

Automatic Fertilizer Distributor

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Abstract— The purpose of this is fertilizer spreader machine. When the machine is in forward direction then front side of arm make whole on land surface after that feed is drops is in this wholes. In that case this created whole close by back side arm. The fertilizer falls from container up to control knob which is rotate by motor. This knobs rotation is use for to control the feed, and then feed is out from "Y" shape output tubes. All movement of machine is control by arduino on the basis of incoming signal from mobile/tab.

Keywords: Fertilizer Distributor

I. INTRODUCTION

India is agricultural based country. Near about 70% of people of our country are farmer. Our economy also depends on agricultural product. Now a day tremendous changes have occurs in conventional method of agriculture like seed plantation, irrigation system, pesticides & spray used for developing our economic condition. It is necessary to increase our agricultural productivity & quality also. Farming process includes many stages out of which fertilization is one of the best important stage, & which is not exploded up to the mark up till. Now a days we are used to spreading of fertilizer in traditional way which is the more time consuming, costly as well as not provide comfort to the farmer. So, we are going to design a manually operated machine for fertilizer spreading by taking into consideration the user group & their needs which helps to them to work easy & functional. So, using fertilizer spreading machine equal amount of fertilizer spread, Good fertility, less waste, save time & reduce effort of farmer.

II. LITERATURE SURVEY

A. Nartode R.R.

Studied that, a method was generated to spread the fertilizer uniformly over a fallow land by dropping the fertilizer over the impeller disc. The system consists of a three wheels, two at the front and one at the back. These two wheels at the front are used to impel the fertilizer. The two hoppers are used. The fertilizer falls on to the impeller. The hopper is provided with flow control mechanism. In fertilization, the flow maintenance is necessary. Generally every crop should get sufficient amount of fertilizer. This condition is satisfied by Spring Mechanism. In normal conditions spring is not in tension and hopper is closed. As operator apply tension on the spring, controlling plate moves backward and hopper is open. Below this system there is an impeller. It is mounted on output shaft. Hooper opens on Impeller eccentrically and due to centrifugal action fertilizer spreads in the farm.

B. Vignesh.B.

Studied that, a method was generated to spread the fertilizer automatically over the agricultural land by dropping the fertilizer over the impeller disc. A 25cc engine is used to rotate impeller disc in which the fertilizer drains and spreads from hopper where it is introduced. In tractor mounted or manual system they carry four and three wheels respectively. But here two wheels are used in which the bigger front wheel is connected to engine through supporting wheel can be adjustable. The speed of wheel is varied by control lever connected through a cable. In this the fertilizer spreads only in front side of impeller while its back side 180 is covered. The size and width of the fertilizer is reduced to make it less weight and suitable for multi crops. From this method the cost fertilizer spreader is reduced by 50%.

C. Arun Abraham

Studied that, conventional spreading of fertilizers for small scale farming are by hand. It has some problems like uneven spreading of fertilizer, more time consuming, high human effort. The farmer have to carry heavy bags throughout the International Journal of Advance Engineering and Research Development (IJAERD) Technophilia-2018., Volume 5, Special Issue 04, Feb.-2018. Organized by JCEI' S Jaihind Polytechnic, Kuran 2 spreading process. So it is necessary to develop a fertilizer spreader for small scale farming. The proposed fertilizer spreader uses a trolley type of mechanism. The main part is spreader disk, which helps for uniform spreading. The feed for the disk is from the wheels of the trolley using gear transmission. By using this spreader, a lot of time can be saved, human effort used for carrying heavy bags of fertilizer is reduced and wastage of fertilizer can also be avoided.

D. S.Ramchandra

Studied that, in India 73% of population is directly or indirectly depends upon the farming. Hence it is said that India is an agricultural based country but till now our farmers are doing forming in same traditional way. They are doing seed sowing, fertilizers and pesticide spraying, cultivating by conventional methods. There is a need of development in this sector and most commonly on fertilizer broadcaster technique, because it requires more efforts to spread uniformly over the entire field. The main objective of fertilizer broadcaster at sowing time is to uniformly distribute the fertilizer over entire field. The present trend in fertilizer broadcaster in India is based on manual method. It's time to replace the manual method by the motorised. It will decrease the manual effort and time to spread the fertilizer over the entire field. The present project work is concentrated on design and fabrication of fertilizer broadcaster which will uses the solar energy to run the

motor. This makes the work is easier, more efficient and less time to spread the fertilizer on farms.

E. Joao P.A.R. Cunha.

Studied that, the quality of fertilizer distribution process is important to the success of agriculture. This research aimed to study the distribution uniformity of fertilizers with spreaders capable of performing variable rate. Evaluations were carried out in different farms, in the Southwest region of the State of Goiás, Brazil. 13 longitudinal and transversal distribution profiles with 11 centrifugal spreaders were evaluated: five with limestone, two with gypsum, two with magnesium oxide, one with monoammonium phosphate (MAP), one with super simple phosphate (SS), one with chloride potassium (KCl) and one with formulated fertilizer (02-20-20). The collectors and the form of distribution followed the ASABE S341.3 standard (2006). The broadcasted distribution by centrifugal spreaders performed unevenly over the applied area. Therefore, application evaluation, in addition to correct regulation, should be performed frequently for each type of product, even on machines with capacity in variable rate.

III. SCOPE OF PROJECT

In agriculture field the most of the farmers used traditional methods, And by using this traditional method the yield of agriculture will reduce. So if the farmers used some advanced and automated technique then yield of agriculture field increase in some amount and by using these techniques farmers can overcome financial problems. So using this automatic fertilizer distributor farmers gets lot of benefits.

Automaton is playing a significant role in agricultural production and management. There is a need for autonomous and time saving technology in agriculture to have efficient farm management. The researchers are now focusing towards different farming operational parameters to design autonomous agricultural vehicles as the conventional farm machineries are crop and topological dependent. Till date the agricultural robots have been researched and developed principally for harvesting, chemical spraying, picking fruits and monitoring of crops. This Automated fertilizer distributor are perfect substitute for manpower to a great extent as they deploy unmanned sensing and machinery systems. The prime benefits of development of autonomous and intelligent agricultural machine are to improve repeatable precision, efficacy, reliability and minimization of soil compaction and drudgery. This machine have potential for multitasking, sensory acuity, operational consistency as well as suitability to odd operating conditions. The agricultural machine are designed using different Basic techniques which are Bluetooth signals, Controlling of feed etc. In this paper, comparative study including an overview of automated fertilizer spreader for precision Agriculture in India and worldwide development is explored.

IV. METHODOLOGY

For this project we have used following method

1) Controlling to machine using mobile

For controlling the movement of machine we have used Bluetooth module HC05. This controlling method are very simple and very Affordable to ordinary people. When we press any key on our mobile then this signal goes to Arduino Board through Bluetooth Module HC05, and as per the Instruction Arduino take Decision.

2) Controlling the flow of feed

For controlling the flow of feed we have used controlling knob. When the feed is rapidly flow through the pipe then this feed controlled by our controlling knob which is ball valve by rotating circular movement is provided to the knob by using D.C motor (high torque 300rpm) and then finally feed out from "Y" shape output tubes.

3) Use of gravity

Because of gravity the feed is falls in downward direction, without any external force.

V. DETAILS OF DESIGNS

A. ARDUINO UNO

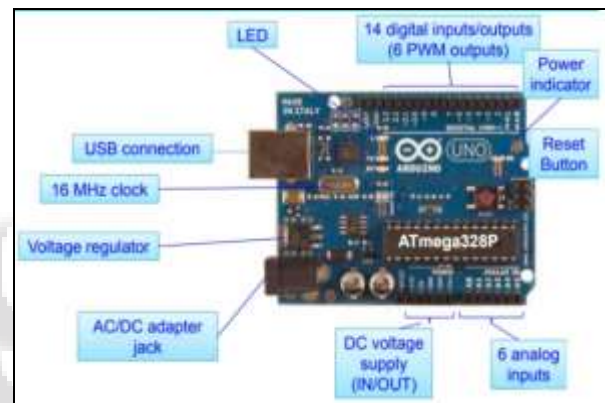


Fig. 1: Arduino Uno Board

ARDUINO

Arduino interface board is a device which have low-cost, easy-to-use technology to create their creative, interactive objects, useful projects etc...

1) WHAT IS ARDUINO?

Arduino is a open source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists, and anyone interested in creating interactive objects or environments. It's an open-source physical computing platform based on a microcontroller board, and a development environment for writing software for the board.

In simple words, Arduino is a small microcontroller board with a USB plug to connect to your computer and a number of connection sockets that can be wired up to external electronics, such as motors, relays, light sensors, laser diodes, loudspeakers, microphones, etc., They can either be powered through the USB connection from the computer or from a 9V battery. They can be controlled from the computer or programmed. The software for programming your Arduino is easy to use and also freely available for Windows, Mac, and LINUX computers at no cost.

2) Microcontroller

Microcontroller is the controlling device, it is a single chip that can perform various calculations and tasks, and

send/receive signals from other devices via the available pins. Precisely what tasks and communication with the world it does, is what is governed by what instructions we give to the Microcontroller. It is this job of telling the chip what to do, is what we refer to as programming on it.

Also, the job of programming it has to be accomplished by an external circuit. So typically, a uC is used along with a circuit which provides these things to it; this combination is called a microcontroller board. The Arduino Uno that you have received, is one such microcontroller board. The actual microcontroller at its heart is the chip called Atmega328.

3) Features

- 16 MHz
- 8 Kbyte Flash RAM(1K taken by the boot loader)
- 1 Kbyte RAM(eg.for auto/local variables and stack)
- 14 digital Input/Output Ports

4) Current and Voltage Rating

The power requirement for ARDUINO is 9 to 12V DC, 250mA or more, 2.1mm plug, centre pin positive.

a) The OFF-the shelf adapter

- Must be a DC adapter (i.e. it has to put out DC, not AC)
- should be between 9V and 12V DC
- Must be rated for a minimum of 250mA current output, although you will likely want something more like 500mA or 1A output, as it gives you the current necessary to power a servo or twenty LEDs if you want to.
- Must have a 2.1mm power plug on the Arduino end, and
- The plug must be "centre positive", that is, the middle pin of the plug has to be the + connection.

b) Current rating:

Since you'll probably be connecting other things to the Arduino (LEDs, LCDs, servos) you should get an adapter that can supply at least 500mA, or even 1000 mA (1 ampère). That way you can be sure you have enough juice to make each component of the circuit function reliably.

The Arduino's on-board regulator can actually handle up to 20V or more, so you can actually use an adapter that puts out 20V DC. The reasons you don't want to do that are twofold: you'll lose most of that voltage in heat, which is terribly inefficient. Secondly, the nice 9V pin on the Arduino board will actually be putting out 20V or so, which could lead to potential disaster when you connect something expensive to what you thought was the 9V pin. Our advice is to stick with the 9V or 12V DC adapter.

B. BLUETOOTH MODULE (HC-05)

- For The Communication Between Mobile Phone And controller Bluetooth Module(Hc05)Is Used
- Low Power 1.8v Operation, 1.8 to 3.6v I/O.
- Serial Port Bluetooth Module Have A Bluetooth 2.0+Edr(Enhanced Data Rate), 3mbps Modulation With Complete2.4ghz Radio Transceiver And Baseband.
- Using Bluetooth Profile and Android Platform Architecture. Different Type Of Bluetooth Applications Can Be Developed.

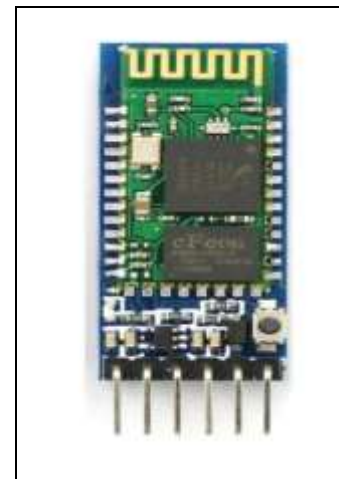


Fig. 2:

1) HC-06 Features and Electrical characteristics

- Bluetooth protocol: Bluetooth V2.0 protocol standard
- Power Level: Class2(+6dBm)
- Band: 2.40GHz—2.48GHz, ISM Band
- Receiver sensitivity: -85dBm
- USB protocol: USB v1.1/2.0
- Modulation mode: Gauss frequency Shift Keying
- Safety feature: Authentication and encryption
- Operating voltage range:+3.3V to +6V
- Operating temperature range: -20°C to +55°C
- Operating Current: 40mA

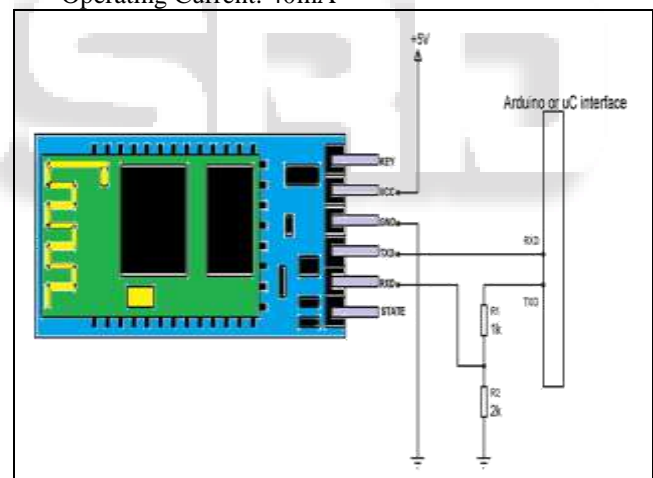


Fig. 3:

2) HOW TO USE HC-05 BLUETOOTH MODULE

The communication with this HC-06 module is done through UART interface. The data is sent to the module or received from the module through this interface. So we can connect the module to any microcontroller or directly to PC which has RS232 port (UART interface). A typical interface circuit of the module to an arduino is shown below.

Here the module is connected to +5V standard regulated power supply and UART interface is established as shown in figure. All you need to do is connect RXD of arduino to TXD of module and TXD of arduino is connected to RXD of module through a resistor voltage divider. This voltage divider is provided for converting 5V logic signal sent by arduino to +3.3V logic signals which are suitable for the module. The ground of arduino and module must be

connected for voltage reference in case separate power sources are used.

After connecting the module you have to write the program in arduino IDE to receive and send data to the module. For successful wireless communication you need to remember a few things:

In programming you need to set default baud rate of UART serial communication to 9600. The value is default setting of module and can be change in program.

The module is a slave and so you need a master to establish a successful wireless interface. For that you need another [arduino + module (with master feature)] setup or you can use a smart phone as a master and search for HC-06 slave.

The master searches for slave and connects to it after authenticated with password. The HC-06 module has default password '1234' which can be changed.

In program you can receive data master sends (After authentication) and perform tasks based on it.

Also you can download libraries for module through the websites and use them to make communication easy. All you need to do is download these libraries and call them in programs. Once the header file is included, you can use simple commands in the program to tell the arduino to send or receive data. The module sends this data to master through wireless Bluetooth. If the module receives any data from master, it will transmit it to arduino through UART serial communication.

You can also interface HC-06 to PC using RS232 cable. Once you interface is done you can use serial terminal on PC or any similar software to send or receive data to module. You need to type in AT command in serial terminal to communicate with the module and these commands can be downloaded here.

3) Applications

- Hobby projects
- Engineering applications
- Robotics
- Mobile Phone Accessories
- Servers
- Computer Peripherals
- USB Dongles

C. L298 MOTOR DRIVER

L298 46V, 2A Stepper Motor / Dual DC Motor Driver module can drive bipolar stepper motor or Two DC motors at the same time. Each L298 has two H-Bridges. Each H-Bridge can supply 2Amp. current. L298 has heat sink for better heat dissipation and fly back diodes for protection from back EMF (Electromotive Force). For higher current rating these H-Bridges can be connected in parallel. For easier mounting board have four mounting holes. Board has 2pin Terminal Block (Phoenix Connector) for high power connections. Board is made of double sided PTH PCB for giving better strength to the connectors.

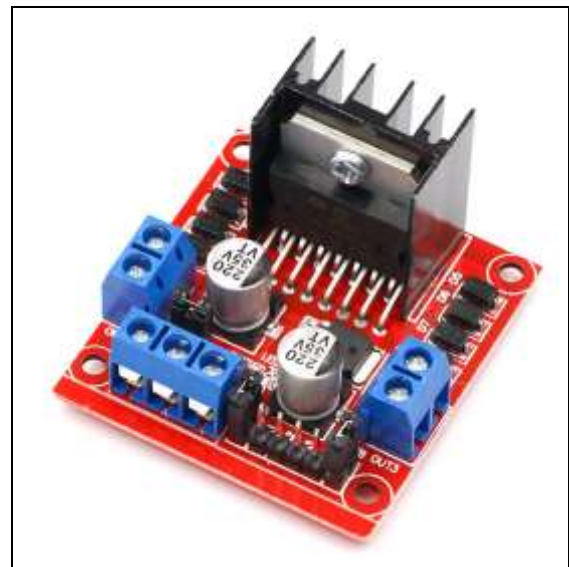


Fig. 4: L298 MOTOR DRIVER

1) FEATURE

- Easily compatible with any of the system
- Easy interfacing through FRC (Flat Ribbon Cable) to 10pin Box Header
- External Power supply pin and 3pin Terminal Block for Motors supported
- On-board PWM (Pulse Width Modulation) selection switch
- 2pin Terminal Block (Phoenix Connectors) for easy Motors Connection
- On-board H-Bridge base Motor Driver IC (L298)

Technical Specification:

- Power Supply : Over FRC connector 5V DC
- External Power 9V to 46V DC
- Dimensional Size : 44mm x 37mm x 14mm (l x b x h)
- Temperature Range : 0°C to +70 °C
- Multiwatt Packaged Heatsink for better heat dissipation
- Flyback diodes for protection from back EMF
- ELEDs per H-Bridge for better debugging as well as better notification for motor

2) HARDWARE DESCRIPTION

a) L298 IC:

The driver IC L293D is quad push-pull drivers capable of delivering output currents to 2A per channel respectively. Each channel is controlled by a TTL-compatible logic input and Each pair of drivers (a full bridge) is equipped with an inhibit input available at pin 1 and pin 9.

The motor will run only when chip inhibit is at high logic i.e. chip inhibit is enabled.

The connection diagram is shown below:

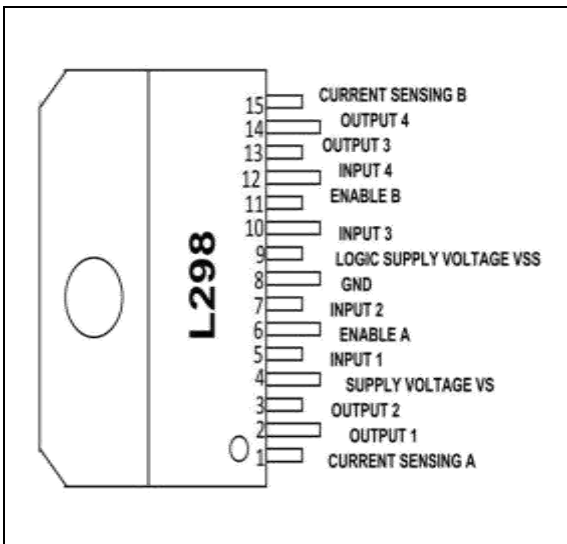


Fig. 5: MOTOR DRIVER PIN DIAGRAM

The input to the motor driver IC is controlled by the controller through its motor driver input connector. Pin Headers with plastic guide box around them are known as “Box Headers” or “Shrouded Headers” and are normally only used in combination with a Flat Ribbon Cable (FRC) connector. A notch (key) in the guide box normally prevents placing the connector the wrong way around. Box Header (denoted as J3 on board) can be connected using FRCs and also Single Berg Wires for individual pin connections. It has following configuration.

D. DC MOTORS

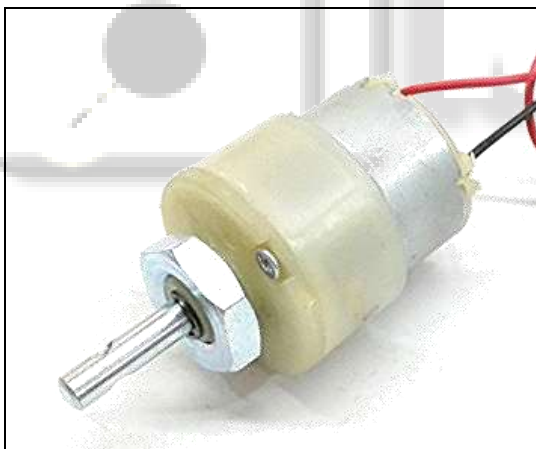


Fig. 6: Dc Motors

DC motors are seldom used in ordinary applications because all electric supply companies furnish alternating current. However, for special applications such as in steel mills, mines and electric trains, it is advantageous to convert alternating current (AC) into direct current (DC) in order to use DC motors. The reason is that speed/torque characteristics of DC motors are much more superior to that of AC motors. Therefore, it is not surprising to note that for industrial drives, DC motors are as popular as 3-phase induction motors. Like DC generators, DC motors are also of three types viz., series-wound, shunt-wound and compound wound. The use of a particular motor depends upon the mechanical load it has to drive.

- 1) Shunt DC motor: The rotor and stator windings are connected in parallel.

- 2) Separately Excited motor: The rotor and stator are each connected from a different power supply, this gives another degree of freedom for controlling the motor over the shunt.
- 3) Series motor: the stator and rotor windings are connected in series. Thus the torque is proportional to I^2 so it gives the highest torque per current ratio over all other DC motors. It is therefore used in starter motors of cars and elevator motors (p. 563 Chapman, 4e, 2005 McGraw-Hill) 2005 McGraw-Hill).
- 4) Permanent Magnet (PMDC) motors: The stator is a permanent magnet, so the motor is smaller in size. Disadv: only used for low torque applications

E. BATTERY



Fig. 7:

The DC battery is used to provide the power supply to the electronic device and this is a main part of any electronics device. As there is a 12 volt battery is used in our project as given above function.

VI. HARDWARE DESIGNING



Fig. 8: Actual Prototype of Automatic fertilizer distributor

VII. WORKING AND PROCESS

A. Construction

We studied that in our project consist of four wheels two is for back and two is for front, which is connected to each other inversely.

Also consist of steel "U" shape parabolic container and this container keeps on four steel strips, and the outlet of "U" shape parabolic container is connected to the "Y" shape outlet tubes. And machines basement is made from rectangular plywood and this is keep on four wheels

B. Working principle

Firstly feed store in "U" shape container and out from his narrow tube and flow of feed is control by his rotation of knob and feed is finally out from output tubes.

VIII. RESULTS

From above project we have successfully developed an automatic fertilizer spreader machine using some automation elements like Arduino. And we have used the principle of Bluetooth communication over a wireless media. And we also have successfully run and operated the fertilizer in actual agricultural field for distributing the fertilizers also.

IX. APPLICATIONS

- It is not use in agriculture field.
- It can also be used for carry out fertilizers from home to farm.
- It can also use for seeding in farming industry.

X. CONCLUSION

The purpose of this system is to use the mobile phone inbuilt Bluetooth facility for the automation. With the help of this Bluetooth facility to make control with the fertilizer by a smartphone android application. Different and software unit of the system are described. The complete application has been designed using android, using C language.

With the help of this system the farmers can get a device or a machine which can make the fertilizer spreading process more convenient and easy as well as secure. Due to this the chances of human efforts is reduce and also save the time

XI. FUTURE SCOP

As per the todays situation automation is enter in agriculture field day by day and people wants create reliable and flexible farming without extra human work so according to new digital India our project

That automatic fertilizer distributor are perfectly match this machine scope is increase in future because of day by day increase the labour problem and thy need lots of time and people wants more earning in few investment so in the future every farmer want more automation in his farm therefore our project increase in future as per the 20th century.

REFERENCES

- [1] Robotic Engineering by Richard D Klafter, Thomas A chmielewski, Michael Negin
- [2] Atmel AVR Microcontroller Primer: Programming and Interfacing By: Steven F. Barret, Daniel J. Pack
- [3] RatheeshRajan "Foundation Studies for an Alternate Approach to Motion Planning of Dynamic Systems" M.S.E., the University of Texas at Austin, 2001
- [4] RK Mittal and IJ Nagarath "Robotics and Control" BITS Pilani, 2003

A. Websites

- [1] <http://developer.android.com>
- [2] <http://android.com>
- [3] <http://en.wikipedia.org>
- [4] Shop.evergreengroups.co.in
- [5] www.nex-robotics.com
- [6] www.rscomponents.co.in