

Mechatronics Seed Sowing Machine

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Abstract

This paper is focused on seed sowing process using a Bluetooth operated machine. The integral construction of the machine is made simple to use. In the farming process, Conventional seeding operation takes more time and more labor. Due to more sowing rate the time required for the total operation is more and the labor cost is increased. So Automation in farming would provide one of the feasible solutions. For that, we are going to automate the seed sowing machine. This machine is controlled by a Smartphone. This project focuses on developing the Bluetooth operated mobile machine to minimize the working cost and increase the accuracy of seed sowing. A 12V battery is used which gives supply to the overall system of the machine, we can also connect solar panel to this circuit. PIC Microcontroller is used which controls the machine for desired sowing operation and a Bluetooth interface is used to navigate the machine.

Keywords- Bluetooth Module HC05, Bluetooth Robo Application, DC motors, Motor Drivers, PIC 16F877A

I. INTRODUCTION

As we know agriculture is the backbone of Indian economy so to make it stronger in the future we are automate the sowing process and weeding process. This machine is controlled that means it moves straight and programmed to turn left or right and also in reverse direction. The machine is fully controlled by the microcontroller and also remote with Bluetooth module.

When the Bluetooth module is configured, the signal transmitted to the transmitter and received by the receiver and it indicates the signal in the remote. The machine starts moving as per the commands. The seed sowing assembly is at front of the machine.

Seed sowing can be done by DC motor which is placed in the funnel which assembled in the seed sowing assembly. It works when the vehicle is going straight Line. The battery is rechargeable by means of the charger. An Acrylic chassis supports all circuitry of the machine.

II. METHODOLOGY

In this project we are cultivating process can do for different seeds. So many different processes in the system like seed sowing, leveling and water spraying it require more manpower in this area explaining the process is given below:

A. Seed Sowing

Seed sowing process is done by rotating the motor placed in funnel and at the shaft of motor the circular disc is attached which carries seeds. When this disc will rotate seeds are dropped from hole in circular disc.

B. Leveling

Leveling is processed after the sowing, and it is done by adjuster which placed below the machine to covers the seeds.

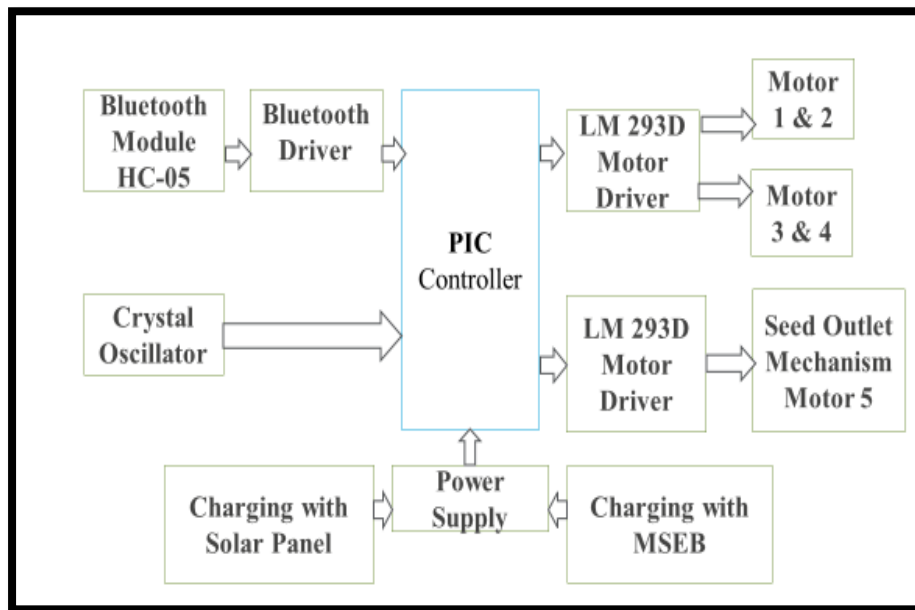


Fig. 1: Block Diagram

As shown in above fig1 it consists of PIC microcontroller IC 16f877a, power supply, Bluetooth module HC05, motor drivers as well as crystal oscillator. Fig.1 shows that microcontroller controls the mechanism. To drives the motors drivers are used. Here we used Bluetooth Module HC05 as communicator between smartphone application and machine hardware.

III. COMPONENTS USED

- 12V Battery
- PIC 16f877a
- Bluetooth Module
- Driver Circuit
- Motors
- Smart Phone with Application

A. 12V Battery

The battery is a storage device its store the charge and release when if need it. It consists of one or more electrochemical cells converts' stored chemical energy to generate electrical energy. Here we connect 3 batteries of 4 Volt in series so we get required voltage i.e. 12V. Specification of the battery is shown below,

Ratings- 4V 1.5Amps

Type-Rechargeable Li-Ion Battery

Charge current-Standard-0.5C

Rapid-1.0C

Charging Time-Standard-5 hrs

Rapid-2.5hrs

B. PIC 16f877a

PIC 16f877a is a microcontroller which controls the sowing machine. It is one of the most renowned microcontrollers in industry this controller is very convenient to use, the coding and programming of this controller is easier and it can be write and erase many times because it uses a flash memory technology so this one of the advantage of PIC16f877a. Specification of PIC 16f877a microcontroller shown below,

Program Memory Type-Flash

Program Memory-14KB

Data EEPROM-256Bytes

RAM-368Bytes

CCP-22

Timers-2*8bit,1*16bit

Temperature range- -40⁰ to 125⁰C

Operating Voltage Range-2 to 5.5 V

Pin Count-40

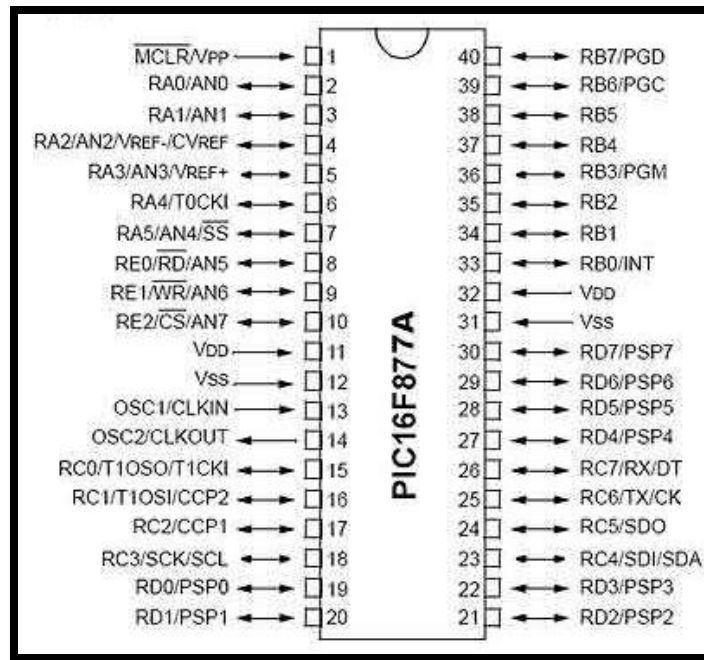


Fig. 2: Pin Diagram

C. Bluetooth Module

The HC-05 module is easy to pair and communicate With PIC 16f877a microcontroller. The Bluetooth module is designed for wireless communication and transmitting power up to 4dBm transmit power. Bluetooth module is operated by 3.3v.it has two work modes: order–response work mode and automatic connection work mode. When the module is at the automatic connection work done, it will follow the configured way to transmit the data automatically. When the module is in the order-response work mode, to set the control parameters and sent control order, user can send the AT command to the module

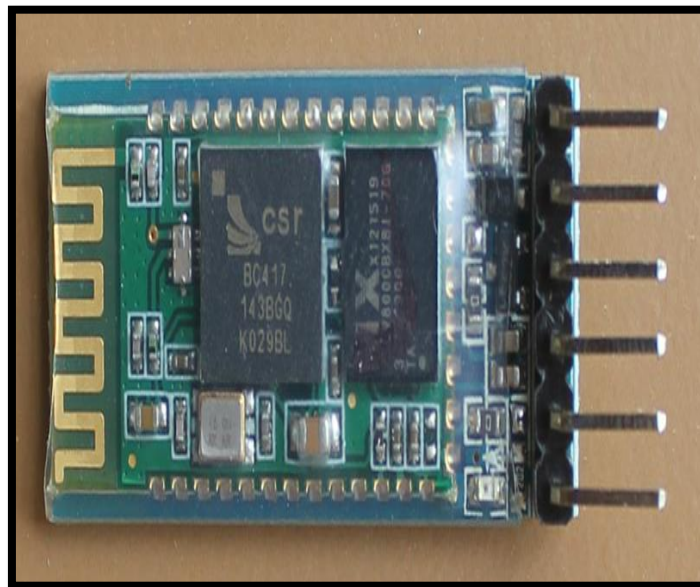


Fig. 3: Bluetooth Module HC05

D. Driver Circuit

L293D is a typical motor driver IC which allows the DC motor to drive in either direction. L293D is a 16- pin IC which can a set of four motors simultaneously in any direction. Dual H-bridge Motor integrated circuit(IC) inbuilt in driver circuits. In its common mode of operation, two DC motors can be driven in forward as well as in reverse direction. Input logic 00 or 11 will stop the corresponding motor. Logic 10 and 01 will rotate it in anticlockwise and clockwise directions, respectively.

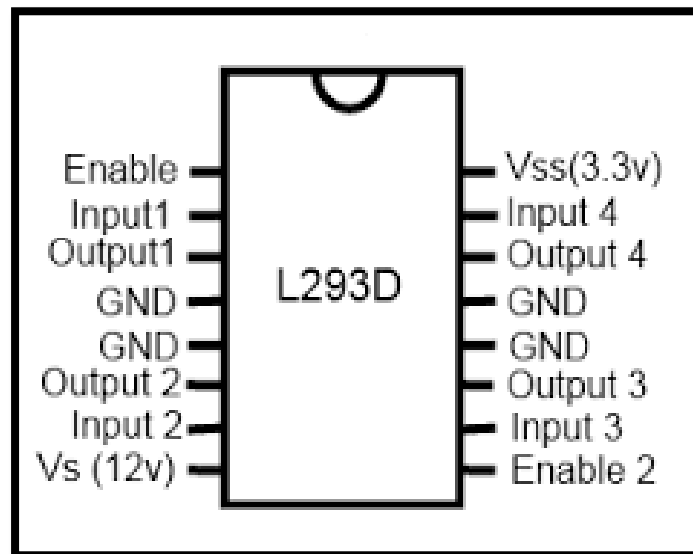


Fig. 4: Pin Diagram for Driver Circuit

E. Motors

An electric motor is a device used to convert electrical energy to mechanical energy. Basically motor is operating on principle of Ampere's law. According to this law a wire carrying an electric current produces a magnetic field around itself. Motors drive the machine operated by 12V battery.

F. Smart Phone with Application

The Smartphone is used to control or navigate the machine by using android application (Bluetooth Robo). In this application, it has four directions forward, backward, left, and right and other options are grab and free.

IV. WORKING PRINCIPLE



Fig. 5: Machine Model

When we switched on the power supply it goes to PIC controller. In this controller already the program uploaded on a 16f877a chip, it interfaces with Bluetooth module and driver circuit. The machine is fully controlled by the android application (Bluetooth Robo). Seed sowing assembly is fixed in the front side of an Acrylic Board, here funnel carries seeds and also main drive motor is connected to the mechanism. While rotating the mechanism the seeds take place from the funnel, at the same time vehicle is moving condition. At the bottom in front of the machine adjuster is fixed to cover the soil.

- Furrow the ground.
- Sow seed inside the furrow hole.
- Cover the soil on hole with the help of adjuster.

V. RESULT AND CONCLUSION

This research it can be concluded that,

- The work for MECHATRONICAL SEED SOWING MACHINE is completed successfully.
- By using this innovative project of MECHATRONICAL SEED SOWING MACHINE we can save the man power, less efforts also time required for manually sowing. It is very helpful for small scale farmers.

VI. FUTURE SCOPE

- Use of Cutter instead of sowing assembly can be used as grass cutter equipment.
- Use of Monitoring Camera Control System.
- Multi-hopper can be attached side by side for sowing of large farm.

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