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Agriculrtural Robot for Plant Health Indication

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Abstract: ***It is difficult task for producing agricultural products, various micro-organisms, pests and bacterial diseases attack on plants. These diseases can occur through the leaves, steams or fruit inspection. This paper covers technique of image processing for early detection of plant disease through feature extraction of leaf and preprocessing of image from RGB (YCbCr) to different color space conversion, image enhancement; segment the region of interest. Minimum distance classifier is used to compare extracted features from original image and stored database. When plant disease is detected fertilizer motor gets ON. By using Graphical User Interface symptoms and fertilizer for detected disease will displayed on computer. The robot has also watering mechanism it will water the plants according to their needs by observing temperature and LCD will display the temperature. Working of the Robot is based on Bluetooth.***

Keywords: Plant Health, Open Agriculture, Bluetooth, Database.

I. INTRODUCTION

Robot uses vision based row guidance method to drive through the row crops. The future of agricultural production deals with robotics and automation which plays important role in our society. As robot plays fundamental role for increase in efficiency and leads to reduction in cost of industrial production and products. Including color, temperature and humidity number of sensors are integrated into robotic system. The system is integrated into automated package. This allows the system to automatically return to specified sites at time intervals. It is use to identify the subtle changes in growth rates and leaf color. It helps us to reduced human input. [1]

II. NEED OF PROJECT

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 robots and machines. Agriculture is very labor intensive field and only field where the robots are not involved. Now-a- days many industries are trying to reduce this human labor by making robots and machines. Currently chemicals are applied to the plants periodically without knowing the requirement of plants. Hence productivity of agriculture decreases. [1]

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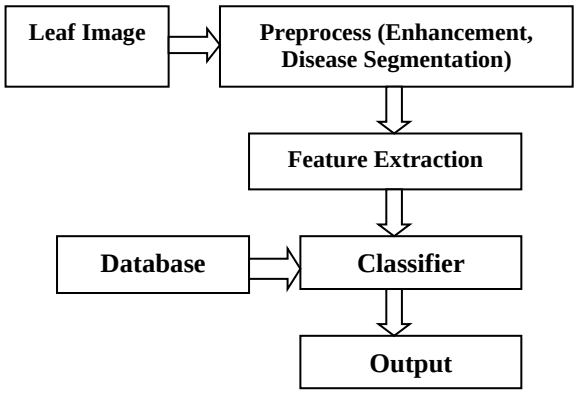

Fig1: Block Diagram of Methodology

A. *Leaf Image:*

Plant leaf disease is one of the crucial causes that reduce quantity and degrades quality of the agricultural products. Currently chemicals are applied to the plants periodically without knowing the requirement of plants.

B. *Pre-Process:*

Image pre-processing is the lowest level of abstraction whose aim is to improve the image data that suppress undesired distortions as well as enhances some image features which is important for further processing and analysis task. It includes color space conversion and image enhancement.

C. *Image Enhancement:*

Direct observation of color images is often strikingly different as human visual perception computes the conscious representation. A simple approach in the block (DCT) Discrete Cosine Transform domain for enhancing color images by scaling the transform coefficients i.e. color enhancement. We use median filter.

D. *Image Segmentation:*

Image segmentation is process used to simplify the representation of an image into some-thing that is more meaningful object of interest from background and easier to analyze. Segmentation is also done through feature based clustering.

E. *Feature Extraction:*

After segmentation the area of interest i.e. diseased part extracted. The aim of this phase is to find and extract features that can be used to determine the meaning of a given sample. Image features usually include color, shape and texture features in image processing. Texture is one of most popular features for image classification and retrieval.

F. Classifier:

In database minimum five types of disease of data are stored classifier compares these stored data with collected data, and detect the diseases. We are using Minimum Distance classifier, for classifying unknown image data to classes which minimize the distance between image data and the class in multi-feature space. Following distances are often used in this procedure are Euclidian Distance, normalized Euclidian distance.

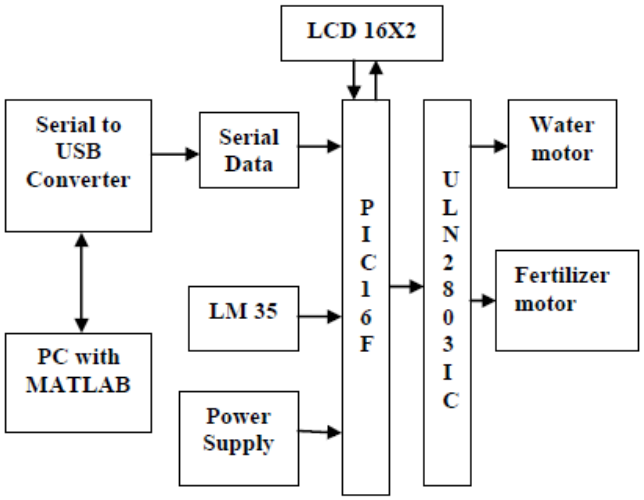

Fig 2: Block Diagram of Interfacing of PIC with MATLAB.

III. INTERFACING OF PIC WITH MATLAB

Leaf disease is detected using MATLAB software. Output of MATLAB is serially given to PIC microcontroller. Temperature sensor and LCD are interfaced to PIC microcontroller. LM 35 will sense the temperature and display on LCD. ULN 2803 IC is interfaced with PIC microcontroller for current boosting. When Relay1 is ON, water motor gets started. When Relay2 is ON, fertilizer motor gets started.

IV. POWER SUPPLY

Most digital ICs including microcontroller, metering and memory ICs operate on a 5v power supply is required. The 5v supply voltages are obtained from 9vtransformer.the Output of the secondary is applied to the bridge receiver, which converts the sinusoidal input into the full wave rectified output. The filter capacitor at the output of the bridge rectifier is changed to the peak value of the rectified output voltage. Since the diodes are not forward biased during the entire positive and negative half-cycle of the input waveform, the voltage across the filter capacitor is a pulsating dc that is a combination of DC and ripple voltage. From the pulsating dc voltage, a regulated dc voltage is extracted by a regulator IC.

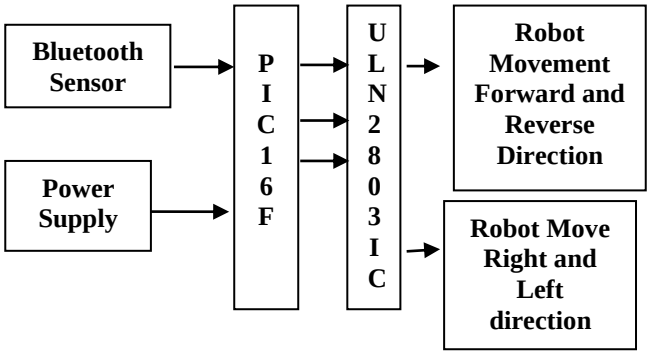

Fig3: Block Diagram of Robot Mechanism

Robot is operated by Bluetooth sensor at a range of 10m. R1 and R3 ON Robot move forward direction. R2 and R4 ON Robot move reverse direction. Relay 1, Relay 2, Relay 3, Relay 4 are interfaced with IC ULN 2803 current boosting, it consists of Darlington transistor pair. It boosts current up to 0.5 to 2A. When Relay 1 and Relay 3 are ON, Robot moves forward direction. When Relay 2 and Relay 4 are ON, Robot moves backward direction. When Relay 1 is ON, robot move to right side forward direction. When Relay 2 is ON, robot move to right side reverse direction. When Relay 3 is ON, robot move to left side forward direction. When Relay 4 is ON, robot move to left side reverse direction.

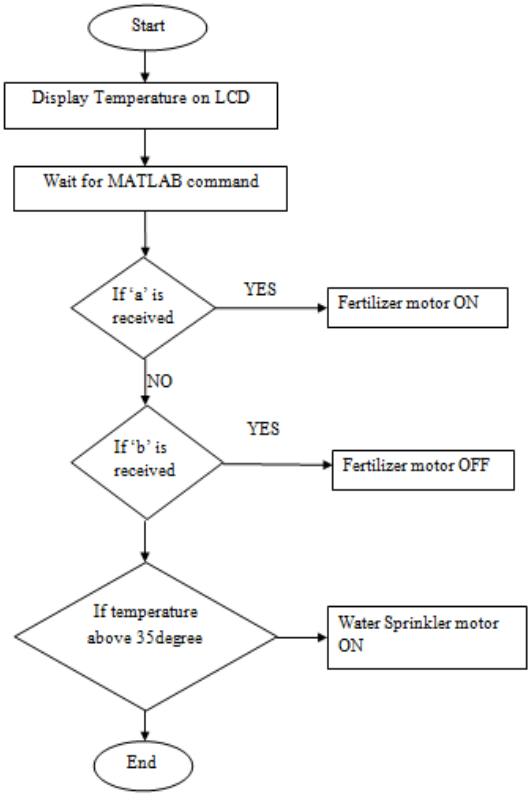

Fig4: Flow Chart of Motor

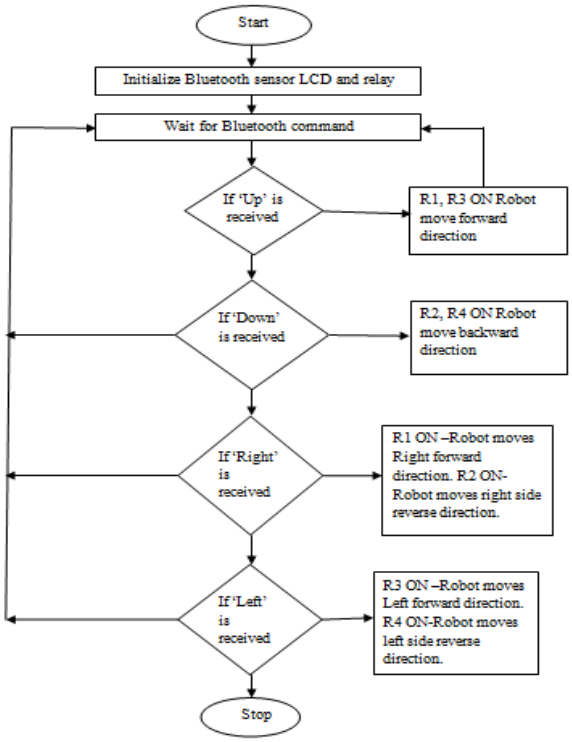

Fig5: Flow Chart of Robot

RESULT

V. CONCLUSION

The proposed system shows how the android Smartphone helps to humans. It gives better result in minimum time using remote controller for robot and various embedded technologies with the help of the Bluetooth technology. The Wi-Fi wireless networks are used to develop effective remote control program. It has realized that communication between Smartphone and robot is simple and convenient way to control robot. Here the image processing technique is used for feature extraction of disease part of leaf. This system reduces the use of harmful chemicals on plants and it gives us the healthy environment.

FUTURE SCOPE

The project can be modifying by increasing robot's accuracy of detection of leaf colour correctly by using high quality camera. The system can be wireless by using RF connectors. The system can further have modified for picking fruits and actual cutting process.

REFERENCES

1. International Journal of Advanced Technology in Engineering and Science www.ijates.com Volume No.03, Issue No. 01, January 2015 ISSN (online): 2348 – 7550 'Autonomous Farming Robot with Plant Health Indication'. Prof. K.V. Fale 1, Bhure Amit P 2, Mangnale Shivkumar 3 Pandharkar Suraj R 4Professor, RSCOE, Pune, (India) 2, 3, 4 Student, RSCOE, Pune, (India)
2. F. Argenti,L. Alparone,G. Benelli ," Fast algorithms for texture analysis using co-occurrence matrices" Radar and Signal Processing, IEE Proceedings , vol. 137, Issue 6, pp:443-448 , No. 6, December 1990.
3. Fang Jianjun, "Present Situation and Development of Mobile Harvesting Robot" and Transactions of the Chinese Society of Agricultural Engineering, 2004, vol. 20, no. 2,pp. 273-278.
4. Bisgaard, M. Vinther, D., and Ostergaard, K. Z. 2004. Modelling and Fault-Tolerant Control of an Autonomous Wheeled Robot. Group Report 04gr1030a. Institute of Control Engineering, Aalborg University, Denmark.
5. Mario M. F. and Giulio R., "Agricultural Robot for Radicchio Harvesting,"Journal of Field Robotics, 2006, vol. 23, no. 6-7, pp. 363-377.
6. Belforte, R. Deboli, P. Gay and D. Ricauda Aimonino, "Robot Design andTesting for Greenhouse Applications," Biosystems Engineering, 2006, vol. 95, no. 3,pp. 309-321.
7. T. Bakker, K. van Asselt, J. Bontsema, J. Müller, and G. van Straten, "Autonomous navigation using a robot platform in a sugar beet field," Biosyst. Eng., vol. 109, no. 4, pp. 357–368, 2011.
8. Anand H. Kulkarni, Ashwin Patil R. K., "Applying image processing technique to detect plant diseases", International Journal of Modern Engineering Research, vol.2, Issue.5, pp: 3661-3664, 2012.
9. P. Revathi, M. Hemalatha, "Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Techniques", IEEE International Conference on Emerging Trends in Science, Engineering and Technology, pp-169-173, Tiruchirappalli, Tamilnadu, India, 2012.
10. Tushar H. Jaware, Ravindra D. Badgujar and Prashant G. Patil, "Crop disease detection using image segmentation", National Conference on Advances in Communication and Computing, World Journal of Science and Technology, pp:190-194, Dhule, Maharashtra, India, 2012.
11. Prof. Sanjay B.Dhaygude, Mr.Nitin P. Kumbhar, "Agricultural plant Leaf Disease Detection Using Image Processing", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering , S & S Publication vol. 2, Issue 1, pp: 599-602, 2013.