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Seed Sowing Robot

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ABSTRACT
Agriculture is the backbone of Indian economy. About half of the total population of our country has chosen agriculture as their chief occupation. The states like Maharashtra, Punjab, and Kerala, Assam are highly involved in agriculture. It all started due to the impact of, "Green Revolution" by means of which farmers came to know about the various techniques involved in farming and the advantages in it. As centuries passed, certain modern techniques were invented in agriculture due to the progress in science. These modern techniques included the use of tractors for ploughing the field, production of pesticides, invention of tube-wells etc. Since water is the main necessity in this scenario, techniques were discovered which would help in watering the field easily, consume less water and reduce human efforts. These discoveries improved the standard of living of farmers. Agro-Technology is the process of applying the technology innovation occurring in daily life and applying that to the agriculture sector which improves the efficiency of the crop produced and also to develop a better Mechanical machine to help the agriculture field which reduces the amount and time of work spent on one crop. Hence in this work of project we decided to design a better mechanical machine which is available to the farmers at a cheaper rate and also which can sow and seed the crop at the same time. This project consists of the better design of the machine which can be used specifically for sowing of soybean, maize, pigeon pea, Bengal gram, groundnut etc. For various agricultural implements and non-availability of sufficient farm labor, various models of seed sowing implements becoming popular in dry land regions of India. The success of crop production depends on timely seeding of these crops with reduced dull work of farm labor. The ultimate objective of seed planting using improve sowing equipment is to achieve precise seed distribution within the row.

Keywords:- NPK, DC, Robot

I. INTRODUCTION

India record of progress in agriculture over the past four decades has been quite impressive. The agriculture sector has been successful in keeping pace with rising demand for food. The contribution of increased land area under agricultural production has declined over time and increases in production in the past two decades have been almost entirely due to increased productivity. Contribution of agricultural growth to overall progress has been widespread. Increased productivity has helped to feed the poor, enhanced farm income and provided opportunities for both direct and indirect employment. The success of India's agriculture is attributed to a series of steps.The major sources of agricultural growth during this period were the spread of modern crop varieties, intensification of input use and investments leading to expansion in the irrigated area. In areas where 'Green Revolution' technologies had major impact, growth has now slowed. New technologies are needed to push out yield frontiers, utilize inputs more efficiently and diversify to more sustainable and higher value cropping patterns". At the same time there is urgency to better exploit potential of rain fed and other less endowed areas. Given the wide range of agro ecological setting and producers, Indian agriculture is faced with a great diversity of needs, opportunities and prospects. Future growth needs to be more rapid, more widely distributed and better targeted. These challenges have profound implications for the way farmers' problems are conceived, researched and transferred to the farmers. "On the one hand agricultural research will increasingly be required to address location specific problems facing the communities on the other the systems will have to position themselves in an increasingly competitive environment to generate and adopt cutting edge technologies to bear upon the solutions facing a vast majority of resource poor farmers".The robotic systems play an immense role in all sections of societies, organization and industrial units. The objective of the project is to develop a microcontroller based system at helps in on-farm operations like seeding and fertilizing at pre-designated distance and depths with all applicable.Agriculture comes from two Latin words: Ager

which means a field. Culturia which means cultivation, Due to traditional methods of agricultural process the Indian farmer faces many problems about productivity of agricultural product than others. It is due to unbalance feeding of fertilizer without knowing the actual requirement of nutrient to a particular crop.Digital models of biological objects have proven to deliver new facilities for the analysis of structural and functional interrelationships as well as developmental processes in a spatial or spatio-temporal context .We are working towards the generation of a generalized 3-D anatomical atlas of developing barley (Hordeum vulgare) grains at different developmental stages. Serving as reference framework for the integration, visualization, and exploration of various data modalities, such inter-individual atlases significantly promote the analysis of developmental gradients and dynamics. Traditional methods include broadcasting manually, opening furrows by a country plough and dropping seeds by hand, and dropping seeds in the furrow through a bamboo/meta funnel attached to a country plough (Pora). For sowing in small areas dibbling i.e., making holes or slits by a stick or tool and dropping seeds by hand is practiced. Multi row traditional seeding devices with manual metering of seeds are quite popular with experienced farmers.In the current generation most of the countries do not have sufficient skilled man power specifically in agricultural sector and it affects the growth of developing countries. So it's a time to automate the sector to overcome this problem. In India there are 70% people dependent on agriculture. So we need to study agriculture. Innovative idea of our project is to automate the process of sowing crops such as sunflower, baby corn, groundnut and vegetables like beans, lady's finger, pumpkin and pulses like black gram, green gram etc & to reduce the human effort and increase the yield.The plantation of seeds is automatically done by using DC motor. The distance between the two seeds are controlled and varied by using Microcontroller. It is also possible to cultivate different kinds of seeds with different distance. When the Robot reaches the end of the field we can change the direction with the help of remote switches. The whole process is controlled by Microcontroller. Seed plantation is our day to day life is done by tractor in farms. The conventional method for seeding is the manual one. But it requires more time & the man power shortage is faced continuously. India is agrarian economies and most of rural populations depend on agriculture to earn their livelihood. Agriculture is the largest livelihood provided in India mostly in the rural areas. The farmers are in need of seeds for ploughing & cultivation. The seeds are available in packets & many industries deal in manufacture of such seed packets. In Modern world, Automation robot is used in many of the fields such as defence, surveillance, medical field, industries and so on. In this paper, the robot system is used to develop the process of cultivating agricultural land without the use of man power. The aim of the paper is to reduce the man power, time and increase the productivity rate. All the basic automation robot works like weeding, harvesting and so on. In current generation most of the countries do not have sufficient human factor in agricultural sector and it affects the growth of developing countries so it's time to automate the sector to overcome this problem. In India, there are 70% people dependent on agriculture. So we need to study the agriculture. Innovative idea of our project is to automate the process of sowing crops such as groundnut, sunflower, and baby corn and so on. The farming system like ploughing, cultivating, weeding, harvesting, etc is the different process. All the processes are advance to modifying the mechanism in farming which works automatically without the man power requirement.The small machine would be assembled from existing mass produced components without the need of specialized design and tooling. Also energy require to this machine is less as compared with tractors or any agricultural instrument. Seeding preparation is our day to day life we use tractor in farms. But it requires more time and the man shortage is faced continuously. Now a day soil is tested in laboratory and proper analysis of soil is done and amount of various contains and their ratio are measured but laboratories are normally in district places and it is little bit time consuming process. This proposed system contributes to give contain of NPK in soil within some minutes.N (Nitrogen) - for growth of leaves and vegetation. P (Phosphorus)-for root and growth.K (Potassium)-regulation of water.Nutrient in plantcell, flowering, fruiting.Seeding is one of the main process of farming activity. Italso takes more power that can be reduced with this system, seeding is automated which helps linear way of seeding and time consumption is reduced.The NPK value is measured and compared with the standard value for particular crop is known so the difference amount of fertilizer is dispensed by robot.

1.1 PROBLEM STATEMENT

In the present scenario most of the countries do not have sufficient skilled man power in agricultural sector and that affects the growth of developing countries. Therefore farmers have to use upgraded technology for cultivation activity (digging, seed sowing, fertilizing, spraying etc.).
So it's a time to automate the sector to overcome this problem which inturn will also eliminate the requirement of Labors and also avoid the wastage of seeds.

1.2 Problem Motivation

As we are interested in Embedded Electronics based projects and there are many advantages of the embedded

system as well in spite of the electronics based projects. We can control the speed of the DC motor which is an electrical component by using a delay in the source coding. We are motivated for doing this project because it is an autonomous agricultural based project and here we get to deal with the controller, its interfacing with the dc motors, interfacing with the ultrasonic sensor, a linear actuator which is used for opening and closing of the valve required for the dispension of seeds and so on.

II. LITERATURE SURVEY

2.1 Wireless control of an Automatted guided ma chine

2.1.1 Introduction

The robotic system is an electromechanical (conveys a sense that it has agency of its own) and artificial agent which is steered by DC motor which has four wheels. The farm is cultivated by the machine, depending on the crop considering particular rows & specific columns. The infrared sensor detects the obstacles in the path and it also senses turning position of vehicle at end of land. The seed block can be detected and solved using water pressure.The machine can be controlled remotely and solar panel is used to charge DC battery. Assembly language is used in programming the microcontrollers. The microcontroller is used to control and monitor the process of system motion of vehicle with the help of DC motor.

As agriculture is extensively supported by technical means like seeding, mowing or harvesting machines, it is widely considered to be a field with a high potential for robotic application as it is a small step from these semi-automatically operated machines to fully autonomous robots in both greenhouse and open field applications. Robots are available on all development levels from experimental to market-ready in several agricultural applications but most of them are in research, where institutes have made progress to extend the existing agricultural machines to robotic systems.Most of the robots considered in this publication are developed for harvesting. Seeding is not yet as important since there are already good tractor based seeding systems. In horticulture there are significantly less robotic applications as in agriculture.

The big exception are small moving robots for home use, but robots for precise planting of single plants or autonomous hedge cutting are not yet available on the market, probably due to high development cost and complexity in relation to the market size. It can be concluded that for the creation of growing flower images, no existing platform can be used or further developed, but a new one has to be designed from scratch.

This research paper presents design and development of manually operated seed planter machine. In this they present objective of seed planter machine design, factors affecting seed Emergence, some mechanisms. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, the significance of the study is in the contribution in the field of wireless control of automated guided vehicle systems and robotics. Through this project, a simpler approach and algorithm is designed for using low cost and in house available RF transceiver and ASSR with low processing requirements but with effective results.

The recommended seed to seed spacing and depth of seed placement vary from crop to crop and for different agro-climate conditions to achieve optimum yields. From this we know that mechanical factors effects on seed germination like uniformity of depth of placement of seed, uniformity of distribution of seed along rows.

Project is to automate the process of sowing crops such as groundnut, sunflower, and baby corn and so on. The measurement of the moisture of soil, temperature of soil and ph value of soil, performing of the seeding and fertilizing in agriculture field is designed in the agriculture Robot. Instead of using line follower, obstacle detecting sensor in the proposed system camera is used for live streaming.

Agriculture robot can be control by the internet using raspberry pi. Live steaming can see by computer by typing ip address of raspberry pi and password then it can be control the robot by pressing controlling key in the system. Rhex rover robot is replaced by the wheeled robot.

Keller et al. further developed this principle in where the seeds are picked up by a precise vacuum probe and let them fall by inverting the pressure. Their robot is not used to plant seeds, but to transfer seeds from one seed-box to another.

A different approach to pick up a single seed is used by Tonus .In his patent a needle moves from the ground of a seed-box to its top. The tip is designed in a way that only one seed remains on it. After reaching the top of the seed-box, the tip enters a small tube from where the seed on the tip is transported to the outlet using air pressure. Trebbin et al. have withdrawn their patent application for the first approach, it is assumed that they focus on the second approach. Neither is published how they create an optimal flowering pattern out of the image to get the best solution. Leenata Vedpathak proposed system is to measure of the N (nitrogen), P (phosphorus) and K(potassium) contents of soil and according to result, we can add the necessary elements in the soil. The N, P and K amounts in the soil sample is determined by comparing the solution with colour chart.

Farmers in India perform agriculture mostly with manual operation. The pain involved in doing each and every operation has to be reduced by the way of introducing simple technology. Sowing is one of the basic operations needed to

get better revenue from agriculture. There are different methods of sowing depending upon the type of crop.
Early planting was done by hand. The seeds would be thrown, or broadcast. This system made it more difficult to weed and harvest the crop. Later a dibber was used for some crops. A dibber was a board with holes evenly spread apart. A stick would be pushed through the holes and then a seed would be placed in the hole made by the stick. This was very effective but also very tedious and time consuming. The idea for dropping seeds through a tube first appeared in Mesopotamia about 1500 B. C. In 1701 Jethro Tull invented the first seed drill. The implement would cut small channels into the soil and the seed would be dropped into the channel. Broadcasting is simply throwing seeds onto the ground. The seed drill had many advantages to the broadcasting system. Less seed was lost to birds or other animals. Finally, with rows, it was much easier for the farmer to weed his crop. Jethro Tull's invention was met with scepticism and not really appreciated or accepted till after his death in 1741. One of the next innovations was a two row seed drill. This was not automatic so the field would have to be marked and then the seeds released by pulling of a lever. Then came the multiple row seed drill. It could be adjusted to the amount of seeds and at what intervals they released into the soil. Which are cost more than the simple machines but most efficient.
[1.https://www.ijirset.com/upload/2014/special/vishwatech/Paper-67_.pdf
2. https://ieeexplore.ieee.org/document/7824880/]

2.2 Comparative performance of seeding devices with other sowing methods

2.2.1 Introduction

In this multipurpose seeding machine equipment consists of cylindrical shape container in which the seeds can fill. The container is attached on the four wheeled carrier assembly. It consists of metering plate bevel gear mechanism and two holes at the bottom depending on seed size. The working as plate will rotate in container when the bottom holes of container and meter plate hole coincide seeds will flow through pipe to soil. Here the metering plate gets rotating motion by bevel gear assembly and the bevel gears get the motion by rear wheels with the help chain and sprocket assembly.

Crop yield

Studies in different parts of the country have shown that seeding devices introduced in rainfed areas have increased crop yields by 10 to 20 percent over conventional methods of seeding due to better plant establishment and proper application of inputs. In most parts of Nortli India, seedcum-fertilizer drills are used for sowing whereas seed drills are found in use mostly in the Southern parts of the country.

Energy saving

It was reported that by using three row bullock drawn ferti-seed drill for wheat crop, a saving of 76.37 percent man hours and 59.92 per cent bullock-hours was obtained when compared with the behind the plough sowing. (Mehta and Varshney, 1970) Singh (1971) revealed that by using a ferti-seed drill for wheat crop, a saving of 69.96 per cent in man-hours and 55.17 percent in huliock hours was achieved when compared.

Drilling or Line Sowing:

In this method seed is sown by seed drill or ferti-seed drill. With the help of this implement seeds drop at uniform depth and results in uniform germination and regular stand.

Seed bed should be fine and well levelled free from clods and weeds for the use of seed drill or ferti-seed drill. Seed drills are easily available in the market. They may be either bullock driven or tractor driven. Ferti-seed drill should be used wherever possible to ensure uniform depth of sowing, proper placement of fertilisers and good germination.

Dibbling:

It is the placing or dibbling of seeds at cross marks (+) made in the field with the help of maker as per the requirement of the crop in both the directions. It is done manually by dibbler. This method is followed in crops like Groundnut, Castor, and Hy. Cotton, etc. which are having bold size and high value. This method is used in case where supply of seed is limited. Sowing is done with the help of a small implement known as 'Dibbler'. It is a wooden or iron frame with pegs. The frame is pressed in the field and lifted and then one or two seeds are dropped by hand in each of the hole. It is not a common method because it is a very time consuming process.

Putting seeds behind the plough:

A majority of farmers use this method. This method consists of dropping the seeds by hand into the furrows that have been opened with local plough. When seed is dropped in furrows by hand, it is called 'Kera' method and when it is dropped through a Pora or Nai or Hazara a special attachment with local plough it is called 'Pora' method. In this method seeds are dropped at a depth of 5-6 centimetre and germination is satisfactory. Manual sowing has the problem of not giving adequate spacing between row to row and plant to plant leading to less population of crops than recommended by the agronomists. Also there is the problem of placing the seeds at correct depth and correct soil coverage.

Weed Mapping

Weed mapping is process of recording the position and

preferably the density (biomass) of different weed species using aspects of machine vision. One method is to just record the increased leaf area found in weedy areas as weeds are patchy and the crops are planted in rows (Pedersen 2001). Another more accurate method is to use active shape recognition, originally developed to recognise human faces, to classify weed species by the shape of their outline (Søgaard and Heisel 2002). Current research has shown that up to 19 species can be recognised in this way.

Robotic Weeding

Robotic weeding Knowing the position and severity of the weeds there are many methods that can kill, remove or retard these unwanted plants (Nørremark and Griepentrog 2004) Different physical methods can be used that rely on physical interaction with the weeds. A classic example is to break the soil and root interface by tillage and promote wilting of the weed plants. This can be achieved in the inter row area easily by using classical spring or duck foot tines. Intra row weeding is more difficult as it requires the position of the crop plant to be known so that the end effector can be steered away. Within the close-to-crop area, tillage cannot be used as any disturbance to the soil is likely to damage the interface between the crop and the soil. Non contact methods are being developed such as laser treatments (Heisel 2001) and micro-spraying. Controlled biodiversity is an opportunity that could be realised with robotic weeding. Non-competitive weeds can be left to grow when they are at a distance from the crop. This is part of the design parameters for the Autonomous Christmas Tree weeder being developed at KVL.

Micro Spraying

Micro spraying within the close-to-crop area, great care must be taken not to damage the crop nor disturb the soil. One method of killing weeds close to the crop plants is to use a micro spray that delivers very small amounts directly on to the weed leaf. Machine vision can be used to identify the position of an individual weed plant and a set of nozzles mounted close together can squirt a herbicide on to the weed. Tests have shown that splashing can be reduced when a gel is used as a carrier rather than water (Lund and Søgaard 2005). Other trials have shown that when the right amount of herbicide is placed in the right way at the right time, the usage of herbicide can be drastically reduced to about 1 gram per hectare for an infestation of 100 weeds per square meter (Graglia 2004). A micro spray system is currently under development at DIAS Bygholm, in Denmark.

Robotic Gantry

Robotic gantry Traditional or macro spraying can be very efficient, especially when they cover large areas. Most equipment manufacturers are developing larger machines, with 42 meter booms currently under development (pers. com. Hardi International). When mounting booms this big, they have inherent stability problems as the tractor has a relatively small wheelbase and they tend to oscillate. One method to improve stability would be to mount a spray boom between two unmanned robots that travelled in adjacent tramlines.

This robotic gantry could apply both liquid sprays and fertiliser and be able to regulate itself according to current weather conditions. If it became too windy then the gantry could just stop and wait until conditions improved. Variable rate, patch spraying, minimising skips and overlaps could all be built into the original design specifications by controlling individual nozzles. Turning on the headland would be different, as it would not include rotation – just translation, as the robots could turn but the boom remains parallel to its working direction. Sensing systems could be mounted on a trolley that could move along the spray boom as in the crop scouting section.

Selective Harvesting

Selective harvesting Selective harvesting involves the concept of only harvesting those parts of the crop that meet certain quality thresholds. It can be considered to be a type of pre sorting based on sensory perception. Examples are to only harvest barley below a fixed protein content or combine grain that is dry enough (and leave the rest to dry out) or to select and harvest fruits and vegetables that meet a size criteria. As these criteria often attract quality premiums, increased economic returns could justify the additional sensing. To be able to carry out selective harvesting effectively, two criteria are needed; the ability to sense the quality factor before harvest and the ability to harvest the product of interest without damaging the remaining crop. Most agricultural equipment is getting bigger and hence not suited for this approach. Smaller more versatile selective harvesting equipment is needed. Either the crop can be surveyed before harvest so that the information needed about where the crop of interest is located, or that the harvester may have sensors mounted that can ascertain the crop condition. The selective harvester can then harvest that crop that is ready, while leaving the rest to mature, dry, or ripen etc. Alternatively, small autonomous whole crop harvesters could be used to selectively gather the entire crop from a selected area and transport it to a stationary processing system that could clean, sort and maybe pack the produce. This is not a new idea, but updating a system that used stationary threshing machines from many years ago. Alternatively a

stripper header could be used to only gather the cereal heads and send them for threshing.

III. PROPOSED ARCHITECTURE

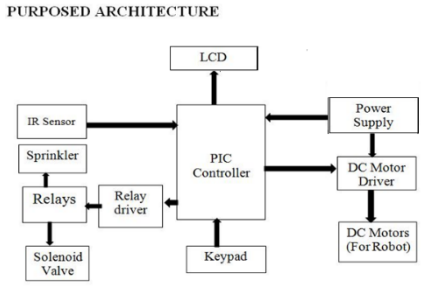


Fig 3 purposed architecture

3.1 Block Diagram

Above figure shows the block diagram of automated seed sowing machine. It consist of PIC microcontroller, DC motors with driver, LCD, Solenoid valve, relay and its driver.This is an Autonomous agricultural Robot. Here, as soon as the users presses the start button the robot starts moving in the forward direction. In Microcontroller, we have already programmed the robots working. When the robot starts moving in the forward motion after few distance it stops and then it starts drilling with the help of a drilling mechanism. After this process, there's a Solenoid valve arrangement through which the seeds are being dispensed in the soil.This same procedure continues until the user does not switches off the circuit. Drilling process is done with DC motor and seed dropping in land is done with the help of a two port solenoid valve. All these process are displayed on LCD.

3.2 Drilling or Line Sowing:

In this method seed is sown by seed drill or ferti-seed drill. With the help of this implement seeds drop at uniform depth and results in uniform germination and regular stand. Seed bed should be fine and well levelled free from clods and weeds for the use of seed drill or ferti-seed drill. Seed drills are easily available in the market. They may be either bullock driven or tractor driven. Ferti-seed drill should be used wherever possible to ensure uniform depth of sowing, proper placement of fertilisers and good germination. Tractor driven. Ferti-seed drill should be used wherever possible to ensure uniform depth of sowing, proper placement of fertilisers and good germination. It is the dropping of seeds into the soil with the help of implement such as mogha, seed drill, seed-cum-ferti driller or mechanical seed drill and then the seeds are covered by wooden plank or harrow to have contact between seed and soil. Crops like Jowar, wheat, Bajara, etc. are sown by this method.

3.3 Dibbling:

It is the placing or dibbling of seeds at cross marks (+) made in the field with the help of maker as per the requirement of the crop in both the directions. It is done manually by dibbler. This method is followed in crops like Groundnut, Castor, and Hy. Cotton, etc. which are having bold size and high value. This method is used in case where supply of seed is limited. Sowing is done with the help of a small implement known as 'Dibbler'. It is a wooden or iron frame with pegs. The frame is pressed in the field and lifted and then one or two seeds are dropped by hand in each of the hole. It is not a common method because it is a very time consuming process.

3.4 Putting seeds behind the plough

A majority of farmers use this method. This method consists of dropping the seeds by hand into the furrows that have been opened with local plough. When seed is dropped in furrows by hand, it is called 'Kera' method and when it is dropped through a Pora or Nai or Hazara a special attachment with local plough it is called 'Pora' method. In this method seeds are dropped at a depth of 5-6 centimetre and germination is satisfactory. Manual sowing has the problem of not giving adequate spacing between row to row and plant to plant leading to less population of crops than recommended by the agronomists. Also there is the problem of placing the seeds at correct depth and correct soil coverage. Manual sowing is time consuming and costly. Hence, there is a need for appropriate seed drill for sowing.The aim of the present study is to develop a seed sowing mechanism to suit the varied topographic condition of Indian agriculture. The specific objective of the study is to develop an automated seed sower and test the performance. It is also compared with manual seeding for its benefit cost analysis.

3.5 Circuit Diagram

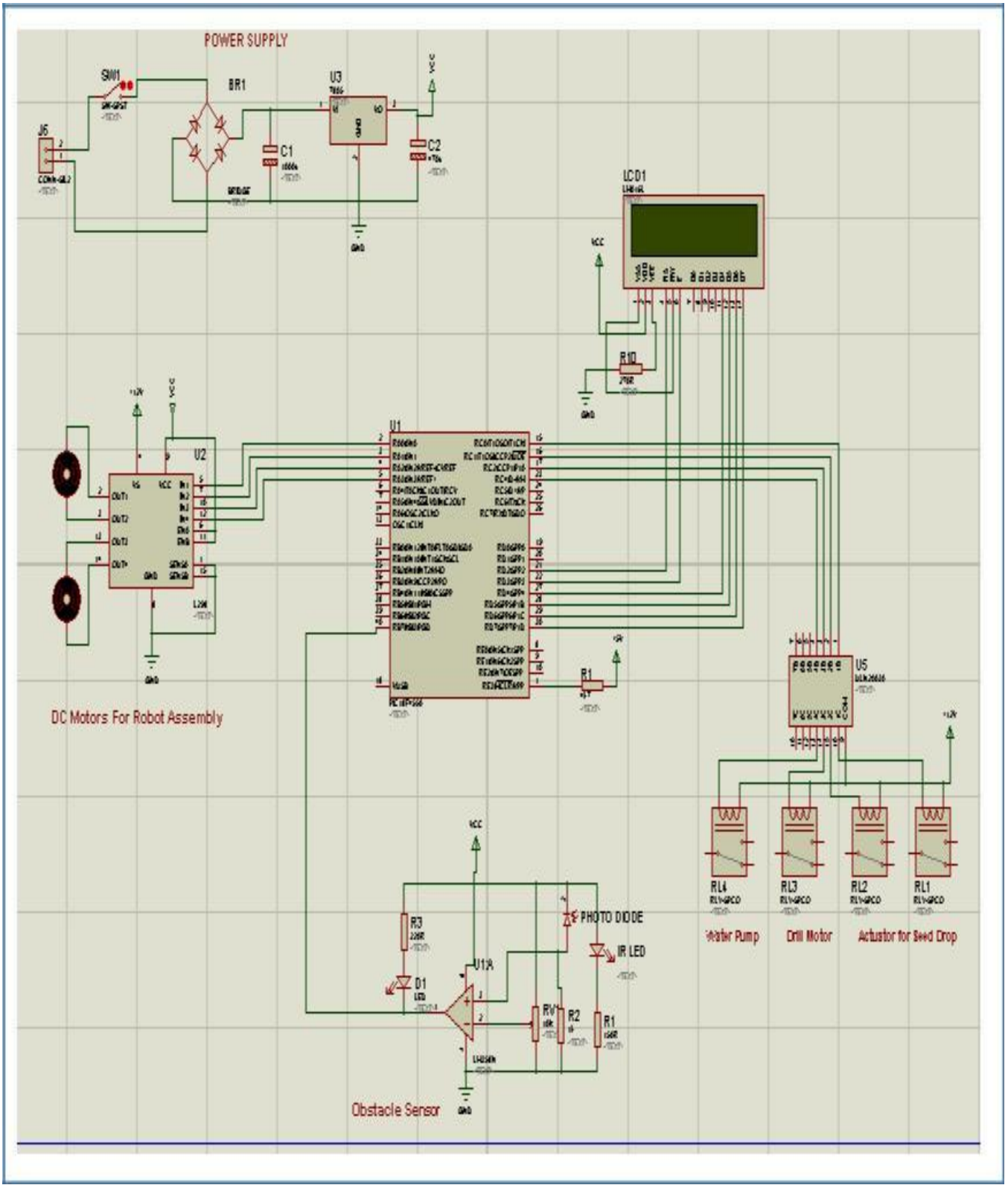
The MAX232 IC is used to convert the TTL/CMOS logic levels to RS232 logic levels during serial communication of microcontrollers with PC. The controller operates at TTL logic level (0-5V) whereas the serial communication in PC works on RS232 standards (-25 V to + 25V). This makes it difficult to establish a direct link between them to communicate with each other. The intermediate link is provided through MAX232. It is a dual driver/receiver that includes a capacitive voltage generator to supply RS232 voltage levels from a single 5V supply.

The receivers, on the other hand, takes input from transmission pin of RS232 serial port and give serial output to microcontroller's receiver pin. MAX232 needs four external capacitors whose value ranges from 1µF to 22µF.

This part explains how the actual process is being done. The working of the project is explained below as follows: At the First Stage we should fill the seeds inside the container. Then select the button for distance between the seeds. When the power supply is given to the robo its start to move in the field. The time taken to reach the distance is

feed into the microcontroller when it reaches the distance it will stop the robo by OFF the geared motor with the use of relay.

Fig 3.5 Circuit design



Then the stepper motor is activated to control the flow of seeds which is kept inside the container after the flow of seed it will stopped by using relay. Finally the DC motor is activated to sow the seeds inside the field at the depth of 1 to 1.5 inches.

Then the DC motor is stopped and Geared motor is activated and the process is repeated.

The front part of the robo has only one wheel to easily change the direction. The change in direction is controlled by geared motor with the assistance of remote button. When the robo reaches the end if the field we can change the direction by using remote switches present in the robo. All the operation is controlled using Microcontroller.

Automation brings comfort to our life. Automation in its pure sense defines any activity that minimizes human factor to increase productivity at consistent quality. The main fact is that how fast the process is being completed. This project "An Autonomous Agricultural Seed Sowing Robo" aims in fulfilling the lack of man power and automate the process of seed sowing with low cost.

Low Cost Automation (LCA), the buzzword in all industrial firms generally involves pneumatic, electrical as well as electronic components. LCA is important in the automation of factories, for example, the electronic component assembly plants. Automation saves a lot of tedious manual work and speeds up the production processes.

Now days we have a problem on lack of man power. So agricultural field we spent more money for both planting especially seed sowing. It consumes more time and also increase the cost with low accuracy. So it is a time to automate the process of sowing.

In agriculture environment heavy or loaded vehicle can't move easily on the bumpy road, so small vehicle is designed, operates on dc motor, in this project. For controlling path of vehicle, it should be predefined as shown in figure 3. Previously, the vehicle drives in straight line to first column and after end of ploughed land, the vehicle rotate 1800 and select second column and proceed further. to maintain the robotic vehicle position in between the two lines of crop there are two sensors that are senses the distance between the crop line and the edge of robot if the distance towards one of the side is decreases then distance towards the other side increases then the vehicle slightly moves towards the distance increasing side up to maintain the near about same distance towards both the side and then robot move in forward direction .To determine instantaneous values of all motors, the analysis of rigid body velocity is used. During the translational motion the longitudinal direction of all front two wheels are oriented identically with respect to vehicle body and both wheels spin at same rate around their drive axes.

In this project direction is provided by using remote control. By using remote proper direction is given to the robot. The farm is not the straight line and smooth. Figure shows how obstacle problem is solved. If any obstacle is occurred like stone, electric light pole, trees, etc such new path is establish by remote control.

3.6 DC MOTOR

Fig 3.6 Stepper DC motor

A dc motor is a device that converts direct current (electrical energy) into mechanical energy. Two dc motors are used for driving the wheels connected to the robot. L293d is a dc motor driver used for driving dc motors. 200RPM 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 200 RPM at 12V but motor runs smoothly from 4 V to 12V and gives wide range of RPM, and torque. Tables below gives fairly good idea of the motor?s performance in terms of RPM and no load current as a function of voltage and stall torque, stall current as a function of voltage.

3.7 L293D DRIVER CIRCUIT

Fig 3.7 L293d Driver Circuit

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 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.

3.8 PIN DIAGRAM

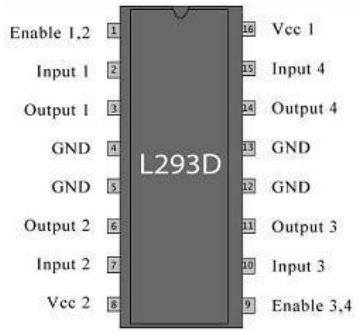


Fig 3.8 Pin Diagram

In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 and 7 and 10 and 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high impedance state.

Be sure that the symbols in your equation have been defined before the equation appears or immediately following. Italicize symbols (*T* might refer to temperature,

3.9 LCD

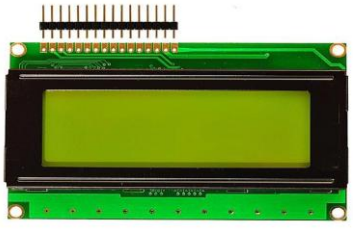


Fig 3.9 LCD

The LCD receives the control signal from the microcontroller, it decodes the control signal and performs the corresponding actions on the LCD. It is used for displaying the amount of fertilizers in the soil snd the amount of seeds being dispensed in the soil.

3.10 IR SENSOR

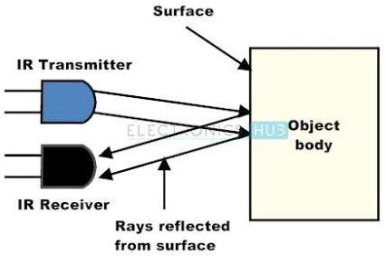


Fig 3.10 IR Sensor

IR Sensors work by using a specific light sensor to detect a select light wavelength in the Infra-Red (IR) spectrum. By using an LED which produces light at the same wavelength as what the sensor is looking for, you can look at the intensity of the received light. When an object is close to the sensor, the light from the LED bounces off the object and into the light sensor. This results in a large jump in the intensity, which we already know can be detected using a threshold. Files with the author's first name or an abbreviated version of either name to avoid confusion. If a graphic is to appear in print as black and white, it should be saved and submitted as a black and white file (grayscale or bitmap.) If a graphic is to appear in color, it should be submitted as an RGB color file.

3.11 SOLENOID VALVE

Fig 3.11 Solenoid Valve

A solenoid valve is an electromechanically operated valve. The valve is controlled by an electric current through a solenoid: in the case of a two-port valve the flow is switched on or off. Solenoid valves are the most frequently used control elements in fluidics. Their tasks are to shut off, release. In this system solenoid valve like arrangement is used to drop the seeds in the farm when seeding is to be done by robot.

3.12 POWERSUPPLY

Fig 3.12 Power supply

A 12v dc battery is being used for our autonomous robot used for driving the dc motors. 5 volt supply is being used by the controller, LCD and for driving the relays.

3.13 Keypad

Fig 3.13 Keypad

Keypad consist of a start and a stop button. As soon as the user presses the start button the robot moves in the forward direction, then after reaching a particular distance its stops and then dispenses a seed in the soil. This process continues until the user doesn't presses the stop button.

IV. SOFTWARE AND HARDWARE SPECIFICATION

4.1 Hardware specification

Arduino Uno R3	
Microcontroller	PIC18F
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by Bootloader)
SRAM	2 KB (ATmega328)
EEPROM	1 KB (Atmega328)
Clock Speed	16 MHZ
Motor (Johnson motor - 12 V DC Geared Motor - 200 RPM)	
18000 RPM base motor	
Shaft	6mm
Gearbox diameter	37 mm
Motor Diameter	28.5 mm
Length	63 mm without shaft
Shaft length	15mm
Weight	300 gm
No-load current	800 mA(Max)
Load current	upto 9.5 A(Max)
Magnetic Tape magmarker25	
Width	2.54cm
Length	0.3048m
Thickness	0.1143cm
Wheels	
Diameter	3 inch
Motor Driver L293D	
Wide Supply-Voltage Range 4.5 V to 36 V Separate Input-Logic Supply Internal ESD protection High-Noise-Immunity Inputs Output Current 1A per Channel Peak Output Current 2A per Channel Output Clamp Diodes for Inductive Transient Suppression	

4.2 SOFTWARE SPECIFICATION

4.2.1 EMBEDDED C

Embedded 'C' is a set of language extensions for the C Programming language by the C Standards committee to address commonality issues that exist between C extensions for different embedded systems. Historically, embedded C programming requires nonstandard extensions to the C language in order to support exotic features such as fixed-point arithmetic, multiple distinct memory banks, and basic I/O operations. In 2008, the C Standards Committee extended the C language to address these issues by providing a common standard for all implementations to adhere to. It includes a number of

features not available in normal C, such as, fixed-point arithmetic, named address spaces, and basic I/O hardware addressing. Embedded 'C' use most of the syntax and semantics of standard C, e.g main() function, variable definition, data type declaration, conditional statements (if, switch. case), loops (while, for), functions, arrays and strings, structures and union, bit operations, macros, unions, etc. The 'C' Programming Language was originally developed for and implemented on the UNIX operating system, by Dennis Ritchie in 1971. One of the best features of C is that it is not tied to any particular hardware or system. This makes it easy for a user to write programs that will run without any changes on practically all machines. C is often called a middle-level computer language as it combines the elements of high-level languages with the functionalism of assembly language. To produce the most efficient machine code, the programmer must not only create an efficient high level design, but also pay attention to the detailed implementation.

Characteristic of an Embedded 'C' programming environment:

Special keywords and tokens (@, interrupt, tiny).

- Many different pointer kinds (far / near / rom / uni).
- Critical timing (Interrupt Service Routines, tasks)
- Hardware oriented programming

4.2.2 Proload

Proload is software which accepts only hex files. Once the machine code is converted into hex code, that hex code has to be dumped into the microcontroller placed in the programmer kit and this is done by the Proload. Programmer kit contains a microcontroller on it other than the one which is to be programmed. This microcontroller has a program in it written in such a way that it accepts the hex file from the keil compiler and dumps this hex file into the microcontroller which is to be programmed. As this programmer kit requires power supply to be operated, this power supply is given from the power supply circuit designed above. It should be noted that this programmer kit contains a power supply section in the board itself but in order to switch on that power supply, a source is required. Thus this is accomplished from the power supply board with an output of 12volts or from an adapter connected to 230 V AC.

Steps to work with Proload:

- Install the Proload Software in the PC.
- Now connect the Programmer kit to the PC (CPU) through serial cable.
- Power up the programmer kit from the ac supply through adapter.
- Now place the microcontroller in the GIF socket provided in the programmer kit.
- Click on the proload icon in the PC. A window appears providing the information like Hardware model, com port, device type, Flash size etc. Click on browse option to select the hex file to be dumped into the microcontroller and then click on "Auto program" to program the microcontroller with that particular hex file.
- The status of the microcontroller can be seen in the small status window in the bottom of the page.
- After this process is completed, remove the microcontroller from the programmer kit and place it in your system board. Now the system board behaves according to the program written in the microcontroller.

V. APPLICATION, ADVANTAGE, DISADVANTAGE

5.1 Application

1) Farming

The design of furrow openers of seed drills varies to suit the soil conditions of particular region. Most of the seed cum fertilizer drills are provided with pointed tool to form a narrow slit in the soil for seed deposition.

2) Gardening

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.

3) Sport's Stadium

The fluted roller seed cup is having the arrangement of seed cut-off and controlling flap to control the amount of seeds and fertilizers.

4) Agri Universities

The Harrow is one of the important agricultural equip-ment which is used in the fields of agriculture for seed bed preparation and weed control. This is used before the seeds are sown in the field. This helps in the leveling of the soil and seeds can be sown in the prepare bed easily Polyhouse 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.

4.3 Advantage

- **Reduce the manual work**

Anyone that has ever had the task of relocating a fixed conveyor system knows that this can be a cumbersome undertaking. Through the use of 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.

• Less skill technicians is sufficient to operate.

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.

• Installation is simplified very much

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.

• Labor requirement reduces

Optimization of transport flows in accordance with vehicle fleet, traffic and missions.Work flows distributed dynamically between the same ASSRs.Possibility of 24/7 operation without human intervention.

• Quantity of seeds reduces

No conventional material-handling infrastructures required. Increase of ASSRs in line with the growth in volume of operations. Updating possible without shutting down the system.Easy reconfiguration of routes or addition of new machines.Reintroduction of vehicles after manual repositioning. Polyhouse 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.

4.4 Disadvantage

- Electronics component cannot sustain the vibrations and the high temperature.
- Accuracy should be reduces due to clod and mud.

VI. CONCLUSION

The main focus of this system is its Automatic way of sowing the seeds. The seeds are been sowed in a proper sequence which results in proper germination of seeds. This automatic way of sowing seeds using a robot reduces the labor requirement. Here the wastage of seeds is also been reduced to a greater extent. This system has been developed for the sowing of seeds in an automatic way. 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 planting process of the onion crop only has been implemented by using this Seed Sowing 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.

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