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A Review on Design and Fabrication of Motorized Low Cost Cultivator

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Abstract: ***Agriculture being one of the major occupations in India, it is very essential to discover and implement new idea in this field, though lot of work has been done in this area. It is unfortunate that, these ideas are not been implemented properly in actual field. This is due to high cost and is complicated for rural people. Multipurpose agriculture equipment is basic and major equipment involved in agriculture for maximum yielding. Conventional method of planting and cultivating the sugarcane is a laborious process and hence for that reason there is a scarcity of labours, this result in delayed agriculture to overcome these difficulties, multipurpose agriculture equipment is designed. Agriculture plays a vital role in the Indian economy. A plough may be made of wood, iron, or steel frame with an attached blade or stick used to cut the earth. It has been a basic instrument for most of recorded history, although written references to the plough do not appear in English until c. 1100 at which point it is referenced frequently. The plough represents one of the major agricultural inventions in human history.***
In this project work, we have focused on to develop low cost cultivation for farm application.
Keywords: Agriculture, cultivator, small-scale farm, fabrication, DC motor, etc.

I. INTRODUCTION

As we know that cultivator is one of the farm mechanization and has been used as an equipment to stir and pulverize the soil, either before planting (to aerate the soil and prepare a smooth) or after the crop has begun growing (to kill the weeds). Basically, many farmers in India also use bullocks, horses and he-buffalo for farming operation. This will not satisfy energy requirement of the farming as compared to other countries in the world.

So we are thinking that human and animal efforts can be replaced by some advance mechanization which will suitable for small scale farmers from economical and effort point of view. So we are developing this equipment which will satisfy all this need and to solve labour problem.

This machine performs farming operation called as cultivation which is used for small scale farming.

II. LITERATURE REVIEW

This includes the Literature survey regarding the dissertation project as follows,

1) *Paper Name: The Role of Agricultural Mechanization in the Economic Development for Small Scale Farms in Adamawa State*
Authors: D. A. Mada, Sunday Mahai, [2013]
In this research paper author has mentioned importance of mechanization in agricultural by giving examples. The conclusion from the paper concentrates on use of single axle multipurpose machines for pre-harvest and post-harvest machines. We have taken this as base for our research and further production of our agricultural machine.
2) *Paper Name: Farm Mechanization Status of West Bengal in India*
Authors: V. K. Tiwari, A. Ashok Kumar, Satya Prakash Kumar, Brajesh Nare [2012]
In this research paper author have done case study on farm mechanization in West Bengal as being part of India it give clear status about availability and progress in India. This ensured us to take right steps compared to current steps.
3) *Paper Name: Performance Evaluation of Power Tiller in Bauchi State Nigeria*
Authors: F. A. Adamu, B. G. Jahun, B. Babangida[2014]
In this paper authors draws our attention towards the performance factor of a power tiller. Among those demand for light weight power tiller was sought out most. Fuel efficiency and field capacity of such parameters are also discussed. We taken those points in consideration while designing a sustainable Agricultural machine.
4) *Paper Name: Employment Characteristics of Tine Cultivators at Deeper Soil Loosening*
Authors; P. Sarec, o Sarec [2015]
Lowest values of soil penetration resistance below the cultivated profile were determined with the cultivators equipped with chisel shaped shares, i.e. in the case of Farmet and Kockerling. This results have taken for our research basis.

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III.PROBLEM STATEMENT

It deals with the concept that why we selected this concept? i .e. reasons for selecting the problem is as follows,

A. To increase the mechanization in farming.
B. To reduce the labour effort and animal effort which used in different process.
C. To reduce the requirement of man power.
D. To overcome the problem of traditional machine.
E. Economically or easily handle for small scale farmer.

IV.METHODOLOGY

The project will undergo through following six phases:

1) Phase I : Literature Survey

A detailed literature survey will be carried out in the related area. Majorly the selected project is come under the agricultural field influence. So in this phase we will do visits in farm and received feedbacks from farmers.

2) Phase II : Concept Generation

In this phase, we are going to do schematic arrangement design and drawing of major component which we can use for completion of our project. In this we will generate the schematic drawing based on the basis of problem statement and feedback and suggestions received.

3) Phase III : Design Calculations

In this phase we are going to do design calculations by referring the standards, catalogue and reference books. In this work we will finalize the design and components dimensions. We are also select the material according to parts and components function and loading conditions. In this phase we will decide the size and shape of components and its position in the assembly. Also we will decide the limit and tolerance between components and also machining method required to select to manufacture the components.

4) Phase IV : Preparation of Drawings

In this phase we are going to prepare the design. The suitable component and assembly drawings will be prepared which will help visualize the actual project set up. In this phase we will prepare the drawing as per industrial format.

5) Phase V : Structural Analysis of the Critical Components

In this phase we will do analysis of component which is under critical loading condition. And by doing analysis we can decide for the final dimensions and material for the component.

6) Phase VI : Fabrication

Manufacturing of various components and assemblies will be carried out by using suitable manufacturing process. The component will be assembled as per the drawing. Working trials of the project will be conducted to confirm testing parameters. We will decide for go to best quality of product.

7) Phase VII : Experimental Investigations (Actual Field Trail)

The fabricated mechanism will be tested for the suitability to the intended application. This experimental testing will include the testing of machine at actual site.

V. COMPONENTS USED

1) Motor - Car wiper PMDC motor is selected to have smooth working and operation, having specifications is as follow,
2) Rated Voltage – 12 Watts
3) Current – 5 Ampere
4) Power – 15-45 Watts
5) Speed – 30-40 rpm
6) Battery – 12 V, 8 Amp
7) Wheel – Used basically for moving purpose.
8) Diameter – 360 mm
9) Width – 150 mm
10) Material – MS
11) No. of Wheel – 2

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VI. CONSTRUCTIONAL DETAILS

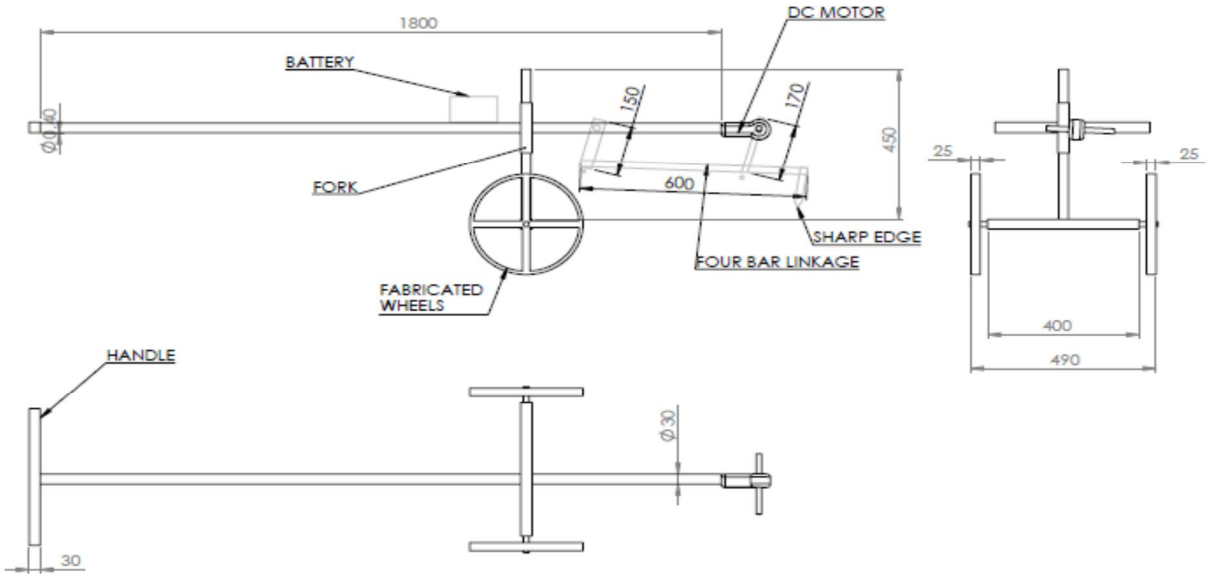


Fig.: Constructional details of cultivator

VII. CONCLUSION

After the manufacturing & trail on the "Motorized low cost Cultivator" conclusion which we made are as follows:
Based on the overall performance we conclude that, Small farmers can get satisfy as they are able to purchase this equipment because of its low cost. Also the farmer can easily handle this cultivator, as it requires less man power compared to traditional methods.

VIII. FUTURE SCOPE

Future scope for our project is as follow;

A. With the use of Solar panel battery charging is possible.
B. Different wireless technologies can be added for the control of mechanism.
C. With the use of sensors controlling is easy.

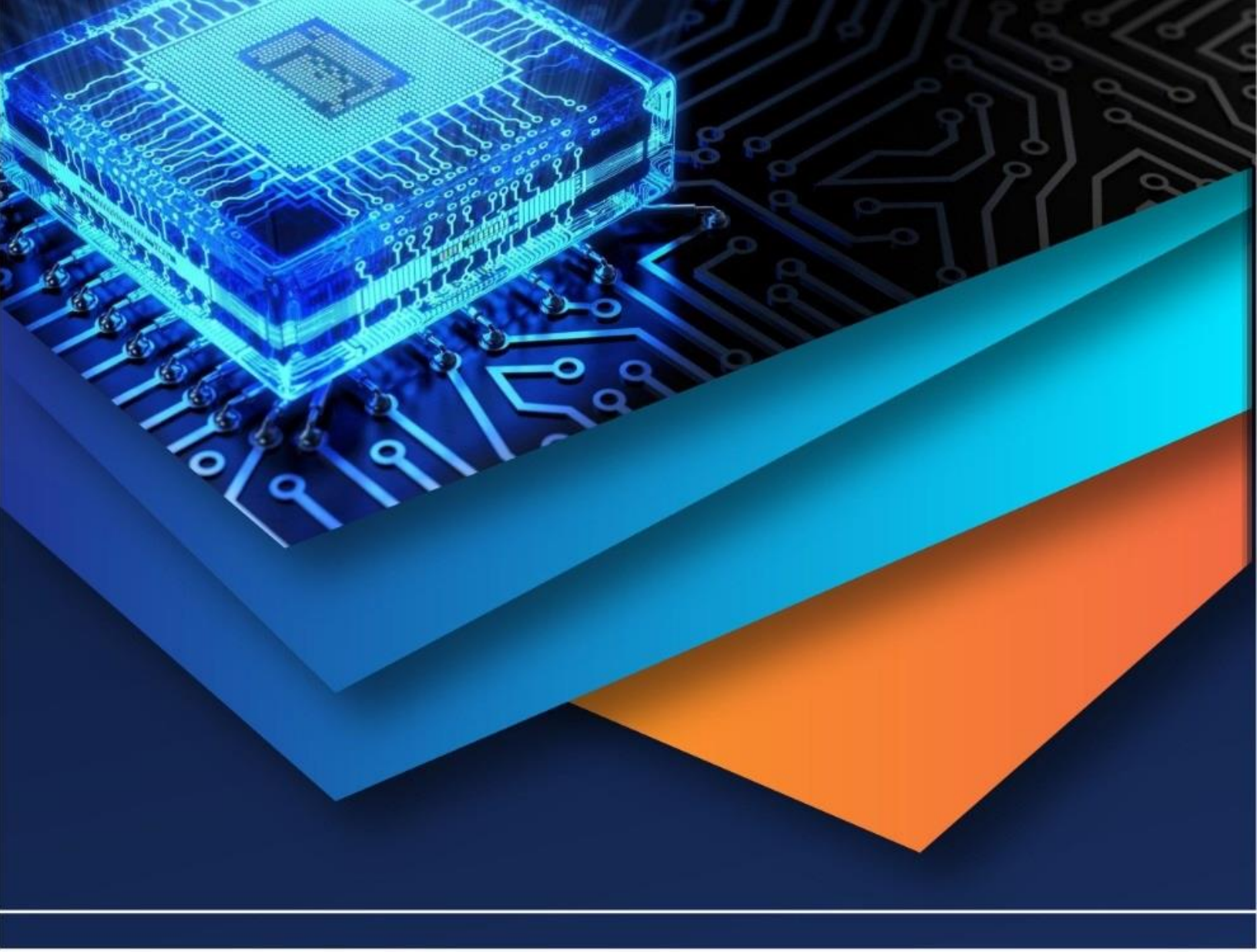
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