

TITLE: Team Happy Trails – Off-Road Wheelchair Attachment

GOAL: The goal of this project is to build a device that will allow manual wheelchair users to access terrain not achievable in their current everyday chair, and increase opportunities for them to explore nature, interact with peers at camps and provide a resource for exploring their environments.



ABSTRACT:

Manual wheelchair users experience one of the highest levels of limitation of their daily activities due to the limit on the environments they are successfully able to explore. Because both functional and physical restrictions are present when using wheelchairs, it is often more difficult to propel and maneuver on various outdoor terrains, such as dirt, gravel, snow, and sand. Self-propelling is difficult for some users on flat, level surfaces as well, and although wheelchairs provide mobility for users with disabilities to ensure a better quality of life, their performance is limited on various terrains. To obtain a better understanding about how to modify wheelchairs to be used more in off-road environments, clinical information about the user's posture, propulsive patterns, and the limitations of existing wheelchair designs were taken into consideration. After brainstorming our ideas as a team, we narrowed our possible solutions and created a design matrix to evaluate which design would be best as scored on the evaluation criteria we established as most important for our design. After completion of our device, we evaluated it using multiple engineering and clinical tests. We measured a 54.5% total power reduction when our device was used over the different terrain. The users were able to attach and detach the device in less than a minute, and the device held up to 347 pounds. With this knowledge and the feedback we have received, we are currently pursuing a patent for our device