

AGRIBOT -RF based farmer friendly Agricultural Robot with automatic seed dispensing system

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Abstract:

Agriculture is a backbone of our nation. Farmers are looking for new ways to implement technology to reduce costs and labor hours. One of the ways to farmers to explore new technologies in farming comes from the RF tractor. This is something to explore new technologies in farming and is quickly gaining popularity from agriculture research companies around the country.

RF remote controls these tractors. By using dc motors the tractor can be moved forward and reverse direction, Also this robot can take sharp turnings towards left and right directions. This project uses AT89S52 as its controller.

Most of the things done during farming are plough, watering and seeding. For performing all these operations lot of manpower is needed. So, by using RF tractor all these things can be done easily. Transmitter, Receiver, RF Encoder and RF Decoder are the RF modules using. The switches are interfaced to the RF transmitter through controller. The status of the switches continuously read by encoder and sends the data to RF transmitter and the transmitter transmits

the data. By using that data different operations in farming will be performed by the robot.

Chapter 1

1. INTRODUCTION

The major occupation of the Indian rural people is agriculture and both men and women are equally involved in the process. Agriculture has been the backbone of the Indian economy and it will continue to remain so for a long time. It has to support almost 17% of world population from 2.3% of world geographical area and 4.2% of world's water resources. The present cropping intensity of 137% has registered an increase of only 26% since 1950-51. The net sown area is 142 Mha. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and spacing, cover the seeds with soil and provide proper compaction over the seed.

The recommended row to row spacing, seed rate, seed to seed spacing and depth of seed placement vary from crop to crop and for different agricultural and climatic conditions to achieve optimum yields and an efficient sowing machine should attempt to fulfill these requirements. In addition, saving in cost of operation time, labor and energy are other advantages to be derived from use of

improved machinery for such operations. A traditional method of seed sowing has many disadvantages. This paper is about the different types of methods of seed sowing and fertilizer placement in the soil and developing a multifunctional seed sowing machine which can perform simultaneous operations.

1.1 AGRICULTURE:

1.1 Introduction

Agriculture is the art and underlying science in production and improvement of fieldcrops with the efficient use of soil fertility, water, labor and other factors related to crop production. It is the most important enterprise in the world. About 70% of Indian populations are either farmers or involved in some agricultural related activities

1.2 Steps Involved In Agriculture

a. Seed selection

Among varieties of crops, a suitable crop has to be selected for cultivation.

b. Land preparation

It involves tilling, ploughing and furrows and ridges formation

c. Fertilizer application: organic fertilizer is applied during ploughing, chemical fertilizer is applied before sowing and during vegetative stage.

d. Seed preparation

Seeds are treated with fungicides like carbendazim before sowing.

e. Sowing

Seeding or sowing is an art of placing seeds in the soil to have good germination in the field

f. Irrigation

Watering the crops for its growth and development.

- Surface irrigation.
- Drip irrigation.
- Sprinkler irrigation.
- Rain dependent irrigation.

g. Germination – seed develops into a two leaf stage, tiny plant.

h. Thinning – only one plant is retained in each pit by plucking the excess seeding. One healthy seeding is left and other seeding is plucked to support the complete resources of water, fertilizer and spacing for single plant.

i. Filling – if there is no germination in some pits; when some seeds fail to germinate, then seedling is plucked from where it is excess and planted at the empty space.

j. Weeding: The process of removing the unwanted plants in the field to ensure complete utilization of resources only to the crop.

- Manual weeding (once in 3 weeks).
- Before sowing, field has to be ploughed well to remove all weeds.
- After germination tiny weeds are removed using weeding blade.
- After vegetative stage weedicides are sprayed. Chemical weeding – spraying of weedicides like "pendimethalin" of 1 litre is mixed with 200 litres of water for one hectare. Spraying during weeding will prevent formation of weeds during next one month.

k. Vegetative stage – maximum growth of plant takes place in this stage.

l. Flowering stage: plant starts producing flowers in this stage.

m. Pesticides spraying – When the crops are infested with pests use pesticides.

1.2 Objective

- To achieve proper distance in two seed in planting and sowing mechanism for proper nutrition and growth of plants.
- To make this machine which operate manually for small farmer
- To provide this machine in lowest cost and light in weight.
- To adjust proper depth in variable soil in any whether condition

1.3 Methodology

To make agriculture project we follow this steps

- The first step is to go to the farmers and find the problems faced by them.
 - The second step is to choose a problem.
- The third step is to visit to agriculture industry.
- The fourth step is to Analyze the problem & their solution.
 - The fifth step is the selection of Design of gear for proper seed distance.
 - The sixth step is to find which mechanism is suitable in lowest cost.
 - The seventh step is to find all components we require in proper dimension.

- The eight steps are to start fabrication.
- The ninth step is to make proper balance sheet of work done.
- The last step is the testing of machine.

CHAPTER: 2

2. LITERATURE SURVEY

Mahesh R. Pundkar [1] stated that the seed sowing machine is a key component of agriculture field. High precision pneumatic planters have been developed for many varieties of crops, for a wide range of seed sizes, resulting to uniform seeds distribution along the travel path, in seed spacing.

M.A. Asoodar [2] another agricultural researcher determined the effects of different seeding technique and machines and also different rates of oilseed rape application on seeding emergence plant establishment and final grain yield.

P.P. Shelke [3] concludes that bullock drawn planters are becoming necessity for sowing as the skilled workers for sowing are almost diminishing. Planting distance and plant population are crucial factors in maximizing the yields of crops.

Singh (1971)[4] revealed that by using a seed drill for wheat crop there was an increase in yield by 13.025 percent when compared with the conventional method, it also revealed that by using a seed drill for wheat crop, a saving of 69.96 per cent in man-hours and 55.17 percent in bullock hours was achieved when compared, with the conventional method. Umed Ali Soomro et al. in Pakistan has evaluated three sowing methods and seed rate in a four replicated RCBD method and concluded that drilling method of sowing at seed rate 125

kg/ha is optimal for yield and quality of wheat grains, because the said sowing method and seed rate

distribute seed uniformly and desired depth which provide appropriate depth for seed germination and crop establishment.

The main goal of M.A. Asoodar [2] another agricultural researcher determined the effects of different seeding technique and machines and also different rates of oilseed rape application on seeding emergence plant establishment and final grain yield.

CHAPTER 3

3.1 seeding and spraying machine,

Introduction:

Day by day the population of India is increasing and to fulfill the need of food modernization of agricultural sectors are important. Due to chemical fertilizers the fertility of soil is decreasing. Hence farmers are attracted towards organic farming. By mechanization in spraying devices fertilizers and pesticides are distributed equally on the farm and reduce the quantity of waste, which results in prevention of losses and wastage of input applied to farm. It will reduce the cost of production. It will reduce the cost of production. Mechanization gives higher productivity in minimum input. Farmers are using same traditional methods for spraying fertilizers and pesticides. Conventionally the spraying is done by labors carrying backpack sprayer and fertilizers are sprayed manually. They are doing seed sowing, fertilizers and pesticides spraying, cultivating by conventional methods. There is need of development in this sector and most commonly on fertilizers pesticides spraying technique, because it requires more efforts and time to spray by traditional way. To solve these problems this project deals with

the development of dual mode solar powered insecticide and fertilizer spraying machine.

3.2 BRIEF INTRODUCTION ABOUT THE PROJECT

A sprayer is a mechanical device used to spray the liquid like herbicides, pesticides, fungicides and fertilizers to the crops in order to avoid any pest. Sprayer provides optimum utilization of pesticides or any liquid with minimum efforts. Dusters and sprayers are generally used for applying chemicals. Dusting is the simpler method of applying chemicals and dusters are best suited for portable machineries and this usually requires simple equipment. But these devices are less efficient than sprayers, because of the low retention of the dust. The invention of a sprayer brings revolution in the agriculture or horticulture sector, this enables farmers to obtain the maximum agricultural output. They are used for agriculture spraying, garden spraying, weed and pest control, liquid fertilizing and plant leaf polishing. There are many advantages of using sprayers such as easy to operate, maintain and handle, it facilitates uniform spread of the chemicals, capable of throwing chemicals at the desired level, precision made nozzle tip for adjustable stream and capable of throwing foggy spray, light or heavy spray, depending on requirement. Sprayers are available in different varieties. In Indian farms generally two types of spray pumps are used for spraying; hand operated spray pump and fuel operated spray pump. out of which hand operated spray pumps are most popular. The main drawback of hand operated spray pump is that the user can't use it continuously for more than 5-6 hours since he gets tired after such a long duration. Also the fuel operated spray pump requires fuel which is expensive and availability of fuel at rural

areas is difficult. At the same time it exhausts carbon dioxide as pollutant which is harmful to our environment. In such situation we should think to move towards some non-conventional energy. Considering it, solar energy would be one of the solutions.

3.4 Objectives of the project

- To utilize renewable energy sources for the purpose of pesticides sprayer.
- To reduce the discomfort occurs to the farmers during spraying.
- To create the awareness to the farmers about the renewable energy sources.
- To eliminate environmental pollution by using natural energy source.
- To Work efficiently under different working conditions.
- To Decrease the cost of machine
- To reduce labour cost and maintenance cost

Advantages:

- It is multipurpose machine.
- Easy to operate and user friendly.
- Very less pollution on other models.
- It is portable
- Unit cost is very cheap one.
- Maintenances cost is low

Chapter 4

MICROCONTROLLER VERSUS MICROPROCESSOR

A system designer using a general-purpose microprocessor such as the Pentium or the 68040 must add RAM, ROM, I/O ports, and timers externally to make them functional. Although the

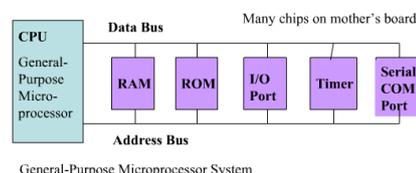
addition of external RAM, ROM, and I/O ports makes these systems bulkier and much more expensive, they have the advantage of versatility such that the designer can decide on the amount of RAM, ROM and I/O ports needed to fit the task at hand.

A Microcontroller has a CPU (a microprocessor) in addition to a fixed amount of RAM, ROM, I/O ports, and a timer all on a single chip. In other words, the processor, the RAM, ROM, I/O ports and the timer are all embedded together on one chip; therefore, the designer cannot add any external memory, I/O ports, or timer to it. The fixed amount of on-chip ROM, RAM, and number of I/O ports in Microcontrollers makes them ideal for many applications in which cost and space are critical.

Microprocessors:

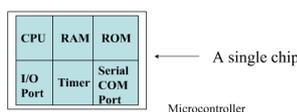
General-purpose microprocessor

- CPU for Computers
- No RAM, ROM, I/O on CPU chip itself
- Example : Intel's x86, Motorola's 680x0



Microcontroller :

- A smaller computer
- On-chip RAM, ROM, I/O ports...
- Example : Motorola's 6811, Intel's 8051, Zilog's Z8 and PIC 16X



AT89S52 MICROCONTROLLER

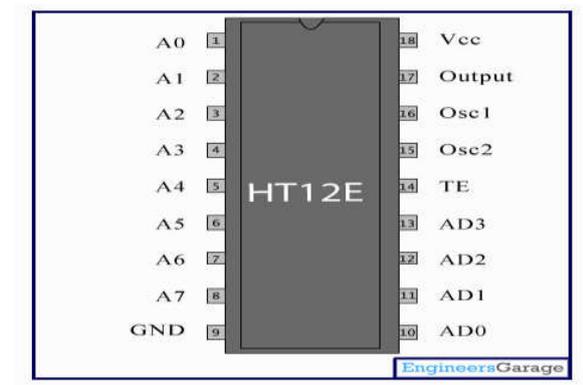
The AT89S52 is a low-power, high-performance

CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel’s high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost-effective solution to many embedded control applications.

Specifications

Voltage	: 3 to 12 volts
Current	: 10 to 15 mA
Working Mode	: AM
Speed	: 4 Kbps
Frequency	: 315/433 MHz
External Antenna	: 315 MHz

Pin Assignment:



Features

- Operating voltage: 2.4V~12V

- Low power and high noise immunity CMOS technology
- Low standby current
- Three words transmission
- Built-in oscillator needs only 5% resistor
- Easy interface with an RF or infrared transmission media
- Minimal external components

Applications

- Burglar alarm system
- Smoke and fire alarm system
- Garage door controllers
- Car door controllers
- Car alarm system
- Security system
- Cordless telephones
- Other remote control systems

CHAPTER 5

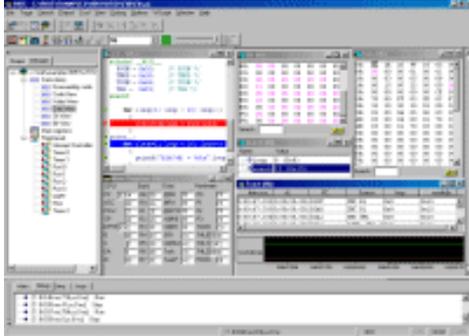
SOFTWARE IMPLEMENTATION(RIDE)

RIDE:

RIDE will reference to RIDE6 software which supports 8051, XA and other derivatives. For ARM, ST7 and STM8 family the software is RIDE7.

RIDE is a fully featured Integrated Development Environment (IDE) that provides seamless integration and easy access to all the development tools. From editing to compiling, linking, debugging and back to the start, with a Simulator, ICE, Rom Monitor or other debugging tools, RIDE conveniently manages all aspects of the

Embedded Systems development with a single user interface.



Chapter 6

6.1 Objective of Our Project

The purpose of this project is to provide farmer with multipurpose equipment which implements all the scientific farming specifications and technology to get maximum yield and good quality crops by reducing investment and number of labor.

There are many tractor powered equipment which are suitable and economical only for more than 5 acres of land. There are many hand pulled equipments which are only suitable for gardening purpose. Our objective of making robotic based agriculture spraying equipment is suitable for 1 acre to 3 acres of land it is both economical and modernized with scientific methods. Majority of the Indian farmers are the land owners of 1 to 3 acres. Hence it is most suitable for Indian economy and farming techniques.

6.3 Components of the Equipment

Working principle and fabrication details

This works on battery and micro control AT89S52. The concoction is accomplished by the use of battery, that power is dc power its positive and negative charges are connected to a batter in order to save the

power and use it when the sun raise are not present by using this device we can spray pest ices to the herbs and plants and any agriculture spraying it is economical as compared to the other means used like petrol/diesel pesticides sprayers. There is no much maintenance cost and no operating cost as it is using solar energy it is free of cost and there is no pollution its working principal is very simple and the it is economical of the farmers which has one more advantage that it can also generate power that power is saved in the battery and it can be used for both for spraying and well as to light in the house when there is no current supply.

The main components used to fabricate the model are:

- Microcontroller
- Pump
- DC motor
- Battery
- Tank
- Nozzle
- Bevel gear

Chapter 7

Conclusions

This manual seed planter machine has considerable potential to greatly increase productivity. Other countries of the world where the two wheel tractor is the main traction unit in farming. The main task now is to promote this technology and have available to farmers at an affordable price.

Newly developed system is also effective as compared systems available in the market. New trans-planter having simple construction and less number of parts which minimizes the cost of development for it. Total cost required to develop the

system is also less. New spraying machine is more flexible than machines available in the market at starting cost.

In this work a robot, named, AGRIBOT, has been designed, built and demonstrated to carry out ploughing, sowing and harvesting in an agriculture field. It is expected that the robot will assist the farmers in improving the efficiency of operations in their farms. The use of mobile camera is the highlight of this paper, which can be very cost effective. This is our first step in making all the process involved in agriculture automatic.

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