

One-Step-Climbing Manual Wheelchair

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Figure 7. Prototype of One-Step-Climbing Wheelchair

INTRODUCTION

The one-step-climbing manual wheelchair is engineered for handicapped people with lower limb disabilities. Sometimes wheelchair users have to find an alternative way or take a lengthy detour to proceed solely because of a curb. Curbs remarkably restrain wheelchairs' movement, and finding an alternative way is such a burden for the wheelchair users. In the market, there are power wheelchairs, which can climb curbs and even stairs. However, these wheelchairs are expensive and not portable, compared to common manual wheelchairs. Meanwhile, there are no manual wheelchairs which can climb a curb. This project designs a one-step-climbing wheelchair as a cost effective solution.

SUMMARY OF IMPACT

Wheelchair users always have a difficulty in mobility, especially when they are independently out in wheelchairs. For handicapped people with lower limb disabilities, the one-step-climbing manual wheelchair offers more mobility and adaptability to manual wheelchairs, and provides a cost effective option to wheelchair users, compared to power wheelchairs.

TECHNICAL DESCRIPTION

The one-step-climbing wheelchair consists of a front and a rear gear subsystem and a linkage subsystem. The front gear subsystem takes input power and transfers it to the rear gear subsystem by bicycle chains. A bicycle hub is used to transfer the input power to the wheels. The rear gear system transfers the power to the linkage system with a designed gear ratio. The linkage system plays a key role to overcome a curb. It has a slot path to relocate the wheel shaft

and also a hexagonal shaped shaft locker at the end of the slot path. It mainly reduces the force input by converting the user's weight to a torque on the wheel shaft. It also allows the user to put a portion of his/her weight over a curb prior to climbing and lock the wheel while climbing. Therefore, the wheelchair is able to climb a curb without electric power driving.

The cost of the parts and supplies for this project was about \$1500.

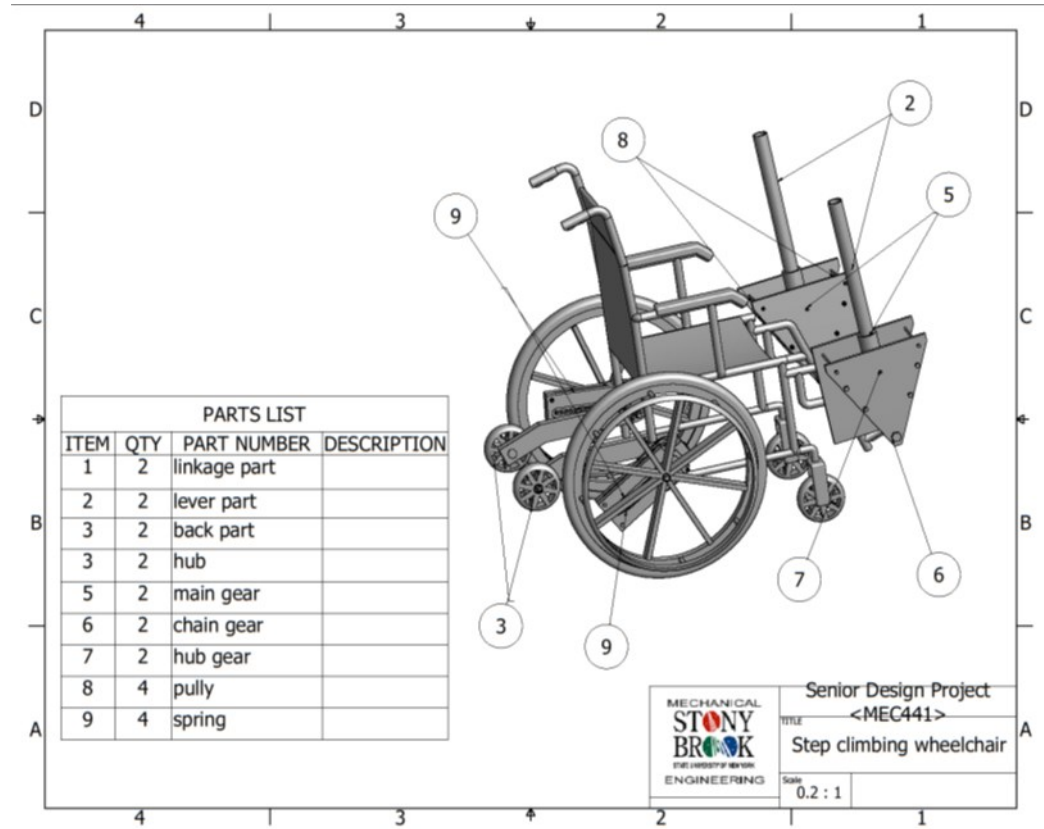


Figure 8. CAD Drawing of One-Step-Climbing Wheelchair