AN IOT BASED AUTOMATICLEAF DISEASE IDENTIFICATION AND CONTROLLING USING ARDUINO UNO

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Abstract: In this paper an automated system has been developed to determine whether the plant is normal or diseased. The normal growth of the plants, yield and quality of agricultural products is seriously affected by plant disease. This paper attempts to develop an automated system that detects the presence of disease in the plants. An automated disease detection system is developed using sensors like temperature, humidity and colour based on variation in plant leaf health condition. Here, IOT comes into picture to supply semi-automated or fully-automated frameworks to supply superior comes about.

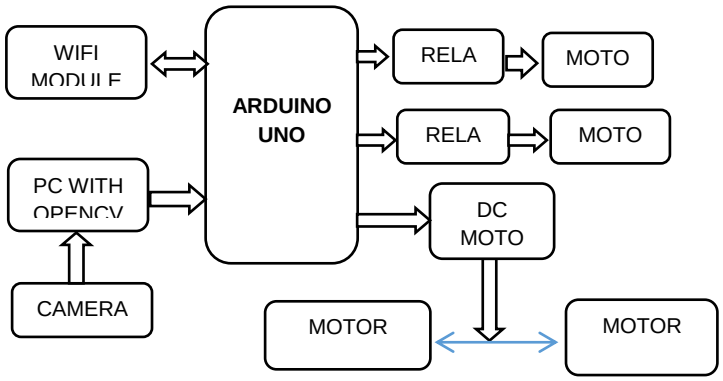
Keywords: Internet of Things, Image Processing, Disease Diagnosis, Arduino, Robotic Setup

I. INTRODUCTION

Agriculture is a boon to the tropical countries like India. However, due to adverse change in the climatic conditions the productivity and sustainability of the farming systems are under high risk. In agriculture applications, pests and diseases cause great economic loss to farmers through reduced yields and increased costs of pesticides and other control measures. Plant disease detection by visual way is a difficult task, and it is less accurate hence automation techniques are developed to ease the task and provide high accuracy. The image processing techniques has been used to increase the cultivation yield by building a decision support system which can detect and classify the disease.

Detection of diseases in the plant is utmost need for farmers and agricultural experts. In most of the plants the disease inception takes place on plant leaves.The main aim of the proposed system is to detect plant diseases using IoT. Hence, in the proposed work we have considered detection of plant disease present on leaves. The discrimination of normal and affected plant leaf can be measured based on variation in temperature, humidity and colour.The camera nodes captures the image of the plants and processes it to detect and segment the disease. The segmented image can be transmitted to the monitoring site using internet from which the features are extracted for further analysis. The expert at the monitoring site classifies the disease based on the features received and provides solutions to the farmers. Precise knowledge of areas where disease has spread would help the farmer to apply appropriate amounts of pesticides to the affected areas, thereby yielding both economic and environmental benefits. In vision based disease detection system, segmentation plays a vital role. For extracting the features, the image must be segmented efficiently. The automation system available at the monitoring site makes use of the classifiers to classify the disease after which the farmers are alerted.

II. BLOCK DIAGRAM



Block diagram explanation:

The architecture of Automatic Detection and classification of leaf disease First, the real time images of various leaves are acquired using a camera. Through OpenCV the features of the image are extracted and the output is given to Arduino Uno. Then various image-processing methods are applied to the acquired images to getting useful features that are important for next analysis process. Preprocessing will also consisting of conversion of RGB to grey, as grey scale image gives perfect accuracy to defect detection. Feature extraction process will consists actual disease detection from an image by comparing the image with non-defected images. After that, many analytical techniques or methods are carried out to classify the images according to the particular problem at hand.

The proposed working process is leaf disease identification using automation robot.Inthis project, robot module moving one plant to another plant through the instructions of the Arduino Microcontroller. Then according to the disease the sprayer will spray the insecticide to the leafs of the plant.

III. WORKING PRINCIPLE

In this project we are design the automatic robot module and leaf disease identification using opencv here

Our working step process is three modules.

- Robot modules
- Camera
- Arduino Uno

Camera:

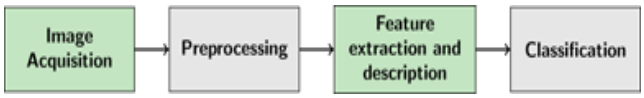


Image acquisition:

The purpose of this step is to obtain the image of a whole plant or its organs so that analysis towards classification can be performed.

Pre-processing:

The aim of image pre-processing is enhancing image data so that undesired distortions are suppressed and image features that are relevant for further processing are emphasized. The pre-processing sub-process receives an image as input and generates a modified image as output, suitable for the next step, the feature extraction. Pre-processing typically includes operations like image de-noising, image content enhancement, and segmentation. These can be applied in parallel or individually, and they may be performed several times until the quality of the image is satisfactory

Feature extraction and description

Feature extraction refers to taking measurements, geometric or otherwise, of possibly segmented, meaningful regions in the image. Features are described by a set of numbers that characterize some property of the plant or the plant's organs captured in the images (aka descriptors)

Classification

In the classification step, all extracted features are concatenated into a feature vector, which is then being classified. The main objectives of this paper are reviewing research done in the field of automated plant species identification using computer vision techniques, to highlight challenges of research, and to motivate greater efforts for solving a range of important, timely, and practical problems. More specifically, we focus on the Image Acquisition and the Feature Extraction *and Description* step of the discussed process since these are highly influenced by the object type to be classified, i.e., plant species. A detailed analysis of the pre-processing and the Classification steps is beyond the possibilities of this review. Furthermore, the applied methods within these steps are more generic and mostly independent of the classified object type.

Arduinouno:

The Arduino integrated development environment (IDE) is used for the Processing programming language and the Wiring projects. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation. Arduino version is used here for interfacing purpose. It is also capable of compiling and uploading programs to the board with a single click. Arduino programs are written in C or C++. The board is equipped with 6 analog inputs and 14 digital input output pins. It acts as a communication interface which can include USB interface used for programming. It consists of power jack, reset button, flash memory of 32 kb, SRAM and EEPROM, clockspeed (16MHz) and it operates on 7 to 12 V.

ESP8266

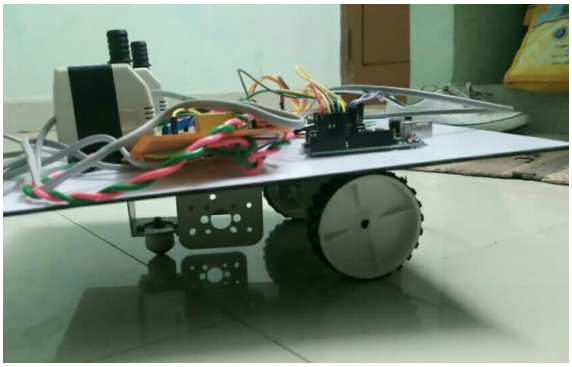
ESP8266 is Wi-Fi enabled system on chip (SoC) module developed by Espressif system. It is mostly used for development of IoT (Internet of Things) embedded applications.ESP8266 comes with capabilities of

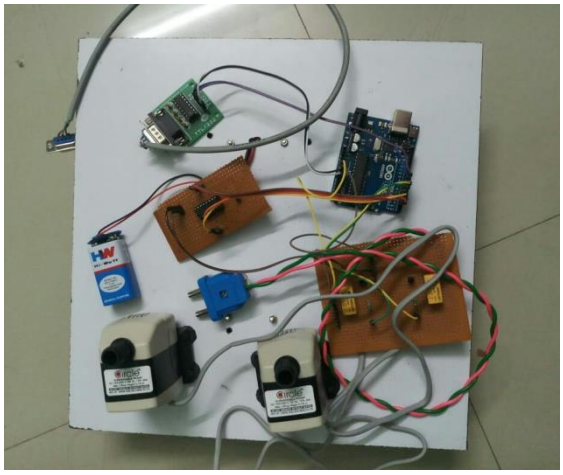
- 2.4 GHz Wi-Fi (802.11 b/g/n, supporting WPA/WPA2),
- general-purpose input/output (16 GPIO),
- Inter-Integrated Circuit (I²C) serial communication protocol,
- analog-to-digital conversion (10-bit ADC)
- Serial Peripheral Interface (SPI) serial communication protocol,
- I²S (Inter-IC Sound) interfaces with DMA(Direct Memory Access) (sharing pins with GPIO),
- UART (on dedicated pins, plus a transmit-only UART can be enabled on GPIO2), and
- pulse-width modulation (PWM).

It employs a 32-bit RISC CPU based on the TensilicaXtensa L106 running at 80 MHz (or overclocked to 160 MHz). It

has a 64 KB boot ROM, 64 KB instruction RAM and 96 KB data RAM. External flash memory can be accessed through SPI.

IV. RESULTS





V. CONCLUSION

The smart agriculture using IOT has been experimentally proven to work satisfactorily by monitoring the leaf diseases in the agricultural field. Mostly identification and curing of plant disease will be done manually. Then also disease will be identified at the severe stagesonly. The main objective of the paper is to automatically detect and cure the plant disease by providing medicine through IoT. In agricultural field, the plant disease plays a vital role to cause loss economically. The plant disease is identified by image processing using the concept of histogram of gradients. The histogram of gradients concept is used to zoom the image and identified the affected part with more accuracy. Then the severity of the disease is identified by comparing value with the trained dataset and provide medicine accordingly.In this proposed system the detection and curing of plant disease will be done automatically. The medicine will be provide through the ARDUINO microcontroller. The microcontroller is serially connected with the system. The proposed system will reduce the manual work and used to increase the yield by identifying the disease in earlier stage. Hence saving the loss and helps in agricultural field efficiently.

VI. REFERENCES

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