



## **Multi Purpose Electric Vehicle**

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### **ABSTRACT:**

Agricultural industry plays one of the major role for driving our country.. In this Multi Purpose Electric Vehicle project we attached cultivator, crop cutter, rotavator, and pesticides spray machine, The harvester is designed and working by scotch yoke mechanism, in which one additional feature if we need drive on the road then we remove cultivator and attached sheet for driving on road. Then we travelling any where ex- Road, field and forest areas. In which also reverse option will be available. This project is work on very low cost, and also in which no need more skilled person for drive vehicle In this Multi Purpose Electric Vehicle project. we use Differential, 6 12Volt batteries in a such way that the 72Volt DC motor can run smoothly, then we have connected the motor to the differential in a such way that it produced the power on the shaft and here attached the wheel on shaft. And we have installed a 72volt DC controller to control its RPM, with the help of which we can control the RPM of the wheels.

**Keyword:** Seed sowing, Pesticides, Cultivator, Multi Purpose Electric vehicle , Differential, controller.

### **INTRODUCTION:**

Agriculture industry the most important sector of Indian Economy. Indian agriculture sector covered 18% per cent of India's gross domestic product (GDP). And Indian agriculture system provides 50% employment of the countries. India is the world's largest producer of agriculture industry, which produce a large amount of rice, wheat, pluses, spices and spice products.

The process equipment's that have been used in the history of agriculture are follows involved in agriculture like seed sowing, pesticides spray, and level of the soil are taken up by using different set up of components of the system, cultivator, rotator, etc. In this Multi Purpose Electric Vehicle project we attached cultivator, crop cutter, rotavator, and pesticides spray machine, The harvester is designed and working by scotch yoke mechanism, in which one additional feature if we need drive on the road then we remove cultivator and attached sheet for driving on road. Then we travelling any where ex- Road, field and forest areas. In which also reverse option will be available. This project is work on very low cost, and also in which no need more skilled person for drive vehicle In this Multi

Purpose Electric Vehicle project Agriculture industry is the backbone of the India. India is the seventh-largest exporter in the word and the sixth-largest net exporter in the agriculture industry, this makes Most of its agriculture exports serve developing and least developed nations. According to the survey in one day approximate 18 million unit bikes will be sold and approximate 600000 to 700000 unit tractors will be sold in our country. If this Multi Purpose Electric Vehicle project come in the market so this project covers both work bike and also mini tractor for a small former, its also more efficient in rural areas small farmers. In terms of units, India is one of the largest tractor markets in the world, selling 600,000 to 700,000 tractors per annum, on average.

### **SCOPE OF THE PROJECT:**

The multipurpose e-vehicle is designed more efficient for small farmers in future.

The crop cutter mechanism is modified into simple mechanism.

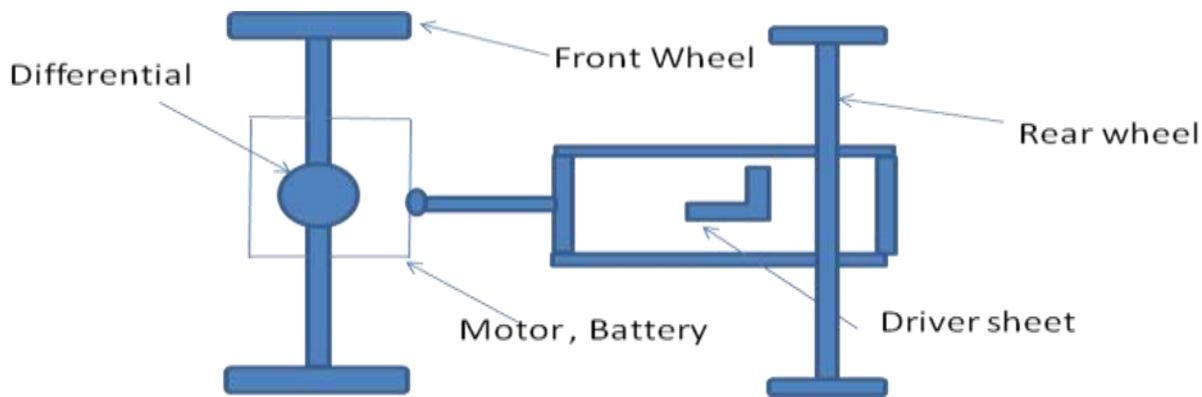
The project will become multipurpose example for future works.

### **WORK METHODOLOGY:**

In this Multi Purpose Electric Vehicle project we use Differential, 6 12Volt batteries in a such way that the 72Volt DC motor can run smoothly, then we have connected the motor to the differential in a such way that it produced the power on the shaft and here attached the wheel on shaft. And we have installed a 72 volt DC controller to control its RPM, with the help of which we can control the RPM of the wheels.

In which also front wheel drive system will be available, in which front wheel will be large as compare to the rear wheel, because this front wheel will be apart with rear wheel when we attached the agriculture tool then in which only exist front wheel.

### **FRAME DESIGN OF VEHICLE:**

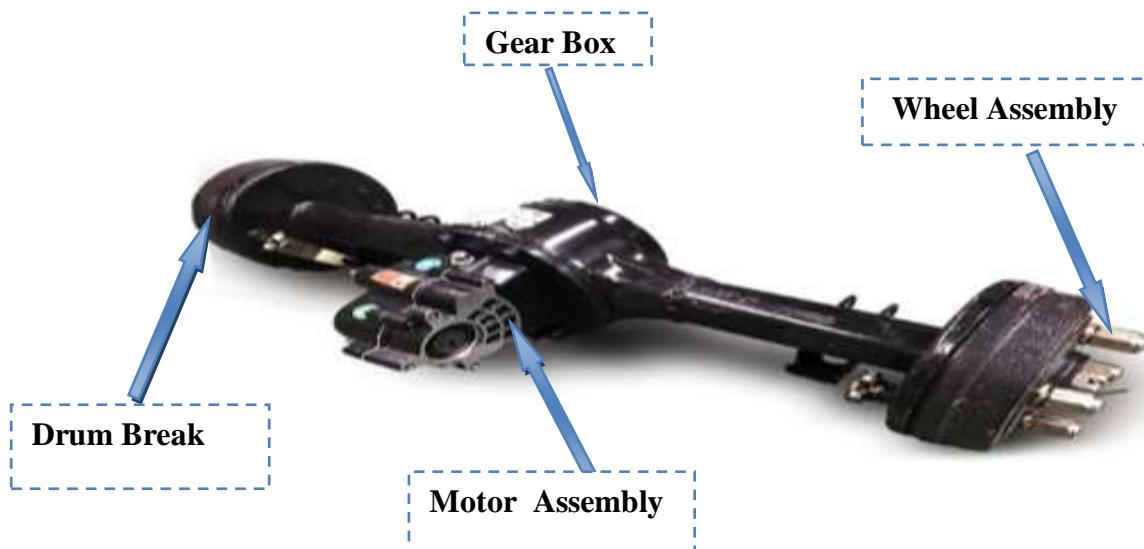


**Figure 1: 2D Design of E-Vehicle**

**PART OF THE VEHICLE:**

**DIFFERENTIAL:** Differential is a type of gear train system in which a gear box is made by combining many gears, with the help of this, when we turn a vehicle on any mode, with the help of which it is easy to turn the same vehicle because when we turn the vehicle, the wheel of that side is slow and the wheel of its opposite is faster than that which is done with the help of differential.

The differential could be a system of gears that permit different drive wheels (the wheels to which power is delivered from the engine) on identical axle to rotate at different speeds, like when the vehicle is turning. A differential is a gear train with three shafts that has the property that the rotational speed of 1 shaft is that the average of the speeds of the others, or a fixed multiple of that average. If the vehicle is turn to the right, the main ring gear may make full rotations at same time, the left wheel will make more rotations because it has more distance travel as compare to the right wheel, and the right wheel will make less rotations as it has less distance to travel.

**Figure 3: Differential****MOTOR:**

A DC motor is used for convert electrical energy into mechanical energy. DC motors take DC electrical power, and convert this energy into mechanical power. In this multi purpose electric vehicle use 3000W motor with 72 Volt and 3300 RPM. This motor produced 8.686 Nm torque which is sufficient for our Multi Purpose Electric Vehicle. Due to use of this motor and the help of controller in which also reverse option is available.

**CONTROLLER:**

A 72V DC motor controller is a device that can manipulate the position, speed, or torque of a DC-powered motor. Also, unlike some AC motors, DC motors are easily reversed by simply switching their leads so that the DC current runs in the opposite direction.

**PLOUGHING TOOLS**

**CULTIVETOR:** Cultivator, farm implement or machine designed to stir the soil around a crop as it matures to promote growth and destroy weeds. Horse-drawn cultivators were introduced in the mid-19th century.

**FIGURE 4: CULTIVETOR****SEAT ATTACHMENT:**

This project consists of one additional feature when we need to drive the vehicle on road or carrying the weight then we attach the seat or otherwise attach the trolley.

**CALCULATION:****Design Calculation for Shaft Power of the engine**

$$P = 3 \text{ Kilowatt}$$

$$\text{Power, } P = 2\pi NT/60$$

$$3000 = (2 * 3.14 * 3300 * T)/60$$

$$\text{Torque, } T = 8.686 \text{ Nm} = 8686 \text{ N-mm}$$

Now T is the maximum torque among all shafts, checking the shaft for failure

$$T = (\pi/16) * 135 * d^3$$

$8686 = (3.14/16) * 135 * d^3 * D = 7.04 = 7\text{mm}$  But in this project, the diameter of the shaft is 40mm. So the design is safe.

**Calculation for Plough**

Depth of cut= 6cm

Speed of the tool= 3 km/hr.= 50m/min

No. of tool= 3

Feed rate= Rpm x N x CL

FR=  $50 \times 3 \times 0.05$

Feed rate, FR= 7.5 m<sup>2</sup> /min

**ADVANTAGE**

Eco friendly: The main aim of electrical vehicle is to reduce the amount of gas emissions which leads to decrease the pollution rate of atmosphere.

Less Maintenance cost: One of the major reasons for using an electric vehicle is that it is very easy to maintain and cost very little because, It does not have to change the mobile nor does it require a coolant, so that its cost is very less because the chances of engine hit in it are very less.

No need of skilled person: In this project no need of more skilled person, it is designed in such a way that any one can operate easily.

**COST OF THE PROJECT**

<b>SN.</b>	<b>ITEMS</b>	<b>COST(Rs.)</b>
1.	Iron, Sheet metal	1000
2.	Differential	2000
3.	Motor	4000
4.	Controller	2000
5.	Battery	10000
6.	Tyre , Rim	3000
	<b>Total</b>	<b>22000(Rs.)</b>

**Table 1 : Cost of the Project****CONCLUSION**

In last few years, the Electric vehicle industry is not only extremely welcomed but highly necessary and good work performed like increasing global green house gas level. On the basis of the entire performance of this multi purpose electric vehicle, we can say that it is very beneficial for small former purchase agricultural equipment. Developing the multipurpose agriculture vehicle, for performing small agriculture operations like goods carrying, pesticide spraying, leveling, row making, crop cutting a Increase the efficiency and reduce the handling cost. Through the



help of this project Multi Purpose E Vehicle it more helpful for small formers in rural areas, in rural areas not enough money for buying a tractor and also buy a bike through the help of this project it's possible.

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