



# E-Tricycle with Front and Rear Steering

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**Abstract:** Tricycle is a vehicle with three wheels. Peoples are not using conventional bicycle in modern era because everyone loves sophistication and comfort. Considering all the facts and need we are coming with one sophisticated design which is having comfort, ease, stability, reliability and competence. This tricycle is a combination of ergonomics and aesthetic, but the question rises that all the tricycle are having this features then, what makes it different? Some special arrangements are there which will revolutionise the tricycle. This tricycle is having length manager, adjustable handle, suspension, front and rear steering. We had enjoyed conventional tricycle with front wheel steering but this tricycle having rear wheel steering also, which makes sharp turns and u-turns motile. Eventually the front and rear steering provides maneuverability and turning capabilities. Last but not least if possible then we will convert it into electrical tricycle to make the cake more tasty.

**Keywords:** Tricycle, Pollution, Transportation, Rear steering.

## I. INTRODUCTION

Tricycle is a conventional vehicle, which is use to cover short distances along the regular roots and transportation as well. As the technology predominates and produce high speed vehicles for travelling and transportation purposes. Resultant of all those activities is very useful but there by product was very dangerous and it start pollution. Now- a - days human transportation ways are switches on solar vehicles and green vehicles. Tricycle is one of the green vehicles which does not harm environment.

Tricycle with front and rear wheel steering is the best way to control and reduce pollution. It is design for humans above 15 years. This tricycle consist of five features, which are length manager for managing overall length as per the height of person. Adjustable handle for manipulation of frontal balance. Suspension for the absorption of any shock. Front as well as rear steering for sharp, smooth and quick turns.[7]



Fig.1 Tricycle basic model

## II. WORKING PRINCIPLE

Working principle of tricycle is as same as the conventional one. Some of the features have been changed which brings this tricycle into wonders. Following are the extra features of tricycle:-

### • LENGTH MANAGER:-

It is a simple sliding mechanism because of which the overall length of the cycle would change. As tricycle is dealing with younger and elders, height will be the hinderance. Manipulation of tricycle is completely based on comfort of driver and to manage comfort we will use length manager.

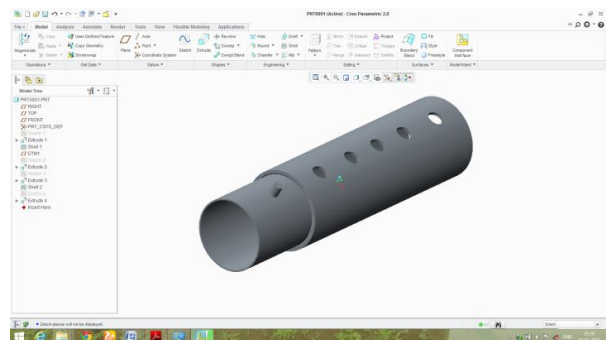


Fig. 2 Length manager

### • ADJUSTABLE HANDLE:-



Fig.3 Flexible handle



It is a handle which will work like hinge. According to height of any person we need to adjust handle position all the time. This gives a better ergonomics and helps aerodynamically. It will also contribute in account for better vision of driver. Adjustable handle also useful for driver comfort because humans could not stay in a single position for long time. Flexible handle gives freedom to move at any angle or any position in order to achieve better driving comfort.

• **SUSPENSION:-**

Suspensions will provide to tricycle to absorb shock obtaining from every hinderances across path. Normal shock absorber position is in a line with front and rear axel. Recumbent tricycle are having small height that's why we decided to apply suspension below the seat, to reduce shock waves from bottom, which gives safe support to spine.



Fig.5 Seat suspension

• **FRONT AND REAR STEERING:-**

Front steering had used in every vehicle and still we are using it. When we required any sudden change, front steering takes time to maintain relative position. As per the quick changes concern, different steering system have to apply. Rear steering with the combination of front, give better turns while it consumes less time and maintain relative balance. Well, this problem can be solved by installing front and rear steering.

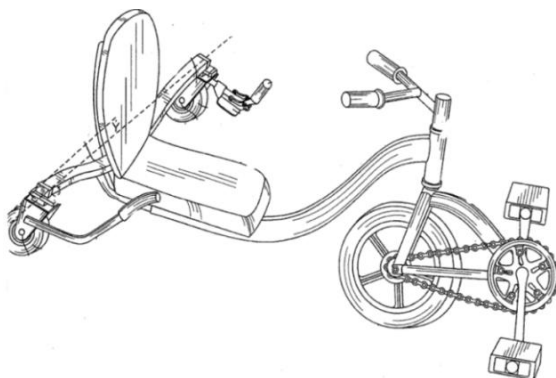


Fig.4 Front and rear steering

• **ELECTRIC SETUP :-**

Basically this tricycle is manual but we have decided to convert it into electrical tricycle so that anyone can drive

it. Seperate setup will provide to regenerate electricity as per the conditions.

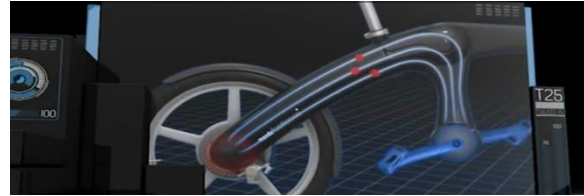


Fig.6 Chain less mechanism

**III. ANTHROPOMETRIC CHARACTERISTICS**

TABLE.1 ANTHROPOMETRIC DATA, [8]

TERMS	ANTROPOMETRIC RANGE
BACKREST ANGLE	30-40 degree
BACKREST LENGTH	450mm
BB-BOS	(800 to 1100) – CL
BB-CLEARANCE	350mm-400mm
BB-HB	CL + 600MM + TC
BB-HEIGHT	400mm
BB-SEAT-DIFF	150mm – 250mm
CRANK LENGTH	145mm – 175mm
HB-BOS	470mm – 610mm
HB-TOS	490mm – 650mm
LUMBER SUPPORT HEIGHT	190mm
SADDLE LENGTH	230mm
SEAT HEIGHT	400mm – 470mm
SHOULDER SUPPORT LENGTH	120mm
TURNING CLEARANCE	150mm – 200mm

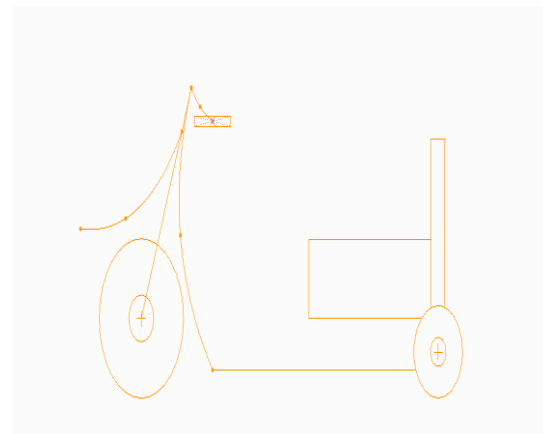


Fig. 7 Basic design for tricycle

Basic design of tricycle is as shown in fig. 7 shows that it is a tricycle with front and rear steering but, the mystery is , it is chainless. Mechanical or physical force applied by paddling will not reach towards any of the wheel. As it is a electric tricycle, physical force of paddling will transfer to the dynamo to generate electricity. Lithium ion battery



will kept it and then supply move towards hub motor, which rotate front wheel. This is the basic way for getting forward moment without chain.

#### **IV. SPECIFICATION**

TABLE NO. 2 GENERAL SPECIFICATION, [9]

Range / Autonomy	55 km
Top speed	25 km/h
Weight	100kg, +100kg paylo
Motor	BLDC 250W
Wattage	250W
Batteries	60V, 20 AH
Voltage	48V
Charge time	6-8 Hr

#### **ADVANTAGES**

1. Tricycle i.e green vehicle reduces pollution.
2. Maintenance cost reduces because of electrical setup.
3. Friction and wear resistance also decreases.
4. Affordable to each and everyone as its cost is low for mass production.

#### **DISADVANTAGES**

1. Weird sound produces during paddling.

#### **V. CONCLUSION**

Tricycle with front and rear steering is one of the best option to replace fuel based vehicles. Now -a- day, pollution with an increased population is merely unstoppable. Control and manipulation is the only option for scientists and humans. This tricycle is very easy for human transportation, features like chainless makes it more marvelous in design and easy while travelling.

#### **REFERENCES**

- [1] Hickman,M.R.(2001) ,A Study of Power Assists for Bicycle Rickshaws in India, Including Fabrication of Test Apparatus. BS, Mechanical Engineering Project Report,MIT, USA.
- [2] Alam,F.,Silva,P.andZimmer,G.(2012),Aerodynamic study of human powered vehicle. Procedia Engineering, Vol. 34, pp. 9-14.
- [3] Yang, Y.P., Liu, J.J. and Hu, T.H.(2011), An energy management system for a directly driven electric scooter. Energy Conversion and management, Vol. 52: pp. 621-629.
- [4] Asaei, B. and Habibidoost, H.(2013),Design, simulation and prototype production of a through the road parallel hybrid electric vehicle. Energy Conversion and Management, Vol.71:12-20.
- [5] Silva, C., Ross, M. and Farias, T. (2009), Evaluation of energy consumption, emissions, and cost of plug-in hybrid vehicles. Energy Conversion and Management; Vol. 50(7):1635-1643.
- [6] Gonder, J.S.A.(2007),Measuring and reporting fuel Economy of plug-in hybrid electric vehicles. World Electric Vehicle Association; 1.
- [7] "Japanese and South korean patents"[patent no. US8256784B2], 2012
- [8] NASA MISI Anthropometric tables
- [9] <http://www.jetstrike.com/ergonomics.html>