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ELECTRICAL MULTIPURPOSE AGRICULTURE VEHICLE

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Abstract - *The main aim of our project is to design and build a Electrical* multipurpose agricultural vehicle, for performing multiple major agricultural operations like Ploughing, Seeding Sowing, Grass cutting, Spraying and leveling. The modification includes fabricating a vehicle which is small and compact in size. The project is about a vehicle design which makes cultivation much simpler. The design of a chassis of the vehicle is made in such a way that it is suitable for the multiple operations. The design of different automatic seed sowing tool is made for different seed. The ploughing tool is designed and modified.

Key Words: Agriculture vehicle, Seed sowing machine, Ploughing, Sprayer, Leveller and Cutter etc.

1. Introduction

Agriculture is one of the major occupations in India, it is very important to discover and implement new ideas in this field, though lots of work has been done in this area. It is unfortunate that, these ideas are not been properly implemented in actual field. This is due to high cost and it is complicated for rural people. Electric Multipurpose agriculture equipment is basic and major equipment involved in agriculture for the maximum yielding. For the reason there is a scarcity of the workers, this result in delayed agriculture to overcome these difficulties, electrical multipurpose agriculture equipment are designing such way that to get it at low cost and high durability. Agriculture plays a major role in rural farmers depend on agriculture and that makes their life style changes. Agriculture is one of the important sector of Indian economy as it contributes about 8.4% to the total GDP and provides major employment to the development of Indian economy. Over 70 % of the rue population. Indian agriculture has been developing in last few decades.

1.1 Objectives

The main objective of our project is to develop Electrical multipurpose agriculture vehicle, for performing multiple agriculture operations like cutting, ploughing, seeding, spraying and leveling the soil and land.

The electrical multipurpose agriculture vehicle is designed for the small farmers. The fabrication of a low cost multipurpose vehicle will help to the farmers for

- Minimizing the time of harvesting
- Minimizing the human efforts
- Easy to maintenance
- More than one operations in a single vehicle
- To save the time of farmers.
- To easier operation of spraying.
- To reduce the labours cost and time required for cultivation of seeds
- Spraying is to operate
- Tools are used for the plough the field, seeding, fertilizing.
- Special spraying mechanism for spraying water and pesticides is also mounted on the chassis which will reduce farmer's work.
- To Increase the work speed and reduce the manpower/labour.

  To reduce the labours cost and time required for multiple agricultural operations .

1.2 Tools And Equipment used

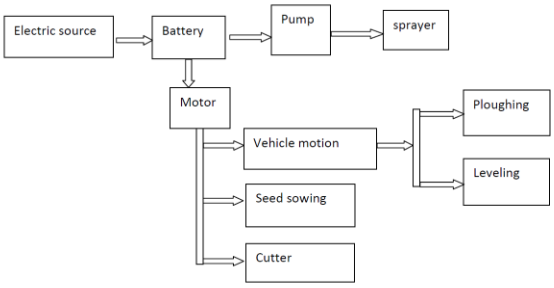
- Wrenches
- Cutting machine
- Drilling machine
- Welding machine
- Grinding machine

2. Methodology

This project, proposes a multipurpose agricultural working vehicle, based on the electric system. It is ecofriendly, user-friendly and affordable to small range farmers. In the 12v , 8amp battery (rechargeable) which stores the electrical energy and a base frame or chassis is made with 4 wheels connected to it, which will facilitate motion and supports to the vehicle through 12V DC motor of 775 model which is used to drive the agricultural vehicle as well as to run the operations (By switching motor with required operations). The DC motor is connected to a 12v 8Amp energy. The choice of material for the electric vehicle is the most important factor for vehicle design. There is variety of materials that can be used in vehicle body and chassis. Whenever we need the different operations such as Spraying

or Cutting, the switching adjustment can be made by using the toggle switch.

The Schematic Representation of working of Electric Multipurpose Agriculture Vehicle.



The operations involved in electric multipurpose agriculture vehicle is given below

2.1 Ploughing:

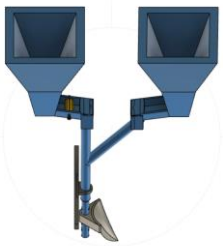
The ploughing tool is connected to frame of the vehicle. The tool and frame are connected by nut and bolt (for clamping and unclamping). The mechanical support is taken from the rear wheels which are connected to motor and for motion. The ploughing tool is fabricated using cast iron. The ploughing tool is machined by the cutting and grinding operations. The tool is fixed to the vehicle frame and various supports are given in the frame for fixture of the plough frame in the vehicle. A separate special attachment is given so that it prevents the motion of the plough in outward direction. The welding is done to join frame and ploughing tool. As the machine moves forward ploughing take place.

2.2 Cutting:

The cutting tool is mounted in front of the vehicle frame. The cutter is rotated bye the application of the 12v motor 555model with the help of drive mechanism. The motor is connected to the battery with the help of the wires. There is a toggle switch which is used for starts and stops of the motors. From this motor, the power transmits to cutter blades and this makes the blade to cut. In this way by providing electrical energy power is produced to cut the paddy, grass. The working of the type of cutter is so simple and environment friendly.

2.3 Seed sowing:

The tool is used for dropping of seeds into the soil. The seeds poured from the hopper and seed rate is controlled by controller drive connected to the shaft of front wheel, which helps in uniform seed sowing.



2.4 Spraying:

It is a standard method of applying pest control chemicals and other compounds to agricultural plants. The pump is run by the battery.

2.5 Leveling:

The leveler is connected to back-side of the frame, which is used to level the soil. This leveler can be used only when it is necessary (assemble and dissemble)

Table.1 Components:

S No	Components	Qty.	Specification
1	Frame	1	L=90cm,W=40cm,H=30cm
2	Battery	1	12v,8amp
3	Dc motor	2	12v,775model And 555model
4	Wheels	4	Dia.=20cm
5	Cutting tools	1	L=30cm,W=30cm
6	Ploughing tool	1	L=15cm,W=25cm
7	Spraying pump	1	
8	Weight of the vehicle	-	9-10 Kg.

Table.2 Cost

Materials/consumables	5000
Labour	1500
Travel	2000
Report	3000
Miscellaneous	500
Total	12000

3. Vehicle Components and Construction

Chain:

The chain is made up of steel which is used for transmitting the power from gear sprocket to pinion sprocket.

Pump:

It consists of piston and cylinder arrangement, it has a lever for operate. The motion of piston in a reciprocating direction. The pump is to generate the pressure of about 2 bar and to discharge of 2 lpm.

Nozzle:

The nozzle is a device which converts the pressure energy of fluid into the kinetic energy. spray nozzles are the precision devices which facilitates dispersion of liquid into a spray. Nozzle is used for purpose to distribute a liquid over an area with a pressure.

Wheel:

Wheels are used to carry the whole assembly and move vehicle from one place to another place by rotary motion of wheel. Bicycle wheel is designed to fit into the frame and hold bicycle tire. We use tubeless tire wheel. The wheel used in our vehicle has diameter of 20cm.

Frame:

The main function of frame is to carry and support the whole assembly on it so it has to be strong enough to hold it. The frame is made of round circular pipes and it is formed out of mild steel. The frame of the vehicle have provision for the 4 wheels provisions for 1 separate motors to the rear wheel shaft of the wheels.

Tank:

The tank is to carry as much fluid as it can be along with its self weight as less as possible. A material used for the tank is plastic fiber. Plastic fiber is used because of very low in weight as compared to the other materials and life . Its cost is low.

Battery:

In order to make the vehicle electrically driven, we have to make use of a 12V ,8amp battery, which is used to drive a motor that is connected to the rear wheels of the vehicle which in turn assists in the mobility of the entire vehicle.

Motor:

A 12v dc motor is connected to the rear wheels. This motor is run with the help of a 12V battery The movement of the vehicle is due to the rotation of motor by the battery.

4. Future scope:

This vehicle can be made for self-propelled by the vehicle hybrid system, for further improvement in design of wheels and individual end effectors will make this vehicle more efficient and effective.

- The More précised mechanism of seed sowing operation and fertilizing by using advanced technologies.
- Involving of hydraulics in the working of ploughing operation.

- The size of the vehicle is must be increased to use it in large field area.
- The Hardening of the required end effectors.

5. Project applications

- Ploughing
- Leveling
- Sowing
- Fertilizing
- Weeding
- Spraying

6. Implementation of project in actual life

It is a concept to design a project for small scale farmers. And in single electrical vehicle multiple functions can be performed with a low cost as compared to other agriculture machines. For this concept not required a skilled person. Mechanism of the vehicle should be very simple. For helping the small-scale farming, we are design this vehicle. After making the manufacturing of vehicle and trials on the Electrical Multipurpose Agricultural Vehicle.

Based on the overall performance of the multipurpose electric vehicle we can definitely say that the electrical vehicle satisfy the needs of small scale farmers with reasonable cost, because they are not able to purchase high cost agricultural equipment, vehicles and machines.

The vehicle requires less manual operating power and less time compared to traditional methods used by farmers, so if this type of vehicle is manufacture it on a large scale its cost gets significantly reduced and importance towards the engine will be less. So that the hope that this electric vehicle will satisfy the partial trust of Indian agricultural.

So, in this way we solve the labours problems which is the need for today's farming in India.

7. Advantages

- simple design and structure of the vehicle
- Skilled labors are not required to operate
- Easy for maintenance
- Zero fuel emission
- Faster operations
- Easy to handle
- The fuel requirement is removed hence cost of operation is reduced and light weight
- Easy to clean the vehicle

8. Disadvantages

- Not suitable for heavy field work
- Required strict supervision of vehicle
- Depends upon weather condition.
- Due to having multiple functional operations consumes times for initial settings.

9. Outcomes

- Significant in reduction in no of labour (skilled/unskilled).
- Gradual decrease in the time consumed.
- It is cheap as compared to the conventional methods.
- Flexibility in defining the depth of plantation or sowing.
- Minimize the human efforts in spraying of chemical fertilizers.

10. Conclusions

After the manufacturing and trails done on the "Electrical Multipurpose Agriculture Vehicle". The conclusions which we are made are as follows:

- Based on the overall performance of the vehicle we can say that the project will satisfy the need of small scale farmers, because they are not able to purchase high cost agricultural equipments.
- The vehicle required less man power and less time as compared to traditional methods used in farming, so if we manufacture it on a large scale its cost is also reduced and we are hoping this will satisfy the farmers.
- So, in this way we can solve the labours problem that is the need of today farming in India.
- Electrical Multipurpose vehicle is designed and fabricated in a low cost and easy for use and effective equipment for agriculture for formers in India.

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