

The Mobility Platform

Project Description: The mobility platform was created by Capstone Team 125. It will serve as a device that allows the user to load a manual wheelchair onto the platform and then use a joystick to operate it as if it were a motorized wheelchair.



Project Scope:

- This project was designed for Kate Stribling, with the Portland Public School District, and Felicity Case, with Oregon Health & Science University (OHSU).
- The Mobility Platform will primarily be used as a form of physical therapy for students with low motor functions. Specifically, students with conditions such as Cerebral Palsy.
- The platform was a pre-existing device, constructed by previous Capstone teams. Our team's primary objective was to improve upon the existing design, and correct areas that were underperforming.
- The primary aspects of the device our team was instructed with modifying was the mechanical aspects. These aspects include: the platform's ability to safely and effectively traverse inclines, and the platform's handling.

Design Solution

Through the team's efforts the finalized design incorporated the aspects required in the project's scope, and provided an acceptable solution to the primary concerns with the initial platform. These concerns included the platform's ability to effectively traverse inclines, and consistency in its handling.

In order to accommodate each area of the scope, the team implemented new components to improve the handling and the platform's ability to maneuver inclines. To amend the issue with inclines, the team transitioned the platform from front to rear wheel drive. In order to provide improved handling, the team replaced the front caster wheels as well as the rear hub motors with new wheels that provided improved traction and torque, resulting in stabilized handling.

Design Development

- Replaced front caster wheels with new caster wheels that provided more tread on the tires resulting in improved traction. With this improvement, the team also drilled this new set of wheels directly into the platform to provide a sturdier alternative to the original setup.
- Transitioned the platform from front to rear wheel drive to allow for increased power and control during operation.
- Replaced the old hub motors with new hub motor wheels to provide improved traction as well as higher torque rates and higher supply voltage to produce higher power output.
- Altered the framing in the under portion of the platform to prevent the rear wheels from rubbing against the frame creating friction, ultimately causing the platform to stall during operation.

Project Status:

As of now, the project is finished in terms of its ability to operate, and the completion of the provided scope requirements. While operational, a few areas that could be improved upon have been provided below:

- Currently, the platform has sensitive joystick inputs, posing possible safety hazards due to jolting motions. For this reason, it would be ideal to have a team look at the code for the joystick, and implement an adjustment that provides a smooth rolling transition between each joystick motion without any delay in the system response.
- The braking on the platform could also use an adjustment, because right now when the platform accelerates it does not stop when the joystick returns to the center position, rather it comes to a rolling stop.
- The platform currently operates at a fairly decent speed, but it may be considered too fast for the intended use. For this reason, the team suggests that the speed be modified to accommodate a more user-friendly experience that ensures the safety of the user.
- A suggested mechanical improvement to the platform would be to implement a system that secures the manual wheelchair to the platform, because currently there is nothing preventing the manual chair from moving during operation.



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