Prototype of Wheelchair Seat Lifting Mechanism: Inclusion and Autonomy

Souza, Laura (School: Instituto Federal do Parana - Campus Londrina)
Pedro, Maria Luiza (School: Instituto Federal do Parana - Campus Londrina)

Observing the mobility difficulties faced by wheelchair users, it becomes evident that the wheelchair model is often inadequate in relation to the daily environment and the accessibility needs of the users. The fixed seat height limits independence, hindering access to shelves and the use of tables in domestic and academic contexts. In Brazil, the high cost of wheelchairs or wheelchair lift systems, coupled with the tax burden, transportation difficulties, and lack of accessibility in public spaces and buildings, compromises the quality of life of wheelchair users. Although there are wheelchair models that allow the person to be positioned upright and even raise the seat, these alternatives are inaccessible to a large part of the population. In this context, this work proposes the development of a small-scale conceptual prototype of a system that allows the seat of manual wheelchairs to be raised by means of an electromechanical drive. The system enables the vertical movement of the structural support assembly, including the backrest, armrests, and footrests, ensuring stability and safety for the user. Three small-scale prototypes were developed and evaluated for stability, electronic control operation, risk of falling on inclined surfaces, and maintenance aspects. Furthermore, in the maintenance analysis, priority was given to low-cost assembly solutions requiring minimal corrective interventions. The pantograph lifting system demonstrated the best performance due to its greater stability. The results indicate potential for future application in full-size wheelchairs, contributing to greater autonomy, mobility, and quality of life for users.

Awards Won: