

'Smart' leg mobility device could provide hands-free, comfortable, effective alternative to conventional crutches

March 23 2017



Brett Adams, a graduate of Purdue's School of Mechanical Engineering, tests the Clutch Crutch, a hands-free, comfortable and potentially more effective alternative to traditional crutches. The device, developed by Adams and several other Purdue graduates, could provide an ergonomic and natural way to assist in the rehabilitation process for those with lower leg injuries, such as a sprained or broken ankle, an Achilles tear or a fractured or broken foot. Credit: Brett Adams

Individuals with lower leg injuries could soon be saying goodbye to traditional crutches with the development of a hands-free alternative that is more comfortable and potentially more effective. The device, developed by Purdue University graduates, could provide ergonomic and natural movement and transmit real-time recovery data to physicians.

"Six and a half million people in the U.S. today use devices such as wheelchairs, walkers, crutches and canes. Traditional crutches are the most common device used for rehabilitation in lower leg injuries," said Nikko Sadural, the device co-inventor. "Crutches pose several limitations such as user difficulty on stairs, nerve ending damage under the arm, and no access to hands and arms to complete daily tasks. A more user-friendly, comfortable and effective option is needed."

The device, named the Clutch Crutch, attaches to the user's upper thigh and straps around the foot and ankle to provide hands-free support. The device could be used for injuries such as a sprained or broken ankle, an Achilles tear, fractured or broken tibia or fractured or broken foot. In addition to Sadural, co-inventors are Brett Adams, Andrew Fan, Jeffrey Cargill, Sameer Saiya and Junyan Lim, all graduates of Purdue's School of Mechanical Engineering.

"The Clutch Crutch provides great ergonomic and natural movement while keeping pressure away from the injured part of the leg. It also allows the user to retain upper leg strength and knee joint movement," Adams said. "The device is adjustable for different heights and has a gas spring that absorbs shock so there is no immediate force on the leg. These features combined provide a more effective gait for the user."

Adams said the Clutch Crutch provides other benefits.

"We included memory foam cushioning pads under the quad and on the foot holder so there is minimal user discomfort," he said. "The Clutch Crutch is very modular, allowing users to go on different terrain such as flat ground, cement, grass and things like stairs. This device is designed to fit varying heights, weights, shapes and lifestyles."

The Clutch Crutch could also become a 'smart' device with the addition of sensors and an app, Fan said.

"We want to bring the Clutch Crutch into the 21st century, so we embedded sensors to measure the force as the user walks," he said. "All the data can be transferred to our app, which is named 'recovr'. We can use this to really modernize the doctor-patient relationship and allow doctors to monitor the user's progress in real time during recovery."

The team is seeking partnerships or licensees to develop an updated prototype.

"We had a prototype that we tested with users and did simple force analysis on the device. The results were very promising," Fan said. "In the future we plan to develop a new device that is much lighter than the previous prototype. We also plan to research the extended use of the [device](#) and how it can affect users, their gait and recovery, and the general wear and tear of the product. Finally we will polish the

movement and design, minimizing setup and increasing adjustability, efficiency and safety."

More information: The Purdue Research Foundation's Office of Technology Commercialization has patented the technology, and it is available for license. For information call 765-588-3470 or email innovation@prf.org.

Provided by Purdue University

Citation: 'Smart' leg mobility device could provide hands-free, comfortable, effective alternative to conventional crutches (2017, March 23) retrieved 24 April 2024 from <https://phys.org/news/2017-03-smart-leg-mobility-device-hands-free.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.