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Eco-friendly Modified Tricycle for the Disabled Person

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Abstract: Mobility of physically disabled persons is a concerning social issue nowadays. The basic Tricycle is a three-wheeled design, pedaled by disabled persons in the side and seat in the middle for sitting arrangement. They use only one hand to steer the handle because other-hand is used to rotate the pedal. Our aim is to design a low-cost bicycle that allows you to take a disabled person or someone with limited mobility for a bike ride. The three-wheel bicycle allows you to see the person in front of your while you control and pedal the bike from behind. The way the Bike Chair works is the back is essentially a regular bicycle, but the front turns it into a tricycle, and sort-of makes it a wheelchair and bicycle combo. The disabled passenger sit on the front two wheels, as the driver uses their front wheels to steer the bike .The passenger has buckles and strap to secure the min place and top even them from falling out of the chair during the bike-ride.

Introduction

Disability may include impairments, limitations in performing the activities, and participation constraints. Impairment is a drawback in body performance or structure. Activity limitation could be a problem encountered by a person in corporal accomplishment of a task or action. Participation restriction could be a drawback intimated by an individual involvement in life conditions. Disability is principally caused by the impairments of various subsystems of the body which can be classified in physical disability and mobility impairments.

Many difficulties are involved with the mobility of the physically challenged individuals within the society. It can be seen that physically disabled people essentially use some helpful devices like artificial limbs or legs, wheel chairs, three wheelers, etc. for transportation. But these wheel chairs or three wheelers that are generally used by Indians are crude or are inefficient in design; not considerably appropriate for the country like India. It is so because generally found manually operated wheel chair has a basic drawback that the user has to apply physical force to turn the wheels. This type of action is physically strenuous and may end up in muscle and joint pain and degradation, carpal tunnel syndrome and torn rotor cuffs; that may result in secondary injury or any other disability.

Literature review

Satish Kumar Dwivedi et. al [1] In this paper the author focuses on simple, high performance, an easy maintained motorized tricycle for the disabled person which can be proved as a better replacement for the indigenous models used by the handicapped keeping in mind the factors such as safety, cost & performance as shown in Fig1.

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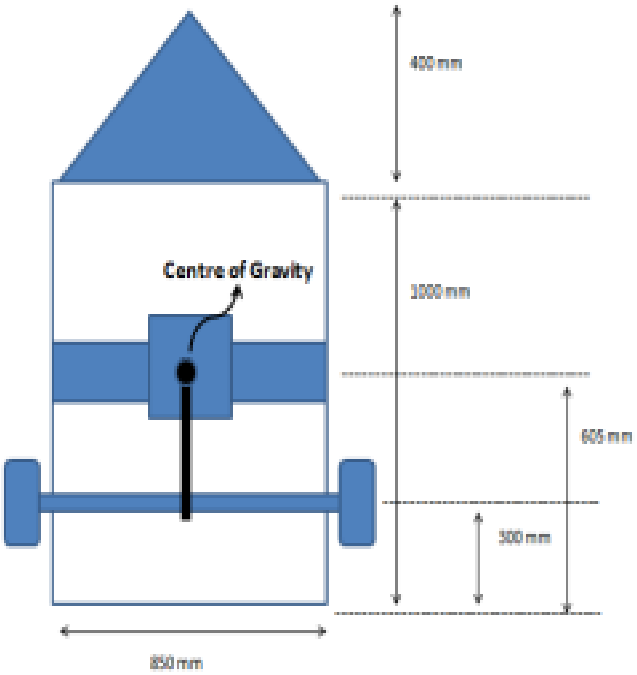

Fig.1

The objectives of the design and fabrication of a motorized tricycle using available local materials was successful to a great extent and it was discovered that the tricycle will lessen the burden of the disabled people due to its affordability.

K. Kalyani Radha et. al [2] In this paper the author focuses on Power Assisted Tricycle with Drive-Train Arrangement for Disabled Persons. The main focus points are to reduce the physical burden on disabled person and be appropriate for use, top limit speed to 10 Kmph, have a power supply that will provide a range of 20 Kilometers at maximum speed, total cost of the power train and power supply will not exceed Rs 22000. The design of the tricycle frame is modified with a back-axle, electric assist setup with motor and battery. The electric system of the assist is relatively simple, consisting of batteries, motor, multi-meter for taking power measurements as shown in Fig2.

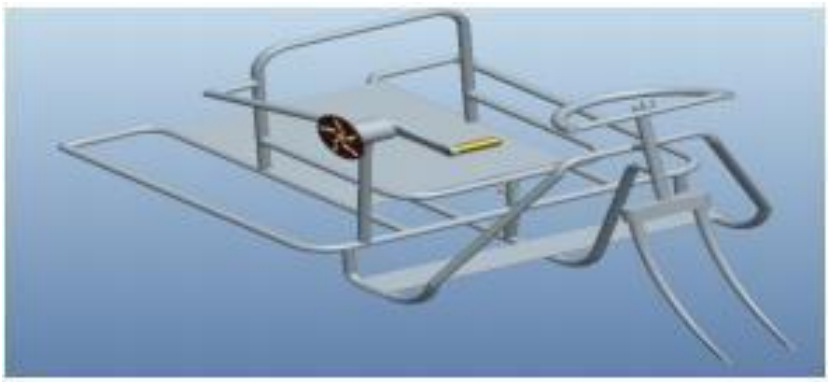

Fig.2

In order to maintain reasonable sprocket sizes and fit the drive-train within the space constraints of the tricycle frame, the necessary gear reduction from the motor was accomplished in three stages: a 13:48 reduction from the motor to the first axle, a 13:48 reduction from the first axle to the second axle, and a 13:48 reduction again from the second axle to the rear axle. This results in an overall gear ratio of 1:48, as desired.

F. Leishman, et al. [3] described the implementation of assistance to the driving of a smart wheel-chair through a dedicated approach. Initially, a state of the art of mobility assistance, interfaces and types of commands for smart wheel-chairs is presented. The deictic concept and more particularly, the approach used

for the design of interface are examined. Then the two functionalities carried out to implement this type of interface, as well as methodology used to control wheelchair are illustrated. Finally, the usability of this deictic approach for the assistance to the driving of a smart wheel-chair is discussed. The deictic approach consists in using a vision of the environment as a control interface. This vision must be as close as possible to the perception of the user so that the interface is intuitive and therefore easy to use. To move, the user specifies the location within the environment he wants to go to by pointing at it on the interface. Then the wheelchair will move automatically to that position. As the command is given from time to time, it does not require much effort from the user. The additional system is composed of a camera, a laser sensor and a computer, and it can be adapted to any electrical wheelchair without any in-depth modification. Control by pointing the goal to reach on the view of the environment is simple and intuitive, which makes it available to any user. This methodology to convert an image point into a point of the laser perception space and following by laser perception. Thus, the available modes of transportation for disabled persons include various wheel-chairs, tricycle etc. But the travelling range is limited due to sophistication of the machinery. So, this work focuses on a design of a retrofitted tricycle that allows a physically disabled person to travel along with the wheelchair in order to increase traveling range.

Rashmi Urdhwareshe, et. al [4] discussed that National Human Rights Commission has focused on the need to provide equal opportunity to physically challenged persons. While providing personalized mobility solutions to the physically challenged person, safety of the driver and also other road users is needed to be sure. Modifications in existing vehicle design involves specific adaptations of foot and hand controls to suit operations by persons having partial or full disability of limbs. In absence of network in country, the entire subject needed detail examination and sensitive treatment. Subject came before Central Motor Vehicles Rules-Technical Standing Committee (CMVR-TSC) and it was agreed that Automotive Research Association of India (ARAI) will take the lead in resolving the matter and establishing approval procedure and notifying the requirement under CMVR which restricted the individuals from altering their existing vehicles in general.

Snehal G. Bali et. al [5] fabricated a Solar Powered Tricycle for Handicapped Person and mainly focuses on to develop a vehicle that use renewable energy, environmentally friendly and cheap and an electrical tricycle that can charge the battery when it is not in used, low speed tricycle, but for a longer distance. The general points of consideration during the designing of the solar three-wheeler are: simplicity, strength, stability, safety, corrosion and wear, weight, size, flexibility, ease of control, modularity, efficient extra action of solar energy, effective use of solar energy and energy storage, all terrain tires for all terrain trafficability/mobility. The working of this project is as such Solar Panel – Controller – Battery – DC Motor – Wheel. The advantages can be as Solar energy creates absolutely no pollution. This is perhaps the most important advantage that makes solar energy so much more practical than fuel. Solar panels and solar lighting may seem quite expensive when you first purchase it, but in the long run you will find yourself saving quite a great deal of money. After all, it does not cost anything to harness the power of the sun. Unfortunately, paying for oil is an expensive prospect and the cost is still rising consistently. It will reduce the efforts of the handicapped person. It is very cheap as compared to the other motorized vehicles, for handicapped person, in the market. The design proposed by them is shown in fig3.

Fig.3

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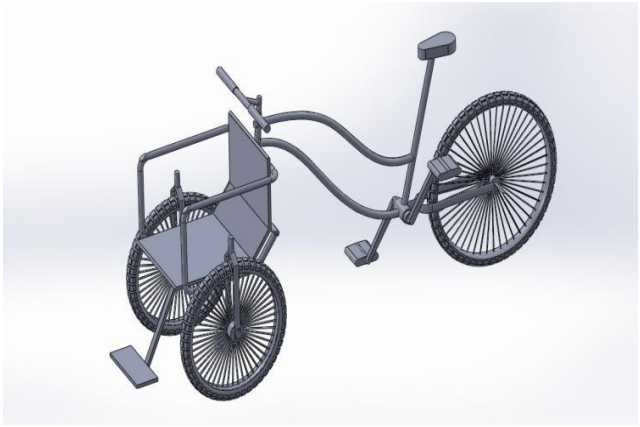
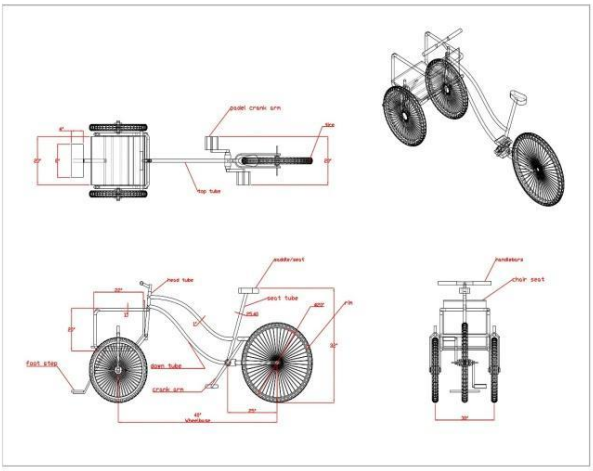
Research design

Tricycle bike for disabled person designed by our group consists of following components for the normal functioning. This is to be noted that solid works 2018 has been used for the designing purpose. Here are the listed components:

1. Base/Foundation
2. Seat with back rest
3. Front support frame and rear support frame
4. Wheel rim with tube tyre
5. Calliper mechanism braking
6. Pedal crank arms, handlebars
7. Footstep, head-tube and seat-tube





Top View, Front View, Side View and End View

Conclusion

Mobility of physically disabled persons is a concerning social issue nowadays. The basic Tricycle is a three-wheeled design, pedaled by disabled persons in the side and seat in the middle for sitting arrangement. They use only one hand to steer the handle because other hand is used to rotate the pedal. Our aim is to design a low-cost bicycle that allows you to take a disabled person or someone with limited mobility for a bike ride. The three-wheel bicycle allows you to see the person in front of you while you control and pedal the bike from behind. The way the Bike Chair works is the back is essentially a regular bicycle, but the front turns it into a tricycle, and sort- of makes it a wheel-chair and bicycle combo. The disabled passenger is on the front two wheels, as the driver uses their front wheels to steer the bike. The passenger has buckles and straps to secure them in place and to prevent them from falling out of the chair during the bike ride. To develop a unique, cost-effective, purpose serving motorized retrofitted tricycle for disabled person.

To design and fabricate a motorized retrofitted tricycle for disabled person for allowing the disabled person to wheel up or down his wheelchair on to or down the tricycle**.**

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