ISSN 2321 3361 © 2021 IJESC

Research Article Volume 11 Issue No.01

Smart Agriculture Robot for Sowing Seed

Prakash Kanade[1], Ashwini P[2]
Researcher in Robotics (Artificial Intelligence, IoT)[1], Assistant Professer[2]
Department of Electronics and Communication
LeenaBOT Robotics, Bangalore, Karnataka, India

Abstract:
In the recent trend of Smart Agriculture making use of Robots plays a very important role. Scarcity of skilled laborers and environmental changes have made man to replace with machines. The automation in forming process is mainly for time saving, energy efficiency of repeated work in farming fields and increased productivity of crop and market trends. The main prerequisite for a good crop yielding is its seeding procedure. In this paper a Robotic vehicle is designed for Seeding in the form using an Arduino controlled by Bluetooth/RF. Certain types of sensors are also used. Agriculture purpose Robot is designed by considering certain climatic conditions and the type of land available for sowing the seed. This Robot is unique of its kind in prototype design. This method can also have extended high end application in Agriculture yielding and other level designs for optimization of time, work and efficiency in order to increase the productivity of crops.

Keywords: Smart Agriculture, Aurdino, LeenaBOT, Agribot, Robotics.

I. INTRODUCTION

Agriculture technology plays a vital role in the cultivation and it is a big step for Civilized lifestyle. The basic trend for Agricultural improvement is well equipped tools. In traditional method also we had equipped tools, but they were not atomized. The number of laborers had to put more energy with the equipped tools [1]. In the recent days due to shortage of skilled laborers and modernization in technology and to consume less time and increase productivity came the automation. At the same time automation should also be cost effective and reduce the time. The influence of environment changes effects the production with the food industry demands are increasing [2]. Considering all those a technological Agribot is designed. The prerequisite for proper yielding is soil preparation. In traditional system soil is first cleaned taking out unwanted roots. And then rows are done accordingly in the plot. these rows are 2-3 inch in deep because after sowing the seeds it has to be closed. The distance between seeding depends upon the type of seeding crop. It varies for different crops. This method used to take lot of time and the Laborers had to put more energy either using some animals or equipped tools or Tractors or some other vehicles which used to give a lot of sound. In some cases, there are also making holes and sowing the seeds in hand. Most of the time the animal used was a pair of bullock carts. So there came the need to automate the problem with the technology applying in Agricultural field [3]. In this paper the process of Soil preparation itself is made automated using the Robot. And then the sowing of seed also. So that almost 80 to 90 percent of the human work is reduced and it also consumes less time. Sound pollution is also less compared to tractors or vehicles. In the recent era Robotic technology plays a very important role in agricultural field, medical field and industries. The main use of robots in agriculture is during seed sowing and harvesting time [4].The robotic Vehicle developed in this paper performs levelling, digging, sowing the seeds and covering seeds simultaneously, which is all controlled by Android application from the former side through the help of controlling circuit in the Robot [5]. Mainly in the controlling circuit Arduino is operated with sensors, valves and levelers. Most of the agriculture designed systems are using GPS, Wi-Fi and remote controlled systems but it has several disadvantages. So the entire seeding operation is controlled by Bluetooth/RF.

The special Motor drives helps in controlling the levelers. Scope of this paper lies in applying during obstacles to complete the system of work successfully. The paper is structured in such a way that in the beginning Introduction and Literature survey is done, followed by Methodology in Section II and then Circuit design and Implementation in Section III followed by results and conclusion in Section IV and Section V.

II. METHODOLOGY

In the proposed method we have designed four wheel Robot Vehicle. Here it can be controlled either with the help of Bluetooth or RF, it is more advantages compared to Robots designed using GPS, Wi-Fi.

Because these systems use network signals and in remote place signal issues will be there and such systems may not work proper. In this paper it makes the electric and mechanical systems share their power in efficient way. It reduces the running cost of digging machine.

A.PROPOSED METHOD

Here Arduino Mega 2560 is the main block which is the controller for the whole assembly. It is getting power from a 5V power supply. This Arduino is operated upon a valve Controller and sensors as shown in Fig 1. Because seeds are stored here, the valve should open when ever needed and when the Robot is taking a turn it should close. Sensor is present to sense the quantity of seeds in the Valve.

When the seeds go below minimum level there will be an indicator in the system to refill the seeds. So both ultrasonic and Infrared Sensors are used. Motor driver circuit is operated by a 9V supply to operate the wheels and also the shafts of Dig string and levelers as shown in Fig 2

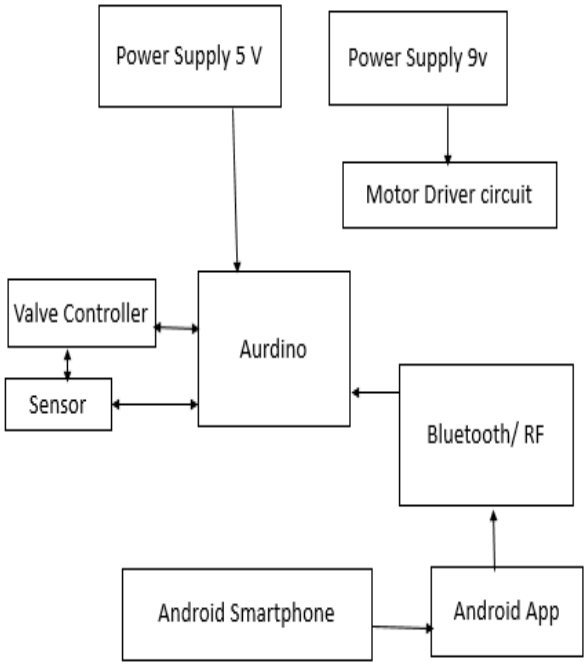

Figure.1. General Block Diagram

Leveling is the first step in preparing the field followed by digging, sowing and then closing it. So the three important mechanisms in the process is –
(i)Turning ON/OFF the Motor through IR Sensors for removing unwanted grasses.
(ii)Turning ON/OFF the Motor through moisture Sensors for detecting moistness in soil.
(iii)Programming the Motor to Turn OFF when the Robot takes turn and moves to next row.
Bluetooth /RF is used to communicate with the farmer regarding the operation performed by robot. The X-Y coordinate system of the field is fed by the farmer to control the movement of robot. A small dongle is maintained between Arduino and Bluetooth device for connecting the interface. Using the Android App all the data is stored.

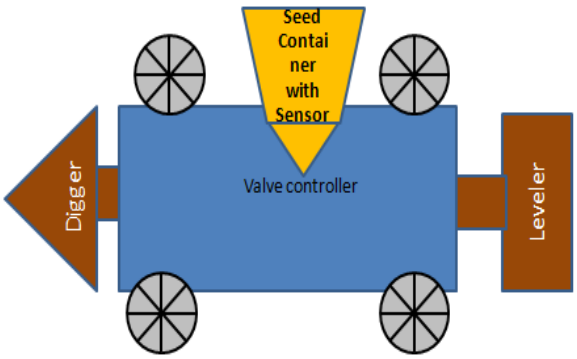

Figure.2. Proposed Robot car design

III. CIRCUIT DESIGN AND IMPLEMENTATION

A. ARDUINO BOARD

Arduino is the very important part in the complete system which is connected to sensors and other hardware components in the system to do the desired work. Control of environmental changes by sending and receiving inputs from sensors can be done by Arduino. It can also control motors, lights and actuators.

We use Arduino Mega 2560 in this paper. The microcontroller based on Atmega 2560 datasheet is the Arduino Mega 2560. 54 digital input/output pins are present in this in which 14 can be used as PWM outputs, 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Everything needed to support the setup is present in it.; Connecting the board with USB cable or powering it with a AC-to-DC adapter or battery and connecting to the computer gets the system started.

B. DC MOTOR

Electromechanical device which converts electrical energy into mechanical movement is the DC motor. The dc motor controls the Robot shaft with the help of L293D IC. Power required to run the Motor and Arduino is separate. The L293D IC is widely used 16-Pin IC for motor driver**.** The name itself suggests that it is mainly used for driving the motors. This 16pin L293D IC is capable of running two DC motors at the same time. The direction of running these two motors can be independently controlled. Bidirectional drive currents of up to 1 A at voltages ranging from 4.5 V to 36 V is possible in this IC. The L293D also has the capacity to give bidirectional drive currents of up to 600-mA at voltages of 4.5 V to 36 V. Operational temperatures for this L293D IC ranges from 0°C to 70°C.

Table.1. Pattern for dc motor

Pattern	Input Av	Input B
Stop	LOW	LOW
Anticlockwise	LOW	HIGH
Clockwise	HIGH	LOW
Stop	HIGH	HIGH

C. POWER SUPPLY

In this Circuit mainly two power supplies are used. The one is 5v supply for Arduino and the other is a 9V supply for Motor driver circuit which mainly controls the shaft of levelers and dig strings.

D. VALVE CONTROLLER

The seeds are stored in a small container and it is controlled with the help of valve through the Arduino and motors. We call this motor as servomotor The motor is capable of rotating to 180 degrees. Meanwhile, when the servomotor is at 180 degrees, it automatically opens the valves and hence the seeds are sown in the field.

E. SENSOR

Once the levelling is done, the seeds are sown at some regular distances for proper production with proper method of closing it. In this designed robotic Robot machine a dig string is used to take depth in the soil and then valve is opened to drop the seeds. The robot moves correctly with the ultrasonic sensor and the seed is sown by the infrared sensor in sowing the seeds at regular intervals[9]. There is a container which contains the seeds when the robot starts the pulley connected to the container rotates and thus it lifts the rod, valve opens and a seed is dropped through the opening in the container and the pulley continues to rotate and now it comes back to the

original position and the opening gets closed. The infrared sensor also checks the presence of seeds, it notifies us when there is no seeds and the motor is switched off immediately. The robot runs only when there are seeds in the container. This is how the seed is sowed at regular intervals.

F. ANDROID APP

Using Bluetooth, we control every data from our mobile phone. First we need to connect the functions of the system via Bluetooth to our mobile phone, so we use an electromagnetic switch (also called as relay) and then we will use a Arduino. This Arduino will program the data however required. The power is transmitted to the rear wheel through gears, which is also controlled using the android app, depending on the conditions needed.

Figure.3. Android App connecting to Robot[11]

IV. RESULTS

Proposed project is constructed as a 4-wheel robot using Arduino, Sensors, motor drivers and Bluetooth. This system gives a well design with low power cost effective and efficient output. Results of seed placement depends on the type of land which is tracked using sensors.

ADVANTAGES

i. Reduced labor Cost.
ii. Saving Time due to automation
iii. Robots can work 24/7/365 days.
iv. Reduced Sound pollution compared to tractors.

V. FUTURE WORK AND CONCLUSION

The proposed robotic machine for Agriculture is a automated Seed sowing machine which has the ability to increase productivity. It has the capability to handle the weight of the complete setup properly performing all the operations. Seed sowing patterns are observed under different conditions. All the data in Robot is collected in Android application and saved for future process. Robotics in Agriculture plays a very important role for the increase in production and economy development of the country. The scientists in agricultural research are mostly focusing on replacement of laborers completely by robots. In India very few areas are covered with robotic implementation in the future there is a lot of scope for the complete automating in farming[10]. Many Agricultural robots designed are based on GPS but it may have signal issue and may not give accurate results. But in this proposed project Bluetooth is used and hence it may give precise results.

VI. REFERENCES

[1]. Saurabh Umarkar and Anil Karwankar, “Automated Seed Sowing Agribot using Arduino” International Conference on Communication and Signal Processing, April 6-8,2016, India.

[2]. Vishnu Prakash K, Sathish Kumar, Venkatesh P, Chand ran A,” Design and Fabrication of Multipurpose Agricultural Robot,” International journal of Advanced Science and Engineering Research Volume:1, Issue:1, June 2016, ISSN: 24 55-9288

[3]. M.Arun, R. Prathipa,Pritanka S, Akshaya Anand, Chandr ika N,” Smart Agricultural Robot”, International Journal of Pure and Applied Mathematics Volume 119 No. 15 2018, 1901-1906, ISSN: 1314-3395

[4]. Dan Wang, Maofeng Yang, Wu Cheng XUguang Guan, Zhan gming Zhu, Yintang Yang “Novel Low Power Full Adder Cells in 180nm CMOS Technology”, 4th IEEE conference on Industrial Electronics and Applications, pp. 430-433,2009

[5]. Avula Likitha, B. Mamatha, Agamanthi Sai kiran, Dondeti Pranitha,” IoT Based Smart Agriculture and Automatic Seed Sowing Robot”, International Journal of Resource Manag ement and Technology, ISSN No:0745-6999.

[6].S Praseena, S Sanjena, S M Thejaswini, Dr M Senthamil Selvi,” Sensor Based AGROBOT for Sowing Seeds” Interna tional Research Journal of Engineering and Technology (IRJET), Volume: 06 Issue: 03 | Mar 2019, e-ISSN: 2395-0056.

[7]. https:// components101.com/l293d-pinout-features-data sheet.

[8].http://www.mantech.co.za/datasheets/products/A000047.p df.

[9]. GS Mahra, P Kumar, Chandan Solanki, DS Tomar, SK Kaushik. Identifying grass root problems and generating susta inable solutions through participatory rural appraisal. Indian Research Journal of Extension Education, 2016

[10]. M Bala, Chandan Solanki, AT Kumar, S Tushir, R Kum ar. Effect of moisture content on some physical properties of HQPM 5 quality protein maize (Zea mays). INDIAN JOUR NAL OF AGRICULTURAL SCIENCES, 2019

[11].Prakash Kanade, https://www.leenabot.com/Raspberry-Pi-Controlling-Robot-using-Bluetooth/