

Analysis of Mechanisms for Design of Add-On Device to Assist in Stair Climbing of Wheelchairs

Authors : Manish Kumar Prajapat, Vishwajeet Sikchi

Abstract : In the present scenario, many motorized stair climbing wheelchairs are available in the western countries which are significantly expensive and hence are not popular in developing countries. Also, such wheelchairs tend to be bulkier and heavy which makes their use for normal conditions difficult. Manually operated solutions are rarely explored in this space. Therefore, this project aims at developing a manually operated cost effective solution for the same. Differently abled people are not required to climb stairs frequently in their daily use. Because of this, carrying a stair climbing mechanism attached to the wheelchair permanently adds redundant weight to the wheelchair which reduces ease of use of the wheelchair. Hence, the idea of add-on device for stair climbing was envisaged wherein the wheelchair is mounted onto add-on only at the time when climbing the stairs is required. This work analyses in detail the mechanism for stair climbing of conventional wheelchair followed by analysis and iterations on multiple mechanisms to identify the most suitable mechanism for application in the add-on device. Further, this work imparts specific attention to optimize the force and time required for stair climbing of wheelchairs. The most suitable mechanism identified was validated by building and testing a prototype.

Keywords : add-on device, Rocker-Bogie, stair climbing, star wheel, y wheel

Conference Title : ICMEAM 2017 : International Conference on Mechanical Engineering and Applied Mechanics

Conference Location : London, United Kingdom

Conference Dates : April 24-25, 2017