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Detection of Musa Leaf Diseases Using Image Processing and Monitoring Plant Irrigation System

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ABSTRACT: This paper presents a method for early detection of leaf diseases in plants based on some important features withdraw from its leaf images. In the proposed method, images of leaves are captured and compared with healthy leaves images which are in database that are pre-stored in the device. After image processing, if the plants are found infected, this device automatically turns on the valves, through which medicine supply is enabled or disabled automatically to the plant area through a sprinkler or drip irrigation method. In addition to this, soil moisture and temperature sensors are used to avoid the spreading of diseases due to change in season changing conditions. If the values of moisture exceed the predefined range, it enables auto-Medicining to the plants.

KEYWORDS: Auto-medicating, Disease**,** , Image processing and plant irrigation monitoring.

I.INTRODUCTION

Agriculture plays a major role in all country. Major part of the growth rate depends on tillage alone. Plants diseases cause major production and economic losses in agriculture. Identification of the plant diseases is the key to prevent the losses in the yield and quantity of the cultivation product. The discovery of the plant diseases mean the finding of visually noticeable patterns seen on the plant leaves. Monitoring and disease detection on plant is very difficult for sustainable agriculture. Farmers require continuous keep an eye on of experts which might be prohibitively expensive and time consuming. It is very difficult to monitor the plant diseases physical. Looking for fast, very cheap and accurate method to automatically find the diseases from the symptoms that appear on the plant leaf is of great practical significance. In addition to this supplying medicines to the infected plant area manually is a difficult task.

The main objective of this project is to monitor the plant health and detect the plant leaf diseases based on the appearance of the leaf at the early stage in order to reduce spreading of diseases by enabling Auto-medicine to the plants through ATMEGA 8APU(1839JCS). If there are any changes then auto- medicining is employed depending upon the conditions. Inaddition to this, soil moisture and minerals sensors are used to avoid the layout of diseases due to change in climatic conditions.

II. IMAGE PROCESSING

Image processing is the use of computer procedure to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many edge over analog image processing. It allows a much wider range of procedure to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined by two dimensions digital image processing may be modeled in the form of multidimensional systems.Image Restoration is the important operation of taking a

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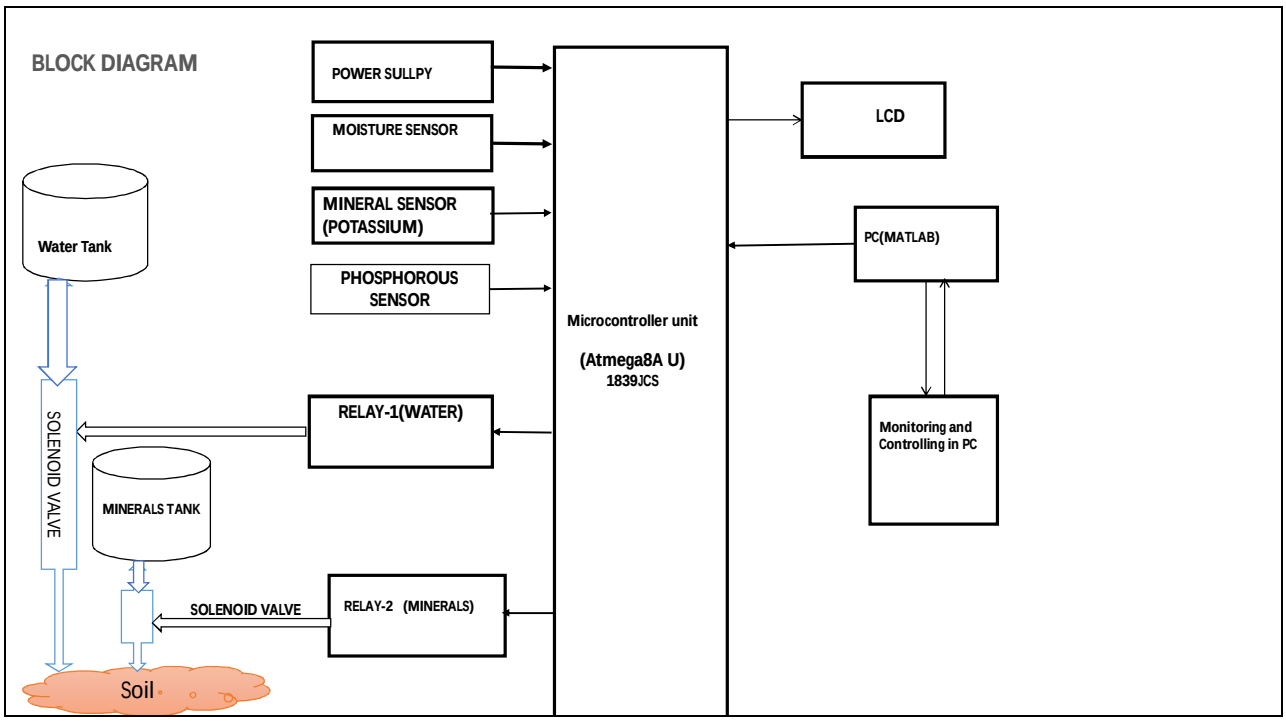
noisy image and estimating the clean, native image. Corrupt may come in many forms such as unfocus, noise and mis-focus. Image restoration is performed by go back the process that blurred the image and such is performed by imaging a point source and use the point source image, which is called the Point Spread Function to restore the image information lost to the unfocusprocess.

III. PROPOSED SYSTEM

The system architecture of detection of musa leaf diseases using image processing consists of ATMEGA 8A U(1839JCS), potassium sensor, moisture sensor, phosphorus sensor, solenoid valve, & PC.



The image processing scheme contains of image purchase by data base, image pre-processing includes image enhancement and image segmentation, morphological techniques and classification. Lastly the presence of diseases on the leaf will be identified the main steps used for the detection of plant leaf diseases. The pictures of various leaves are taken using a database with required reslove for quality. Then this image is pre-processed to better the image data that suppress undesired distortions, improve some image features important for next processing and examination task. It may include colour space conversion, image enhancement, and image segmentation. The algorithm used here is pre-processing, watershed enhancement , geometry, HOG etc The RGB images of leaves are converted into colour space representation. The main purpose of the colour space is to make easy the specification of colours in standard way. Because RGB is for colour generation and his for colour descriptor Shade is a colour attribute that describes pure colour as apparent by an observer. Saturation termed as relative purity or the amount of white light added to shade and value means amplitude of light. After the colour space transformation process, shelter component used for further analysis.

In Existing Automated Drip Irrigation system it is not possible to operate it on decisions, it just operated only on single soil conditions like soil moisture and temperature. It operates on only one condition at a time like if we using soil moisture sensor to control automated drip irrigation then whenever soil moisture level is get decrease then & then only

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it direct the valve to change its position from OFF to ON, and if soil moisture level is go to the proper pre-setted level at that time system is get OFF automatically.

HSV images are next converted into grey scale images. Here fixed constant for green pixel is 90. Now grey scale image can have two values 0(black) and 285(white). From the dark scale picture, picture division can be utilised to supplant every pixel in a picture with a dark pixel (0) if the picture power is not as much as consistent or white pixel (285) if the picture force is more noteworthy than stable . Paired areas created by thresholding are flabby by commotion and surface. Morphological image processing is improved for detach such imperfections by accounting for the structure of the image. Dilation adds pixels to the borders of objects in an image, while erosion removes pixels on borders. Usually in cases like noise removal, erosion is followed by mydriasis. Contouring is a technique that is applied to digital images in order to extract their boundary for varies processing.

IV. HARDWARE DESCRIPTION

A.ATMEGA 8A U(1839JCS)

The ATmega8A U(1839JCS)provides following ascribe 8K bytes of In-System Programmable Flash with Read While-Write ability, 512 bytes of EEPROM, 23 general purpose I/O lines, 32 general purpose working registers, three easily bent Timer/Counters with combine modes, internal and external split, a sequential programmable, one byte oriented Two-wire Serial Interface, a 6- channel ADC with 10-bit accuracy, a programmable Watchdog Timer of Internal Oscillator, an SPI serial port, and five software selectable power saving modes. The Idle mode stops the CPU while allowing the SRAM, Timer/Counters, one SPI port, and interrupt system to continue functioning. The Power-off mode saves the register contents but deep-freeze the Oscillator, disabling all the other chip functions until the next Interrupt or Hardware Reset. In Power-save mode, the asynchronous timer continues to sprint, allowing the user to maintain a timer base while the rest of the device is sleeping. The analog to digital converter Noise depletion mode stops the CPU and all I/O modules except asynchronous timer and ADC, to reduce switching noise during ADC conversions. In Standby mode, the resonator Oscillator is racing while the rest of the device sleeping. This allows very speed start-up merge with low-power consumption.

B. POTASSIUM SENSOR

Potassium electrodes are a type of ion electrodewhich is used in chemical laboratories for various investigation , where quantification of potassium concentration in an solvent solution are need, usually on a real time method. These potassium rods are typical ion interchange resin membrane electrodes, using positive and negative rod material a potassium ionophore, as the ion carrier in the membrane to provide the potassium specificity.This type of ion exacting electrode is subject to interference from (in rubidium, caesium, ammonium).

C. PHOSPHORUS SENSOR

Phosphor sensor is an optical method for surface mineral measurement. The method exploits luminescence emitted by phosphor material. Phosphors are fine white , which may be stimulated by any of a variety of means to luminesce, i.e. emit light. Certain characteristics of the discharge light change with temperature, including brightness, colour, and afterglow duration. This sensor sense the phosphorous level in the required solution, example bacterial leaf spot have brown or black water-soaked marks on the foliage, sometimes with a yellow halo, generally identical in size. In dry soil conditions the spots have a freckled appearance.

D. SOLENOID VALVE

A solenoid valve is an electromechanical device used for controlling liquid flow. The solenoid valve is controlled by electric current, which is run through a coil. When the coil is energized, a magnetic field is created, causing a plunger to move. The most commonly used solenoid valve has two ports an inlet port and an outlet port. Advanced designs may have three or more ports. Some designs utilize a manifold-type design. Solenoid valve helps to control fluid and gas flow automatically. Modern solenoid valves offers fast operation, high reliability, long service life, and compact design.

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E. MOISTURE SENSOR

The Soil moisture sensor is used to measure the water content(moisture) in the soil.when the soil is having water problem,the module output is at high level, else the output is at low stage.This sensor reminds the user to water their plants automatically and also monitors the moisture content of soil.It has been widely used in agriculture area for irrigation and gardening. The Moisture Sensor uses electrolytic condenser to measure dielectric permittivity of the surrounding medium. In soil, dielectric permittivity is function of the water level. The sensor creates a current proportional to the dielectric permittivity, and therefore the water content of the soil. The sensor mean the water content over the entire area of the sensor. There is a 4 cm zone of influence with respect to the flat surface of the sensor, but it has little or no sensitivity at the extreme edges. The Soil Moisture Sensor is used to measure the loss of moisture over time due to evaporation and plant uptake, evaluate optimum soil moisture contents for various species of plants, monitor soil moisture content to control soil irrigation in greenhouses and enhance bottle biology experiments.

F. RELAY

Relays are switches that is used to open and close circuits electronically. It helps to control one electrical circuit by opening and closing contacts in another circuit. Relays assist to switch for smaller currents in a control circuit and do not usually control power consuming devices except for smaller motors and the solenoids that runs under low amps. Inspite of that, relays can control larger voltages and amperes by having an amplifying effect because a small voltage applied to a relays coil.
Protective relays offer preventing the equipment damage by detecting electrical abnormalities, including over current, undercurrent, overloads and reverse currents. In addition to that, relays are also widely used to switch starting coils, heating elements, pilot lights and audible alarms.

V. SOFTWARE DISCRIPTION

A. MATLAB

MATLAB is a multi optional working environment and proprietary programming language developed by Math Works. MATLAB allows mathematics manipulation , plotting the functions and data works, execution of commands, easy of user interfaces, and interfacing with programs written in various languages, such as C, C++, C#, Java, and Python etc. Although MATLAB is deliberate primarily for numeric computing, an voluntary toolbox uses the MUPAD symbolic engine, allowing access to symbolic computing abilities. An additional package, Stimulant, adds graphical multi-domain simulation and model-based design for dynamic and embedded systems. As of 2013, MAT LAB has more than 2 million users worldwide. MATLAB users come from various backgrounds of engineering, science, economics& other fields.

VI. APPENDIX

In addition to this, moisture and minerals sensors are used to avoid the distributing of diseases due to change in season conditions. If the values of moisture/minerals exceed the fixed range, the micro controller enables the relay to ON/OFF the motor to auto-medicining to the plants. The difference between our base paper and the reference paper is that our project is that using different method of algorithm to detect the plant leaf diseases and also inter-connecting the irrigation system hardware kit with the software by serial communication method.
Our method is to develop a system that monitors environmental conditions in agriculture field such as soil moisture, Phosphorus & mineral level also maintaining appropriate level of moisture in the soil.Plants are very sensitive to water level as water deficiency is harmful to plants, so according water requirement of plant drip irrigation system is used. Phosphorous (P) is one of the important macronutrients which helps for plant growth. Nutrient availability which changes with the pH of mineral soil.

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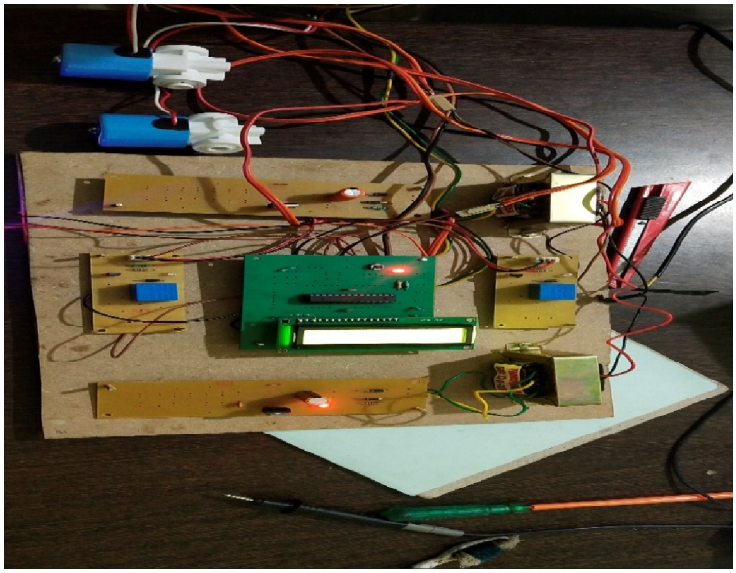

Fig 1. Experimental setup

VII. CONCLUSION

The proposed image processing system helps in early detection of disease in plants. If any diseases are detected, auto-medicining is enabled by turning on the valve and medicine is passed through sprinkler to the agricultural farm. Embedded system for automatic medicining to an agriculture field offers a potential solution to support site specific irrigation management that allows producers to maximize their productivity by detecting the diseases at early stage.

In addition to this, soil moisture and temperature sensors are used to minimize the spreading of diseases due to change in climatic conditions. If the values of moisture/mineral exceed the predefined range, the ATMEGA 8A U(1839JCS) enables automedicining to the plants. It can be programmed to any kind of leaves depending upon the user requirement.

REFERENCES

[1]. Ananthi , S. Vishnu Varthini, "*Detection and Classification of plant leaf Diseases International of Research in Engineering and Applied Sciences"*, Volume 2 and Issue 2 February 2012 ISSN: 22493905.

[2]. H.Al-Hiary, S. Bani-Ahmad, M.Reyalat, M.Braik and Z.AlRahamneh, "*Fast and Accurate Detection and Classification of Plant Diseases"*, International Journal of Computer. Applications (09758887), Volume 17- No.1.March 2011.

[3]. Dheeb Al Bashish, Malik Braik, and SuliemanBani-Ahmad,A "*Framework for Detection and Classification of Plant Leaf and Stem Diseases"*, International Conference on Signal and Image Processing pp. 113-118. (2010).

[4]. N.Valliammal, Dr.S.N.Geethala, *The project is designed using Beaglebone black device. Information regarding the detection of diseases and operation of valves are sent to the user through GSM .Information Technology Journal (WCSIT)*, Vol. 1, Issue 9, pp. 370-375, INDIA. 2011.

[5]. Arunkumar beyyala1, Sai priya beyyala1, *"Application for diagnosis of diseases in crops using image processing"*, International Journal of lifeSciences Biotechnology and Pharma Research, Vol. 1, Issue 2, April 2012.

[6].K. Padmavathi, *" Investigation and monitoring for leaves disease detection and evaluation using image processing*", International Research Journal of Engineering Science, Technology and Innovation (IRJESTI), Vol. 1,Issue 3, pp. 66-70, June 2012.

[7] Stephen Gang Wu, Forrest Sheng Bao, Eric You Xu, Yu – Xuan Wang Yi – Fan Chang[2007] "*A Leaf Recognition Algorithm for Plant Classification Using Probabilistic Neural Network "*, IEEE 7th International Symposium on Signal Processing and Information Technology.

[8] K. Kondratjevs, A. Zabasta, N. Kunicina, and L. Ribickis, *"Development of pseudo autonomous wireless sensor monitoring system for water distribution network"* ,in Industrial Electronics, Istanbul, 2014,no. 1454-1458.

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[9] Majewski P, Luong J, Stretton K, *"The application of surface engineered silica for the treatment of sugar containing wastewater"*, 65(1),no.46-52, 2012.
[10] Daosheng deng, Wasim Aouad, Martin Z.Bassant,Sven Schulmberger,Mathew .E.Suss, *"Water purification by shock elecrodialysis"*, 2014.
[11]Alison B Payne, Kerry B Walsh, PP Subedi, and Dennis Jarvis. Estimation of mango crop yield using image analysis–segmentation method. Computers and electronics in agriculture, 2013.
[12] AD Aggelopoulou, Dionysis Bochtis, S Fountas, Kishore Chandra Swain, TA Gemtos, and GD Nanos. Yield prediction in apple orchards based on image processing. Precision Agriculture, 2011.