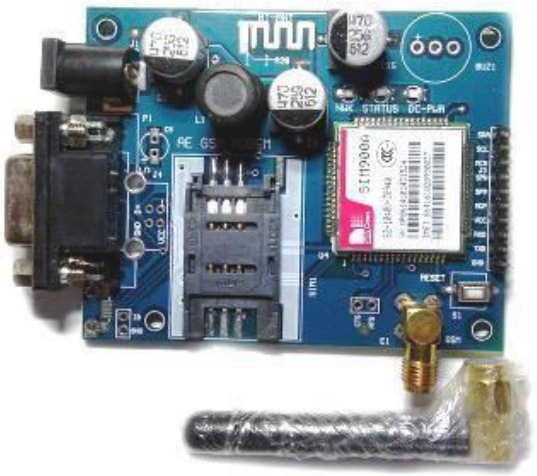

Figure 3 GSM Module

A GSM/GPRS modem is a type of wireless modem that is designed to facilitate communication over the GSM and GPRS networks. Like cell phones, the device requires a Subscriber Identity Module (SIM) card to establish communication with the network provider. Similar to cell phones, these modems have a unique International Mobile Equipment Identity (IMEI) number for identification purposes. Originally developed to comply with the second-generation (2G) digital cellular network standards used by mobile phones, it has now become the universal standard for mobile communications worldwide.

3. Buzzer

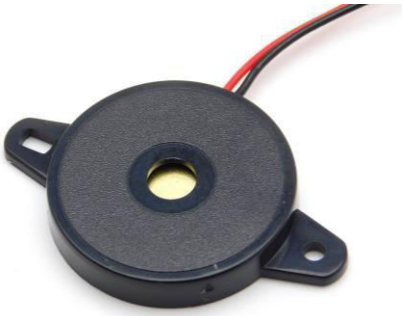

Figure 4 Buzzer

A piezo buzzer is an electronic component utilized for generating an audible tone. These buzzers are lightweight, simple in design, cost-effective, and dependable. They are available in various sizes and frequencies to cater to almost any application requirement. The primary feature that distinguishes this type of buzzer is its piezoelectric element. Piezoelectric components are crafted from specific materials that demonstrate the piezoelectric phenomenon. This effect allows the material to transform some of the energy from an external mechanical strain into an electric charge. Furthermore, these materials demonstrate the converse piezoelectric effect, which means that they undergo deformation when an electric charge is imposed on them.

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4. Soil Moisture Sensor

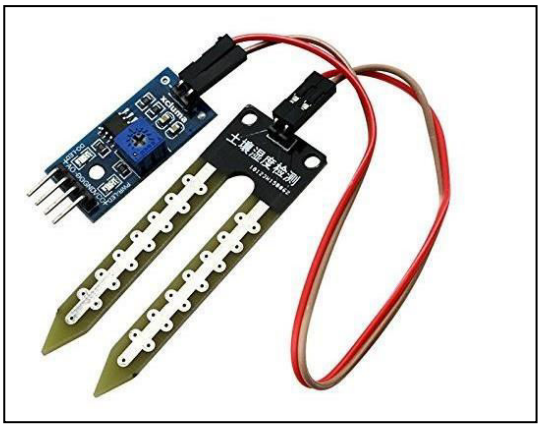

Figure 5 Soil Moisture Sensor

A soil moisture sensor is an instrument that assesses the volumetric water content in the soil. It employs an alternative property of the soil, such as electrical resistance, dielectric constant, or interaction with neutrons, as an indicator of the soil's moisture level. It is necessary to calibrate the relationship between the measured property and soil moisture content because it can change based on the environment, including the type of soil, temperature, and electrical conductivity. Remote sensing relies on reflected microwave radiation that is affected by soil moisture. Soil moisture sensors usually pertain to sensors that gauge the volumetric water content in soil.

5. Rain sensor:

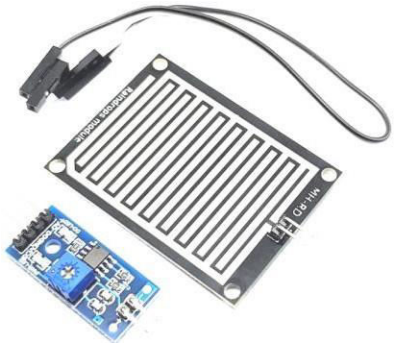

Figure 6 Rain Sensor

A switching device that is triggered by rainfall is known as a rain sensor or rain switch. For rain sensors, there are two main uses. The first is a water-saving gadget that is attached to an automatic irrigation system and causes it to turn off during a downpour. The second is a device that shields an automobile's interior from the elements and supports the automated windscreen wiper function. Rain produces a parallel resistance route that the operational amplifier may use to compute when it falls on the board. This sensor is a resistive dipole, and it solely displays resistance based on moisture. For instance, it exhibits more resistance while dry and lesser resistance when wet.

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Flow chart

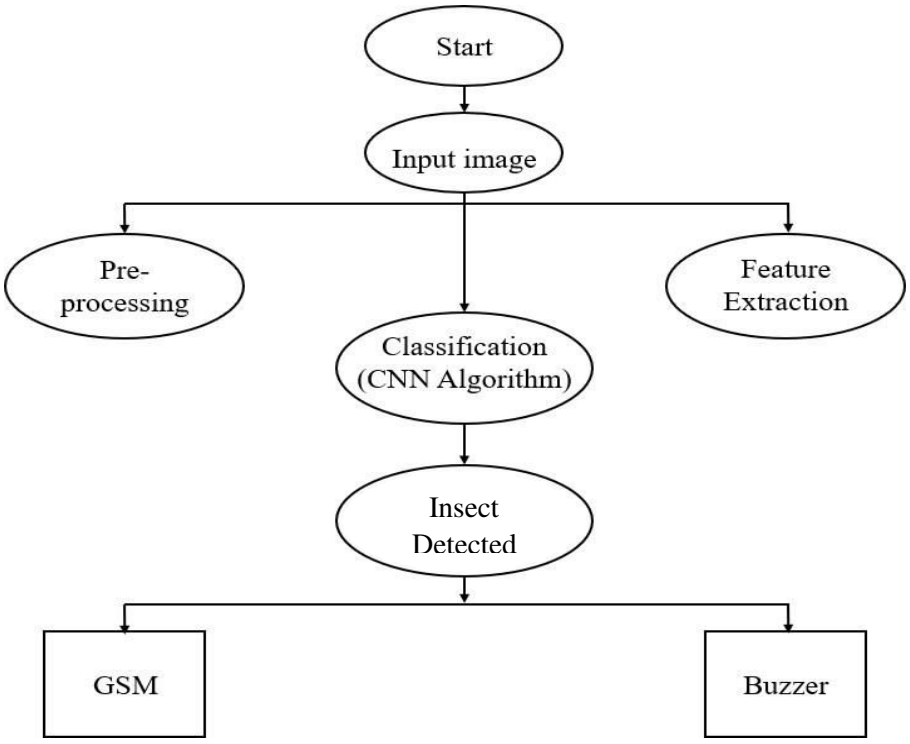

Figure 7 Flow Chart

III. RESULTS

Figure 8.1. Image detection window

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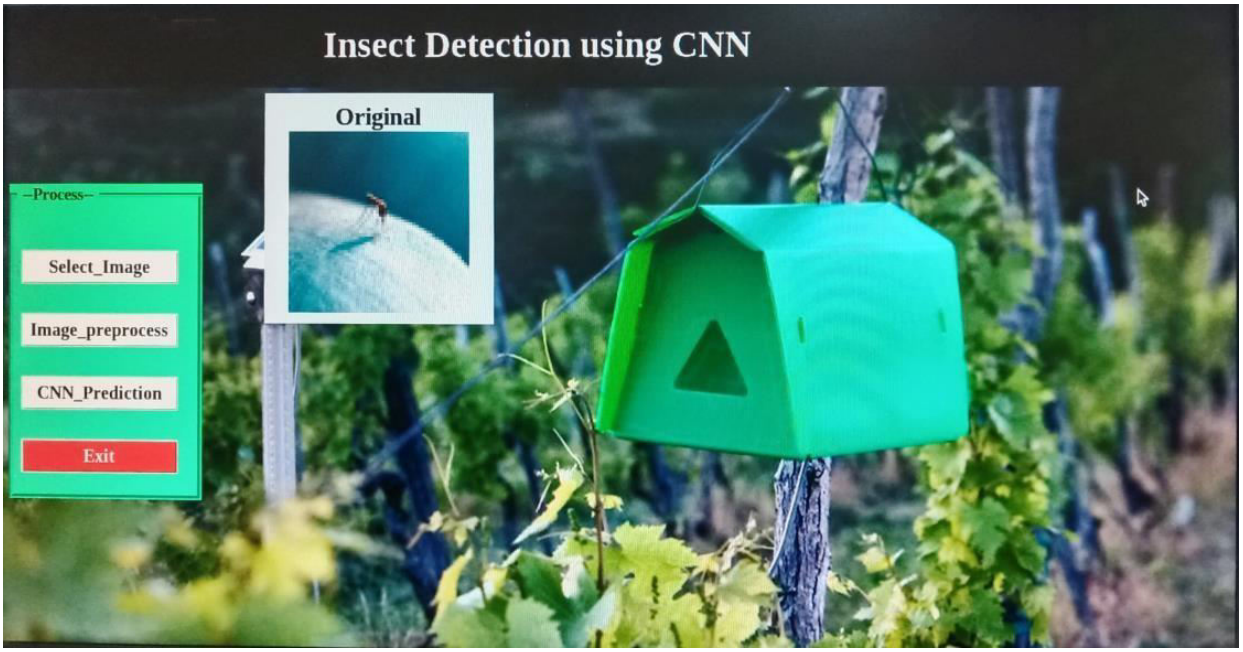

Figure 9. Select Image

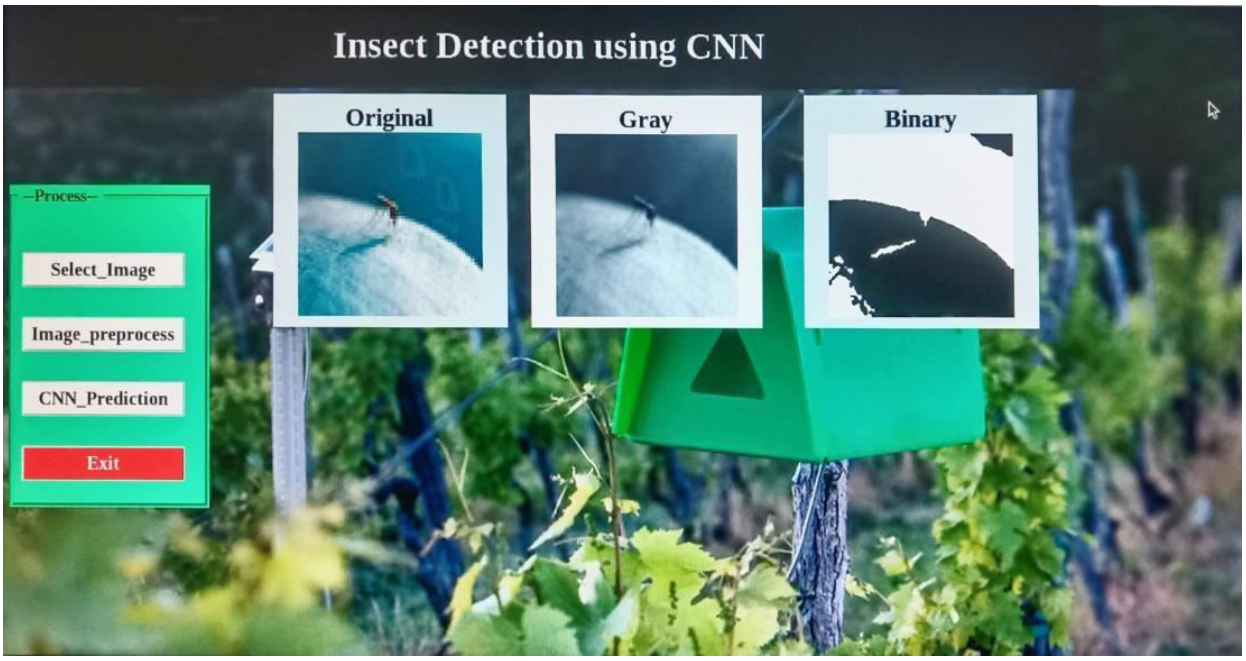

Figure 10. Image processing

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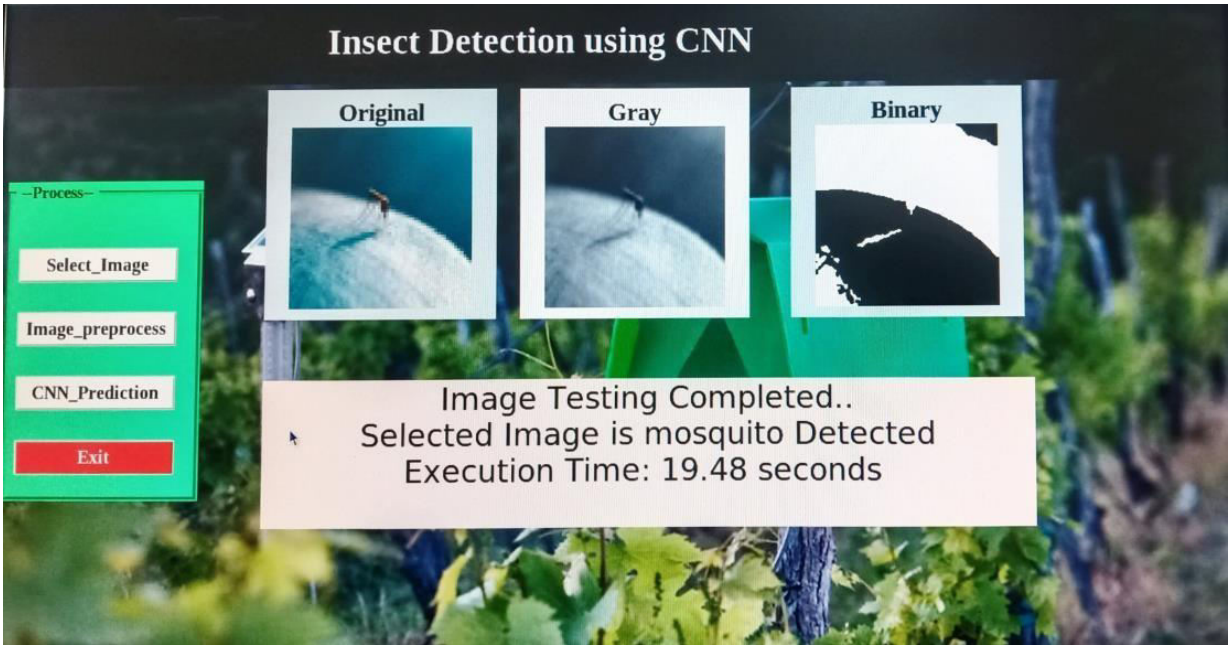

Figure 11. CNN output

IV. CONCLUSION

An IOT based Farm crop protection from insects System detects the presence of insect in the field. Using Image Processing and CNN algorithm the type of insect is detected and the data about that insect is provided to the field owner via GSM Module in text format. At the same time Piezoelectric buzzer is turned on which generates ultrasonic sound which produces the ultrasonic waves. These waves make the insect to move away from the field. In this way the crops will be protected from the attacks of insect. Along with this the Soil moisture and rain detector is used to give the additional information to the farmer for better rearing of crops.

V. FUTURE WORK

In future, the project can be enhanced on large scale. Updated dataset can be used to detect insects and based on type of insect detected, the pesticide to be sprayed can be selected and sprayed automatically over affected area. The same data can be sent to owner and the owner can also control the application on pesticides from remote location.

REFERENCES

1. Varshini B.M, Sushma A.V: “SMART CROP PROTECTION USING ARDUINO” International Advanced Research Journal in Science, Engineering and Technology Vol. 8, Issue 7, July 2021. DOI: 10.17148/IARJSET.2021.8741
2. Srikanth N, Aishwarya, Kavita H M, Rashmi Reddy K, Soumya D B Assistant professor, UG students Dept of ECE, RYMEC, Ballari: “Smart Crop Protection System from Animals and Fire using Arduino” International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE) Vol 6, Issue 4, April 2019
3. Agreem Ghosh, Dr. Bindu Garg: “Smart Ultrasonic Animal & Insect Repeller Through IOT” INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY. September 2020| IJIRT | Volume 7 Issue 4 | ISSN: 2349-6002

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