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Latch - Catch Uni - Cycle

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***Abstract:** In today's world, transportation has become one of the prime requirements of people for moving self or goods from one place to another. We have even come across people travelling for more than 200 km every day for reaching their work place. Mobility has thus become an essential part of our lives with many development and improvements happening in this field. Because of the changing lifestyle of today's world, there is a huge reduction in the level of interactions within the people group. In these conditions it becomes more difficult for physically challenged people to commute and to perform their day to day activities like working, education, shopping etc. as they have to constantly depend on others for getting assistance to alight and board the vehicle. In this project. a feasible design solution in form of a user friendly three wheeler vehicle, which allows physically challenged people to commute on their own and perform their activities without anyone's assistance, has been proposed.*

The activity was started with customer survey and market study. The questionnaire was framed keeping the needs of physically challenged people in mind. The major inputs received from this study were related to ingress\egress issues, ergonomics, carrying wheel chair and utility space. Considering these inputs from the survey, two concepts, namely - Chariot and Sholay, were generated. Using Pugh matrix Sholay concept was finalised for carrying out the detail design. Layout and detail design was carried using CATIA. The finalised model was analysed to validate for stiffness and Ergonomics. Ergonomics study using Jack software was carried out considering the 5th and 95th percentile manikins to take care of the ergonomic issues. On finalising the design, prototype building activity was initiated. A full scale working prototype model was manufactured for physical validation of the design function. Outcome of this project is the solution of transport for physically challenged community using which they can commute and lead an independent and normal life.

Keywords: uni-cycle, latch-catch, disabled, wheelchair

I. INTRODUCTION

Turn your wheelchair into a power scooter without any human need! We transformsyour wheelchair into a three-wheeled motorcycle by attaching an electric motor that powers you over long distances, up hills, and through rough terrain. Unicycle is a electric wheelchair attachment that motorizes most wheelchairs. Unicycle will attach and detach from your wheel chair in seconds.

A wheelchair is a wheeled mobility device in which the user sits on and is able to be mobile. The device is propelled either manually (by turning the wheels by the hand) or via various automated systems such as electric motors. Wheelchairs are used by people for whom walking is difficult or impossible due to illness (physiological or physical), injury, or disability.

A wheelchair assists people to become more mobile and independent. There are many different types of wheelchairs that are used for various reasons. It is important to understand the limitations and safe operation of whatever wheelchair you choose. The unicycle Attachable Electric Hand cycle turns your everyday wheelchair into a speed machine. Let the compact hub motor do the hard work while you steer. Designed to fit most folding/ rigid, adult and paediatric chairs.

II. LITERATURE SURVEY

Latikesh khedkar etal., (2016) "Structure And Fabrication Of Reverse Gear Mechanism For Handicapped People Vehicle", This examination paper goes for the planning and creation on a switch gear instrument, which will be fitted to the vehicle with little alterations in the existing model. The turn around apparatus system is accomplished by including just about 2% of unique weight balance.

Ripal Kumar Patel etal., (2015) "Structure and improvement of sunlight based tricycle for disabled individuals" , In this paper sun based tricycle is structured and well grown uncommonly for the debilitated individual which will diminishes the exertion of disabled individual. It can keep running up to 15km/hour once batteries are completely charged which convey 120kg of burden.

Jayaprabakar J etal., (2016) " Design of Affordable Electric Vehicle for Handicapped", the target of this consider was to structure and build up a vehicle of exceptionally reduced to enter building and structure like enterprises, clinics, indoor and open air place. The vehicle had less weight so as to build its range and furthermore to convey a better weight. The vehicle was worked with a stature as low as could reasonably be expected however the other factor, ground freedom is too considered for the reasonableness of

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Indian street conditions. A plat structure was made in the vehicle with the goal that impaired individual make due with wheel seats can likewise keep their wheel seats easily.

A model of this vehicle was created and tried out and about.

Samip Mehta etal., (2016) "Foot Steered Tricycle", In this exploration paper to improve ambulation, the foot guided client mix can be upgraded at three levels. The client can improve physical limit and strategy via preparing. The second dimension centers around directed tricycle UI. At long last, the tricycle center lies on limiting force loss of the tricycle client by decreasing frictional powers and streamlining the vehicle mechanics. Algarni S etal., (2017) "Execution examination of a sun powered fueled wheel seat", the primary point of this paper is to talk about on another plan of sun oriented controlled wheel seat (SPW) thinking about different plan angle and functionalities. \

This incorporates the change of a mechanized wheel seat to utilize sunlight based vitality with the assistance of sunlight based boards, and an ideal minimized structure was moreover done to comprehend the viable portability of wheel seat. Vitality qualities investigation of the photovoltaic cell added to this structure for the climate conditions up to a normal intensity of 490 Wh/day. Consequently it can give an extra continuous voyage of 9km at a most extreme speed of 6 km/hr.

Weijun TAO etal., (2016) "A Novel wheel-track half and half electric fueled wheelchair for stairs climbing", this paper going for proficient movement on the ground and safe stair moving for matured or physical handicapped individuals. Here they present the wheel-track half and half plan of the EPW with an attention on the mechanical structure and of installed control framework. At that point they talk about and dissect the haggle track versatile modes and their exchanging structure of the EPW. The utilization of the track versatile mode is for regularly ground surfaces.

The mechanical examination amid these two mode exchanging and in the procedure of ascending and down the stair are too introduced in the paper.

The incitement and exploratory outcomes demonstrate that the new wheel-truck half and half EPW can successfully lead the two velocity modes including ascending and down the stairs.

Abhishek K. Saw etal., (2015) "Writing Review on sunlight based fueled Tricycle for Handicapped individual", this paper gives the insights concerning the exploration papers related to the sunlight based power tricycle venture and incorporates the strategy and contemplations in regards to the correct working of the tricycle. The substance of this paper is sun oriented PV board, Brushless PMDC engine, charge controller and battery. This paper will talk about the fundamental thought of the part and here they thought about the extraordinary segment.

Subrahmanyam V etal.., (2015) "Manufacture of Triwheeled Electric Vehicle to Aid Disabled", in this paper to help debilitated individuals they displayed and created a tricar. This tri-vehicle is a three wheeled electric controlled vehicle with two seats one against other consecutive what's more, can suit two pillions and a drive. They at long last planned the vehicle to be moved by an electric center point engine mounted in the front haggle by 48V Lithium-particle battery.

III.MECHANICAL DESIGN

The development process includes an investigation of existing designs which are then ranked with a decision matrix. Following this is a discussion of the mechanical design of components that were manufactured for the uniCycle. These include the fork and spindle assembly, the main chassis, and the seat pole location.

The design process focused on achieving five key goals: ease of manufacture, optimal centre of gravity , durability, design flexibility and aesthetics. To achieve these goals the design process was an iterative process involving modelling the uniCycle, Cog analysis and a static structural analysis of the critical components to determine component dimensions and center of gravity of the uniCycle inclusive with rider

Several constrains were taking into account in the first phase of the mechanical design. They were:

A. Minimal and maximal distance
B. Weight
C. Moving ability
D. Power request

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IV. MECHANISM INVOLVED

While coming to this project two kinds of mechanism are involved they are

A. Steering mechanism
B. Latch-catch mechanism

Steering is the collection of components, linkages, etc. which allows any vehicle (car, motorcycle, bicycle) to follow the desired course. An exception is the case of rail transport by which rail tracks combined together with railroad switches (and also known as 'points' in British English) provide the steering function. The primary purpose of the steering system is to allow the driver to guide the vehicle.

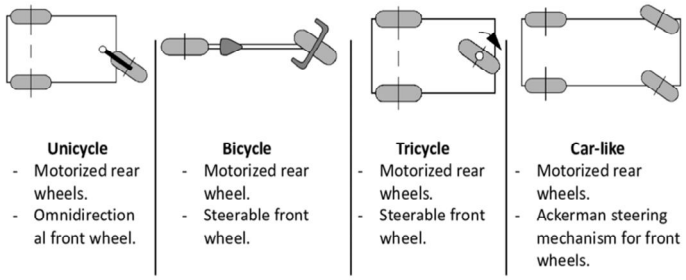


Fig. 1 Types of steering mechanisms

A latch is a very simple device that keeps a door or window closed. On a door, it is simply a sliding piece of metal or wood that slips into a slot, or even a piece of rope with a loop that can go over a small post. A lock needs a separate device (a key) that will unlock the lock.

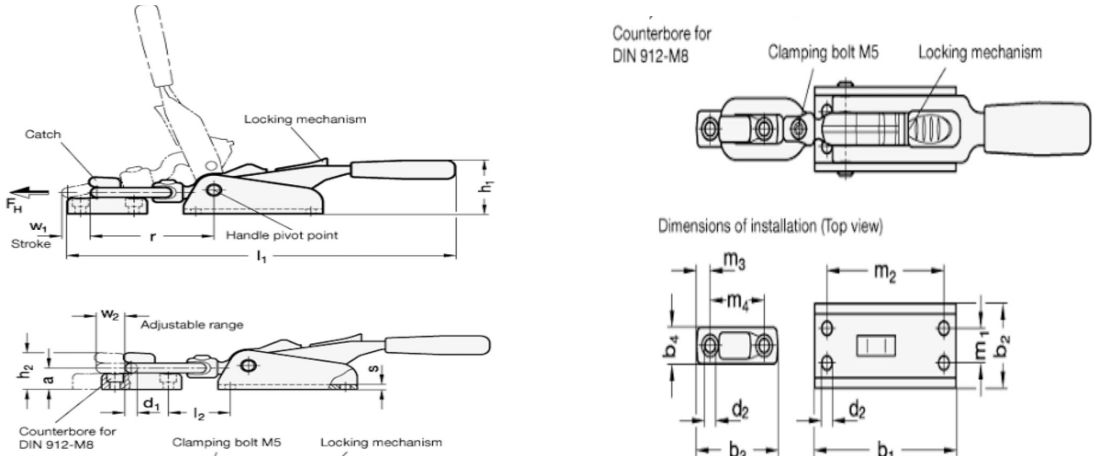


Fig. 2 Latch mechanisms

V. EXISTING UNI CYCLE

A unicycle is a vehicle that contacts the ground with just a single wheel. The most widely recognized variety has a casing with a seat, and has a pedal-driven direct drive. A two speed center point is industrially accessible for quicker unicycling. Unicycling is drilled expertly in carnivals, by road entertainers, in celebrations, and as a leisure activity. Unicycles have likewise been utilized to make new games, for example, unicycle hockey. As of late, unicycles have likewise been utilized in mountain unicycling, an action like mountain biking or preliminaries.

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TABLE I

S.No	Cycles
1	Freestyle unicycles
2	Mountain uni cycle
3	Trials uni cycles
4	Touring/Commuter unicycle
5	Standard racing unicycle
6	Flatland uni cycle
7	Giraffe unicycle

VI. CONSTRAINTS OF UNI CYCLE

This cycle depends upon size and need of the person it will wait strongly on the maneuverability of cycle and its dimensions. An ideal cycle should ;

A. It can drive upon any surface without any external person use
B. Have sufficient battery durability with stand long distance travel.
C. Be robust and reliable.

VII. CONCLUSIONS

The objective of this study was to design and develop a vehicle of highly compact to enter the building and structures like industries, Hospitals, indoor and outdoor place. The vehicle was made with light weight in order to increase its range and also to carry a better weight. The vehicle was built with a height as low as possible but the other factor, ground clearance is also considered for the suitability of Indian roads. A plat form was made in the vehicle so as the disabled persons survive with wheelchairs can also keep their wheelchairs comfortably. By wheel up or down they can accommodate in the vehicle easily without without dismount them. A prototype of this vehicle was designed fabricated and tested manually on the road.

We can say our project can be a success considering the changes we had to make in the spring once we actually found out how the unicycle. We can achieve our aims, and we believe that we have a system that will be effective in providing mobility for persons who have physically challenged. One of the major lessons we have learned is that designing an appropriate technology is huge challenge. Appropriate is more than just availability for replication, it considers longevity, reliability, and efficiency

A very important design goal of the unicycle systems is the adaptability to the physically handicapped persons. So, we had proposed a new design for unicycle. The major advantage is that it could be used in case of travelling of disable persons made an ease. Real prototype was developed to test the feasibility of this unicycle.

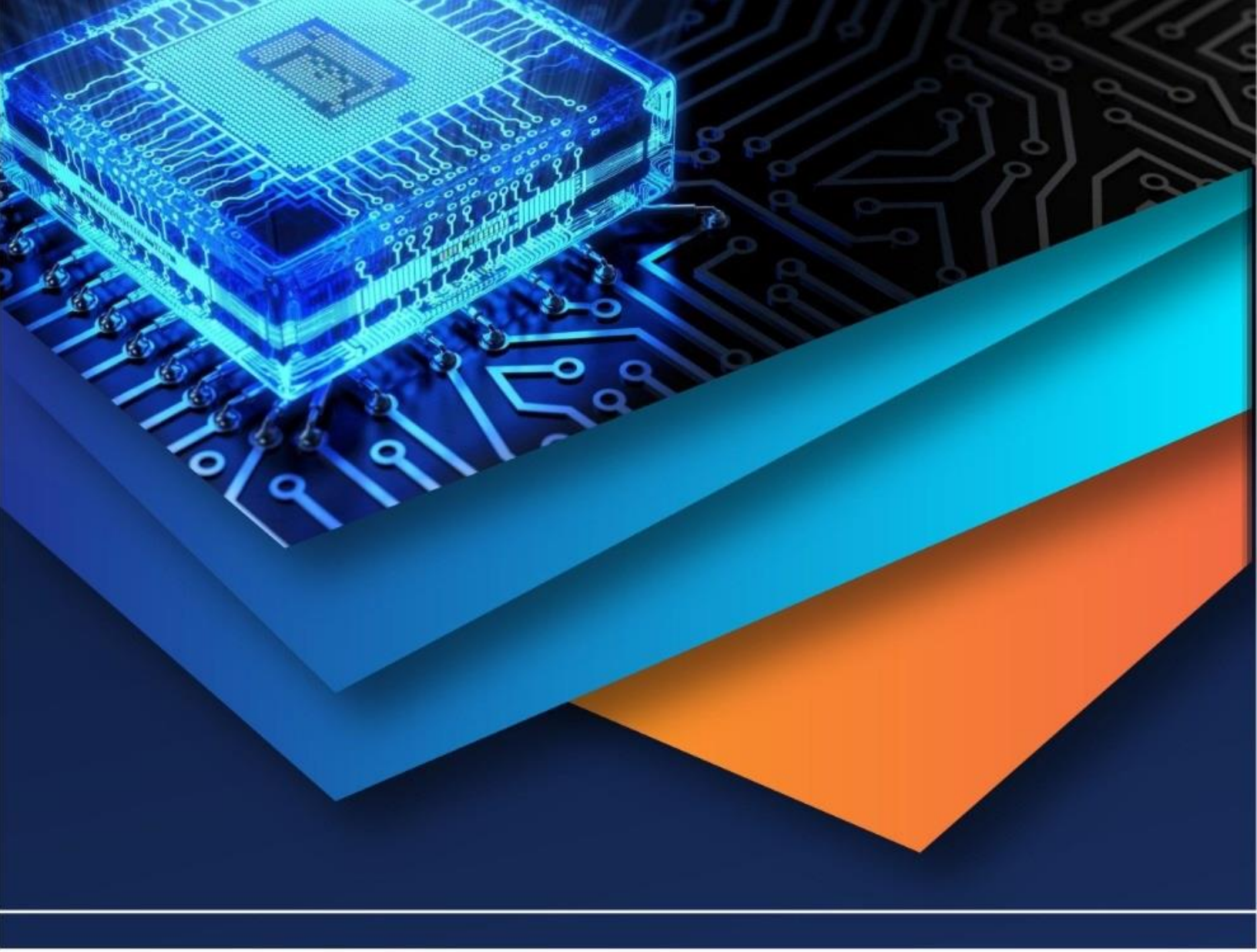
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