

Visual control of skilled walking in people with spinal cord injury

The Human Locomotion Research Laboratory is located at the International Collaboration on Repair Discoveries (ICORD) in Vancouver, Canada. ICORD is an interdisciplinary center part of the **University of British Columbia** and the Vancouver Coastal Health Research Institute. They are dedicated to research on the development and translation of strategies to promote prevention, functional recovery, and improved quality of life for people with spinal cord injury (SCI). Spinal cord injury is a devastating injury that leaves individuals with complete or partial paralysis. The majority of individuals with partial paralysis have the possibility to improve walking function, especially with intensive rehabilitation training. In their laboratory, they aim to create new innovative strategies that will result in long-lasting improvements in walking function following SCI.

PROBLEM DEFINITION

Most current therapeutic strategies to improve community ambulation following SCI have focused on improving walking for endurance and distance. But everyday mobility requires us to engage more skilled walking ability so that we can maneuver around and cross obstacles. Our ability to successfully navigate everyday environments relies on visual input. At the same time, excessive reliance on visual input during walking could limit the functionality of locomotion, e.g. the ability to walk and talk at the same time. In order to further understand the impact of

neurotrauma on functional walking ability, one of the objectives is to understand how people with SCI use vision during obstacle crossing.

WHY ERGONEERS?

For the project, it was critical that participants were able to walk and cross obstacles with an eye-tracker. Given the nature of SCI, it was imperative to obtain a mobile eye tracker that was light and wearable for people with SCI. Walking for people with partial paralysis is already very effortful. ICORD did not want to add to this effort by equipment that added substantial weight to the body. The Dikablis Mobile Eye-Tracker was advantageous in that it is light, easy to wear, and comfortable. Indeed, all of the research participants were comfortable wearing and walking with the eye-tracker.

RESULT

The results showed that people with SCI rely more heavily on vision when crossing obstacles during walking, indicated by the greater number of gazes towards, and more time spent looking at, the obstacle. The ability to determine these results heavily relied on the Dikablis' consistent ability to accurately represent the pupil throughout the walking trial. The new Measure- and Analysis software platform D-Lab made it easy to collect and analyze the data, particularly with the

updated pupil recognition system in the newest software version.

This new version allows to accurately detect pupils with minimal manual adjustments.

This is a critical step in collecting accurate, usable data. The ability to collect and analyze the data in the same software also enhanced the efficiency of our experiments. Importantly, you could monitor the experiment online to ensure that the trials were properly recorded. The analysis software also made it easy to create areas of interest within the environment to calculate the necessary gaze parameters.

“The Support Team at Ergoneers was a major factor in our decision to buy the Ergoneers product,” says Tania Lam, Associate Professor at the University of British Columbia. “Considering that we did not have any previous experience in studying gaze behavior, we were grateful for the excellent support provided by the Ergoneers Support Team.”

“Even after the initial on-site training, we could always rely on the prompt attention of the Support Team to assist us through the planning, collection or analysis phases of our project, via email or by remote accessing of our computer,” says Dr. Lam’s PhD student, Raza Malik. “With their help we were able to quickly resolve any questions or issues that we faced.”

ABOUT ERGONEERS

Ergoneers GmbH was founded in 2005 as a spin-off from the faculty of Ergonomics at the Technical University of Munich. Today the company has a worldwide presence through three offices in Manching (Germany), Geretsried (Germany) and Portland (USA) and through global sales partners; serving the Transportation / Automotive, Market Research & Usability, Science and Sports / Biomechanics application areas.

In addition to development, manufacturing and distribution of measurement & analysis systems for behavioral research and optimization of human-machine-interaction, Ergoneers also offers comprehensive expertise in each phase of your study.

The product portfolio primarily comprises of the 360-degree solution - D-Lab; an extensive software platform for capturing and analyzing human behavior. With its different software modules you can synchronously measure and analyze eye tracking, data stream, video, audio, physiology and CAN-Bus data. With the Dikablis Eye-Tracking system, Ergoneers provides the best hardware for professional Eye Tracking studies in real or virtual environments.