Agricultral Robot

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ABSTRACT - An agricultural automaton may be a automaton deployed for agricultural functions like plant detection, weeding, harvesting, automatic irrigation system . The most space of application of robots in agriculture these days is at the gather stage and plant detection. Rising applications of robots in agriculture embody weed management, planting seeds, harvesting, environmental watching and soil analysis that is incredibly useful for the farmers to spot the crop yield using this approach. AS per Verified research agricultural robots market is predicted to achieve $11.58 billion by 2025. During this paper, we've got AI in agriculture sector with its implementation supported exactitude agriculture thought is that the freshly rising technology. the most reason behind automation of farming processes is saving the time and energy needed for activity repetitive farming tasks and increasing the productivity of yield by treating each crop severally optimum farming thought that is incredibly useful in modern-day technology and useful for all the farmers. Planning of such robots is sculpturesque supported specific approach and sure concerns of agriculture atmosphere within which it's progressing to work on basis sure sort of land within which specific crop yield is a lot of. These concerns and totally different approaches as mentioned during this paper that reviews different technologies which will be used at different section. Also, example of associate autonomous Agriculture automaton is bestowed that is specifically designed for seed sowing task solely that is incredibly useful for the farmers. It's a four vehicle that is controlled by LPC2148 microcontroller and chiefly controlled through app named "Agrirobot" bluetooth signal. Its operating relies on the exactitude agriculture that permits economical seed sowing at optimum depth and at optimum distances between crops and their rows, specific for every crop sort and gather the crop at the actual soil which can have nice yield.

Key Words: Agricultre, crop,yeild, Specfic, Robots, Optimium

1. INTRODUCTION

Earlier methodology needs labor and a really time and energy overwhelming. Whereas in tractor-based drilling operators of such power units area unit exposed to high level of noise and vibration, that area unit harmful to health and work performance. The stress within the development of autonomous Field Robots is presently on speed, energy potency, sensors for steering, steering accuracy and enabling technologies like wireless communication and GPS. There area.

Implementation of digital farming and site-specific exactitude management area unit a number of the potential responses to the current expectation, that depends not solely on the sensing element technology however the continual assortment of field knowledge that's solely possible through correct utilization of agricultural robots. Agricultural scientists, farmers, and growers are facing the challenge of manufacturing a lot of food from less land in an exceedingly property thanks to meet the stress of the anticipated nine.8 billion populations in 2050. That's equivalent of feeding a freshly another town of two hundred folks daily. Integration of digital tools, sensors, and management technologies has accelerated style and developments of agricultural artificial intelligence, demonstrating vital potentials and edges in fashionable farming. These evolutions vary from digitizing plants and fields by grouping correct and elaborated temporal and abstraction info in an exceedingly timely manner, to accomplishing sophisticated nonlinear management tasks for mechanism navigation. Autonomous guided tractors and farm machinery equipped with native and international sensors for operational in row-crops and orchards have already become mature.. In the case of harvest home as an example, the sensing mechanism should establish the maturity of fruits within the presence of assorted disturbances in AN unannounced heterogeneous surroundings, whereas the feat mechanism ought to perform motion and path getting to navigate within the plant system or tree cover with minimum collisions for grasping and removing the soft fruit fine. This can be tougher compared to an industrial mechanism accountable of selecting and putting a solid bolt in an production line.

2. OBJECTIVES

1 To urge the processed leaf image as AN input.

2 To section the image exploitation K-Means cluster algorithmic program.

3 Finally give the kind of illness attacked within the leaf exploitation NN classifier and severity level

4 Using this we can submit the disease using app

5 And all the test like Sensors of soil, water, temperature also submitted in the app.

3. PROBLEM STATEMENT

This system has 2 main sections, watching station and management station, that are inter-communicated using/aided by the wireless Bluetooth communication technologies. The management station furthermore as robotic station possesses the amenities that is soil wetness device, seed dispenser, and seed storage, malady Detection , robotic system with motors, ARM microcontroller, and power offer. The microcontroller is brain of this method, which might dedicate the order of suggestions received to any or all the networks, and wise factors processed by their corresponding embedded programs. Robotic mechanism plays by their internal motors and motor drivers that drive the motors in desired directions. The Bluetooth wireless protocol used for signal sending and receiving functions. The ADC is approximation analog to digital convertor and helps in process of analog factors within the microcontroller. Here the one can monitor the golem and send the signal. in line with the received signal the golem can move within the direction and it'll place the seed on field for specific distance. In the planned system artificial intelligence model provides a facility to manage the movement of agriculture vehicle. the standard and amount of agricultural merchandise will cut back by Plant diseases that have created a colossal post impact situation. Early tormentor detection may be a major issue treated the plantation crops. beginning involves in keen and regular observation of plants. Then the morbid plants are going to be classified and also the affected a part of the plants pictures are going to be nonheritable exploitation camera. These pictures are then subjected to pre-processing, transformation and agglomeration. Then, these pictures ar given as input to the processor, and also the processor can compare the photographs. If the image given is affected image, then associate degree automatic chemical sprayer is concerned to spray the chemical to the localized space within the leaf.

SYSTEM DESIGN

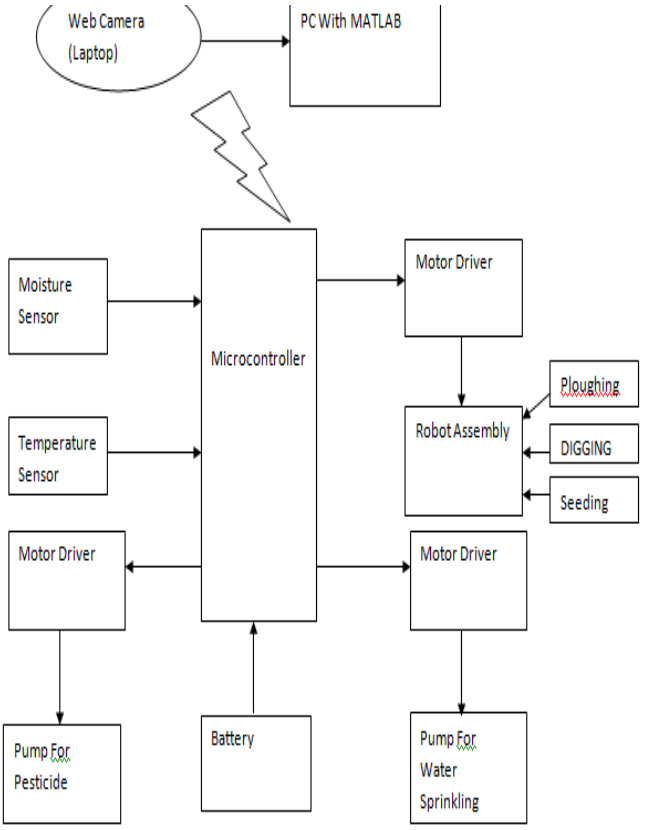


Fig 4.1: Architecture Design

The main reason behind automation of farming processes area unit saving the time and energy needed for playing repetitive farming tasks and increasing the productivity of yield by treating each crop on an individual basis mistreatment exactness farming thought. Planning of such robots is sculpturesque supported explicit approach and sure issues of agriculture atmosphere within which it's reaching to work. These issues and completely different approaches area unit mentioned during this paper. Also, epitome of associate autonomous Agriculture mechanism is bestowed that is specifically designed for seed sowing task solely. it's a four vehicle. Its operating relies on the exactness agriculture that permits economical seed sowing at optimum depth and at optimum distances between crops and their rows, specific for every crop kind.

4. IMPLEMENTATION

4.1 Rust Disease

Puccinia melanocephala is a fungal that causes rust disease. This fungal is now found in almost everywhere in all types of plants grown. The spread of rust disease has had economic impact. The symptoms start from small, elongated yellowish spots on both leaf surfaces. This spots increase in length, turn brown to orange-brown or red-brown in color. Lesions ranges are from

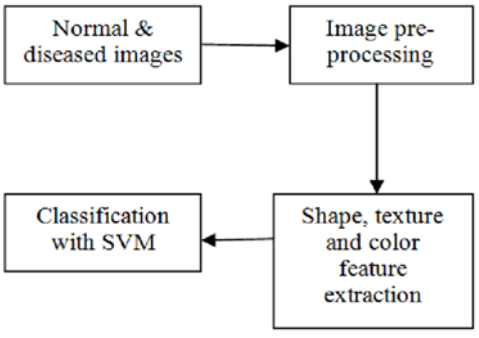
2-10 mm in length but these lesions can reach 30 mm. The lesions are no more than 1-3 mm in width. Infections of rust disease are usually most numerous toward the leaf tip and less toward the base. High rust disease severities can cause death of young leaves. Rust with high severity has caused reductions in stalk mass and numbers, thereby reducing plant growth. Rust pathogen incites new infections on living host tissue. Prevention of rust disease have been observed over the years, suggesting the existence of fungal variants. Spores of rust disease are well-suited to dissemination by air currents. It is well-adapted for atmospheric transport and it has been hypothesized that rust disease in the America came from the continent of Africa via high altitude trans-Atlantic winds. On local scale rust spores are develop in the direction of prevailing winds. Environmental factors that most influential in rust development are leaf wetness and atmospheric temperature

4.2 Feature Extraction

To extract shape feature, the color image is processed to be a binary using Otsu thresholding. The results of binary image from normal sugarcane leaf with Otsu thresholding. Combinations of color, shape and texture feature of an image are used in feature extraction. To extract color feature, we transform image from RGB to LAB color. We use shape, texture and color feature extraction to identify rust disease in sugarcane. SVM is used to classify normal and diseased images. All features from these images are extracted and classified into normal and rust disease. After that, accuracy is calculated from several combinations of features.

On the other hand, color feature results in 87% accuracy because leaf with rust disease has different color from normal leaf. The differences between rust disease and normal leaf of sugarcane. Normal leaf have no lesion on its surface. Leaves with rust disease have lesion on its surface so it is different in texture. The differences are also on its color, normal sugarcane leaf is green on all its surface but leaf with rust disease have yellow until brown lesion on its surface

1.3 Proposed algorithm flow



Main steps are data collection which contains normal and diseased images, image pre-processing, and feature extraction and classification Real data of sugarcane images are collected from sugarcane field's survey in Malang. Observation is conducted by capturing photos of sugarcane leaf on a paper. There are 200 data of normal sugarcane leaves and 200 data of sugarcane leaves with rust disease.

1.4 Detection

1. Read a image
2. Convert the image from RGB Color Space to L*a*b* Color Space.
3. Classify the Colors in a* b* Space using K-Means Clustering.
4. Label every pixel in the image using the results from k-means.
5. Create images that segment the image by color.
6. Separate the infected part and uninfected part

Features	Accuracy
SHAPE	51 %
COLOR	87 %
TEXTURE	96, 5 %
COLOR + TEXTURE	97, 5 %
COLOR + SHAPE	86, 5 %
SHAPE + TEXTURE	96 %
COLOR+ SHAPE + TEXTURE	97, 5 %

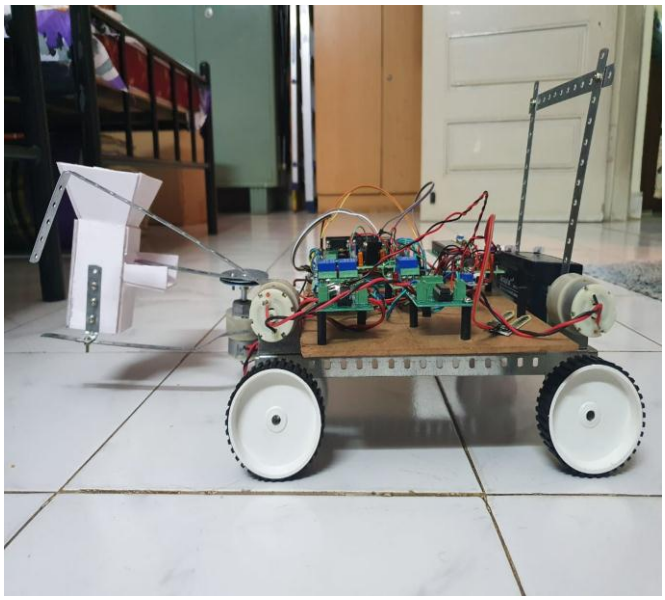
Classification Accuracy

Placement of seed(distance between two seed)	Farm land
Corn Expected(6-8 cm)	7.2cm
Wheat Expected(8-10 cm)	9 cm
Jowar Expected(10-12 cm)	10cm
Soya bean Expected(5-6 cm)	.3 cm

The placement of seeding

Crops	Humidity (%)	Moisture level
Corn	65	33
Yellow corn	65	15.3
Soybean	65	12.6
Wheat	65	13.8
Barley	65	19
Jute	65	13.7
Paddy	65	24

The data sheet of moisture level



Prototype of Proposed Model

5. RESULT

The agricultural robot will be using a chassis as a base to connect and assemble everything on it will be consisting of four motors. Two of which are toy motors and the other being gear motors. The robot is capable of doing three separate functions.

1. Digging
2. Hopper
3. Leveler
4. Disease Detection

These will be working in different modes. Programming of different modes will be done separately the different modes.

The result of this research can be seen from accuracy that calculated from several combinations of features. Table 3 shows classification accuracy of this research. When single feature is used, shape feature has the lowest accuracy of 51% because rust in sugarcane has various shape of lesion so it is difficult to analyze it by solidity, extent, minor axis length and eccentricity of image. But, normal and diseased images have different shape. Healthy leaf has no lesion and rust diseased leaf has lesion, so system can recognize the pattern.

6. Conclusion

This project projected a leaf image pattern classification to spot malady in leaf with a mix of texture and color feature extraction. The farmers sends a digital image of the pathologic leaf of a plant and therefore these pictures are browse in MATLAB and processed mechanically supported SVM and the results were shown. The results of this project is to search out applicable options which will establish plant disease of sure normally caused disease to plants. Firstly, traditional and pathologic pictures are collected and pre-processed. Then, options of form, color and texture ar extracted from these pictures. After that, these pictures ar classified by support vector machine classifier. a mix of many options is employed to judge the acceptable options to search out distinctive options for identification of plant disease. once one feature is employed, form feature has the bottom accuracy and texture feature has the best accuracy. A mix of texture and color feature extraction results a highest classification accuracy. A mix of texture and color feature extraction with polynomial kernel ends up in smart classification accuracy. Supported the classified kind of malady a text message was sent to the user within the project. With fully-automated farms within the future, robots will perform all the tasks like mowing, fertilizing, observation of pests and diseases, harvesting, tilling, etc. This additionally permits the farmers to merely supervise the robots while not the necessity to work them. The project are often increased to the other sorts of crop. Hence, it are often applicable to the $64000 time agricultural field.

7. FUTURE SCOPE

In this project, we demonstrated only few types of diseases which were commonly caused and it can be extended for more disease in future. Here only a text message was sent to the farmer but in future a robot can be sent to spray the pesticides to the plants automatically without human interaction

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