

Fast Speed Driving Wheelchair

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Figure 7. Prototype of Fast Speed Driving Wheelchair (Extended)



Figure 8. Prototype of Fast Speed Driving Wheelchair (Folded)

INTRODUCTION

The fast driving wheelchair was designed to improve the wheelchairs used daily by people with lower limb disabilities. The design was made by combining the features of a tricycle and a wheelchair. Different from the currently existing designs for tricycles or wheelchairs, the fast driving wheelchair has a translating motion driving system, which would make users feel more comfortable to use. It has a convertible front wheel which can be shortened when the user drives it indoors. It is similar to a regular wheelchair when the front wheel is folded. However, when the user drives it outdoors and needs to ride a long distance, the front wheel can be stretched out, and the sprocket driving system enables a fast driving speed (up to 14 miles per hour). The fast driving wheelchair has a compact design, and its back can also be folded down. Since both the chair and front wheel are convertible, and they can be closed to reduce the carrying and storage space. It is possible to be carried and stored in a van. Besides that, a shock absorbing system was included in the design to ensure that the fast driving wheelchair has a strong anti-vibration ability. It has no problem to overcome any small obstructions on the road when it is under a high speed driving. In addition, the brake system helps the wheelchair stops quickly.

SUMMARY OF IMPACT

The statistics shows that 4.6% of the U.S. population has lower limb disabilities or impairments. These people rely on their wheelchairs for most of their daily activities. The current existing manual wheelchairs move slowly and require high effort from the users to drive and control, while electrical-driven wheelchairs are expensive. The design of the fast driving manual wheelchair provides an improved option to the wheelchair users, helping them move fast with low cost and improving their life quality.

TECHNICAL DESCRIPTION

With the fast driving wheelchair, the user pushes and pulls the hand bars to convert the arm power to mechanical power, which is more comfortable and requires less effort than directly rotating the rear wheels by hand. The compact size of the design ensures that the wheelchair can enter any daily used space and provide more convenience.

The front wheel can be extended out to make the whole wheelchair more stable when it is driven in a high speed on the road. The shock absorbing system increases the ability to overcome the bumps and small obstructions that often occur on the road.

The driving system consists of a 3-piece sprocket set, a 5-piece sprocket set and a chain. The 3-piece set was connected to the hand bar to mainly convert human power to mechanical power and rotate the sprocket systems. The 5-piece set was installed on the shaft of the rear wheel to rotate the wheel.

The front wheel, rear wheels and chair were connected by a T-shape structure made of ANSI 1020 steel.

The total material cost of the project is about \$650.

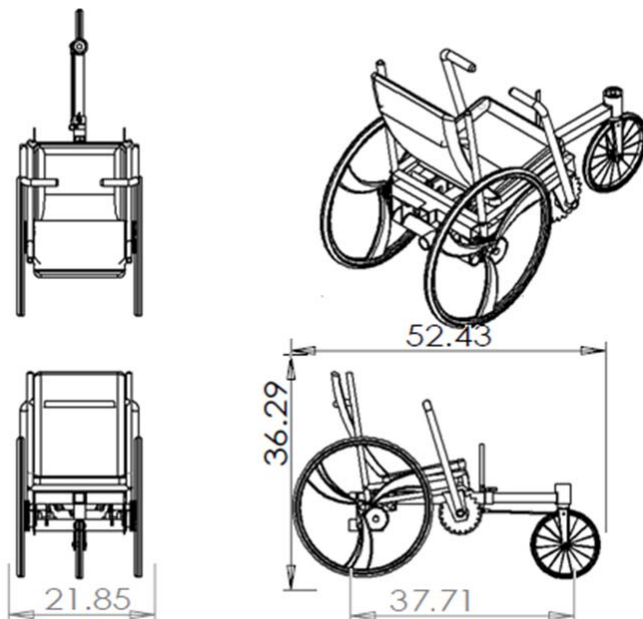


Figure 9. CAD Drawing of the Assembly of Fast Speed Driving Wheelchair