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Smart Nutrition Management Using Semi-Automatic Rover

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***Abstract*: Automating the agricultural system is very useful for farmers as it would increase the productivity. If installed and programmed properly, automatic agricultural systems can save us money and help in water conservation. The main focus is to automate the agricultural practises for welfare of farmers and also to provide efficient irrigation in particular area. Our project involves the application of a semiautomatic rover for soil nutrition management as well as plant health management. This system involves the spraying of the fertilizers on a specific crop as per the pre-coded value. This potentially reduces the risk of depletion of nutrients of soil due to usage of fertilizers than required. It also involves of keeping a check on the plant health through continuous monitoring using a CCTV camera installed in the field with the simultaneous monitoring at a centre .This system employs the usage of image processing technique for identification of leaf colour and pattern. The system compares the colour and pattern with a pre stored image and indicates if a plant is healthy or not .This system also involves an efficient water drain management system by the usage of soil moisture sensors to effectively drain excess water from the field. Another feature of this proposed system is automating the irrigation process by employing automatic control of valve. This involves opening and closing of valve after the required amount of water has been discharged**

***Keywords:* CCTV, image processing, irrigation, semiautomatic rover, soil moisture sensors.**

1. INTRODUCTION

The farmers observe the crops with their naked eye for detection and identification of plant diseases or consult an expert for the same. But, this requires continuous monitoring of farmers or experts which might be prohibitively expensive and tiresome in large farms. In some countries like India, farmers are illiterate and are unaware of non-native diseases. The detection of plant diseases automatically is very essential as it helps in covering large areas of the fields and enables prompt and timely action for the treatment of the diseases. There is also a problem of depletion in the nutrients of the soil due to thee over usage of fertilizers. The chemical fertilizers are harmful to the soil and pollute the farm land. The current irrigation system is highly flawed. The consequences of over irrigation are water logging, salination of soil etc. This also leads to severe wastage of water and increase in the salt content in the soil. All these problems lead to one common consequence 'depletion of nutrients in the soil'. Every year tremendous losses are faced by the poor farmers due to the destruction of crops due to various diseases. Hence there is a need of smooth and efficient system that is automatic to tackle this problem efficiently.

2. PROPOSED SYSTEM

The proposed system consists of monitoring plant growth and health by means of a CCTV. The camera captures the image of the crop and its processed with the samples of healthy ones and the rover sprays the pesticides accordingly. Along with that the fertilizers can also be sprayed according to the prescribed value. This would prove economical as well as healthier alternative. This System also involves automation of the irrigation system by the opening and closing of the control valves after the required amount of water has been discharged This effectively prevents the usage of excess water

than required. This system thus effectively tackles the problem of covering the large area of a field manually by a single farmer as the CCTV covers a large area and enables the automatic detection of plant health by using the image processing technique that enables prompt action by the monitor. The monitor then instructs the rover to spray medicine or pesticide accordingly. There are prescribed values for the amount of fertilizer to be sprayed on a crop. The value can be encoded in the rover and it will spray the fertilizer accordingly. The system also aims in automating the irrigation system by opening and closing of the valve and also by sprinkle irrigation using the rover. This system effectively prevents the issue of water logging and also saves water effectively

3. BLOCK DIAGRAM

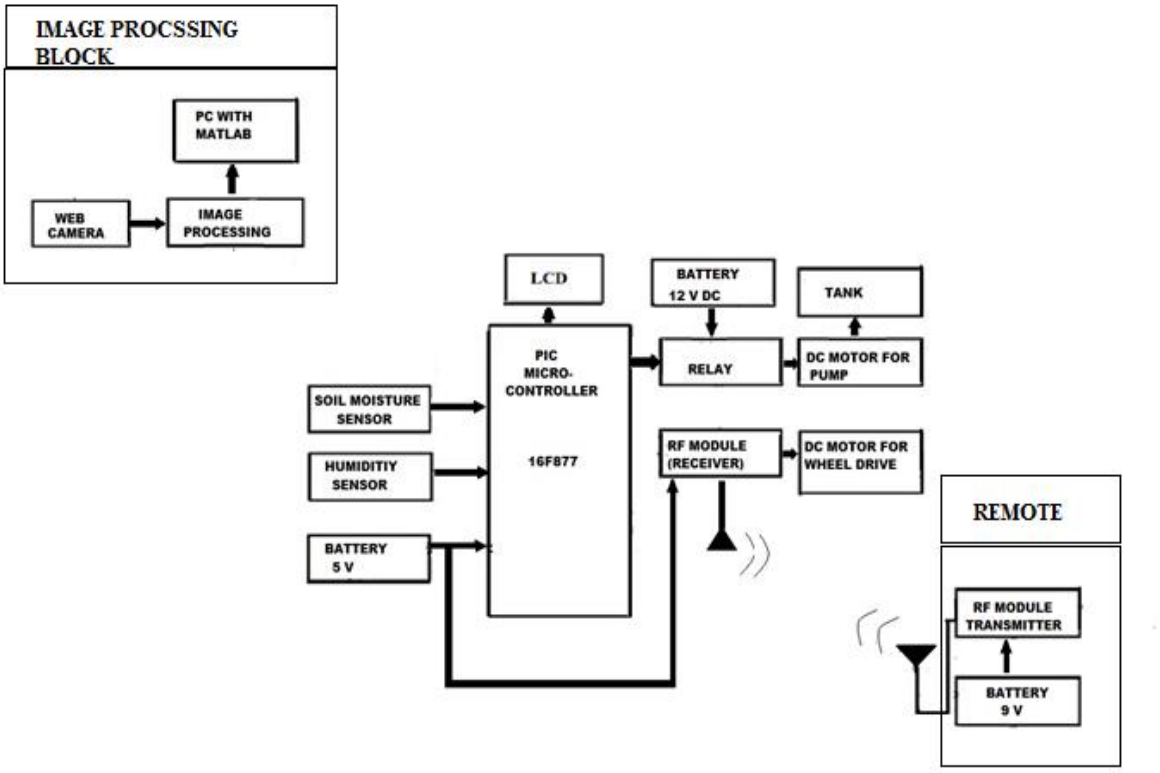

Fig.1. Block Diagram of The Project

Fig.2. Hardware Model Image

4. SIMPLIFIED WORKING OF THE SYSTEM

HARDWARE:

The rover is powered by a 12V DC battery source. The Soil moisture sensor measures the soil moisture content and the humidity sensor measures the humidity content in the air. If the soil moisture content is less the rover sprays the water in the soil. The tank attached to the rover can be filled with either fertilizer or pesticide and sprayed to the crop based on the requirement. The rover is controlled by RF controller which can be manually controlled by a farmer.

SOFTWARE:

MATLAB was used for the image processing where two separate codes were written, a code for collecting samples of leaves and storing in the database and the other code for comparing the sampled leaf with the ones stored in the database. On the basis of comparison the output will be generated citing the health of the leaf

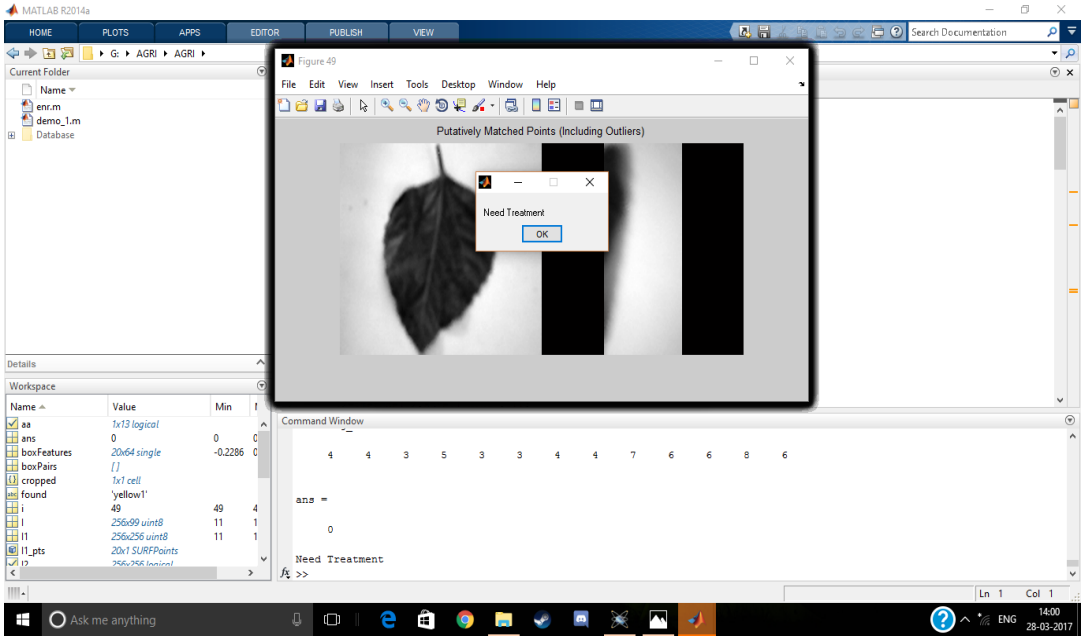

Fig 3. Output for Unhealthy Leaf

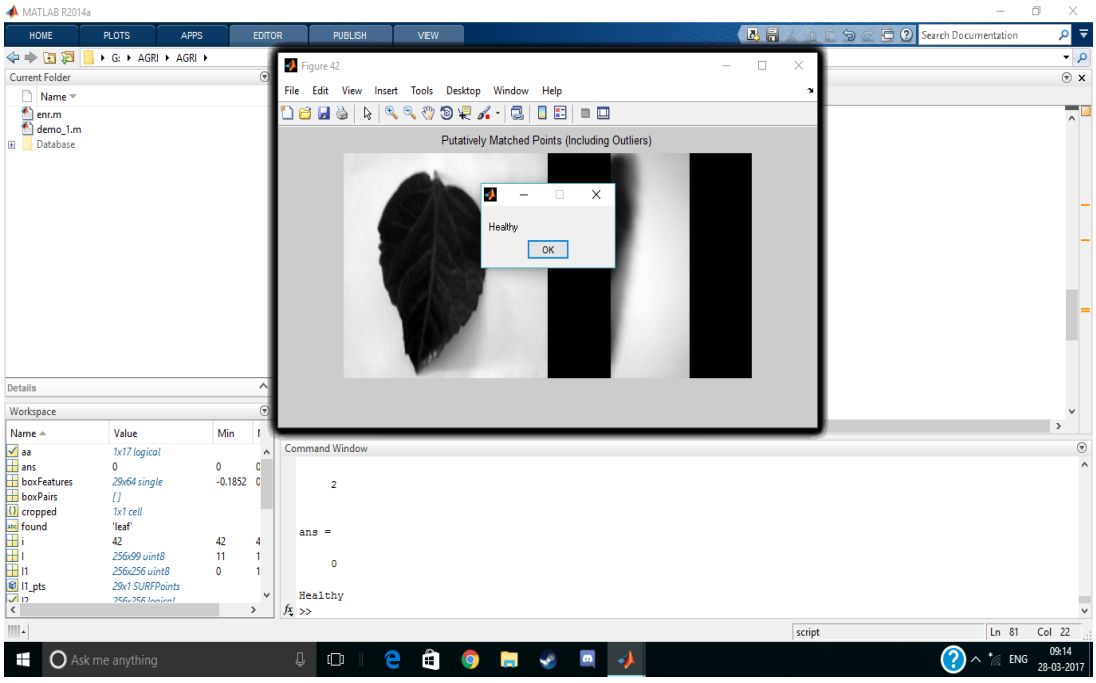

Fig.4. Output For Healthy Leaf

5. CONCLUSION

The extension of this work will focus on bringing about more economical way of designing the rover and also fully automating the agricultural process while taking into consideration the cost

MERITS:

The proposed system thus effectively tackles the problem of depletion of nutrients in the soil which is caused due to the current system as well as tackles the problem of loss of yield due to disease affecting the crops by using the image processing technique by automating the plant health monitoring system. This also effectively controls the wastage of water and salination of soil by employing the automation of irrigation technique. This system if implemented will bring about a drastic change in the agriculture system and also increase the yield of the crops benefitting both the farmers and the nation.

LIMITATIONS:

The proposed requires proper spacing between the crops and thus the plantations have to be rearranged to suit the requirement of the rover. The farmers need to be educated on the functioning of the rover which makes it complicated. The image processing technique cannot cover all the available diseases and the process is complicated

FUTURE SCOPE:

The rover can be run on solar powered battery. A nutrient sensor can be used by the rover to measure the nutrient content of the soil and spray nutrients accordingly. The size of the rover can be reduced to suit the farm. A live image processing system may be incorporated into the system, thereby cutting down the need of CCTV cameras, and also improve the accuracy of detection

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