Asian Journal of Electrical Sciences
ISSN: 2249-6297 (P) Vol.8, No.S1, 2019, pp.51-54

DOI: https://doi.org/10.51983/ajes-2019.8.S1.2307

Design and Development of Automatic Seed Sowing Machine

P. Premalatha[1] and Sharath Singh[2]
[1&2]Assistant Professor, Department of Electrical and Electronics Engineering,
MVJ College of Engineering, Bangalore, Karnataka, India
E-Mail: hod_electrical@mvjce.edu.in
(Received 25 March 2019; Revised 18 April 2019; Accepted 3 May 2019; Available online 9 May 2019)

***Abstract* - Indian economy is dependent on agriculture to a great extent. Increase in production, tends to improve social welfare, particularly in rural areas. This project aims to increse the productivity and to reduce the time for seed sowing process and wastage of seeds. Automatic seed sowing machine designed and developed, which uses Solar powered DC motors driven by L298N driver circuit with Aurdino UNO R3 control kit. An ultrasonic sensor is also installed to detect the obstacle in the path and end of each row.**
***Keywords:* Automation, Agriculture Productivity, Arduino UNO3, L298N Driver, Solar Powered DC Motor**

I. INTRODUCTION

Agriculture plays an important role in the Indian economy. The introduction of technology to agriculture will result in reduction of manpower and corresponding increase in productivity. The main aim of this project is to design and develop an automatic seed sowing robot with minimal cost affordable by the small-scale formers. This seed sowing robot reduces the labour cost involved in agriculture and it saves the time. The model proposed makes use of an ultrasonic sensor and Arduino controller unit which helps the robot to move freely over the field without human intervention. And, it sends a message to the owner once the seed drum becomes empty.

The process of seed sowing was costly and time consumption was high with the help of farmers where these existing problem was overcome by the usage of electronic controller. [1] The uasage of "MSP430 MICRO CONTROLLER" was introduced where the time consumption was reduced. But the human intervention was required. To overcome these the BLUETOOTH Control was introduced [2] where the control was easy with time consumption reduced with increase in production. Still the human control was required where he should posses the technical knowledge for control action. There was still the problem of power so, it was overcomed by the SOLAR PANEL [3]. Where the problem of power was completelly solved. But the automatic control was not developed which is succesfully achived by our Automatic Seed Sowing Machine.

II. METHODOLOGY

The proposed model uses solar powered DC motors placed in the wheels of the robot. The fall of seeds from the seed drum and seed sowing process takes place without any wastage of seeds. It also has an ultrasonic sensor fixed in the front for proper navigation of the robot over the field. After completion of each row the robot must turn, and it has to start the seed sowing in the second row. This is done with the help of the sensor which detects the end of the row. In the conventional method the sowing takes place in only one row then it must be shifted manually to second row. Addition of sensor in this proposed model reduces the human intervention. Control action is provided by ARDUINO UNO R3 which is interfaced to sensor through USB channel. DC motors are driven by L298N driver circuit. As the technique of sowing seed with robot is good and efficient the time consumption will be less and gradually reducing the amount of manpower. Seeding depth will be accurate this tends to no later or earlier growth of plants and the yield will be of same growth. Seeds will be sowed accurately in rows and this tends accurate plantation and causes very well growth of food and economy. The Complete system becomes ecofriendly, since DC motors used here are powered by solar panel.

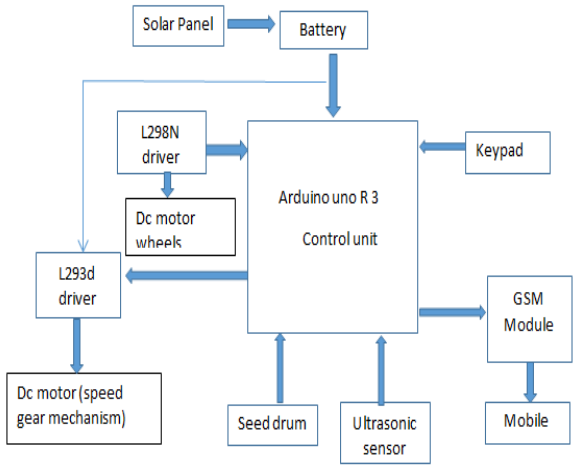

Fig.1 Block diagram of the Automatic seed sowing machine

III. PROPOSED SYSTEM

A. Arduino UNO R3: The Arduino UNO is a widely used open-source microcontroller board based on the AT mega 328 microcontroller and developed by Arduino. The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards

(shields) and other circuits [4]. The board features 14 Digital pins and 6 Analog pins. It is programmable with the Arduino IDE (Integrated Development Environment) via a type B USB cable. It can be powered by a USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is also similar to the Arduino Nano and Leonardo. Layout and production files for some versions of the hardware are also available. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform. The ATmega328 on the Arduino Uno comes preprogrammed with a boot loader that allows to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol. The Uno also differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

Fig. 2 Arduino Control Kit

B. Ultrasonic Sensor: The Ultrasonic Sensor sends out a high-frequency sound pulse and then times how long it takes for the echo of the sound to reflect back. The sensor has 2 openings on its front. One opening transmits ultrasonic waves, (like a tiny speaker), the other receives them, (like a tiny microphone). The speed of sound is approximately 341 meters (1100 feet) per second in air [5]. The ultrasonic sensor uses this information along with the time difference between sending and receiving the sound pulse to determine the distance to an object.it uses the following mathematical equation. Distance = Time * speed of sound divided by 2. Time = the time between when an ultrasonic wave is transmitted and when it is received.

Fig. 3 Ultrasonic sensor

C. DC Motor: A dc motor is a device that converts direct current (electrical energy) into mechanical energy [6]. Two dc motors are used for driving the wheels connected to the robot. L298N is a dc motor driver used for driving dc motors. 60RPM Centre Shaft Economy Series DC Motor is high-quality low-cost DC geared motor. It has steel gears and pinions to ensure longer life and better wear and tear properties. The gears are fixed on hardened steel spindles polished to a mirror finish. The output shaft rotates in a plastic bushing. The whole assembly is covered with a plastic ring. Gearbox is sealed and lubricated with lithium grease and require no maintenance. The motor is screwed to the gear box from inside. Although motor gives 60 RPM at 12V, but motor runs smoothly from 6 V to 12V and gives wide range of RPM, and torque.

Fig. 4 Dc Motor & Wheel

D. Keypad: 4*4 Keypad is been used for setting the vertical input and horizontal input as shown in the table for different seeds. The keypad input given based on the table provided for sowing in the robot.

TABLE I SEED SOWING DISTANCE

S. No.	Name of Seed's	Vertical distance (plant to plant) cm	Horizontal distance (row to row) cm
1.	Cotton	33.02	101.6
2.	Jowar	12	60.96
3.	Ground nut	10	30
4.	Soya bean	18	30
5.	Millet	30	Continues (5)
6.	Thoor dal	33.02	101.6
7.	Sunflower	30	60.96
8.	Sweet corn	15	60.96
9.	Maize	15	60.96
10.	Bengal gram	15-20	30

E. GSM Module: Sim808 module contains a set of TTL Serial interface 5V-18V Power supply [7]. Supports sending and receiving text messages telephone, GPS and supports http protocol. It also has special features such as recording function, Bluetooth. Easy to debug. Equipped with micro-sim card position, convenient to users

Fig. 5 GSM Module

F. L298N Driver: L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two [6] DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H Bridge Motor Driver integrated circuit (IC). L293D is a dual H bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

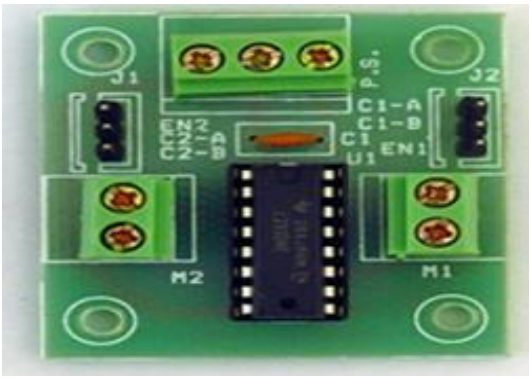

Fig. 6 L298N Driver

IV. WORKING

Automatic seed sowing robot works with the power supply from solar panel and battery. It requires the manual input which are of two types namely Vertical and Horizontal input. Vertical input refers to the distance between the two plants and horizontal input refers to the distance between the rows. The input is provided through once the input is given then the power switch is Switched ON. And power supply is provided to DC wheels.

Based on the distance provided by farmer the robot moves to a fixed distance and stops. At the same time seed gear system rotates and seed falls through the pipe. Once when the robot stops the servo motor operates and makes the seed falling chamber open and after some delay it closes itself. Process continues and robot continues to move until the obstacle is found.

Fig. 7 Automatic seed sowing machine prototype

Once the obstacle is found it will be detected by ultrasonic sensor and it sends signal to the controller. As a result, the robot turns and moves certain distance which is given by the farmer (Horizontal input), it again turns back and continues to sow the seed. Here the robot turning is alternatively as it results in proper movement of robot through the field. Hence the system is designed fully automatic. The special feature of these robots is that it sends the message whenever the seed gets empty in seed drum which is detected by LDR. It sends "Seed Drum Is Empty" message to the registered mobile number of the farmer. Here we have used GSM Module to get message whenever the seed gets empty in seed drum. Message is sent to the registered number.

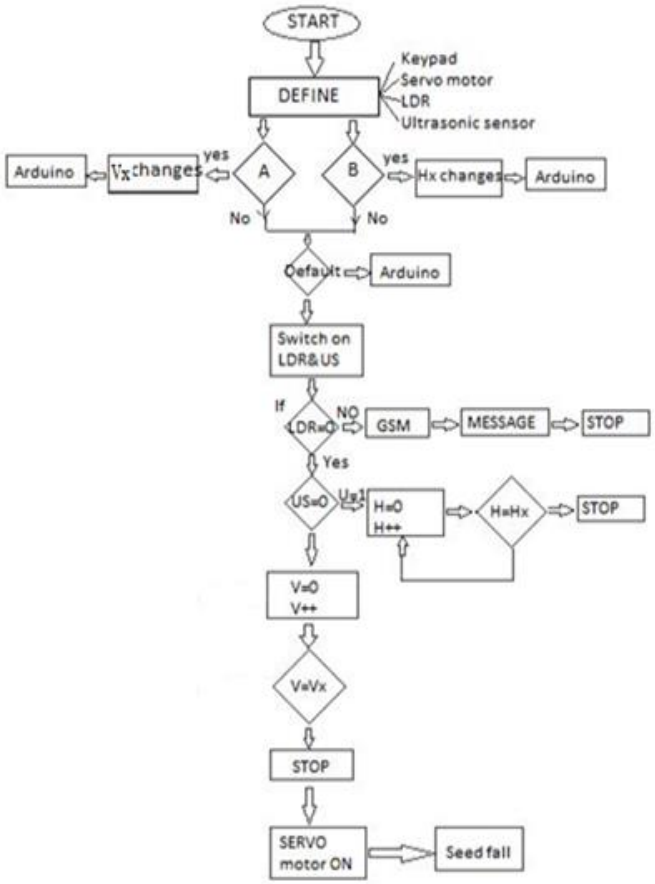

Fig. 8 Flow Chart

V. ADVANTAGES

Using advanced ASSR technology and wireless routing, vehicles can be quickly reprogrammed to change path or operation, eliminating the need for expensive retrofitting. New directions, tasks, and work cells can be created almost instantaneously without the need for physical equipment installation. Through the advancement of control systems ASSRs offer a safe and predictable method of delivery, while avoiding interference with human and building factors. ASSRs can operate almost around the clock, without the need for breaks and vacation time. In addition, ASSRs operate in conditions that may not be suitable for human operators, such as extreme temperatures and hazardous environments.

Automated Seed Sowing, combined with RF technology, interface with the Warehouse Control System or Warehouse Management System to improve accuracy and efficiency. ASSRs have little downtime and operate at a fixed rate to meet a predictable metric for operational activity. No conventional material-handling infrastructures required. Increase of ASSRs in line with the growth in volume of operations. Updating is possible without shutting down the system. Poly house Seeds are broadcasted on the soil which results in the loss and damage of the seeds. As the cost of seeds is more and cannot be affordable for the farmers so there is the need for the proper placement of seeds in the soil.

VI. DISADVANTAGES

1. Electronic Component cannot sustain any variation in high temperature.
2. Accuracy will be reduced due to cloud and mud.

VII. RESULT AND FUTURE SCOPE

We have designed and developed the Automatic seed sowing machine which successfully sows the seeds based on the input provided by the user. It moves certain distance based on input given and stops for some duration to drop the seed. And this process continues until obstacle is found. Then it turns and moves certain distance horizontally and it turns back to sow the seed in next row. Hence our Robot can be used by small scale farmers successfully without any technical knowledge. Our seed sowing machine also gives the message to the farmer when the seed Drum is empty and also after the seeding process is complete. Operation is possible without any human intervention.

We have designed our robot for small scale farmers where in future it can be designed for large scale. The system can be upgraded by introducing ploughing of fields and closing of seeds automatically. It can be made still more user friendly with improvements like efficiency and accuracy.

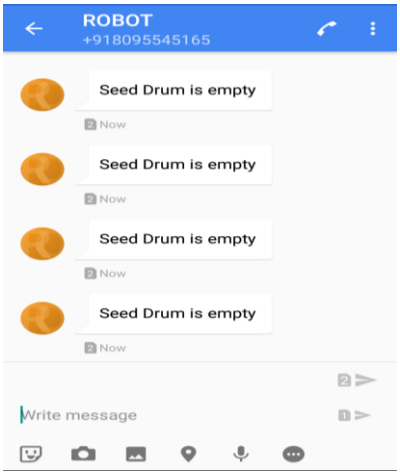

Fig. 9 Message sent from the ASSM to the registered mobile

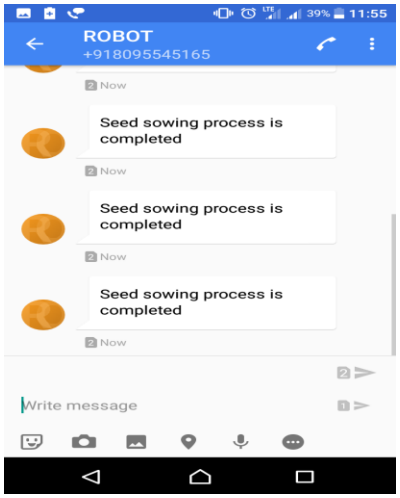

Fig. 10 Message sent from the ASSM to the registered mobile

REFERENCES

[1] K. Amit Kumar and Vishal Parit, "Design and development of template row planter", *Transnational Journal of Science and Technology*, Vol. 3, No. 7, 2016.

[2] Swati D. Sambare and S.S. Belasare, "Use of robotics technology for seed sowing in Agriculture", *International Journal of Electrical and Data Communication*, Vol. 2, No.1, 2016.

[3] Rashmi A Pandhare and Tejas Padathare, "Design and development of automatic operated seed sowing machine", *International Journal of Recent and Innovation Trend in Computing and Communication*, Vol. 5, No. 2, 2017.

[4] B. Yogesh Ramdas, "Green growth management by using arm controller", *International Journal of Engineering Research and Applications*, Vol. 4, No. 3, pp. 360-363, March 2014.

[5] B. S. Shivprasad, M. N. Ravishankara and B. N. Shoba" Design and implementation of seeding and fertilizing agriculture robot", *International Journal of Application or Innovation in Engineering &Management*, Vol. 3, No. 6, June 2014.

[6] Abdulrahman, Mangesh Koli, Umesh Kori and Ahamedakbar, "Seed sowing robot", *International Journal of computer science trends and Technology*, Vol. 5, No. 2, March 2017.

[7] R. Sagar Chavan, Prof. Rahul Shelke and Prof. Shrinivas R. Zanwar. "Enhanced agriculture robotic system", *International Journal of Engineering Sciences & Research* Technology, pp. 368-371, Feb. 2015.