



ISSN: 0976-3031

RESEARCH ARTICLE  
AUTOMATION IN AGRICULTURE

<sup>1</sup>S.S.Katariya, <sup>2</sup>S.S.Gundal, <sup>3</sup>Kanawade M.T and <sup>4</sup>Khan Mazhar

Department of Electronics Engineering, AVCOE, Sangamner Dist. Ahmednagar, Maharashtra, India

ARTICLE INFO

Article History:

Received 2<sup>nd</sup>, May, 2015  
Received in revised form 10<sup>th</sup>,  
May, 2015  
Accepted 4<sup>th</sup>, June, 2015  
Published online 28<sup>th</sup>,  
June, 2015

Key words:

Automation, Delay time, Robot,  
Farm, Microcontroller

Copyright © Katariya S.S et al This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

Automation is a illumination of human afford from the working field. From last two decade the industrial automation is growing very rapidly. But the automation concept in agriculture is not developed as much. Automation in agriculture is very necessary because of firstly by the year 2042, the world population is projected to increase to 9 billion souls. There will be a huge challenge in providing abundant high quality, affordable, safe and nutritious foods for such population, especially in light of the trend to use arable land for bio-fuel production. Secondly with tradition method of agriculture some drawbacks like wastage of seed, improper spraying of pesticide on crop so soil standard get degrades also food become harmful to human body, if The major problem of water which is facing by each nation, especially India, Brazil, China and South Asian countries is only due to the improper use of water and water management deficiency. In order to overcome all the above drawbacks of tradition agriculture and to become the agriculture field modern , hi-tech and fastest growing , we made a robot which will perform pesticide spraying , water supplying , plugging , dropping of seed , accurately and automatically, and the solar plant provide the supply source to whole robot which makes it echo-friendly. Through this we are going to integrate the different application of agricultural works which is not done in before researches and technologies in agriculture field.

System Design

As we know every agriculture cropping is done in a row wise manner as shown in the figure 1.0 for that we also mark white

ABSTRACT

This paper describes the four major work in agriculture field which is done by a robot without giving any human support. For designing automatic system we provide proper tracking through the white line following robot concept in which the robot distinguishes white and black or dark surface and follows only white track. With reference to this concept we are going to implement a white line on a farm where actually we need to work & remaining surface is treated as a black surface due to the brownish color of soil. We also provide delay to robot at equal distance to do the agriculture work like pesticide spraying, water supplying, plugging, dropping of seed, accurately and automatically & the solar plant provides the supply source to whole robot which makes it echo-friendly. Through this we are going to integrate the different application of agriculture field which not happened in previous technologies and research.

track in same row wise manner. While the robot still running on a white track we will give the delay after equal interval of time. At that equal interval of time the robot stop and do the operation of 1) Pesticide spraying 2) Dropping the seed's 3) Ploughing 4) Providing water to crop



Fig 1 Fruit crop orientation in rows

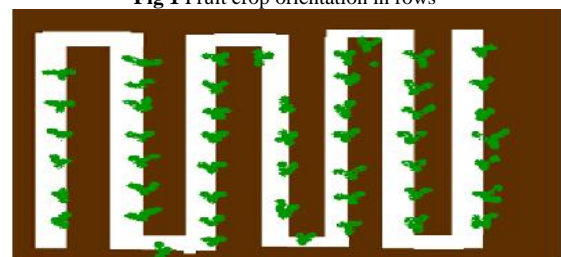


Fig2 Structure of farm after implementation of white track.

\*Corresponding author: S.S.Katariya

Department of Electronics Engineering, AVCOE, Sangamner Dist. Ahmednagar, Maharashtra, India

**Block Diagram**

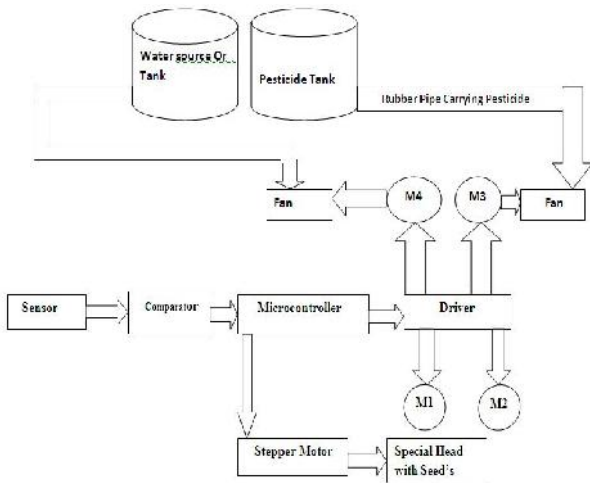


Fig. 3 Block diagram for Robot

**Tracking System**

Capturing of whole farm is done using white line follower robot [3].

What is white line follower robot?-

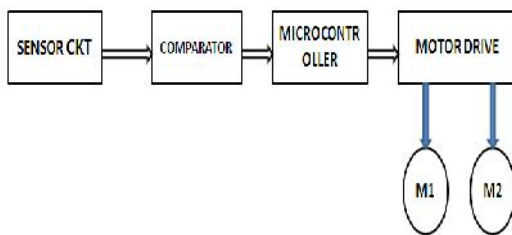


Fig. 4 White line follower robot

Sensor circuit consists of one transmitter and one receiver. For transmission purpose the IR LED is used which reflect its light on either white line or soil.

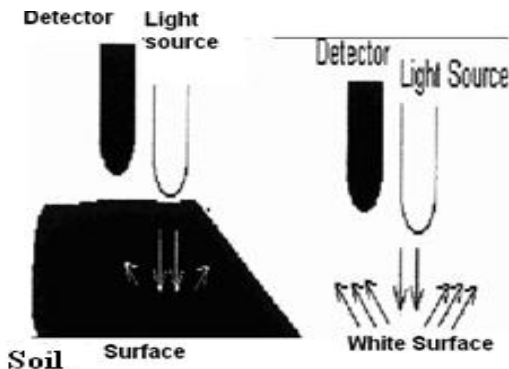


Fig 5 IR LED Functioning

The white surface is good reflector of light so more light will fall on the photo diode. So photo diode output voltage will more than the soil surface because of bad reflection of soil color.

Comparator is a simple LM358 IC which compares the white line output voltage and soil color output voltage with reference voltage. So the reference voltage is set in such a manner that it

will be greater than soil color voltage and less than white line voltage .because its output will be like following equation.

1.  $V_{ref} > V_{soil\ voltage} = '0'$
2.  $V_{ref} < V_{white\ line} = '1'$

The output of the comparator will give to the microcontroller (89c51) which will take the controlled action according to output of comparator. Microcontroller takes action which can be explained in three different conditions.

**When Robot Is On White Track:** At this condition both the Motors's ON. Due to both motors in ON condition, the robot will follow the straight white line path.

**White line bend to Right Side:** In this situation the left sensor detects the soil color voltage, still the right sensor is on White track. To take the right turns the right motor gets OFF. And the left motor still ON condition, which force the robot to move in a right direction, once it moves in right direction robot finds the white track and the right motor get ON. And the normal operation will continue.

**White Line Bend to Left Side:** In this situation the right sensor detects the soil color voltage, still the left sensor is on White track. To take the left turns the left motor gets OFF. And the right motor still ON condition, which force the robot to move in a left direction, once it moves in left direction robot finds the white track and the left motor get ON. And the normal operation will continue. After tracking concept we will move on the functioning and application of the robot, while the robot is on white track we are going to provide the delay time to the robot for the purpose of providing the function in the farm at equal distance.

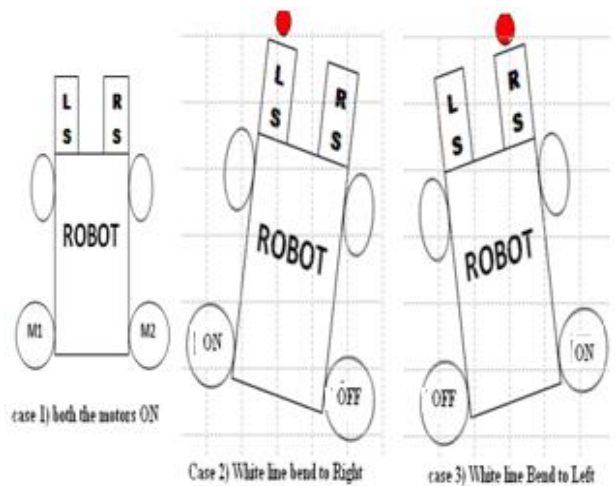


Fig 5 Movement of Robot based on white line

**Working of Robot**

**Spraying of Pesticide :** The pesticide liquid which is contain by a tank is came through the rubber pipe to the tip of DC motor , at that shaft of motor a fan blade is attach , which revolves at the delay time of robot or on front of crop. Due to revolution the liquid get spray on crop. The standard level is maintained by how much time delay we provide to the robot or the time in which the robot stands in front of crop. E.g. If a tomato crop

the Endosulphan pesticide level is of 50ml. and robot delay time is of 2sec in which it spraying 25ml. then increase the delay time by 2 sec again so the standard level of pesticide get maintain.

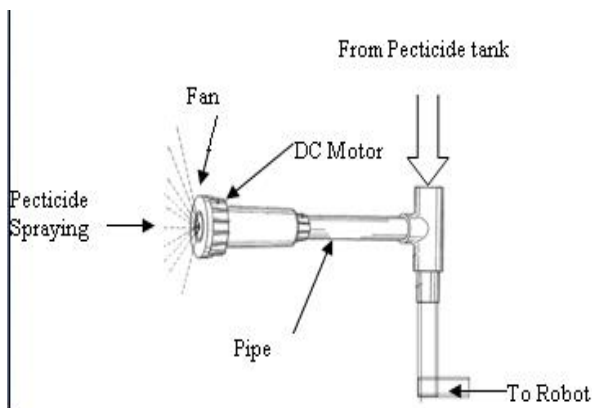


Fig 6 Spraying of Pesticide

**Dropping of Seed's:** The dropping of seed is done using the stepper motor mechanism. For that we are using the special mechanical head at the shaft of stepper motor.

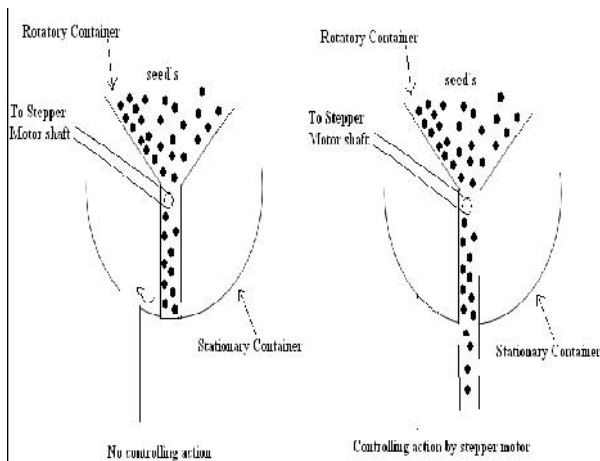


Fig.7 Dropping of Seeds

The point on the farm where we want to dropping the seed is come, the stepper motor moves in a clockwise direction [1]. due to clockwise step angle change by stepper motor the tip of stationary as well as rotator container get match , due to matching of this tip`s the seed`s get path to dropped in the farm .after very small delay of time the stepper motor moves in anticlockwise direction with same angle and the tips get close. In this way the controlling action of motor takes place at equal distance of farm, and also it dropped quantities seed`s on the farm.

**Water Supply:** This application is very important in the sense of best water management to crop. The rubber pipe which carrying the water from tank is fed to the tip of fan which is attach to the DC motor. As the motor revolves the sprinkling of water is takes place in front of crop only. According to delay time we can decide the actual level of water which is required for crop. It provides the water to the crop in sufficient and accurate manner so the wastage of water will be minimize. It also overcome the requirement of sprinkle and drip irrigation system, and become less costly and easy construction.

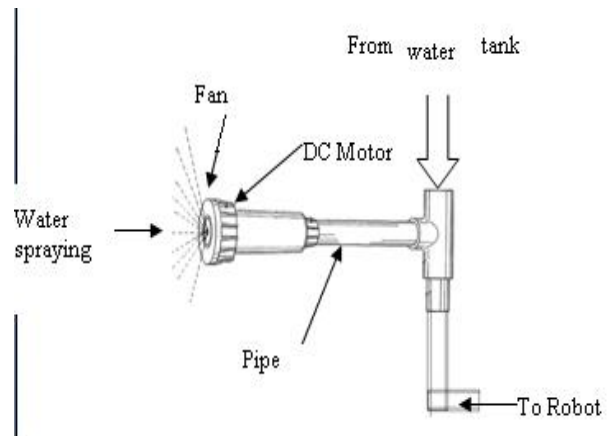


Fig 8 Water Supply Mechanism

**Ploughing:** This application is very easily archived by attaching the rotavator at the back side of the robot. For this application we require to give good mechanical strength to the robot, because it is quit heavy and when it is place on soil for ploughing purpose, it required extra force to move forward. This is the initial operation in the farm. Only this application required no delay time. Once it place on the farm it continuously track the white line on the farm and do ploughing through the rotavator.

**Power Supply:** To becoming system echo friendly and beneficial for farmer we are going to provide the solar panel as a source power to the operation of whole process. Echo friendly in the sense of it doesn't required any fuel and source for operation, it saves electricity and fuel. Minimum pollution as well as saves the convention power. Due to open space of farming field it will easily available, exception is the cloudy environment in rainy session .The solar energy is non conventional source of energy so we can makes system life longer.

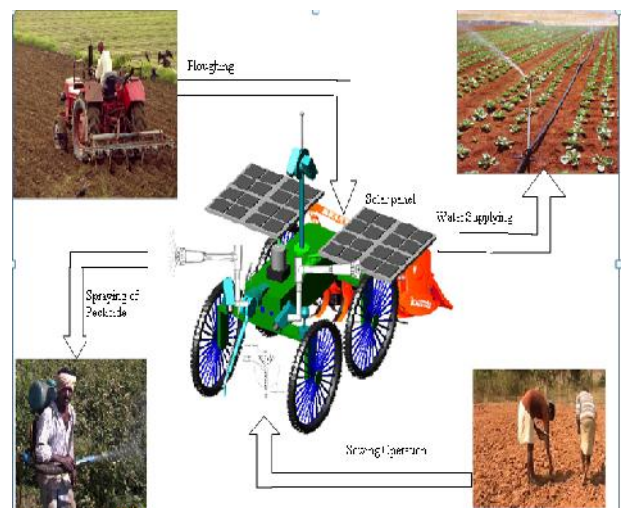


Fig 9 Future Model OF Agriculture Robot

## CONCLUSION

From this project we conclude that without giving human support system performs the main agricultural work automatically. Tracking system provides free to move in a necessary path only. It is useful only for fruit cropping system. The system is failed in rice agriculture production because the

white track is impossible for implementation. Spraying of pesticide mechanism avoids direct contact between farmer and poison pesticide liquid also maintains standard level of pesticide which improves the fruit quality and soil standard. Water supply system provides accurate water to particular crop and saves the wastage of water which is spoil in other traditional method. Overall we can say that system is fully automated which saves money and time also improves the quality of production and also it will be create green evolution if implement properly in every farm.

## References

### Books

1. MuhammadAli Mazidi;Janice Gillispie Mazidi ;Rolin D. McKinaly., (2012.) *The 8051 Microcontroller and Embedded Systems using Assembly And C* Second Edition .
2. Canudas de Wit, C., Siciliano, B., and Bastin G. (editors), (1996) *Theory of Robot Control*. New York, Spinger-Verlag,
3. Bar-Shalom, Y., Li, X.-R.,(1993) *Estimation and Tracking: Principles, Techniques, and Software*. Norwood, MA, Artech House,

### How to cite this article:

S.S.Katariya et al, Automation In Agriculture. *International Journal of Recent Scientific* Vol. 6, Issue, 6, pp.4453-4456, June, 2015

4. Craig, J.J., (1989) *Introduction to Robotics: Mechanics and Control*. 2nd edition. Boston, Addison-Wesley.

### Papers

5. Ulrich, I., Nourbakhsh, I., "Appearance-Based Obstacle Detection with Monocular Color Vision," in *the Proceedings of the AAAI National Conference on Artificial*
6. *Intelligence*. Austin, TX. August 2000.
7. Tillett, N.D., Hague, T. and Merchant, J.A.(1998) A robotic system for plant scale husbandry. *Journal of Agricultural Engineering Research*, 69, 169-178.

### Interesting Internet Links to Mobile Robots

#### Homepages with mainly wheeled mobile robots

1. <http://www.Agriculture Robot with arm.html>
2. <http://www.white line following robot.html>
3. <http://www.sensor based robot.html>
4. <http://www.mobile tacking robot.html>
5. <http://www.indian agriculture farm and work.html>
6. <http://www.pictiside and water management in India .html>

\*\*\*\*\*