

W.A.S.P

Wheelchair Adaptive Stability Project

Project

The main issue we addressed in our project is the one facing wheelchair users while traversing a steep incline or a ramp not in compliance with ADA standards. Without any corrective action to adjust the seat the user is placed at risk of falling out.

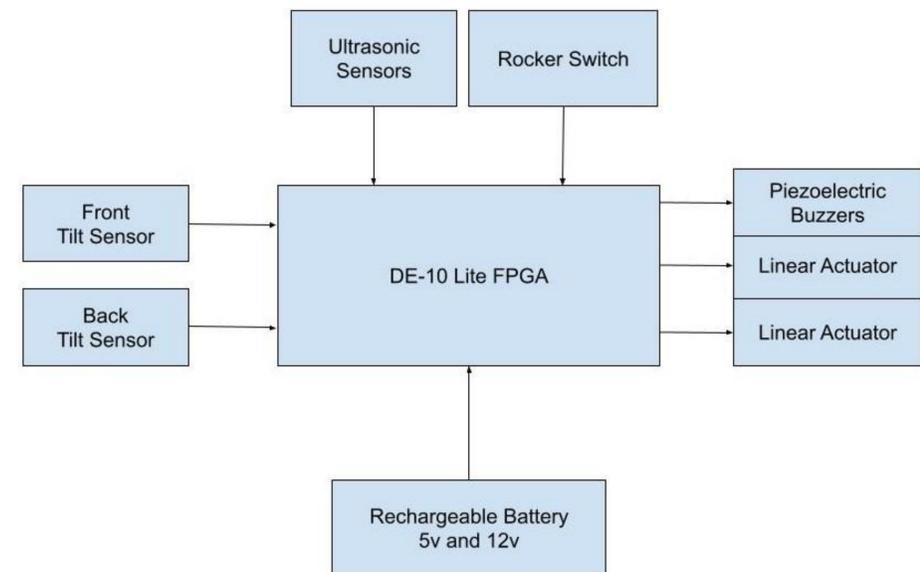
In addition, we wanted to address the challenge with seeing around the wheelchair. The limited mobility of wheelchair users can hinder their ability to see blind spots.

Objectives:

- Detect when a wheelchair seat is not level.
- Develop a system that can automatically adjust the wheelchair seat.
- Alert the user to people, pets, or objects within wheelchair blind spots.

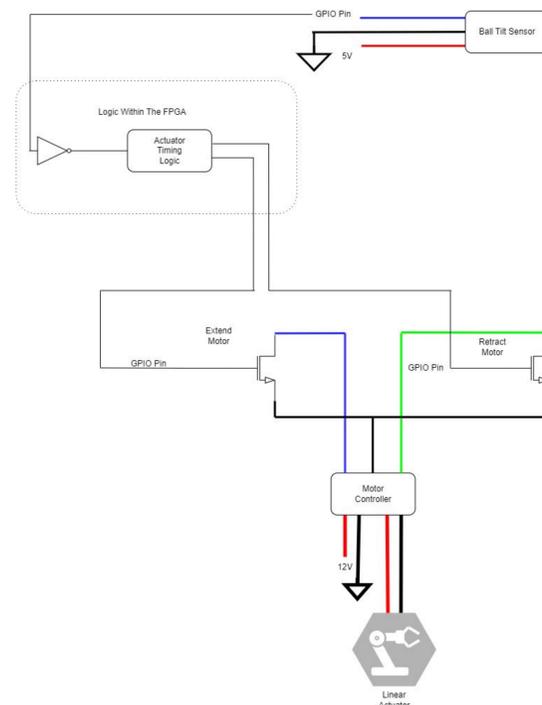


System



Methods

- Two linear actuators operated the recline buttons on the wheelchair.
- A 3D resin printed housing was installed to support the linear actuators.
- Two ball tilt sensors measured if the wheelchair seat was level to ground.
- A set of Ultrasonic sensors were added for object detection.
- An FPGA development board was used as the computational unit.



Conclusion

Our design proved effective at making automatic adjustments to the wheelchair seat. We also successfully demonstrated the blind spot alert system.

- Further research would be needed to enhance system precision and sensitivity.
- Overall, the results validate our design as a viable aftermarket product.
- Lesson learned:
 - Always have a backup plan in case the original idea falls through.
 - Leave plenty of time to resolve issues that come up during testing.
- Future development ideas:
 - Expanding the field of view for the blind spot alert system with more sensors.
 - Removing the need for linear actuators by wiring directly into the control panel.