

## E-PLOUGH FOR SMALL AND MARGINAL FARMING

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### ABSTRACT

Earlier, bulls and oxen were extensively used to plow the fields for agriculture. Bulls and oxen were the main source of farming and were considered as a member of the farmer's family. However, in today's modern world and with the development of technology, there are many changes in agriculture that we have been doing for generations. With the advent of machination, now modern agricultural machinery is being employed instead of bulls and oxen for plowing the fields. This has resulted in a decreased usage of domestic animals such as bulls and oxen for agriculture. The farmers who used to feed these bulls and oxen are now shifting towards the machination. The rapid introduction of machination in the field of agriculture is a primary cause of rising input costs. Nowadays we are using a tractor for the fast plowing of the agricultural lands. Moreover, the smoke coming from these tractors pollutes the atmosphere. In today's situation the use of bulls, oxen and tractors to plow the land is proving to be very expensive and involves a lot of hard labor work. In our country, there are many small and marginal farmers. Such farmers cannot either use expensive agricultural machinery or own bulls or oxen. As an alternative, we are proposing a novel E-Plough for low-cost agricultural land plowing. This E-Plough is battery operated. We can control the speed of this E-Plough by using a throttle. E-Plough being battery operated is eco-friendly and avoids atmospheric pollution.

**KEYWORDS:** Plow, Agriculture, Farmer, development, technology, machination, E-Plough.

### I. INTRODUCTION

Cultivator stirs and pulverizes the soil, either before planting or after the crop has begun growing (to kill weeds—controlled disturbance of the topsoil close to the crop plants kills the surrounding weeds by uprooting them, burying their leaves to disrupt their photosynthesis or a combination of both. Unlike a harrow, which disturbs the entire surface of the soil, cultivators are designed to disturb the soil in careful patterns, sparing the crop plants but disrupting the weeds. E-Plough is integrated with an electric motor, which can be used for propulsion. E-Plough uses rechargeable batteries that do not pollute the environment and reduce the cost. E-Plough stirs and pulverizes the soil, before sowing. Unlike a harrow, which disturbs the entire surface of the soil, E-Plough is designed to disturb the soil in or after the crop has begun growing. Controlled disturbance of the topsoil close to the crop destroys the surrounding weeds in a careful manner such that the crop is spared. E-Plough will help the farmers in easy cultivation to achieve good productivity to raise the standard of living of the farmers. The E-Plough is free from pollution and takes less time to plow. The proposed E-Plough overcomes all the drawbacks from previous methods in farming to a large extent.

### II. MOTIVATION OF THE PROJECT

Family farming in many parts of the world is still a significant factor in food production. These animals worked very hard in adverse climatic conditions all through the day in the fields plowing and tilling the soil before sowing. With the advent of the machination in the field of agriculture, tractors were introduced. The tractors have no doubt reduced the time and labor for preparing the fields for farming, but the overall cost has increased enormously. Farmers have to pay large sums of money for hiring a tractor during the sowing season. Apart from the cost of hiring, during the peak sowing season there is an acute shortage of tractors and hence sometimes there is undue delay in starting the farming activity. Moreover the tractors run on diesel and the smoke let out not only pollutes the environment but also damages human health. E-Plough eliminates the fuel cost, reduce time and labor cost and mainly, it is eco-friendly.

### III. OBJECTIVES

- To help Indian farmers to achieve good crop yield with low cost to give more income to the farmers without polluting the environment.
- To reduce the cost thereby making agriculture profitable.

- To avoid the usage of cows and bulls.
- To minimize the Plowing time.
- To perform additional tasks including removal of weeds, the addition of fertilizers, etc.
- To use rechargeable batteries which reduces the cost of regular fuel investment.

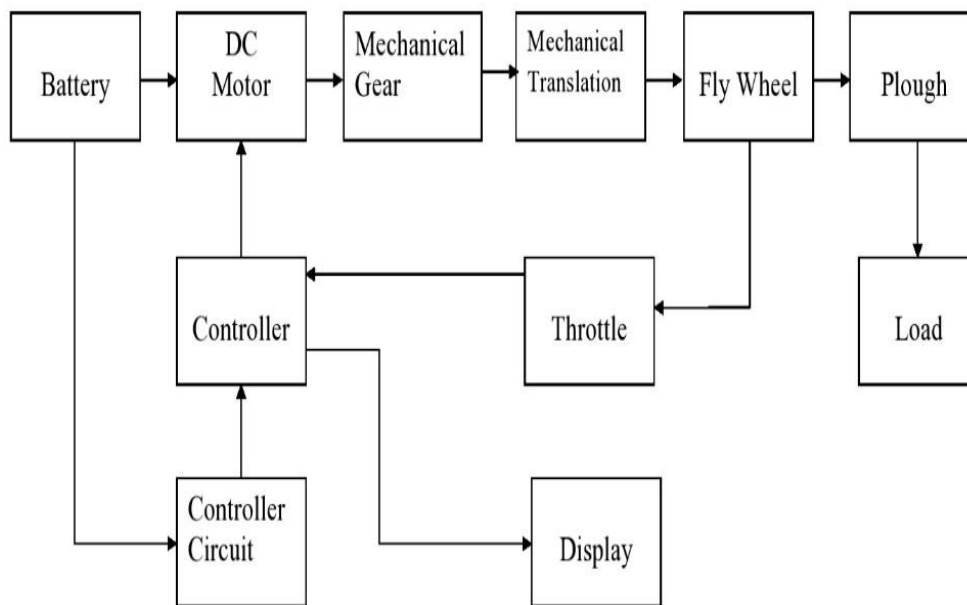
#### IV. NECESSITY OF THE PROPOSED WORK

- Developing a substitute method of transport, which has more run time in plowing the soil.
- Developing a machine that acts as a friend to a farmer.

#### V. METHODOLOGY

The method and analysis that is performed in our research work are written in this section.

##### a) Block Diagram



##### b) Block Diagram Description

###### A) Lead Acid Battery

The battery which uses sponge lead and lead peroxide for the conversion of the chemical energy into electrical power, such type of batteries is called a lead-acid battery. These lead-acid batteries are most commonly used in the power stations, substations, Electric Vehicles, etc. because it has higher cell voltage and lower cost. In this machine, we are using four 12V lead-acid batteries that are connected in series to increase the voltage to 48V that is required to run the motor. The 12V 12Ah batteries provide the required amount of supply to the motor and the parts that run on battery supply. The charging time of these types of batteries is nearly 4 to 5 hours. These batteries are very convenient to use and have more life.

###### B) BLDC Motor

###### Name Plate Details:

- Rated Operating Voltage: 48V.
- Rated Power: 750W.
- No Load Current: 4.0A.
- No Load Speed: 500 RPM.
- Rated Torque: 102Kg-cm.
- Rated Speed: 400 RPM.
- Rated Current: 13.4A.
- Efficiency: 80%

Here the motor is fixed to the base of the vehicle to have the stable position without any movement so that the motor can't be tilted, hence the other parts of the vehicle won't be disturbed because of the motor and is connected to the mechanical gears to increase the torque which helps the entire vehicle to move smoothly and to get high starting torque. This motor has higher efficiency and easy to operate. The speed of the motor is controlled using a controller and throttle. The maximum speed of the vehicle is 40kmph and by using the throttle we can limit the speed to our requirement. A chain is used to connect the motor axis to the axle of the vehicle. And the vehicle is moved when the motor is started.

### C) Controller

The controller is a device or a group of devices that serves to govern in some predetermined manner the performance of an electric motor. The controller includes a manual or automatic means for starting and stopping the motor, selecting forward or reverse rotation, selecting and regulating the speed, regulating or limiting the torque, and protecting against overloads and electrical faults. Here controller is connected to motor, throttle, display and battery. It acts as the brain of the system because it controls all the parts of the vehicle and helps in sending the necessary commands to the parts.

## VI. MODELING

Model and Material that are used is presented in this section



**Figure:1** CAD view of the Vehicle

Dimensions of the Project:

Length	--	60 inches or 152.4 cms or 1.524 mt
Breadth	--	28 inches or 71.12 cms or 0.711 mt
Height	--	40 inches or 101.6 cms or 1.016 mt

## VII. ADVANTAGES

1. It is affordable, helps in reducing the cost thereby making agriculture profitable.
2. It does not need muscular power and the use of bulls and oxen can be avoided.
3. Eliminates the environmental pollution caused by conventional diesel engine driven tractors, hence eco-friendly.
4. It takes less time to plow the field.
5. Easy and hassle-free operation of E-Plough when compared to tractors.
6. In addition to plowing, the E-Plough can perform additional tasks including removal of weeds, the addition of fertilizers, etc.
7. This E-Plough is designed with a powerful motor and rechargeable battery.

## VIII. RESULTS

E-Plough with less investment that will reduce the investment to the farmers, environment friendly that does not pollute the air, desired output Torque that requires for the starting of the vehicle, user friendly that is easily operated, more working hours and less weight is achieved.

## IX. CONCLUSION

This paper proposed an idea of plowing the agricultural land with less investment and the pollution-free machine is discussed. With this machine the amount which the farmers are spending before planting the crops is reduced and it is easy to handle and every farmer can buy it because of its less cost. As it is made of low weight materials it can be carried easily. This paper concludes that the requirement of the machine which plows the land with less investment has been manufactured. The usage of solar power to charge the batteries is to be studied further.

## ACKNOWLEDGEMENT

We would like to express our deepest gratitude to our esteemed Director, Dr. P. Narasimha Reddy, our principal, Dr. T. Ch. Siva Reddy, our Head of the Department, Dr. C. Bhargava and Sreenidhi Hub Head, Ameet chawan forgiving us this opportunity to do the project. We would like to thank our project coordinators, M.T.L. Gayatri, Associate Professor, EEE Department, for their consistent encouragement in completion of the project.

## X. REFERENCES

- [1] <http://ieeexplore.ieee.org/>
- [2] [https://www.ijsr.net/?gclid=Cj0KCQjwzN71BRCOARIsAF8pjfhg4uV2ENWHHWH7YI9trJGRX8IgkqGVfkIlbsfWeLAuB023on\\_XJBYaAn49EALw\\_wcB](https://www.ijsr.net/?gclid=Cj0KCQjwzN71BRCOARIsAF8pjfhg4uV2ENWHHWH7YI9trJGRX8IgkqGVfkIlbsfWeLAuB023on_XJBYaAn49EALw_wcB)
- [3] <https://kmwagri.com/power-disc-plough-tiller/>
- [4] L Marquez, Solo tractor`90, Madrid: Laboreo, 1990.
- [5] Available at: <http://jalopnik.com/5796595/when-the-soviets-built-anelectric-tractor>
- [6] "Plough". Cambridge English Dictionary. Retrieved 16 September 2018.
- [7] BBC - Anglo-Saxon 7th Century plough coulter found in Kent - 7 April 2011
- [8] Collingwood, R. G.; Collingwood, Robin George; Nowell, John; Myres, Linton (1936). Roman Britain and the English Settlements. Biblio&Tannen Publishers. p. 211. ISBN 9780819611604.
- [9] Sahgal, A C; Sahgal, Mukul. Living Sci. 8 Silver Jubilee. India: RatnaSagar. p. 7. ISBN 9788183325035.
- [10] Paul Hughes (3 March 2011). "Castlepollard venue to host Westmeath ploughing finals". Westmeath Examiner. Archived from the original on 2 October 2011. Retrieved 1 June 2011.
- [11] Patrick Freyne (27 September 2009). "The plough and the stars". Sunday Tribune. Dublin. Archived from the original on 31 March 2012. Retrieved 1 June 2011.
- [12] "The Famine Potato". St Mary's Famine History Museum. Archived from the original on 24 May 2011. Retrieved 1 June 2011.
- [13] Jonathan Bell, "Wooden Ploughs From the Mountains of Mourne, Ireland", Tools & Tillage(1980) 4#1. pp. 46–56; Mervyn Watson, "Common Irish Plough Types and Tillage Techniques", Tools & Tillage (1985) 5#2. pp. 85–98.
- [14] Weber, William (2014). Production, Growth, and the Environment: An Economic Approach. CRC Press. p. 63. ISBN 9781482243062. Retrieved 18 January 2019.
- [15] Wang Zhongshu, trans. by K. C. Chang etc., Han Civilization (New Haven and London: Yale University Press, 1982).
- [16] Evi Margaritis and Martin K. Jones: "Greek and Roman Agriculture", Oleson, John Peter, ed.: The Oxford Handbook of Engineering and Technology in the Classical World, Oxford University Press, 2008, ISBN 978-0-19-518731-1, pp. 158–174 (166, 170).
- [17] A Brief History of The Plough
- [18] "The Rotherham Plough". rotherhamweb.co.uk. Archived from the original on 24 September 2015.