



Kirigami Wheelchair

Wheelchairs Advanced Manufacturing Assistive Technology Rehabilitation

Engineers at the Human Engineering Research Laboratories have developed a wheelchair from laser-cut and bent sheet metal that increases the quality and customization of wheelchairs, while lowering the cost.

Globally more than 75 million people need an appropriately fitted and affordable wheelchair, however 85-95% are using lower quality wheelchairs which are minimally customizable. These chairs tend to have poor ergonomics, which restricts people's function and results in high rates of injury. One reason that customized wheelchairs are so expensive is that they are typically made of metal tubes that must be bent and welded together by highly skilled welders or robots, which is very costly.

To reduce the cost of labor, we designed a manual wheelchair inspired by "kirigami," - a variation of origami in which paper is cut in addition to being folded. Instead of tubes, the kirigami wheelchair frame is made from sheet metal, which is laser-cut and then bent into shape using a press brake. To achieve efficient, low-cost customizability, the kirigami wheelchair uses an individual's ideal wheelchair dimensions, which are identified by clinicians during a wheelchair seating assessment, that can be input into computer software to automatically customize the wheelchair. The kirigami wheelchair's alternative manufacturing method could reduce the skilled labor and inventory needed to manufacture customized wheelchairs and could ultimately make higher quality wheelchairs available at a more affordable price.

Applications

- Wheelchair users in the U.S. (Medicare, Medicaid, Veterans Affairs)
- Wheelchair users in low and middle-income countries

Advantages

- Lightweight and ergonomic for improved comfort and mobility
- Parameterized for easy customization
- Can be riveted, bolted, glued or spot welded
- Reduced skilled labor and inventory
- Can be folded flat packed for shipping

Invention Readiness

The invention is in the prototype and development stage. A functional prototype has been developed, but the researchers will be iterating on this prototype prior to conducting wheelchair standards testing.



IP Status:

Patent Application No.
PCT/US2023/027233 was filed on
July 10, 2023

Inventor(s):

Rory Cooper
Garrett Grindle
Ian Eckstein
Benjamin Gebrosky

Joshua Kanode
Jonathan Duvall
Rosemarie Cooper
Jessica Steinberg

Related Publications:

Not Applicable



**For licensing
interest contact:**

University of Pittsburgh
Office of Innovation and
Entrepreneurship

partner@pitt.edu