

Dan Ferris, Ph.D.

Human Neuromechanics
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Research Interests

- **Neuromechanical control of locomotion**
- **Gait rehabilitation**
- **Biorobotics**
- **Neural engineering**

Prof. Ferris' research focuses on how the nervous system and musculoskeletal system interact to produce coordinated movement, specifically locomotion. Using a combination of techniques from engineering mechanics, neurophysiology, and non-linear dynamics, he studies both basic science and applied health issues. Some of the fundamental questions his research addresses include:

- How flexible are the neural networks that control human locomotion?
- Do the brain and spinal cord let the natural dynamics of the limbs determine movement patterns?
- Can powered exoskeletons reduce the metabolic cost of human walking?
- Can we use robotic exoskeletons or devices to improve gait rehabilitation after spinal cord injury?

The common goal of his research is to discover general principles of locomotor control and apply them to improve human health. Prof. Ferris directs the **Human Neuromechanics Laboratory**. Projects in the laboratory include designing pneumatically powered lower limb exoskeletons, constructing computer simulations of neuromechanical systems, and devising new neurorehabilitation strategies and exercises.

Education

- B.S., Mathematics Education, University of Central Florida, Orlando, FL
- M.S., Exercise Physiology, University of Miami, Florida
- Ph.D., Human Biodynamics, University of California, Berkeley, CA
- Post-doc, Neurophysiology, University of California, Los Angeles, CA
- Post-doc, Bioengineering, University of Washington, Seattle, WA

Prof. Ferris' cross-disciplinary approach to scientific research is reflected in his diverse academic background. He completed his doctoral studies in biomechanics at UC Berkeley and has served as a post-doctoral researcher in the UCLA Department of Neurology and the University of Washington Department of Electrical Engineering. While at UCLA, Dr. Ferris worked on clinical research testing new rehabilitation techniques for individuals with spinal cord injuries. Patients were supported in modified parachute harnesses while physical therapists helped move their limbs on a treadmill. He later moved to Washington in order to begin work on robotic devices to assist this type of gait rehabilitation. He has been at the University of Michigan for eight years and is currently an Associate Professor.

Teaching

Prof. Ferris teaches an undergraduate course, Biomechanics of Human Movement (MOVESCI 330), once per year. He also alternates between teaching a graduate course, Neuromechanics (KIN 533/BME 533), and an upper division undergraduate elective course, Biomechanics of Human Locomotion (MVS 435/KIN 435), every other year.

Grants and Publications

Prof. Ferris has received research grants from the National Institutes of Health, NASA, the Christopher Reeve Paralysis Foundation, the Paralyzed Veterans of America Spinal Cord Research Foundation, and the National Science Foundation. A full list of downloadable publications is available on the Human Neuromechanics Laboratory [publications page](#)

Full Curriculum Vitae

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