IOSR Journal of Engineering (IOSRJEN) **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
Volume 12, PP 56-58

Autonomous Plant Health Indication System Using Image Processing In MATLAB

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Abstract—*India Is An Agricultural Country And Most Of The People Are Farmers. Farmers Are Cultivating Different Types Of Crop. These Crops Affected By Fungi, Bacteria, Viruses And Many More. Identification Of Disease Is Very Difficult For Farmers At Its Early Stage. There Are Number Of Diseases Found In Crop. Farmers Cannot Be Determining Accurate Percentage Of Observed Disease. Patterns Of Diseases Are So Many Complexes That Finding Affected Area Is Difficult. In Modern Science, Taking Image Of These Diseases By Using Digital Camera On Robot To Collect The Data For Leaf Detection. It Is Very Difficult To Monitor The Plant Diseases Manually. It Requires Tremendous Amount Of Work, Expertise In The Plant Diseases, And Also Require The Excessive Processing Time. Hence, Image Processing Is Used For The Detection Of Plant Diseases. Disease Detection Involves The Steps Like Moving Robot Mannerly For Image Acquisition, Image Pre-Processing, Image Segmentation, Feature Extraction And Classification. In This Project We Are Using Computer Software Which Will Extract The Feature Of Leaves Of Plant By Using Digital Camera. The System Required The Use Of Vision, With Custom Algorithms Being Developed To Identify Plant Growth Rates. The Entire System Will Integrated Into A Fully Automated Package.*

Keywords— *MATLAB, Diseases, Detection, Automated Process .*

I. Introduction

In This Project, We Are Going To Make A Automation System Which Uses Vision Based Row Guidance Method To Drive Through The Row Crops. Ultimately, A Unique System Has Been Described For Plant & Food Research Which Makes Use Of A Number Of Electrical And Computer Systems Engineering Theories. A Prototype Automation Systemic Arm Has To Be Designed, Developed And Constructed, Which Should Be Integrated With Motors, Controllable Using Specific Electronic Components And Custom Computer Software. A Number Of Sensors Are Integrated Into The Automation Systemic System Including Color, Proximity, Temperature And Humidity Systems. The System

Required The Use Of Vision, With Custom Algorithms Being Developed To Identify Plant Growth Rates. The Entire System Will Integrated Into A Fully Automated Package. This Allowed The

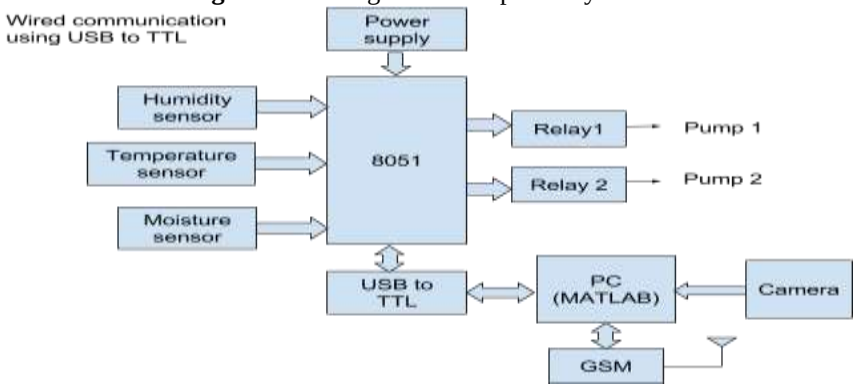
System To Autonomously Return To Specified Sites (I.E. Individual Plantlets) At Set Time Intervals To Identify Subtle Changes In Growth Rates And Leaf Color. This Provided The Potential For Plant Nutrient Levels And The Immediate Environment To Be Routinely Adjusted In Response To Continuous Sensing Resulting In Optimized Rapid Growth With Minimal Human Input.

From The Start Of Human, Humans Are Worked In The Farms Directly But From The Start Of 21st Century Many Industries Are Worked To Reduce This Human Labor By Making Automation Systems And Machines. Many Industries Developed Machines For The Specific Task Like Picking, Harvesting, Weeding, Pruning, Planting, Grafting, Agricultural Classification, Etc. And They Gradually Appear Advantages In Agricultural Production To Increase Productivity, Improve Application Accuracy And Enhance Handling Safety. Automation Systems Are Increasingly Being Used To Sort, Grade, Package And Even Pick Fruit And Vegetables. For Example, An Autonomous Wheeled Automation System Has Been Developed To Pick Orange From Orange-Farm Using Vision To Identify Both Fruit Quality And As A Means Of Navigation. The Automation Systems Are Made Which Observe The Leaf Color Based On RGB Color Standard And Also Investigates The Chlorophyll A And Lipid Contents To Investigate The Plant Health. For This Purpose Many Color Sensors And Image Processing Technology Is Used.

II. Block Diagram Of Proposed

SYSTEM

Fig.1. Block Diagram Of Proposed System.



In This Project We Are Designing The Agricultural Autonomous System Which Will Sense The Conditions In Real Time And Then Decide Which Plantation Is Best Suited For That Particular Field. For This, We Are Analyzing The Field Parameters Such As, Temperature, Humidity, Soil Moisture Etc.For Doing The Field Analysis Temperature Sensor , Humidity Sensor And Moisture Sensor Are Interfaced With The Microcontroller.The System Will Also Have A Watering Mechanism So, In All This Is A Completely Autonomous Automation System. The Main Feature Of The Automation System Is The Ability To Sense The Colour Of A Leaf And Any Hole Is Present Or Not In That Leaf Using Image Processing.The Web Camera Will Give Input To PC For Image Processing. With The Help Of Image Processing We Will Detect The Fault In Leaf. And The Output Of That Will Be Transmitted To Microcontroller Through USB To TTL. If The Condition Is Not Normal , System Will On The Water Pump Using Relay And It Will Notify I.E It Will Send A SMS To Farmer Using GSM Module..

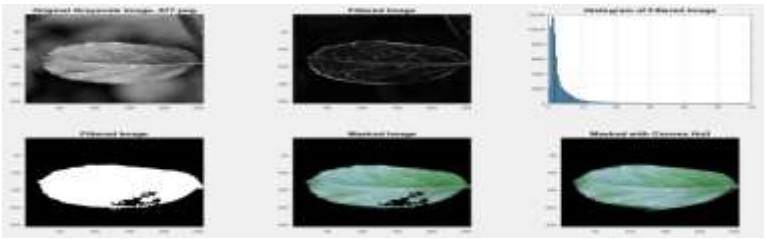
III. Techniques Used In Proposed System

Blob Detection :

Background Subtraction Also Known As Blob Detection Is A Technique In The Fields Of Image Processing And Computer Vision Wherein An Image Foreground Is Extracted For Further Processing. Generally An Imsge's Region Of Interest Are Object In Its Foreground .Background Subtraction Is Widely Approach For Detecting Moving Objects In Videos From Static Cameras.

Code:- Conversion RGB To HSV

```
%Convert RGB To HSV Color
Conversion:- [Background_Hsv]=(Rgb2hsv(Background))
[Currentframe_Hsv]=Round(Rgb2hsv(Currentframe))
Out=
Bitxor(Background_Hsv,Currentframe_Hsv)
%Convert RGB To GRAY
Out=Rgb2gray(Out);
```



APPLICATONS

- This System Can Be Used Only For Agricultural System.

1) It Can Be Used To Know The Plant Health.
2) It Can Be Used For Watering.
3) Complete Automation Of The Entire Process.
4) This System Can Be Used For Better Yield.

ADVANTAGES

- Fully Automated System Thus Reduces The Human Labor.- As We Are Making A Fully Autonomous Automation System Which Works On Open Architecture Principle And Done Lot Of Work In Farms So It Reduces Human Labor.
- Saves Time- As We Are Using Machines Which Works Faster Than Human Efforts Which Definitely Saves The Time.
- More Accuracy- The System Observes Different Environmental Conditions And Take Actions Accordingly Which Humans Can't Do Accurately.
- Low Cost- We Are Using Sensors And Drivers For Making This System Which Are Easily Available In Market And Cheap Which Reduces The Cost Of System.
- Farmer Gets A Notification, If Any Fault Is Detected In Leaf Or In Any Abnormal Condition.

IV. Conclusion

The Proposed System Is Open Architecture So Anyone Can Make This Type Of System Using Any Way Or Path. The System Uses Image Processing To Observe The Leaf Color Which Increases Further Accuracy Of The System As It Identifies Color Very Accurately Than Human. The System Also Observes Different Environmental Conditions Such As Humidity, Soil Moisture And Temperature Which Human Cannot Measure Accurately By Open Eyes To Decide The Plant Health So The Accuracy Of The System Is High. It Also Involves Watering Mechanism Which Reduces Human Labor And We Can Reduce Labor And Notifies To Farmer About The Abnormal Conditions. Further By Modifying The System Further For Other Agricultural Work Such As Picking, Harvesting, Weeding.

Future Scope

- We Can Increase Automation Systems Accuracy Of Detection Of Leaf Color Correctly By Using High Quality Camera.
- Using Wireless Technology Instead Of USB-TTL Can Make The Entire System Portable And More User Friendly.
- The System Can Further Modified For Picking Fruits, Seed Dispensing Mechanism, And Actual Cutting Process By The System

Acknowledgement

We Are Grateful To ATHARVA COLLEGE OF ENGINEERING For Giving Us The Opportunity To Do The B.E. Project Work In Department Of Electronic And Tele communication Engineering. We Feel Privileged To Express Our Deepest Sense Of Gratitude And Sincere Thanks To Our Project Guide Prof. Divya Sharma For Her Continuous Support And Guidance Throughout Our Project Work. We Would Also Like To Thank Our H.O.D. Prof. Jyoti Kolap For Approving Our B.E. Project. We Also Wish To Thank Them For Their Patience And Cooperation, Which Proved Beneficial For Us.

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