ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

An ISO 3297: 2007 Certified Organization *Volume 5, Special Issue 1, March 2016*

National Conference on Recent Trends in Electronics and Instrumentation Engineering (NCRTE 2K16)

1st& 2nd March 2016

Organized by

Department of Electronics &Instrumentation Engineering, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India

Agricultural Robot

L.Manivannan[1], M.S.Priyadharshini[2],

Assistant Professor, Dept. of EEE, Knowledge Institute of Technology, Salem, Tamil Nadu, India[1]

PG Student [EST], Dept. of EEE, Knowledge Institute of Technology, Salem, Tamil Nadu, India[2]

ABSTRACT: Agricultural is one of our most important industry for providing food, feed and fuel necessary for our survival. Certainly, robots are playing an important role in the field of agriculture for farming process autonomously. Normally, farming process include planting, irrigation, fertilisation, monitoring and harvesting of a crop of any kind. All these processes are not being done by using a single robot. The proposed system focuses on implementing all the farming process especially on onion crop in a single bot by using Fire bird v robot. The fire bird v robot uses ATMEGA 2560 as master controller, ATMEGA 8 as slave controller, IR, gripper arrangement and other accessories. The proposed system prototype is implemented by selecting an arena which considering the agricultural field of any kind of onion crop. The robot detects the planting area by using sensors and seeds to be planted in the corresponding field using gripper arrangement of the robot. In a continuation, the rest of remaining farming process could be done automatically. This system uses AVR ATMEL STUDIO 6.0 and AVR Boot loader for the programming part of the robot. This robot could help the farmers for doing the farming process in accurate.

KEYWORDS: Agriculture, Fire Bird V Robot, ATMEGA 2560,ATMEGA 8, Automation.

I. INTRODUCTION

Agriculture is the backbone of India. The robotics plays a major role in various fields such as industrial, medical, military applications etc., The robotics field are gradually increasing its productivity in agriculture field. Some of the major problems in the Indian agricultural are rising of input costs, availability of skilled labors, lack of water resources and crop monitoring. To overcome these problems, the automation technologies were used in agriculture. The automation in the agriculture could help farmers to reduce their efforts.The robots are being developed for the processes such as fruit picking, monitoring,irrigation, etc., All of these functions have not yet performed using a single robot.

In this the robots are developed to concentrate in an efficient manner and also it is expected to perform the operations autonomously. The proposed idea implements the robot to perform the functions such as planting, irrigation, fertilization, monitoring, and harvesting of an onion crop. These functions can be integrated into a single robot and then performed. The robot is expected to perform the functions such as planting, irrigation, fertilization, monitoring, and harvesting autonomously in the field of onion.

This project uses Atmel ATMEGA2560 microcontroller is used which acts as a master (AVR architecture based Microcontroller) and Atmel ATMEGA8 acts as a Slave (AVR architecture based Microcontroller). Firebird V Robot is used to move on the field. The gripper arrangement is used for planting, harvesting of the plant and to spray fertilizers and pesticides to the land. The camera is used for monitoring the plant growth.IR sensor is used to detect the insect in the plant, if found.The software required is AVR ATMEL STUDIO 6.0 and AVR Boot loader. The AVR ATMEL STUDIO 6.0 s/w is used for writing the coding and AVR Boot loader acts as an interface between the PC and the robot. It is used for burning the coding from PC to a robot.

II. LITERATURE SURVEY

2.1 Designing an Autonomous Soil Monitoring Robot(IEEE - 2015)

Patrick M. Piper and Jacob S. Vogel et al designed an autonomous soil monitoring rover to expedite data collection. The rover will be able to autonomously navigate through a field and avoid obstacles. It will gather data on

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

An ISO 3297: 2007 Certified Organization Volume 5, Special Issue 1, March 2016

National Conference on Recent Trends in Electronics and Instrumentation Engineering (NCRTE 2K16)

1st& 2nd March 2016

Organized by

Department of Electronics &Instrumentation Engineering, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India

soil moisture and temperatures at a set of given points and relay the information back to the farm manager. The vehicle is equipped with a stevens hydra probe II used to sense the soil moisture and temperature. GPS is used to navigate through the field.

2.2 Application of Computer Vision Technique on Sorting and Grading of Fruits and Vegetables (JFPT-2012)

Mahendran R and Jayashree GC et alpresented an idea of sorting and grading of fruits by image analysis. Computer Vision technique is used to evaluate the quality of the fruits. This paper presents the application of image analysis and computer vision system to evaluate the quality of products in the field of agriculture. Computer vision is a novel technology for acquiring and analysing an image by using computers to control machines or to process it.

It includes capturing, processing and analysing images to facilitate the quality characteristics in agricultural and food products. The techniques used in image analysis include image acquisition, image pre-processing and image interpretation, leading to quantification and classification of images and objects of interest within images. Images are acquired with a physical image sensor and dedicated computing hardware and software are used to analyse the images with the objective of performing a predefined visual task.

2.3 Robots for Precision Agriculture (National Conference on Mechanisms and Machines-2007)

Satish Kumar KN, Sudeep CS et al presented a multi-purpose agricultural robot to implement precision irrigation, fertilizer addition and de-weeding apart from continuous monitoring of crop and soil conditions. This will involve efficient utilization of water resources, intensive plant and soil monitoring, condition based use of fertilizers and the ability to work in unstructured environments. Precision agriculture involves the adequate and optimum usage of resources based on various parameters governing crop yield.

The Handbook of Precision Agriculture defines that the critical factors that affect the yield are identified and the variability in soil, crop in the agricultural field are determined. The gantry robots perform various operations and helps the farmers to reduce the input costs and the usage of water resources.

2.4 Agribot (International Journal of Advanced Research in Computer and Communication Engineering-2015)

Ankit Singh, Abhishek Gupta et al presented an idea that agribot is a robot designed for agricultural purposes. This Bot performs basic elementary functions like picking, harvesting, weeding, pruning, planting, grafting. It is designed to minimize the labour of farmers in addition to increasing the speed and accuracy of the work. The main feature of the robot is the ability to find the grass in the field using image processing.

For this a special purpose web cam which will take photos inside the field and if the grass is found then the user will inform the robot to cut the grass in the crop field and also the user will pick the grass which has been cut by the robot. The image processing is also used for analysing the height of the plant. If the height of the crop is larger than the reference height then the cutting mechanism will be used by the robot to cut the crop. A vision-based row guidance method is presented to guide the Robot platform driven along crops planted in row.

2.5 Autonomous farming robot with plant health indication(IJATES-2015)

K.V.Fale and P.Bhure amit et al designed an autonomous intelligent farming robot which indicates plant health by observing the colour of their leaves and the height of the plant. It also notes environmental conditions such as temperature, moisture and humidity. The health of the plant is displayed on the LCD. The robot has also watering mechanism, it will water the plants according to their needs by observing soil moisture and humidity. The main feature of the robot is the ability to sense the health of the plants using image processing. Webcam will take the photo inside the field and analyses the growth according to the height, colour of the leaves, etc.. Vision based row guidance method is used to guide the robot platform driven along crops planted in row.

III.PROPOSED SYSTEM

Fig 1 shows the block diagram of proposed system in which the fire bird ‘v’ robot comprises of ATMEGA2560 acting as a master microcontroller, ATMEGA8 acts as a slave microcontroller which inbuilt sensors, gripper & camera arrangement, indicators such as LED, LCD etc., The proposed system integrates all the functions such as planting, irrigation, fertilization, monitoring, and harvesting into a single robot and perform the operations automatically.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

An ISO 3297: 2007 Certified Organization *Volume 5, Special Issue 1, March 2016*

National Conference on Recent Trends in Electronics and Instrumentation Engineering (NCRTE 2K16)

1st& 2nd March 2016

Organized by

Department of Electronics &Instrumentation Engineering, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India

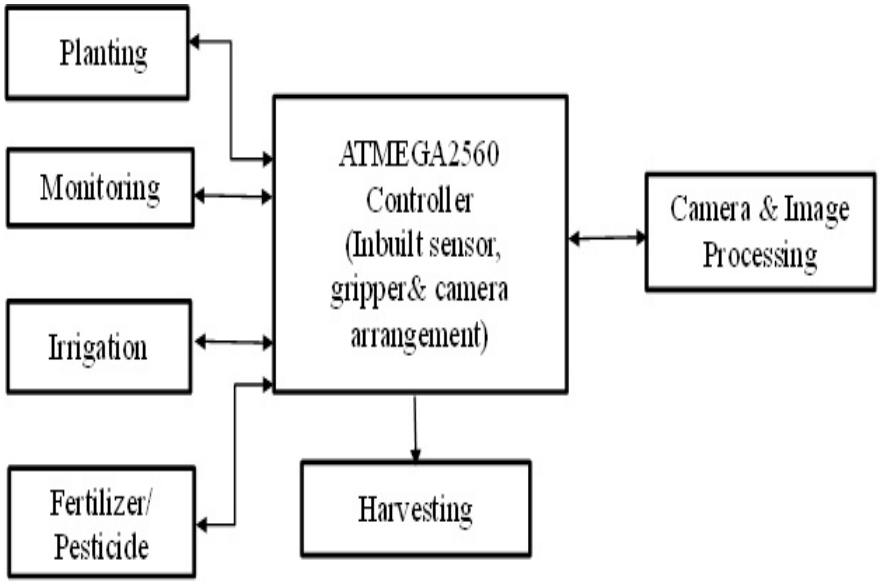

Fig1: Block Diagram of Proposed System

The gripper arrangement with arm is used for planting, harvesting, and to spray the pesticides to the plant whenever required. The camera is used for monitoring the growth of the plant. IR sensor is used to detect the insects or animals present in the field. The requirements of the water are identified by the temperature sensor. The level of pesticides and fertilizers can be detected by the sharp sensor. If the water resources or pesticides are insufficient an alerting buzzer sound is produced.

In the concerned field the fire bird v robot is placed to move around it. The gripper arrangement with arm is used for planting and harvesting the onion. It plants the onion in each concerned agricultural field of the arena. The camera with image processing is used for monitoring the field. The irrigation, spraying of pesticides and fertilizers are performed with the help of gripper arrangement.

IV.RESULT

The AVR ATMEL STUDIO 6.0 s/w is used for writing the coding and AVR Boot loader is used for burning the coding from PC to the robot. The entire process can be done with the help of Embedded C Coding which has been written on the robot.

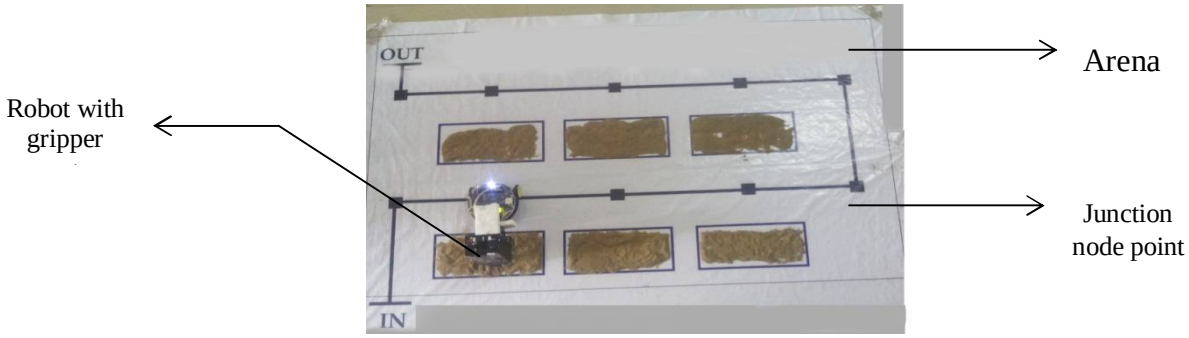

Fig 2: Planting Process of Onion Crop

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

An ISO 3297: 2007 Certified Organization *Volume 5, Special Issue 1, March 2016*

National Conference on Recent Trends in Electronics and Instrumentation Engineering (NCRTE 2K16)

1st& 2nd March 2016

Organized by

Department of Electronics &Instrumentation Engineering, Adhiyamaan College of Engineering, Hosur, Tamilnadu, India

Fig 2 shows the result of planting process. The implemented robot is traversing on the block line using the white line senor. Once the junction point identified, the robot will plant the onion crop to the corresponding area. The onion crops are placed on the top of the robot. The gripper arrangement will pick up the crops and plant it on the corresponding node. This process is continued to the next field till the out position comes in the arena field.

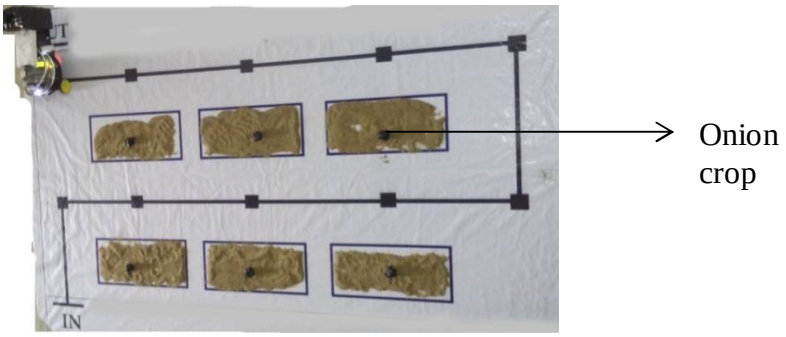

Fig 3: Plantation of Onion

Fig 3 shows that the plantation of onion was done by the robot autonomously in the entire field. This process is continued to the next field.

V.CONCLUSION

The planting process of the onion crop only has been implemented by using this Fire bird V robot autonomously. This robot will help the farmers to do the farming process efficiently. The project can be enhanced to any other kinds of crop such as fruits, paddy, sugarcane etc. The robot can be designed with chain roller instead of normal wheel. Hence, it can be applicable to the real time agricultural field.

REFERENCES

[1] Patrick Piper and Jacob Vogelpublished a paper on "Designing an Autonomous Soil Monitoring Robot" (IEEE - 2015).
[2] Mahendran, Jayashree, Alagusundaram published a paper on "Application of Computer Vision Technique on Sorting and Grading of Fruits and Vegetables" (JFTP-2012).
[3] Satish Kumar and Sudeep published a paper on"Robots for Precision Agriculture" (NaCoMM-2007).
[4] Ankit Singh and Abhishek Gupta published a paper on "agribot" (IJARCCE-2015).
[5] Fale and Bhure amit published a paper on **"**Autonomous farming robot with plant health indication"(IJATES-2015) .
[6] Blackmore and Stout published a paper on "Robotic agriculture - the future of agricultural mechanisation" (IEEE-2005).
[7] Akash Bhosale and Sumeet Poddar published a paper on"An autonomous robot for harvesting cucumbers in green houses" (IEEE- 2011).
[8] Bill Stout and Maohua Wangpublished a paper on "Detecting tomato crops in green houses using a vision based system" (IEEE-2012).
[9] Gragliapublished a paper on "Autonomous robots for agricultural tasks and farm assignment and future trends in agro robots" (IJMME-IJNS-2013).
[10] Weather head published a paper on "An autonomous tree climbing robot utilizing four bar linkage system" (CIGR-2002).