

Electric Wheelchair Hand Bike

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ABSTRACT

It consists of how the model is done of study of design of wheelchair attached electric hand bike that can be attached to manual wheelchair for better mobility on road. The hand bike consists of electric bike motor, rechargeable battery, a controller electric throttle, and mechanical brakes. As the team made this bike or mechanism from waste. The concept is best from waste, and is affordable for middle class peoples. The hand bikes are designed to be safe, light weight and aesthetic look. This electric hand bike can be easily detachable for wheelchair. This explains how an electric hand bike is made within limited budget for handicapped people. implementation of an electric wheelchair hand bike system tailored to augment the mobility and independence of individuals with disabilities. The technology is designed with great care to work smoothly with regular electric wheelchairs, giving users a simple hand-operated means of propulsion. For people with low upper body strength or mobility problems, the electric wheelchair hand bike offers a revolutionary alternative thanks to a rigorous design approach that promotes user-centricity, safety, and ease of use. By utilizing cutting-edge electric propulsion technology, ergonomic design concepts, and lightweight materials, the system enables effortless navigation through a variety of terrains and situations. Moreover, extensive user testing and iterations based on feedback provide the best possible functionality, convenience, and user happiness. The importance of cutting-edge assistive technologies in fostering inclusion and enhancing the quality of life for people with mobility problems is highlighted in this research.

Key Words: Electric Wheelchair, Electric Attachment, E bike, Eco-tricycle, Solar Wheelchair, front wheel power drive.

I. INTRODUCTION

When using a manual wheelchair for extended periods of time, disabled people frequently get shoulder pain as a result of using their upper limb muscles exclusively to guide the chair. The sprocket chain drive tricycle, which has been around for a number of decades and is still widely used in the Indian market, is also inappropriate since it requires physical labor, which is extremely uncomfortable for people with disabilities. A variety of electrical hand bikes have recently been introduced, with an easy-to-dock design that allows for easy mobility using the electrical system once docked. Some individuals with disabilities require medical attention, and in severe cases, surgical intervention. Once the connector is

easily installed, the mechanical loads are continuously applied to the sections connecting the manual wheelchair to the electric front wheel drive when traveling at a relatively high speed over different terrains. These applications help to reduce losses, and it is determined how the force that accumulates at the connecting parts as a result influences the structural integrity of the connecting parts. The goal of this study is to implement a three-dimensional dynamic model that can simulate a durability test through computational analysis. Additionally, by verifying the model through motion analysis, it will assess the dynamic structure stability of parts between manual wheelchairs and electric front wheel drives during durability experiments. Related research on this topic is still lacking. Firefly wheelchair bike with electric attachment Sherpa electric cycling bicycle.

II. WORKING

The electric wheelchair is a smooth mobility aid for people who are unable to walk, thanks to the harmonious interaction of complex mechanical, electrical, and electronic components.

The electric motor, which transforms electrical energy into mechanical force by using a rechargeable battery as power, is at the center of everything. This power is channeled through an advanced control system, typically operated by joystick controls or touchpad interfaces, which convert user input into exact commands for the motor, determining direction and speed. The wheelchair's drive train, which consists of gears, shafts, and other mechanical components, transfers power to the wheels based on the user's intention. This allows the wheelchair to move forward, backward, or make turns. The tires and wheels are carefully chosen for traction and stability, allowing for smooth mobility over a variety of surfaces. In the meantime, the sturdy chassis and frame maintain structural integrity, supporting the weight of the user while guaranteeing stability and comfort. In addition to providing additional user protection, safety measures including seat belts, anti-tip wheels, and braking systems also provide a safe and secure ride. Essentially, the electric wheelchair combines state-of-the-art technology with ergonomic design to enable those with mobility problems to move around with unprecedented flexibility and independence.

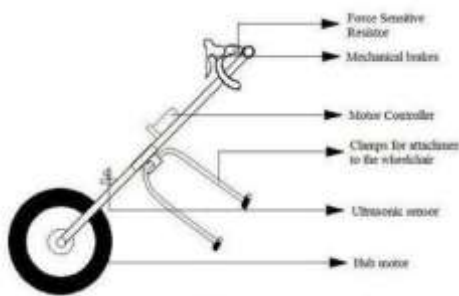


Fig.1 basic model of attachment

III. COMPONENTS

1. Brushless DC motor

This type of motor is often referred to as a BLDC or hub motor. They usually have several independent coils and an electrical circuit and are brushless motors. The motor spins because of the circuits that turn on and off the power in the coils, which generate force in each of them. A lithium-ion battery that can be recharged powers the electric motor.



Fig.2 BLDC motor

2. Motor Controller

The primary functions of the motor controller are heat, over-voltage, over-current, and hall sensor communication, as well as motor speed measurement and PWM output to the motor.



Fig.3 Motor Controller

3. Microcontroller

The ATMEGA32 microcontroller computes the analog input that must be supplied to the motor controller by analysing the inputs from the throttle, force-sensitive resistor, and ultrasonic sensor. The PWM duty cycle that is applied to the motor is determined by this analog input



Fig.4 microcontroller

4. Electric Throttle and Brake

The three connections on an electric throttle are a ground wire, a 5V supply, and an analog output that changes based on how much the throttle is turned. The motor controller provides the first and second connections, and the microcontroller's analog input is connected to the analog output. There is a 1V to 4V range in the analog output. The hub motor is attached to the mechanical brake.



Fig.5 Electric Throttle and Brake

5. Actual Image:



Fig.6 actual image

6. CAD Model:



Fig.7 CAD model of the wheelchair

In order to transform the wheelchair into a three wheeled bike that can be ridden without the

need for human assistance, the electric hand must be fastened to the wheelchair using an appropriate clamping mechanism. The wheelchair will be pulled by the arrangement at the necessary pace. The handle can be used to change the movement's direction. Wheelchairs can be used more conveniently indoors if the handle is removed from the system.

IV. CONCLUSIONS

As we are preparing the attachable electrical front wheel power drive for wheel chair, we faced certain problem. As the foreign companies are manufacturing it to their standards, they have the mass production in which they have proper machines with them to create mechanism for connecting the wheel chair with the hand bike. The team are creating it and manufacturing it to our standards with good quality of material. We have tried to match the standard with foreign companies. Main advantage is we have added another power source as solar energy, which also contributes to the increased operational range other than the reduction in operational cost. Along with that we have added the camber angles to the rear wheels of the wheelchair to solve the problem of toggle while taking sharp corners at higher speeds. The brakes are applied to the rear wheels to avoid the imbalance rather than the front brakes. The carriage is also attached to make it easier to carry the materials especially for the handicapped person. Now we will analysis that how companies can price their product (hand bike) and how can we manage to make or develop it at affordable price.

V. FUTURE SCOPE

1. Simple initial goal is, to convert the ordinary wheelchair in to composite electrical power wheelchair, Ability to convert the wheelchair into a performance-oriented tricycle for disable users without the need to get out of the chair.
2. Designing a proper clamping mechanism.
3. When mechanism is attached the front two wheels of wheelchair should be lifted up
4. Engagement & disengagement should be easy.
5. To increase the range of the operation using a alternative power source of solar energy.
6. Providing the mechanisms to avoid the issues of imbalance and the toggle.

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