ALL-TERRAIN, CUSTOMIZABLE WHEELCHAIR
FOR WHEELS FOR THE WORLD
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THE NEED

Wheels for the World, an outreach of Joni and friends, is attempting to provide a mobility option to individuals with disabilities around the world. Many people around the world suffer from a disability which renders them incapable of freely moving around their community. This lack of mobility causes adults to be unable to find employment and children to not have access to education. Individuals with disabilities are often seen as less valuable members of their society, deeply harming their sense of self-worth. Joni and Friends collects donated wheelchair parts, restores them, and sends them to people around the world who receive wheelchairs custom fit to their bodies and needs.

OUR GOALS

❑ Provide the gift of mobility to individuals around the world.

❑ Design a wheelchair that can be mass-produced by our client which costs less than $225 and is capable of rolling on a variety of surfaces, including dirt, grass, and gravel.

❑ Design for a person of 100kg (220 lbs) with a safety factor of 3.

❑ The design should be fully customizable for different users and easily collapsible for easy transportation when not in use.

❑ The wheelchair will be partially assembled in the United States and shipped as a kit to its location where the rest of the assembly will take place on site to allow for user customization.

❑ The redesign phase of the project addresses the feedback that the team received about the original prototype from Wheels for the World in the summer of 2018.

DESIGN CHANGES

BACK WHEEL
**Problem:** Wobbles when rolling at higher speeds.
Solution: New caster wheel with a different geometry significantly reduces wobbling.

ARMREST
Problem: User cannot easily transfer from another surface of similar height (bed, etc.) to the wheelchair because the armrest gets in the way.
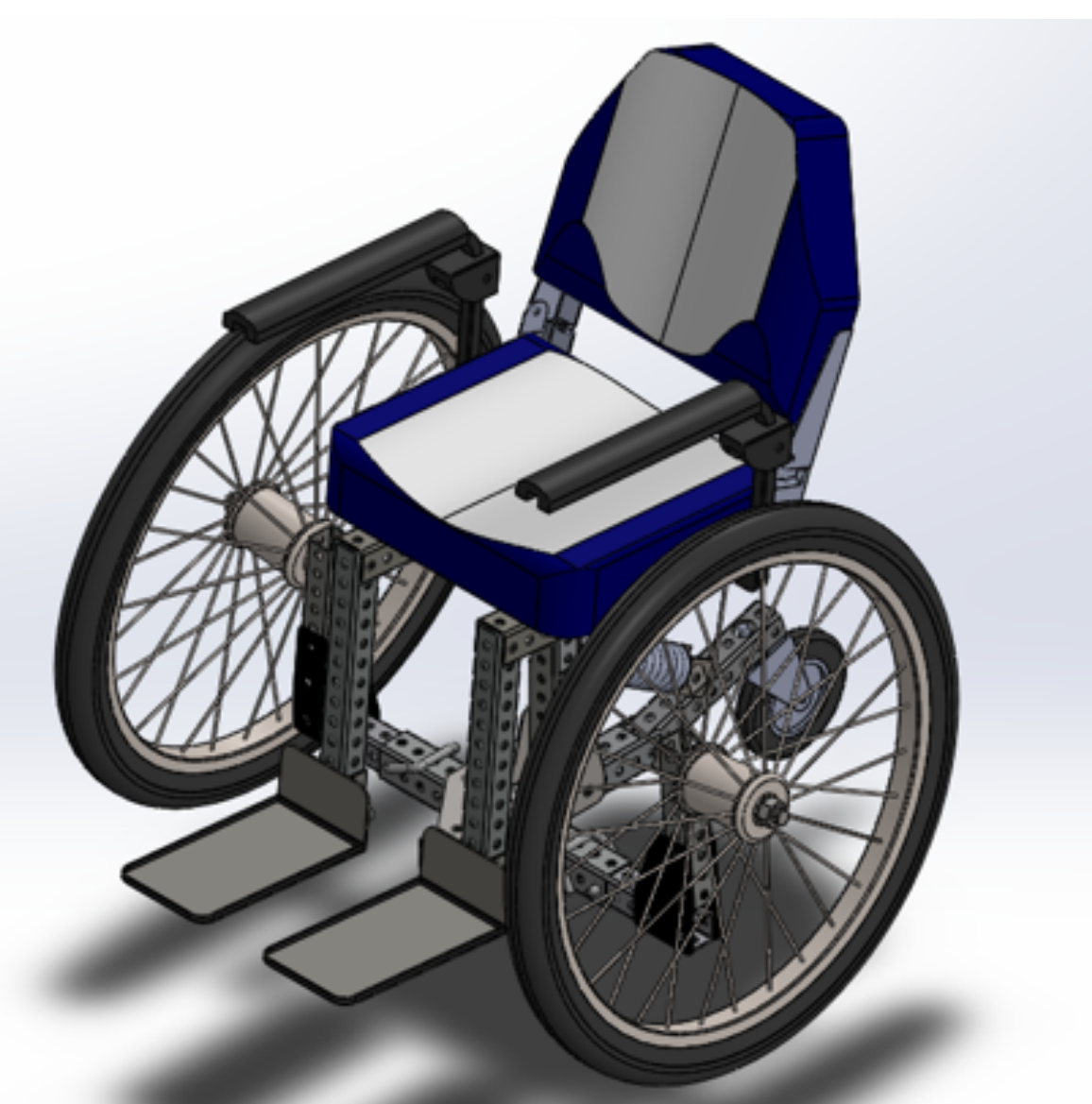**Solution:** Add a part that the armrest can easily slide in and out of to allow for removal.
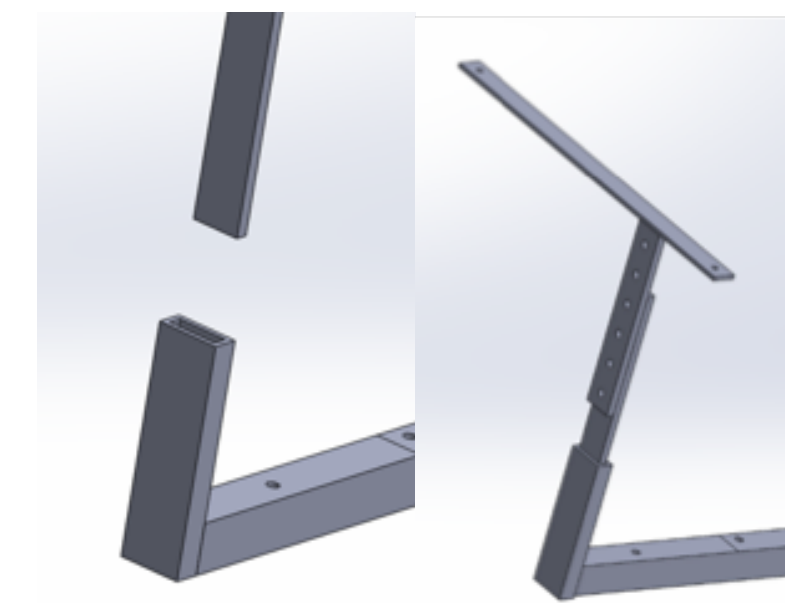
PUSH HANDLES
Problem: Needs push handles in the back for others to be able to push the wheelchair when necessary.
Solution: Will attach bike handles to the back.

Old Design   *New Design*

> "Do nothing out of selfish ambition or vain conceit. Rather, in humility value others above yourselves, not looking to your own interests but each of you to the interest of others."
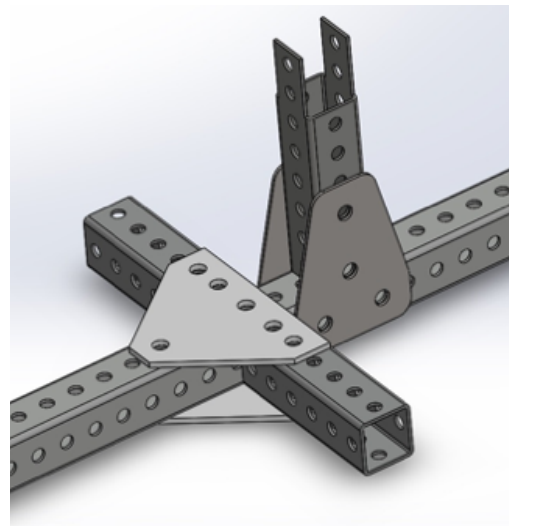> **Philippians 2:3-4**

DESIGN CHANGES

CROSS BRACE PLATE
Problem: Seat post moved forward to allow users to have better grip positioning on the wheels; needed to redesign a cross brace.
**Solution:** Redesigned a cross brace plate to meet the specifications of the original plate and work with the new design.

FOOTREST
Problem: Knees not bent at 90°, footrest gets in the way of mounting and dismounting.
Solution: New footrest is made of two pieces instead of one to clear a path in the middle. New footrest has more vertical and horizontal adjustability to ensure optimum leg placement.
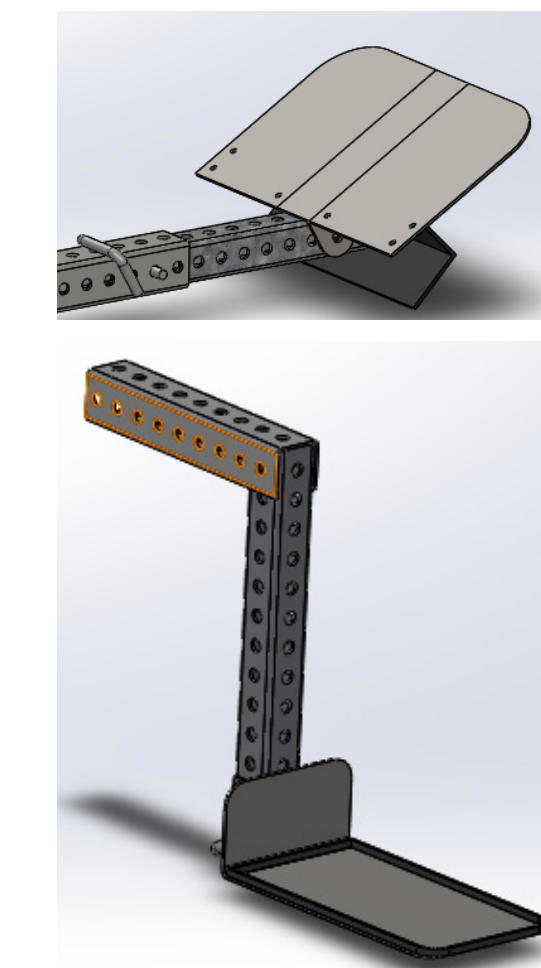
FRONT CASTER WHEEL
Problem: With the new footrest, there is nothing to stop to the wheelchair from tipping forward when stopping too quickly.
Solution: Add a caster wheel in front to minimize the tipping angle and allow the wheelchair to roll a little for a more comfortable stop.

RUST PREVENTION
Problem: Rust forming on the surface of the steel members
Solution: Applying an aerosol based rust prevention adhesive such as Rustoleum.

ACKNOWLEDGEMENTS

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