

SmartCane: Sensing and Providing Biofeedback at Target Axial Load

Smart Cane is a technology that offers assistance and feedback to cane users for proper, long-term use. This is designed to provide real-time biofeedback via a vibration based on the patient's body weight support on the cane.

What is the Problem?

The prescription of a cane is a common treatment method for patients with knee osteoarthritis. Cane use can reduce medial knee load during gait and, when used in the contralateral hand, has been shown to reduce Knee Adduction Moment (KAM) by an average of 10%. In addition, a recent study showed a direct dose-response effect between cane loading and KAM; as cane loading increased to 20% body weight the KAM decreased. This study confirmed that reduced knee loading is only achieved when sufficient body weight loading of the cane occurs. With proper loading, cane use has been shown to reduce knee pain and improve function in osteoarthritis patients, but the majority of cane users do not receive instruction on how to most effectively use a cane to unload their knee joint. A recent study found that a majority of cane users in a senior living community self-prescribe their canes and most receive no education or demonstration from medical professionals as to its proper use. Proper cane use is not intuitive and users sometimes fail to even use the cane in the proper contralateral hand without instruction. A simple and intuitive over-the-counter solution facilitating proper long-term cane use and loading is needed.

What is the Solution?

The solution, Smart Cane, is designed to help people with knee OA reduce their medial knee joint loading. The Smart Cane uses real-time biofeedback to guide the user to apply the correct amount of body weight support on the cane. The Smart Cane can be programmed to vibrate (sounds and lights are other feedback modalities) once the user achieves a particular percent body weight support through the cane. In this way, the cane user can be instructed to simply load the cane until they feel the vibration in the cane handle. The vibrational feedback informs the user that they have achieved the desired cane body weight support.

What Differentiates it from Solutions Available Today?

Existing canes do not offer feedback during use and are often self-prescribed. This means that many patients are not trained in how to use a cane. This results in improper cane use, and continued knee issues. The goal of the Smart Cane is to help users use a cane properly and consistently over the long-term. This could result in greater, more consistent, and more

Technology ID

BDP 7365

Category

Device/Other
Selection of Available
Technologies

Authors

Patrick Aubin

Learn more



accurate cane loading and thus reduce knee loading as compared to a conventional cane.

Patent Information:

[US10849395B2](#)

References

1. Evan Schuster, Rebecca L. Routson, Mason Hinchcliff, Karley Benoff, Pradeep Suri, Chris Richburg, Brittney C. Muir, Joseph M. Czerniecki, and Patrick M. Aubin(44197) , <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9027918/>, J Biomech