

# Electric Plough for Agriculture Using Bicycle

1kasamji taukeer sajid, 2khan ajaz ramzan, 3maknojiya salman yunus, 4patel ashraf musa, 5obaid ul haque ansari  
1student, 2student, 3student, 4student, 5assistant professor  
Theem college of engineering

**Abstract** - One of the best method to help the farmers who have small scale farming is to develop a technique of developing an machine or cultivator on there own (DIY type) in alternative of large investable tractor, to help out our small Farmers we have come forward for developing a technique where we are using components of bicycle which is easily available and cheap. We have fabricated the frame of the bicycle and converted it into a cultivator, and installed a Hub-motor and battery to run the cultivator, as this plough runs on battery, so it is eco-friendly machine which helps in reduction of Air pollution by being an alternative of air polluting tractor.

**keywords** - Hub-motor, Controller, Plough, Bicycle components, Battery

## 1.INTRODUCTION

In this paper we have demonstrated that how we have converted bicycle into an electric plough or electric cultivator, but there may be a question that “How is it possible?” So here in this paper we are going to show the process of making an Electric Plough for Agriculture using Bicycle.

We have to remove many components of the Bicycle which are not required in our Electric Cultivator, following are the list of the components.

- Front Wheel
- Pedals
- Braking System
- Chain and Sprocket
- Back Carrier
- Seat
- Front Handle (Further we have fabricated it into a different type)

As we have removed the front wheel of the bicycle which states that the cultivator is going to run only on a single wheel, so we installed the rear wheel into the front side of the bicycle and fabricated the rear of the bicycle and made an fabricated adjustment to install plough in the rear, which was fabricated by forging MS Rod into an arrow for cultivating the soil. The single wheel cultivator consists of an, Hub motor into the Wheel of the Cultivator, which is installed into the spokes of the bicycle's Rear Wheel and this wheel gives power to the cultivator to cultivate the soil and it runs on battery and is control by the controller. And the controller is connected to the Throttle, when the throttle is accelerated the hub-motor runs. So the Cultivation of soil is done by the single wheel which rotates and takes the plough forward which is into the soil and it tears the soil and moves forward to cultivate the soil.

## 2.PROBLEM STATEMENT

- As the wheel of bicycle consists of rubber tyre, due to this when we accelerate the hub-motor the wheel of the plough continuously spins on one place and does not moves forward, this was happening because the rubber tyre was not able to have grip with soil.
- To overcome this problem, we removed the rubber tyre and installed 18 L-Angle plugs on the Wheel of the cultivator and welded it, this worked successfully and gave a proper grip to the wheel of the cultivator and soil.
- As we installed L-angle plugs on the wheel of the cultivator, which created an uneven circumference of the wheel, due to this when we run our cultivator on the plane surfaced roads, cultivator runs in a very uneven way of going up and down because the circumference of the wheel was not fully round to give grip in the soil. Also, the plugs were getting damage when we run the cultivator on the plane surfaced road while travelling it to the field.
- To overcome this problem, we installed an adjustable side wheels into the cultivator, which rotates 90 degree up and down. Therefore, when the cultivator is on the plane surfaced road, we rotate the adjustable wheel downwards due to which this side wheel touches the road and the wheel with plugs goes 4 inches upward, in this way the plugs of the wheel is safe from getting damage. And when the cultivator is in the field, the side wheels are rotated upward and the wheel with plugs comes in contact with soil and the side wheels remains upward without touching the ground surface.

## 3.OBJECTIVES

- To acquire required cultivation from the electric plough at a very minimal cost.
- To manufacture this project at reasonable cost, so that small farmers can easily buy it.
- To reduce air pollution by making it an alternative of tractor for small farms.

#### 4.METHODOLOGY

- Removing unnecessary components of bicycle.
- Fabricating the bicycle frame in a required design.
- Designing the wheel with plugs for grip.
- Selection of Hub-Motor.
- Selection of Battery and Controller for controlling the Hub-Motor.
- Designing the Plough and Assembling all the fabricated Components of the Cultivator.

##### ***Removing unnecessary components of bicycle***

The unnecessary components of the bicycle which are not going to use in cultivator have been removed.

##### ***Fabricating the bicycle frame in a required design.***

A proper required fabrication work was done on the frame of bicycle, so as to install a single wheel into the bicycle and also making a perfect adjustment for installation of Plough at the rear of the plough. Proper fabrication is done at handle to give it a required shape, also the battery box was fabricated for the setting of batteries.

##### ***Designing the wheel with plugs for grip.***

The wheel of the bicycle consists of rubber tyre, due to this the wheel was not getting grip and was spinning at one place without moving forward, due to this reason we have to weld L-Plugs on the wheel of the bicycle so as to get grip in the soil.



##### ***Selection of Hub-Motor.***

After adequate analysis of the required power and Calculation for the design of Hub-Motor, we decided to select Hub-Motor of 36V 250W.

##### ***Selection of Battery and Controller for controlling the Hub-Motor.***

As we selected Hub-Motor of 36V 250W, therefore we selected controller of 36V and 250w and as the controller is 36V 250W we have selected battery of 36V, therefore we connected three 12V battery in series connection to acquire 36V.

##### ***Designing the Plough and Assembling the fabricated components of the cultivator.***

We took a deep research on the different types of Plough and decided to forge the 12mm MS-Rod into arrow shape and welded this arrow shaped rods into the frame of the Plough.



We assembled all the fabricated components of the cultivator into the frame of bicycle in a way as shown in the figure given below.



## 6.RESULT

1) We test the cultivator in a well-measured and marked area of 20ft by 10ft which can be also defined as 200sqft of area, the cultivator successfully cultivated the area easily and the time taken for the cultivation of 200sqft of area was noted 4 minutes :47 seconds, which means it take approximately 5 minutes to plough 200sqft of area.

2) Before cultivating, we full-charged the battery, after cultivation, when we charged the battery, the charge took 0.1 units which means 40 paise if cost of 1 unit of electricity is 4 rupees

## 5.CONCLUSION

1) After the testing of this Electric Cultivator it has been concluded that this project is very useful for farmers having small scale farming.

2) Its is very cost effective alternative of highly expensive tractor.

3) The cultivation cost of the cultivator is very low.

4) It gave a great battery back-up, while cultivating the soil.

5) The battery charging cost of the cultivator is very low.

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