ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 6, Issue 5, May 2019

Agri Robo

[1] Sridevi Rao, [2]Sushma Nayak R, [3]Sushmitha N G , [4] Sowmya Poojary, [5]Nagaraja Rao
[1][2][3][4][5] Dept of ECE, SMVITM Bantakal

Abstract: **The Discovery of Agriculture is the first big step towards civilized life, advancement of agricultural tools is the basic trend of agricultural improvement. The project we put forth has been designed to automate work of a farmer so that he can tirelessly perform his farming tasks. We intend to automate the most common and frequent tasks of the farmer. This paper focuses on remote controlling and slightly automating the tasks in agriculture so as to get daily farming tasks done with ease. The qualitative approach of this paper is to develop a system which minimizes the working cost and also reduces the time for ploughing, cutting, digging, seed sowing operation, spraying, weed control by utilizing solar energy and power supply to run the robot.**

Key words: DC Motor, Arduino, Zigbee, Raspberry pi.

I. INTRODUCTION

The main motive for developing Agricultural Automation Technology is decreasing labour force, a phenomenon common in the developed world. Robotics offer solutions in precision agriculture to processes. The multipurpose agricultural robots are designed to perform the basic functions required to be carried out in farms. This Agri Robo can perform basic elementary functions related to ploughing, cutting seeding, water, pesticide spraying etc. to improve productivity and efficiency. Manual method includes broadcasting the seeds by hand. Sometimes method of dibbling i.e. making holes and dropping seeds by hand is used. Also a pair of bullocks is used to carry heavy equipment of leveling and seed dropping. These processes are time consuming and not precised one. So it's time to automate the sector to overcome this problem. Moreover, farmers have great benefits by having this robot which leads less work, requires less amount of labor that also eliminates both maintenance and labor costs while having high profit. The benefits of the developed Agribot are better efficiency when compared to manual system. A agricultural robot controller is developed using microcontroller which transmits the data using Zigbee link to a remote server. Using the most efficient and compatible technology, a few proposed solutions have been mentioned which can be integrated with Raspberry Pi to provide better robot for agriculture.

In today's world robotics technology plays an important role in all sections like industries, medical field and various other organizations. In other countries robots are used in almost all fields including agriculture to perform different operations. Driverless robots are designed to replace human labor. Robotics and artificial intelligence achievements offered solutions in precision agriculture to processes related to seeding, harvesting, weed control, grove supervision etc. to improve productivity and efficiency. The agricultural robot designed in this will perform multiple farming tasks like seed sowing, cutting, ploughing, water spraying, and pesticide spraying. Agricultural robot is a robot deployed for doing agricultural purposes. Thus the agricultural robot developed here will contain all in feature and can be controlled wirelessly using remote.

II. LITERATURE SURVEY

Author discussed on two major issues in modern agriculture. They are water scarcity and high labour costs. The Agribot is developed using an Arduino microcontroller. Agribot acts as an IoT device and transmits the data collected from multiple sensors to a remote server using Wi-Fi link. At the remote server, raw data is processed using signal processing operations such as filtering, compression and prediction. Accordingly, the analysed data statistics are displayed using an interactive interface, as per user request. [1]

The proposed system aims at designing multipurpose autonomous agricultural robotic vehicle which can be controlled through Bluetooth for ploughing, seeding and irrigation systems. The objectives of the proposed system are to dig the soil depending on moisture level in the soil, to plough the seeds with teeth's like structure at the end to turn the top layer of soil down, to close the seeds and level the ground automatically and to provide irrigation system by spraying water with a pump in the field. [2]

Here author discusses to design, fabricate, program a low-cost mobile robotic system to perform pesticide spraying and insect repelling tasks in the field efficiently without seeking any human interaction during operation. Spraying Mechanism consists of water pump, water tank, water hose and nozzle. 12V DC Water Pressure Diaphragm Pump is

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 6, Issue 5, May 2019

used as water pump source which allows 4L/min flow rate that is crucial for fast spraying operation during the task [3]

The authors propose system that aims at designing multi-purpose autonomous agricultural robotic vehicle which is controlled by GPS and magnetometer for ploughing, seeding, levelling and message indication to start irrigation.. Bluetooth module and GSM are used to communicate with Arduino about utilizing of robot for particular operation. The targets of the proposed framework are to burrow the dirt relying upon dampness level in the dirt, to furrow the seeds with teeth resembles structure toward the conclusion to turn the best layer of soil down, to close the seeds and level the ground consequently and to give water system framework by sending a message using GSM module. [4] Most reported prototypes shared the same mobile platforms with industry robots or commercial research platforms, other than designing specific mechanism and engine solutions according the requirements of agricultural scenarios. As a result, existing agricultural mobile robots suffer from improper shape and insufficient traffic ability. To tackle the problem, a new four-wheel drive agricultural mobile robot is designed and implemented in this paper. [5]

Agribot in this project is designed to perform sowing only for four crops: cotton, maize, soybean, wheat. With slight variations of few centimeters in the distances defined robot successfully covers distances between crops and their rows. Navigation technique using IR sensors in Agribot is easier and less bulky over other existing agriculture robotic systems. Also the coverage area by the robot is restricted because of its dependence on DC battery. [6]
Here author discuss a main issue on production rate and geographical location. Pest attack and the infection of many diseases also cause damage to crops. It is possible to increase production in agriculture by reducing the harmful effects of these factors. With the use of robots in agriculture, the harmful effects are reduced. Moreover, it is possible to carry out tedious tasks continuously, with reliability and desired accuracy. Above all, it decreases farming complexities, increases production rate, and reduces the cost of long-term production. [7].The main focus of this system is its Automatic way of sowing the seeds. Here with the help of a robot the seeds are been dispensed in the soil in a proper sequence hereby reducing the wastage of seeds. The robot has to plant the seeds after every 10cm. It will have to stop after every 10cm. This can be done by turning off the dc motors. This mechanism consists of a funnel containing the respective seeds which will be clamped to a hinge attached to motor. There is a plate below the funnel with an indentation in the corner. Also the disc is smooth to avoid friction between funnel and disc. [8]

III. METHODOLOGY

A. Block diagram

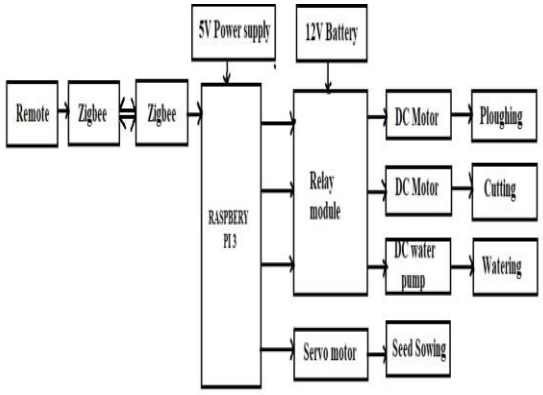

Fig: 3.1 Block Diagram of the system

Fig.3.1 shows the block diagram of the proposed system.The block diagram consists of a remote, Raspberry pi and two Zigbees which are serially connected. Remote consists of two parts Arduino and switches. Arduino receives an input when one of the switches is pressed and it sends this signal to Zigbee. Signal from remote is received by the receiver of one of the Zigbee which has got transmitter and receiver. Then signal is transmitted to another Zigbee through serial communication. Both Zigbees are used together for wireless serial communication. Raspberry pi receives input from transmitter of Zigbee. Raspberry pi is used to control the overall operation of farming operation through relay. From raspberry pi signal is transmitted to robot. There are totally eight switches in remote each for particular operation. When these switches are pressed, it performs action assigned to it. In this way robot performs assigned farming task on getting instruction or signal through switches.

B. Working

In the remote push buttons are used to send the characters. Resistor values of 10k ohm is used which is connected to one side of push button. The other side of push button is connected to Arduino. The resistors are used to reduce current flow. When Arduino pin is setup as input, it's floating that is nothing but it defines it's value and it can drift anywhere between 0 and 5 volts. Using pull up resistors or pin mode function clearly defines the input pin

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 6, Issue 5, May 2019

at 5 volts. Then, pushing the button connects the pin to ground and the pin goes to 0 volts. Each state can be read using the digital Read () function and will tell you if the button is pressed or not. Without the pull up, the pin could arbitrarily be at 5 Volts, 0 volts or something in between. Then, the digitalRead() function would not work that is what it return would not accurately reflect the state of the button. Many pins of the chip here have more than one function. Blades and gears are used here to implement grass cutting operation.

Two relays are used for grass cutting whose opening and closing terminals are shorted and then connected to 12v battery and the other terminal is connected to the motor. Here Johnson dc motors are interfaced with blades. A relay is an electrically operated switch used to control a circuit by separate low-power signal. In relay two pins out of four pins are connected to vcc and ground. The other two pins are connected to Raspberry pi as assigned in program which is designed for design model. Water tank and pump are used for water spraying operation. When switch is pressed, water spraying operation will takes place. Here pump is connected to Johnson motor to perform the water spraying operation smoothly, which in turn connected to relays. In relay two of the pin terminals are shorted and then connected to 12V battery and others are connected to raspberry pi. Thin iron rod shaped like nails are bunched together to perform ploughing operation.

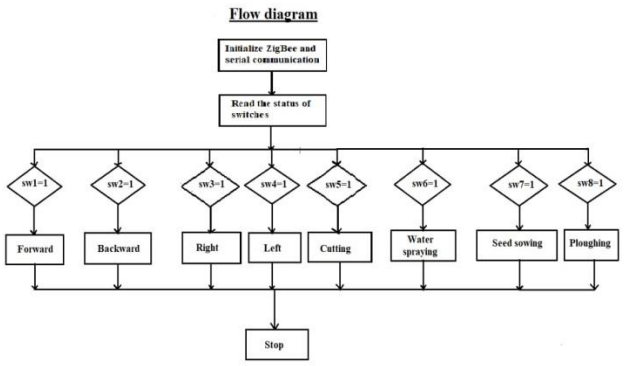

Fig.3.2 Flowchart of the proposed system

Fig.3.2 shows the Flowchart of the proposed system. At first Zigbee is initialized, along with this serial communication is also initiated. Next status of switches is read. It will check if any one of the switch is pressed from remote. There are totally eight switches. Each one of them has assigned with one of the farming task. On pressing switch1, as by design structure forward operation takes place which means robot starts to move in forward direction. In similar way when switch 2,3 and 4 is pressed backward, right and left operations takes place respectively. When switch 5,6,7,and 8 is pressed robot starts to perform cutting operation ,water spraying, seed sowing and ploughing operations respectively. When stop button is pressed, robot stops the current operation.

IV. CONCLUSION

The automated agricultural robot has considerable potential to increase productivity. The chassis handles the battery and the hardware mounted on agrirobo which is able to perform each and every operation skillfully and successfully. All the data collected from agrirobo sent to the wireless receiver and controlled using remote successfully. As we can perform multiple operations in a single system it gives cast effective system. The agrirobo gives a compact, low power and low cost system with an effective output.

REFERENCES

[1] Rahul D S, Sudarshan S K, Meghana K, Nandan K N, R Kirthana and Pallaviram Sure, “IoT based Solar Powered Agribot for Irrigation and Farm Monitoring”, IEEE, 2018 : 978-1-5386-0807-4.

[2] K DurgaSowjanya, R Sindhu, M Parijatham, K Srikanth, P Bhargav,” Multipurpose Autonomous Agricultural Robot”, IEEE, 2018, 978-1-5090-5686-6.

[3] EgeOzgul, UgurCelik, “Design and Implementation of Semi-autonomous Anti-pesticide Spraying and Insect Repellent Mobile Robot for Agricultural Applications”, IEEE, 2018978-1-5386-6392-9.

[4] Mr.ShaikKareemulla, Edwin Prajwal ,B.Sujeshkumar, Bonu. Mahesh, BalapanuriVamseedhar Reddy, “GPS based Autonomous Agricultural Robot”, IEEE, 2018,978-1-5386-7523-6

[5] Zhengqiang Fan, QuanQiu, ZhijunMeng,” Implementation of a Four-Wheel Drive Agricultural Mobile Robot for Crop/Soil Information Collection on the Open Field”, IEEE, 2018/978-1-5496-0807-3

[6] Neha S. Naik, Virendra. V. Shete2, Shruti. R. Danve3,”Precision Agriculture Robot for Seeding Function”, IEEE, 2018, 977-1-5497-0807-4.

[7] ShantaNiloy Paul, Abu Shakil Ahmed, Md. NurunnabiMollah, MdMunimRayhan, EklasHossain

,"Simplistic Approach to Design a Prototype of Autonomous, Affordable, and Highly Efficient Agricultural Sprayer Robot" , IEEE, 2017,976-1-5496-0817-3

[8] Prof. Ayaneswapnil,BhorRajashri A, MadaneKajal A" Agricultural Robot for Automatic Seeding",International Journal of Innovative research in Science, Engineering and Technology, DOI:10.15680/IJIRSET.2018.0703096.