



**International Journal of Advanced Research in
Education and Technology (IJARETY)**

Volume 11, Issue 3, May-June 2024

Impact Factor: 7.394



Solar Power Based Multipurpose Agriculture Robot with Leaf-Disease Detection

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ABSTRACT: The detection of plant leaf is a very important factor to prevent serious outbreak. Automatic detection of plant disease is essential research topic. The commitment of a plant is very imperative for both human life and condition. Plants do experience the ill effects of ailments, similar to people and creatures. There is the quantity of plant maladies that happen and influences the typical development of a plant. These ailments influence finish plant including leaf, stem, organic product, root, and blossom. More often than not when the illness of a plant has not been dealt with, the plant bites the dust or may cause leaves drop, blossoms and organic products drop and so on. Suitable determination of such illnesses is required for precise ID and treatment of plant sicknesses. Plant pathology is the investigation of plant infections, their causes, methodology for controlling and overseeing them. Yet, the current strategy incorporates human inclusion for order and distinguishing proof of maladies. This strategy is tedious and expensive. Programmed division of illnesses from plant leaf pictures utilizing delicate registering approach can be sensibly valuable than the current one. In this paper, we have presented a strategy named as Bacterial searching improvement based Radial Basis Function Neural Network (BRBFNN) for recognizable proof and characterization of plant leaf illnesses naturally. For doing out ideal weight to Radial Basis Function Neural Network (RBFNN) we utilize bacterial searching streamlining (BFO) that further expands the speed and exactness of the system to recognize and arrange the districts tainted of various infections on the plant leaves. The locale developing calculation expands the effectiveness of the system via looking and gathering of seed focuses having regular characteristics for highlight extraction process. To chipped away at parasitic maladies like basic rust, cedar apple rust, late scurge, leaf twist, leaf spot, and early curse. The proposed strategy achieves higher precision in recognizable proof and characterization of infections.

KEYWORDS: PV Panel, ATmega08, Battery, LCD, Node MCU and Relay.

I.INTRODUCTION

Image processing is a method to convert an image into digital form and perform some operations on it, in order to get an enhanced image or to extract some useful information from it. It is a type of signal dispensation in which input is image, like video frame or photograph and output may be image or characteristics associated with that image. Usually, Image Processing system includes treating images as two-dimensional signals while applying already set signal processing methods to them. Image processing basically includes the following three steps. Importing the image with optical scanner or by digital photography. Analyzing and manipulating the image which includes data compression and image enhancement and spotting patterns that are not to human eyes like satellite photographs. Output is the last stage in which result can be altered image or report that is based on image analysis. Analog or visual techniques of image processing can be used for the hard copies like printouts and photographs. Image analysts use various fundamentals of interpretation while using these visual techniques. The image processing is not just confined to area that has to be studied but on knowledge of analyst. Association is another important tool in image processing through visual techniques. So, analysts apply a combination of personal knowledge and collateral data to image processing. Digital Processing techniques help in manipulation of the digital images by using computers. As raw data from imaging sensors from satellite platform contains deficiencies. To get over such flaws and to get originality of information, it has to undergo various phases of processing. The three general phases that all types of data have to undergo while using digital technique are Pre- processing, enhancement and display, information extraction. Plant species can be accurately identified using Elliptic Fourier shape features of whole, extracted leaflets from plant canopies.

II.EXISTING SYSTEM

Precision Botany (PB) refers to the application of new technologies in plant identification. Computer vision can be used in PB to distinguish plants from its species level, so that an identification can be applied on the size and number of plants detected for the classification purpose. Automatic plant identification tasks have gained recent popularity due to its use in quick characterization of plant species without requiring the expertise of botanists. Leaf-based features are preferred over flowers, fruits, etc. due to the seasonal nature of the later and also the abundance of leaves (except may be for the winter season). The current electronic devices for capturing images have been developed to a point where there is little or no difference between the target and its digital counterpart. The success of machine learning for image recognition also suggests applications in the area of identification of plant by herbarium specimens. Precision Botany (PB) refers to the application of new technologies in plant identification. Computer vision can be used in PB to distinguish plants from its species level, so that an identification can be applied on the size and number of plants detected for the classification purpose. Automatic plant identification tasks have gained recent popularity due to its use in quick characterization of plant species without requiring the expertise of botanists. Leaf-based features are preferred over flowers, fruits, etc. due to the seasonal nature of the later and also the abundance of leaves (except may be for the winter season). The current electronic devices for capturing images have been developed to a point where there is little or no difference between the target and its digital counterpart.

III.PROPOSED SYSTEM

In the proposed system, Plant diseases have turned into a big problem as it can cause significant reduction in both quality and quantity of agricultural products. In our proposed work, we center around distinguishing proof and characterization of plant illnesses utilizing some computational knowledge approach. The proposed strategy utilizes Radial Basis Function Neural Network (RBFNN) that is prepared with the assistance of Bacterial Foraging Optimization (BFO), to locate the influenced district by means of various illnesses present on plant clears out. RBFNN is the extraordinary direct capacity having a novel ability of which increments or reductions monotonically with separation from the middle point fit for taking care of the multifaceted nature of the influenced district exists on the plant leaf pictures. The productivity of the Radial Basis Function Neural Network is additionally improved by utilizing district developing strategy hunting down seed focuses and gathering them having comparable properties that assistance in highlight extraction process.

BFO with its imitating ability and multi-ideal capacity confirms to be a productive and ground-breaking instrument for instating the heaviness of RBFNN and preparing the system that can accurately distinguish diverse areas on plant leaf picture with high union speed and exactness. Plants have become an important source of energy, and are a fundamental piece in the puzzle to solve the problem of global warming. There are several diseases that affect plants with the potential to cause devastating economic, social and ecological losses. In this context, diagnosing diseases in an accurate and timely way is of the utmost importance. There are several ways to detect plant pathologies.

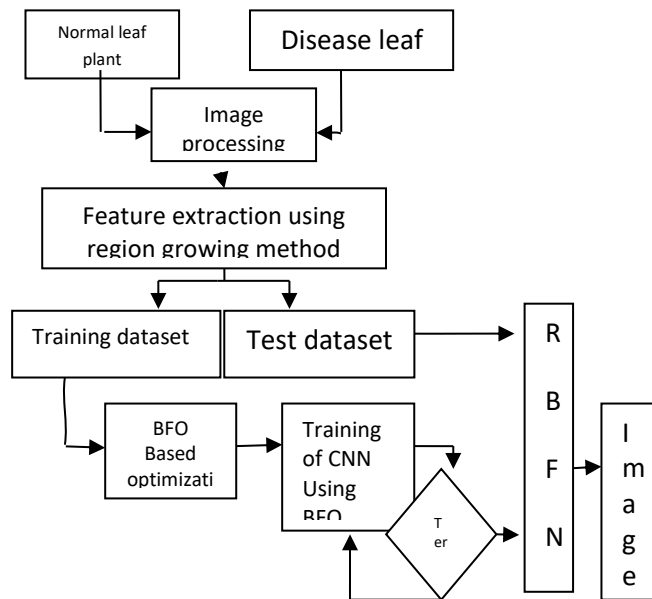


Figure.1. Block Diagram of Proposed System

PV Panel

Photovoltaic (PV) is the name of a method of converting the solar energy into the direct current of electricity using semiconducting materials that exhibit the photovoltaic effect.



Figure.2. PV Panel

Battery



Figure.3. Battery

An electric battery is a device consisting of two or more electrochemical cells that convert stored chemical energy into electrical energy. Each cell has a positive terminal, or cathode, and a negative terminal, or anode.

AT Mega328



Figure.4. ATmega-328

A microcontroller is a small computer (SoC) on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Microcontrollers are used in automatically controlled products and devices.

Color Sensor

A color sensor detects the color of the material. This sensor usually detects color in RGB scale. This sensor can categorize the color as red, blue or green. These sensors are also equipped with filters to reject the unwanted IR light and UV light.

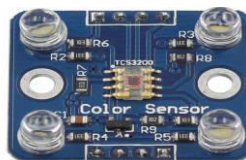


Figure.5. Color Sensor

DC Motor



Figure.6.DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

Relay Switch

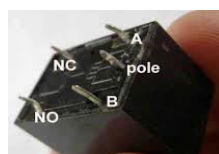


Figure.7.Relay Switch

A relay is an electrically operated switch. Relays are used where it is necessary to control a circuit by a low-power signal.

Boost Converter

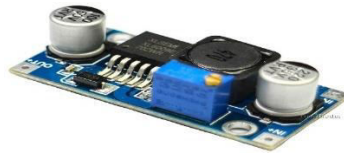


Figure.8.Boost Converter

A boost DC-DC converter is used to control the solar PV power. The boost converter operates in both MPPT mode and voltage control mode.

Arduino UNO

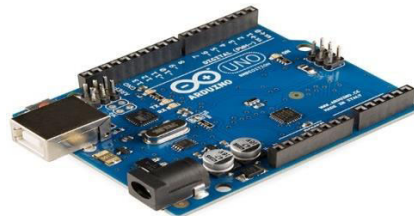


Figure.9.Arduino UNO

Arduino Uno is an open-source microcontroller board-based on Microchip ATmega328P microcontroller (MCU). Layout and production files for some versions of the hardware are also available.

IV.HARDWARE RESULT

There is the number of reasons that could affect the native surroundings and may cause fluctuations in the bacterium population where they exist. The rise in temperature causes a high concentration of nutrient gradients or events due to which all the bacteria in a region are killed or moved to another region. The new replacements are randomly initialized over the search space to handle such situation with some bacteria are liquidated at random with a very small probability.

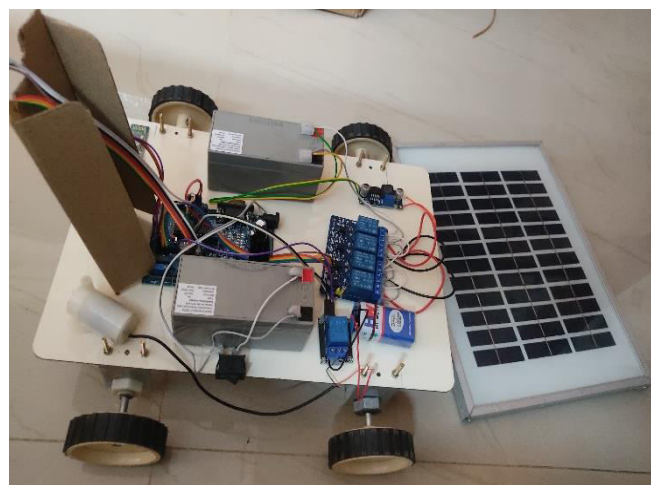


Figure.10.Hardware Result

They are the most important and integral part of our surroundings. Just like a human or other living organism does plant do suffer from different kind of diseases. Such diseases are harmful to plant in a number of ways like can affect the growth of the plant, flowers, fruits, and leaves etc. due to which a plant may even die. So in this work, we

have proposed a novel method named as Bacterial foraging optimization based Radial Basis Function Neural Network (BRBFNN) for identification and classification of plant leaf diseases. The results, when compared with other methods, show that the proposed method achieves higher performance both in terms of identification and classification of plant leaf diseases.

V.CONCLUSION

The plant serves as the basic need for any living organisms. They are the most important and integral part of our surroundings. Just like a human or other living organism does plant do suffer from different kind of diseases. Such diseases are harmful to plant in a number of ways like can affect the growth of the plant, flowers, fruits, and leaves etc. due to which a plant may even die. So, in this work, we have proposed a novel method named as Bacterial foraging optimization based Radial Basis Function Neural Network (BRBFNN) for identification and classification of plant leaf diseases. The results, when compared with other methods, show that the proposed method achieves higher performance both in terms of identification and classification of plant leaf diseases.

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International Journal of Advanced Research in Education and Technology

ISSN: 2394-2975

Impact Factor: 7.394