

Design and Fabrication of Agriculture Planting Bot Vehicle

Mohan Kumar.E¹, Kiruba Shankar.S², Logesh.S², Vivith Kumar.S², Nithish Kumar.K^{2*}

¹Associate Professor, Department of Automobile Engineering, SNS College of Technology, Coimbatore.

²Students, Department of Automobile Engineering, SNS College of Technology, Coimbatore.

ABSTRACT

The major causes for decrease in food production are the lagging interest in the field of agriculture and high man power requirements. The objective of the project is to implement automation in the field of agriculture. A Robot is designed and developed to perform functions like seeding, watering in the field. Various sensors are employed to collect information regarding falling of seed, presence of seed in specified socket and also to identify the moisture content in the soil. These tasks are performed and controlled manually using Bluetooth module and mobile phone. The status of the bot is intimated periodically to the user through the Bluetooth module. The obstacle avoiding technique is also used, to avoid the bot to travel over crops or uncertain area in the field. Different modes of operations are performed by the bot, which are controlled by the user.

Keywords: Sensors, bot, Bluetooth, robot

1. Introduction

The major causes for decrease in food production are the lagging interest in the field of agriculture and high man power requirements. The objective of the project is to implement automation in the field of agriculture. A Robot is designed and developed to perform functions like seeding, watering in the field. Various sensors are employed to collect information regarding falling of seed, presence of seed in specified socket and also to identify the moisture content in the soil. These tasks are performed and controlled manually using Bluetooth module and mobile phone. The status of the bot is intimated periodically to the user through the Bluetooth module. The obstacle avoiding technique is also used, to avoid the bot to travel over crops or uncertain area in the field. Different modes of operations are performed by the bot, which are controlled by the user.

This bot is designed to perform functions like planting, seeding, fertilizing, watering, spraying pesticides (if required) and harvesting in the field. All these tasks are performed automatically when the dimensions of the field are provided along with the distance between each plant and seed to be placed in the field. The status of the bot is intimated periodically to the user through the GSM module. Solar panel is also used in order to make use of solar energy which aids in recharging the battery, thereby increasing the operating time of the bot. The obstacle avoiding technique is automatically modified when the harvesting mode is selected in the bot.

2. Literature Survey

Ramesh D ETAL: This research paper present “Agriculture Seed Sowing Equipment: A Review”. The present review provides brief information about the various types of innovations done in seed sowing equipment. The basic objective of sowing operation is to put the seed and fertilizer in rows at desired depth and seed to seed spacing, cover the seeds with soil and provide proper compaction over the seed. In this multi- purpose seeding machine equipment

* Corresponding author. Tel.: +918248657302;
E-mail address: nithish208999@gmail.com

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 purpose of this paper is to compare conventional gets rotating motion by bevel gear assembly and the sowing methods and modern methods. The required bevel gears get the motion by rear wheels with the row to row spacing, seed rate, seed to seed spacing help chain and sprocket assembly. Can be achieved by proposed machine. The machine reduces the human efforts.

Mr. Sager B .S: This review paper present brief information about semi-automatic seed feeding vehicle. The main importance of this semi-automated seed feeding vehicle is to inseminate the seed as per the required depth with certain space and covering .the seed with the soil with the help of closing jaw or furrow closer. And this machine is also used for the furrow in order to feeding the seed as per the depth. This semi-automated seed feeding vehicle will not affect the soil, it will increase the overall crop production. This machine reduces the effort and total cost of feeding the seed.

Literature summary:

- Automatic seeding, irrigation, fertilization.
- ARDUINO that supervises the entire process.
- Seeding is one of the first step in farming.
- The soil sensor used for monitoring the environmental conditions.
- The robots works on solar energy.

Srinivasan R.Zanwar, ETAL (June2012)

The whole machine requires the 12v battery to this research paper presents design modification in operate the system multipurpose sewing machine. In this they present that for Toggle switches are used to control the operation of sowing purpose we import the machinery which are bulk in the vehicle. Size having more cost. To prevent this they design multipurpose sowing machine which consists of hopper, Horizontal Distance between plants seed metering mechanism, ground wheel, power transmission system, seed distributor, and tiller. In this they design model on PRO-E software. Plants Horizontal distance (ft.) actually the working is very simple as the tiller rotates it directly transmit motion into ground wheel which directly connected through main shaft. A main shaft has a disc with scoops inside the hopper. When the ground wheel rotates the main shaft also rotates with the help of power transmission system. The scoops collect the seed from hopper and leave it inside the seed distributor. The tiller is 1 2 3 4 5 6 7 Ground nut Pearl millet Sorghum Sugar cane Cotton Soybean Corn 1.25 1.25 1.25 1.25 2 to 3 1.25 1.25 having very good contact with ground.

3. Projected System

This paper aims in overcoming the demerits that square measure prevailing in real time modernization of agriculture. During this system the bot vehicle could be an automaton designed for agricultural purpose. The automaton may be autonomous and might perform form of tasks with nice accuracy.

12v Dc motor

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration which is shown in the fig 3.14. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system. Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing. The motor which is used as a DC servo motor generally have a separate DC source in the field of winding & armature winding.

Relay Module:

This is a LOW Level 5V 4-channel relay interface board, and each channel needs a 15-20mA driver current. It can be used to control various appliances and equipment with large current. It is equipped with high-current relays that work under AC250V 10A or DC30V 10A. It has a standard interface that can be controlled directly by microcontroller. This module is optically isolated from high voltage side for safety requirement and also prevent ground loop when interface to microcontroller.

12V DC SUBMERSIBLE PUMP

A submersible pump is a device which has a hermetically sealed motor close-coupled to the pump body is shown in the figure. The whole assembly is submerged in the fluid to be pumped. The main advantage of this type of pump is that it prevents pump cavitations, a problem associated with a high elevation difference between pump and the fluid surface. Submersible pumps push fluid to the surface as opposed to jet pumps having to pull fluids. Submersible are more efficient than jet pumps.

ARDUINO UNO ATMEGA328P

Arduino Uno is a microcontroller board based on 8-bit ATmega328P microcontroller. Along with ATmega328P, it consists other components such as crystal oscillator, serial communication, voltage regulator, etc. to support the microcontroller. Arduino Uno has 14 digital input/output pins (out of which 6 can be used as PWM outputs), 6 analog input pins, a USB connection, A Power barrel jack, an ICSP header and a reset button.

HC-05 Bluetooth module

The HC-05 is a very cool module which can add two-way (full-duplex) wireless functionality to your projects. You can use this module to communicate between two microcontrollers like Arduino or communicate with any device with Bluetooth functionality like a Phone or Laptop. There are many android applications that are already available which makes this process a lot easier. The module communicates with the help of USART at 9600 baud rate hence it is easy to interface with any microcontroller that supports USART. We can also configure the default values of the module by using the command mode.

So if you looking for a Wireless module that could transfer data from your computer or mobile phone to microcontroller or vice versa then this module might be the right choice for you. However do not expect this module to transfer multimedia like photos or songs; you might have to look into the CSR8645 module for that.

SERVO MOTOR

A servo motor is an electrical device which can push or rotate an object with great precision. If you want to rotate an object at some specific angles or distance, then you use servo motor. It is just made up of simple motor which run through servo mechanism. If motor is used is DC powered then it is called DC servo motor, and if it is AC powered motor then it is called AC servo motor. We can get a very high torque servo motor in a small and light weight packages. Due to these features they are being used in many applications like toy car, RC helicopters and planes, Robotics, Machine etc.

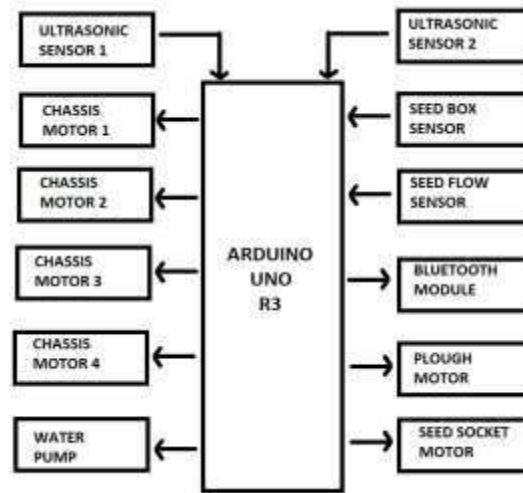


Fig 1. Arduino Uno

4. Principle

The Agriculture bot vehicle is working under a HC-05 Bluetooth module all motors are connected to the wheels to operate forward and reverse the seeder and the water sprayer is fitted in the bot vehicle through the mobile phone the app is installed and the bluetooth module is fitted in the vehicle when the bluetooth is on the vehicle is on and the operations are done by the mobile phone if we press forward the agriculture bot vehicle moves forward if it is backward it will move through backward all the operations are done by the bluetooth module an arduino Uno r3 atmega 38p is used to control all the system of the bot vehicle. It is programmed by using c language.

5. Methodology

This agriculture bot vehicle is done by a simple design as a fabricated model first we analyzed a problem in the agriculture field and then we are focused on doing some stuffs in bot vehicle concept this method was verified and concluded different journals and we got an idea on that bot vehicle concept and the vehicle is completely run by the via automated it is programmed by using c language and the vehicle is used in different agriculture purpose area not only in agriculture purpose it is also used in the medical and small applications.

6. Working

This bot is fully automated and starts operating when the user provides the required dimensions of the field and distance between each seed plant. When the planter mode is selected, the planting operation is carried out. When the seeder mode is selected, the seeding operation is carried out. When the harvester mode is selected, the harvesting operation is carried out. The fertilizer is dropped along with the seed and the plant if required. The pesticide is sprayed to the plants, once it is grown. And by using the HC Bluetooth module the vehicle is used to move all electronic circuit are fixed in the vehicle the motor is used to move the vehicle from one place to another.



Fig 2. Image of the product

7. Applications

Farmland

- In farm agro-botix is employed for seeding, planting with equal distances between every seed or plant within the farming plot, moire and fertilizer is sprayed on all the plants.
- Some crops want fertilizers, once the seed germinates and also the plant begins to grow.

Dryland Farming

- Dryland farming and dry farming square measure agriculture techniques for non-irrigated cultivation.
- The agro-botix aids in farming techniques on drylands.

8. Result

The overall project is controlled by victimization ARDUINO UNO ATMEGA328P the automaton operates on automatic mode once the size of the sector square measure provided beside the gap between every plant or seed to be placed within the field. Once the inputs square measure given, then all operations like seeding, planting, watering, fertilization, gathering and spraying pesticides square measure performed mechanically. The GSM is employed to intimate the standing of the larva sporadically to the user. For power consumption purpose use renewable (Solar) energy. The larva moves expeditiously across the sector by activity various operations, such that by the user.

9. Conclusion

This project is especially supported in minimizing man power likewise as the price of instrumentation. The automaton may be with an open supply system rather than traditional robotic automotive. Automation is required like business, bio-medical, survey line etc. Particularly in the agriculture field for increasing yield of crops. Flexibility of automation systems is higher than ancient systems. The advantage of this technique scales back to the labour price, and time. The major aim of this technique is to scale back the labour price, and time. During this project an automaton is made and established to hold out automatic seeding, planting, fertilizing, watering in AN agriculture field. The functioning of the automaton is performed by renewable energy like alternative energy. It's expected that the automaton can support the farmers in raising the potency of operations in their farms. It will facilitate the farmers within the initial stage of Agriculture.

REFERENCES

- [1] Srinivasan-R.Zanwar, R.D.Kokate, (June 2012)"Advanced agriculture system, International -Journal of Robotics and automation (IJRA) magazine.- VOL.3, NO.1,pp,1987-1992.
- [2] R. Eaton, S. D Pathirana (2008),-,Autonomous farming modeling and control of agricultural machinery in fame work.- pp,324-345

- [3] Blackmore S. (2007)-,A systems view of agricultural robotics. Precision agriculture conference, Wagon Academic publishers, Netherlands.- VOL.2,NO.1,pp,1345-1356.
- [4] Simon Blackmore, bill stout, Maohua Wang, (2005),Robotics agriculture-The future of agriculture mechanism, Agro technology, the royal veterinary and agriculture university.
- [5] Butler S. (1887)-, An attempt to throw additional light upon Darwin's theory of natural selection. Reprinted as vol. 8, pp- 324-355.
- [6] Multipurpose Agricultural Robot -Ms. Aditi D. Kokate1, Prof. Priyanka D.Yadav2 Student E&TC Department, Dr. Daulatrao Aher College of Engineering, Karad, India.
- [7] Ieropoulos I., Greenman J., and melhuish C. (2003). An imitating metabolism: energy autonomy in biologically inspired robots. AISB -03.