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Design and Fabrication of Multi Utility Agricultural Vehicle

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Abstract: ***Agriculture is one of the most important factors for our Indian economy. Agricultural growth has increased impressively in the last few years. We all know most of the Indian farmers are small scale farmers; they cannot afford heavy agricultural equipment. So in this project, the attempt has been made for design and fabrication of multi-utility agricultural vehicles which can be used by small scale farmers at a cost not exceeding above 22000/- per unit with less maintenance. We have designed and fabricated this vehicle by using solid works. The basic idea behind this project was to reduce human as well as animal efforts and can be changed by the semi-autonomous mechanism. A study has been carried out to develop and fabricate parts used in the multi-utility agricultural vehicle for performing major agricultural operations like harvester, seed sowing, ploughing and a provision for stubble burning. It will reduce the cost of spraying, pesticides sprinkling and crop cutting the field and will help to increase the production rate of the farmer. The model does not use any kind of fuel. This design will help the farmers.***

Keywords: Multi-utility, Ploughing, Seed Sowing, Harvester

I. INTRODUCTION

Agriculture has been the backbone of the Indian economy and will remain so for a long time. India ranks second worldwide in farm output. Some of the major problems in the Indian agricultural field are increasing input costs, less availability of skilled labour and lack of water resources. To reduce these factors automation technologies were used in agriculture so that farmer's efforts can be reduced. We are embedding plougher, harvester, leveller, seed sower and a provision for stubble burning in one vehicle which can perform efficiently and can give a high production rate.

II. REASONS FOR USING MULTI UTILITY VEHICLE

A. All the machine which are present can perform only one operation
B. Even there are so many vehicles that can perform these operations but they require fuel as their power medium.
C. This machine does not require any kind of fuel.
D. More time consumption

III. OBJECTIVES

The basic purpose of this project is to provide farmers with multi-utility vehicles that help the farmers to reduce their time and effort and can increase their crop production rates and their income levels as well as increase their farming standards.

IV. LITERATURE REVIEW

Patel Nikhil V et al.[1] have studied some issues like a way to minimize the losses, a way to increase productivity and the way to reduce value. In India, 2 styles of agricultural ways square measure used, manual methodology (conventional methodology) and mechanize sort method. Mechanization involves the utilization of a hybrid device between the ability supply and therefore the work. This hybrid device typically transfers motion, like rotary to linear, or provides ample of mechanical benefits like increase or decrease or leverage of speed. Agricultural machinery employed in farming or alternative agriculture. the complete history of agriculture contains several samples of the utilization of tools, like the hoe and therefore the plough. The advantage of agro automation is that it saves the labour value. However, it additionally saves the energy and price of materials and to boost the standard, accuracy, and nicety. The seed feeding, pesticides sprinkling and crop cutting square measure the vital stages within the agriculture field. the design of a useful agro instrumentation machine can facilitate Indian farmers in rural aspect and little farm. it'll cut back the value of seed feeding, pesticides sprinkling associate degreed crop cutting the sector and can facilitate to extend economic normal of an Indian farmer.

R JaffarSadiq et al.[2] carried out a study to develop useful agricultural instrumentation, for playing major agricultural operations like product carrying, chemical spraying, laddering, inter-cultivating and dig operations of sandy soil deep soils, to

extend the potency and cut back the assembly and cost. Modification was dispensed, and therefore the modification includes fabricating a vehicle that is tiny, compact which might move simply across the fields. This vehicle was named as NCET kissan tired one. that consists of varied agricultural implements like inter-cultivator ladder, pesticide sprayer, product carrying instrumentation, plough, which might be simply assembled and Roman deity assembled by one person, the value of apparatus is a smaller amount by 83%compared to a tractor. And four-hundredth compared to a tiller.

Waghmare S. N. et al[4] have analyzed that human and animal efforts will be replaced by some advance mechanization which can be appropriate for little scale farmers from economical and energy purpose of read. So, we tend to square measure developing this instrumentation which can satisfy all this want and to resolve labour drawbacks. during this instrumentation, we tend to use a 24cc engine for dig operation and for spraying used motor with 12V battery. Next 2 operations square measure manual base that is cultivation and sowing. By exploiting on top of attachments, one could perform varied farming operations in less time and economically. once the producing and path on the "Multipurpose Agricultural Automobile (Farm Machine)" conclusion that we tend to created square measure as follows:

1) Supported the general performance of the machine. we can undoubtedly say that the project will satisfy the necessity of small-scale farmers, as a result of they're powerless to buy expensive agricultural instrumentation.
2) The machine needed less manpower and less time compared to ancient ways, thus if we have a tendency to manufacture it on an outsized scale its value gets considerably cut back and that we hope this can satisfy the partial thrust of Indian agriculture. So, during this manner, we have a tendency to solve the labour drawback that's the necessity of today's farming in the Asian nation.

Shree harshaB[2017] This project is principally a little version of agriculture vehicles such as tractor, harvester, etc. this can be simple to run. This vehicle work on alternative energy that charges the batter with the assistance of star electric cell gift on an electrical device. This vehicle uses instruments like motor, electrical device, batteries that square measure valuable.

Md. Aquibnaque, Akhtar Ali Rizvi [2013] This machine is developed to scale back the time and energy needed for production up to a good extent. Also, this machine producing value is a smaller amount as compared to the alternative, NY choosing on top of the topic we have a tendency to square measure understand, acquainted and recognize the main points of agricultural technology, with the assistance of this machine we tend to try to scale back labour value, time of a social class and tiny-scale farmers.

V. PROPOSED METHODOLOGY

A. *Frame Design*

The selection of fabric for the vehicle is that the 1st and most vital factor for automotive style. there's a sort of materials that may be employed in the automotive body and chassis. the foremost necessary criteria that a fabric should meet are light-weight, economic effectiveness, safety, recyclability, and life cycle thought. The material for the body and chassis of the vehicle is steel. The most factors for choosing material especially for the body is a wide selection of characteristics like thermal, chemical and mechanical resistance that area unit ease for producing and sturdiness.

The planning is formed that is appropriate for supporting all the operations. This design is suitable to perform all operations.

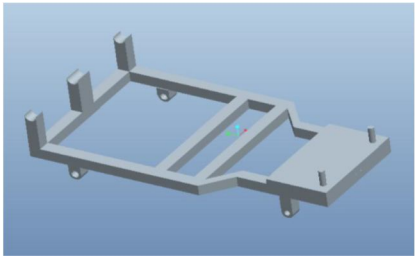

Fig 1: Chassis of the vehicle

B. *Ploughing Tool*

1) *Concept of The Tool:* The ploughing tool is meant within the manner that it wouldn't break because of the abrupt encounter of rocks and roots present within the soil. The faults within the current tool changed and modified. The designed new tool is sturdy and reasonable and might be utilized in every kind of nation.
2) *Design of proposed Tool:* The lifetime of the tool is increased by substitution the sole the tip of the tool. The sharpness of the tool remains constant for a considerably longer amount of your time. The potency and also the effectiveness of the tool is enhanced. Tools optimum weight is obtained. The breakage of the tool is reduced by exploitation high speed steel within the tip. the fabric used for the plough tool is High-Speed Steel.

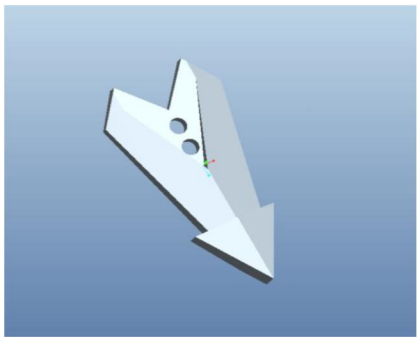

Fig 2: Ploughing tool

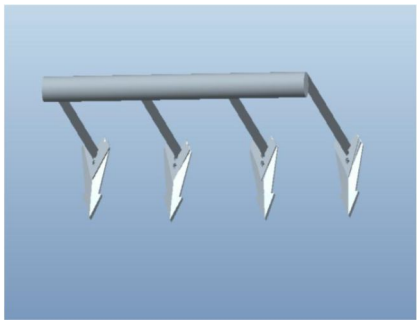

Fig 3: Vehicle to tool connector

C. Vacuum Cleaner

Vacuum cleaner is used to pick up the waste product left by cutting of the crops. By using this farmer can stop practising stubble burning.

D. Seed Sowing Machine

The existing seed sowing machine is simply too costly. it's profusely obtainable in the Asian nation. the price of the machine goes to be reduced by introducing the common seed storage place within the machine. A motor drive mechanism is employed.

1) *Major Components in the Proposed Sowing Machine:* The projected sowing machine carries with it the subsequent parts Hopper it's an arrangement to store the seeds. The form of the hopper is rectangular box therefore the wastage of the seed is avoided. it's created from iron 20G sheet it reduces the burden of the hopper. hopper, sliding plate and a motor is embedded into the machine. The hopper is created through a sheet. within the sliding plate equally distant four holes are created and a slot is given for the movement of to and fro motion that is connected to the dc motors.
2) *Sliding Plate:* Hoppers base consists of sliding plate holes engraved at equal distance. The sliding plate reciprocates to and fro higher than the bottom of the hopper. it's created of mild steel plate.

E. Harvester

The harvester design is predicated on the look of the brush cutter. The cutter is additional strong and stronger. The denser vegetation is often cleared with it simply. The cutter blade is fabricated, one is a static blade and another one is movable.

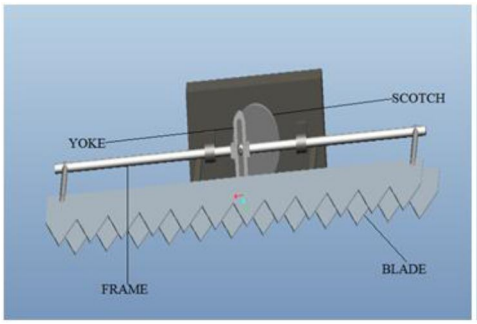

Fig 4: Harvester

VI. WORKING

Embedding all the fabricated components on the vehicle. by using a 12v battery as the power source for the vehicle(prototype). power transmitted to the wheels of the vehicle is done by dc motors. Hopper is attached over the body and the plougher is attached at the back of it. Harvester is attached at the front of the vehicle and a vacuum cleaner is used to pick up the waste products left after cutting.

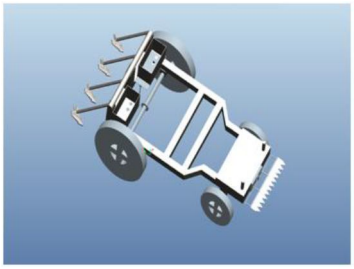

Fig5: 3D Design of the Multipurpose Agriculture Vehicle

VII. CONCLUSION

The project entitled multi-utility agricultural vehicle is completed and the results obtained are satisfactory.

A. Machine requires less manpower and less time as compared to the conventional methods
B. This machine can be produced on a large scale which will cost less.
C. So in this way we solve the problem faced by the farmers which is the need of the hour.

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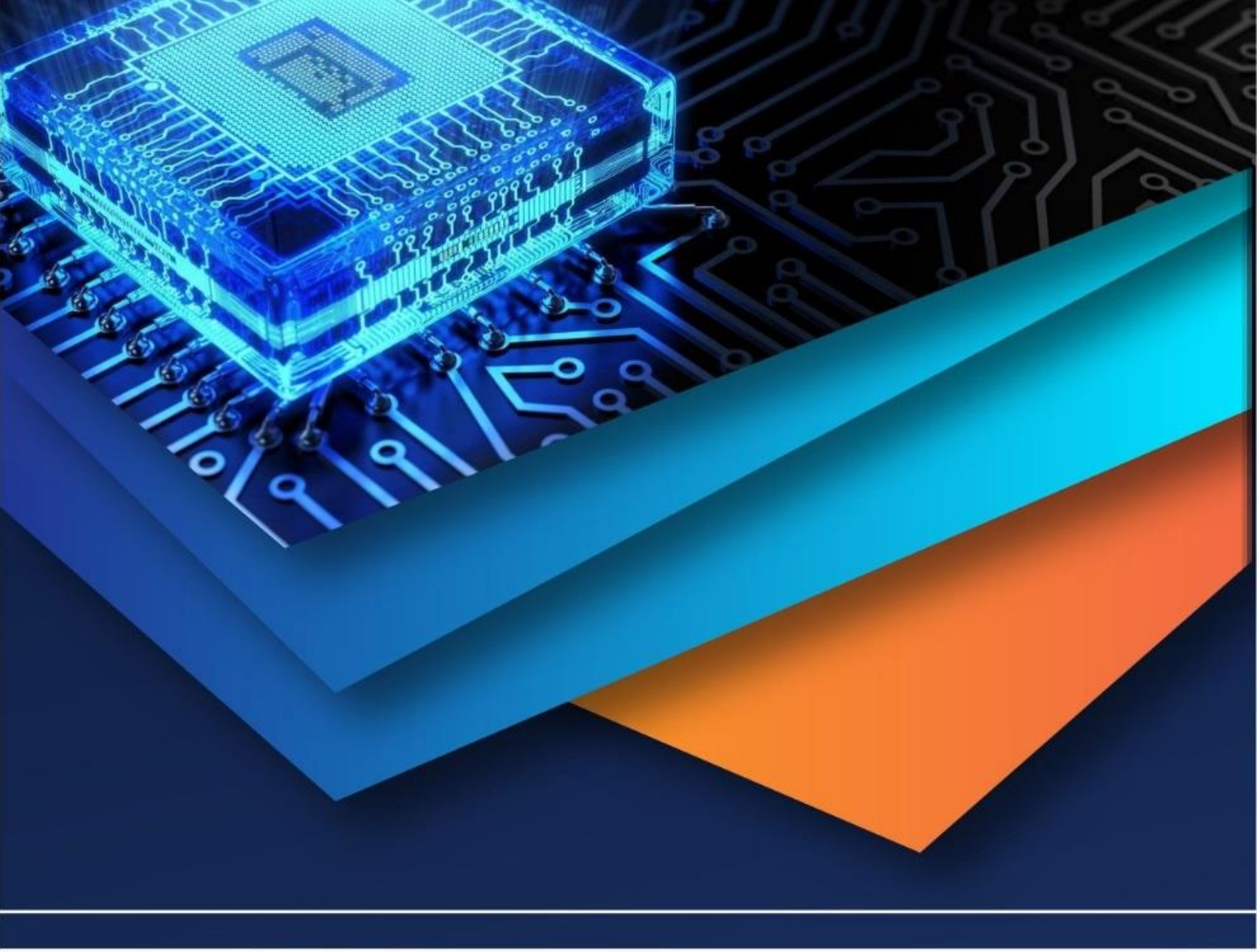

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