Krushi Roboter-"Future Farmer's Friend"

Prashanth Reddy R [1], Ravi Chandran R [2], Hemanth Kumar S[3], Jagadeesh D[4]
[1, 2, 3, 4] Dept of Mechanical Engineering
[1]REVA Institute of Technology and Management,Bangalore-560064, Karnataka
[2]Sir M Visvesvaraya Institute of Technology,Bangalore-562157, Karnataka
[3]New Horizon College of Engineering,Bangalore-560103, Karnataka
[4]Sri Jagadguru Chandrashekaranatha Swamiji Institute of Technology, Bangalore-562101, Karnataka

Abstract- *In this project we will be fabricating a multipurpose irrigation vehicle that will be able to dig the Earth, Sow the seeds and Cultivate the crop after the harvest is ready. We have designed an agricultural robot which will be able to perform five different functions including sowing, ploughing, water pumping, harvesting, and rolling. We will be using a android smart phone application to control the vehicle to respond to the control signal this type of vehicle should be useful for the farmers as a low investment option instead of buying 2 or more machines to do this work done by a single machine of ours. We are using solar panel as a power supply to our agricultural robot.*

Keywords- Robot, farmer friendly, remote controlled.

I. INTRODUCTION

In the field of agriculture, various operations for handling heavy material are performed. For example, in vegetable cropping, workers should handle heavy vegetables in the harvest season. Additionally, in organic farming, which is fast gaining popularity, workers should handle heavy compost bags in the fertilizing season. These operations are dull, repetitive, or require strength and skill for the workers. In the 1980.s many agricultural robots were started for research and development. Kawamura and co-workers developed the fruit harvesting in orchard. Grand and co-workers developed the apple harvesting robot. They have been followed by many other works. Many of the works focus on structure systems design (e.g., mechanical systems design) of the robot and report realization of the basic actions in actual open fields. However, many of the robots are not in the stages of diffusion but still in the stages of research and development. It is important to find rooms to achieve higher performance and lower cost of the robots.

Over history, agriculture has evolved from a manual occupation to a highly industrialized business, utilizing I wide variety of tools and machines. Researchers are now looking towards the realization of autonomous agricultural vehicles. The first stage of development, automatic vehicle guidance, has been studied for many years, with a number of innovations explored as early as the 1920s. The concept of fully autonomous agricultural vehicles is far from new; examples of early driverless tractor prototypes using leader cable guidance systems date back to the 1950s and 1960s. In the 1980s, the potential for combining computers with image sensors provided opportunities for machine vision based guidance systems. During the mid-1980s, researchers at Michigan State University and Texas A&M University were exploring machine vision guidance. Also during that decade, a program for robotic harvesting of oranges was successfully performed at the University of Florida. In 1997, agricultural automation had become a major issue along with the advocacy of precision agriculture. The potential benefits of automated agricultural vehicles include increased productivity, increased application accuracy, and enhanced operation safety.

Additionally, the rapid advancements in electronics, computers, and computing technologies have inspired renewed interest in the development of vehicle guidance systems. Various guidance technologies, including mechanical guidance, optical guidance, radio navigation, and ultrasonic guidance, have been investigated. Agriculture involves the systematic production of food, feed, fiber, and other goods. In addition to producing food for humans and animals, agriculture also produces cut flowers, timber, fertilizers, animal hides, leather, and industrial chemicals.

A robot is a machine that can be programmed and reprogrammed to do certain tasks and usually consists of a manipulator such as a claw, hand, or tool attached to a mobile body or a stationary platform.

Autonomous robots work completely under the control of a computer program. They often use sensors to gather data about their surroundings in order to navigate. **Tele-controlled** robots work under the control of humans and/or computer programs.**Remote-controlled** robots are controlled by humans with a controller such as a joystick or other hand-held device. The word"Robot" came from the Czech word "robota", which means forced labour, or work. It was first used in the play R.U.R., Rossum's Universal Robots, written in 1921 by a Czech playwright named Karel Capeck. Isaac

Asimov was the first person to use the term robotics in "Run-around," a short story published in 1942.The current state of agricultural robotics.Today agricultural robots can be classified into several groups: harvesting or picking, planting, weeding pest control, or maintenance.

II. REQUIREMENT SPECIFICATION

System Requirement Specification (SRS) is a central report, which frames the establishment of the product advancement process. It records the necessities of a framework as well as has a depiction of its significant highlight. A SRS is essentially an association's seeing (in composing) of a client or potential customer's frame work necessities and conditions at a specific point in time (generally) before any genuine configuration or improvement work. It's a two-way protection approach that guarantees that both the customer and the association comprehend alternate's necessities from that viewpoint at a given point in time.

NON-FUNCTIONAL REQUIREMENT

- **Usability**

The user must be familiar with the user interfaces and should not have problems in migrating to a new system with a new environment.

- **Reliability**

The changes made by the Programmer should be visible both to the Project leader as well as the Test engineer.

- **Security**

Including bug tracking the system must provide necessary security and must secure the whole process from crashing.

- **Performance**

The system will be hosted on a single web server with a single database server in the background, hence performance becomes a major concern.

- **Portability**

This is required when the web server, which is hosting the system gets stuck due to some problems, which requires their system to be taken to another system.

- **Reusability**

The system should be divided into such modules that it could be used as a part of another system without requiring much of work.

HARDWARE REQUIREMENTS

- Microcontroller – AT89s52
- Power Supply
- DC Motors
- Irrigation Vehicle
- L293 Motor Driver Circuits
- Bluetooth
- Water Pump

III. SYSTEM IMPLEMENTATION

HARVESTING

Harvest is the process of gathering mature crops from the fields. *Reaping* is the cutting of grain or pulse for harvest, typically using a scythe, sickle, or reaper. The harvest marks the end of the growing season, or the growing cycle for a particular crop, and social importance of this event makes it the focus of seasonal celebrations such as a harvest festival, found in many religions. On smaller farms with minimal mechanization, harvesting is the most labor-intensive activity of the growing season.

ROLLING

Many farmers throughout the country have been rolling out land in recent week, however the practice is viewed by others as grassland management. Rolling the field is important in agriculture as it helps to retain the soil its nutrients back without eroding it.

WEEDING:

The supply of water to land or crops to help growth, typically by the means of channels which is analysed.

GROWCUT ALGORITHM:

GrowCut is an interactive segmentation algorithm.It uses Cellular Automation as an Image model.Automata evolution models segmentation process.each cell of the Automata has some label.During automata evolution some cells capture their neighbours,replacing their labels.Here a captured image is initially loaded which is then contrasted,and finally segmented by which user gets the exact percentage of affected area in the leaf. The fig(4.1) represents the flow chart of this concept diagrammatically.

IMAGE PROCESSING USING MATLAB

```
% Evaluate the disease affected area
black = im2bw(seg_img,graythresh(seg_img));
%figure, imshow(black);title('Black & White Image');
m = size(seg_img,1);
n = size(seg_img,2);

zero_image = zeros(m,n);
%G = imoverlay(zero_image,seg_img,[100]);
cc = bwconncomp(seg_img,6);
diseasedata = regionprops(cc,'basic');
A1 = diseasedata.Area;
sprintf('Area of the disease affected region is : %g%',A1);

I_black = im2bw(I,graythresh(I));
kk = bwconncomp(I,6);
leafdata = regionprops(kk,'basic');
A2 = leafdata.Area;
sprintf(' Total leaf area is : %g%',A2);

%Affected_Area = 1-(A1/A2);
Affected_Area = (A1/A2);
if Affected_Area <0.1
   Affected_Area = Affected_Area+0.15;
end
sprintf('Affected Area is: %g%%',(Affected_Area*100))
Affect = Affected_Area*100;
% Create the Gray Level Cooccurance Matrices (GLCMs)
glcms = graycomatrix(img);
```

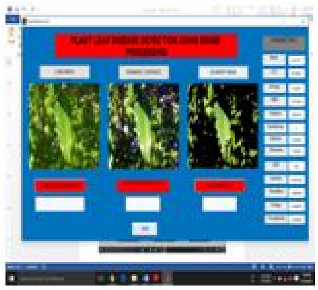
IV. RESULT AND DISCUSSION

The test results: All of the test cases that are mentioned above are passed successfully. No defects were encountered.

The acceptance testing: The user acceptance testing is the critical phase in any project and it requires the significant participation from the user, it will also ensure that the system will meet the functional requirements.

The test results: All the test cases that are mentioned above are passed successfully. No defects were encountered.

FIG : 1(A)REPRESENTING SNAPSHOTS OF PROTOTYPE



1(B)REPRESENTING SNAPSHOTS OF IMAGE PROCESSING

V. CONCLUSION

In agriculture, the opportunities for robot-enhanced productivity are immense – and the robots are appearing on farms in various guises and in increasing numbers. The other problems associated with autonomous farm equipment can probably be overcome with technology. This equipment may be in our future, but there are important reasons for thinking that it may not be just replacing the human driver with a computer. It may mean a rethinking of how crop production is done. Crop production may be done better and cheaper with a swarm of small machines than with a few large ones.

REFERENCES

[1] "java."[Online]Available:https://en.wikipedia.org/wiki/Ultra-high-molecular-weight_polyethylene.

[2] B. P. Chang, H. Md. Akil, and R. Bt. Md. Nasir, "Comparative study of micro structured and robotics reinforced study composites under dry sliding wear," Wear, vol. 297, no. 1–2, pp. 1120–1127, 2013

[3] Z. L. Wang, "Ten years' venturing in ZnO nanostructures: From discovery to scientific understanding and to technology applications," Chinese Science Bulletin, vol. 54, no. 22. pp. 4021–4034,2009.reinforced java program composites under dry sliding wear,"

[4] Affatato S Ruggiero A Merola M, "Advanced biomaterials in hip joint arthroplasty. A review on polymer and ceramics composites as alternative bearings.

[5] Dr R.K Bansal, Text book on cloud computing, Laxmi Publications(P) Ltd,2005.
[6] Anthony Esposito, Text book on java Power with Applications, Pearson Education, 7th edition.