

Bradley D. Hatfield, Ph.D.

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My research team investigates exercise and sport psychology issues from a cognitive neuroscience or biological psychology perspective. We focus on 1) health-related issues such as the effect of exercise on the aging brain and the protective effects of physical activity on brain processes that underlie memory and executive function. An important question is whether the neurobiological benefits of exercise are more prominent in those individuals who are genetically at risk for dementia and Alzheimer's disease. The research team also addresses 2) issues related to human performance in order to understand critical brain processes underlying superior cognitive-motor performance, how emotion alters the brain and the quality of performance, and the management of stress in high-performance individuals such as competitive athletes and specialized military personnel.



Amy J. Haufler, Ph.D.

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My research focus on the psychology of human physical activity, performance-related research examines the mechanisms underlying the continuum of skill acquisition and performance (novice to expert), strategies to optimize and accelerate skill learning and the role of stress in skilled performance. Health-related research examines the role of physical activity and health status on cognitive performance across the lifespan. Specifically, the role of physical activity, motor skill, and cognition in school-aged children and the aged are of particular interest.

Jose L. Contreras-Vidal, Ph.D.

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I integrate neuroimaging, behavioral and computational neuroscience methods to study the neural mechanisms and computational principles underlying adaptive sensory-motor control in humans during normal and neurological conditions across the life span.



Another research aim is to transfer relevant biological principles (hardware and algorithms) to the design and development of cognitive-motor architectures and Brain-Computer Interfaces for rehabilitation and enhanced reality applications.

Cognitive Motor Neuroscience

Jane E. Clark, Ph.D.

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My current research focuses on the developing relationship between perception and action in infants and young children. Postural and reaching tasks provide experimental windows for probing what develops as motor control and coordination improve. In addition, we are studying children with Developmental Coordination Disorder (DCD) and their ability to adapt their movements to changes in the environment and to different tasks.



John J. Jeka, Ph.D.

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My research aims to bridge the basic and applied science underlying balance control. Postural control mechanisms are studied with virtual reality techniques which allow precise control of vestibular, proprioceptive and tactile inputs to uncover the properties of multisensory fusion. Computational methods combine mechanisms of multisensory fusion with biomechanical investigations of multilink



body dynamics to develop new techniques and assistive devices for treatment of patient populations with balance disorders.

Timothy L. Kiemel, Ph.D.

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My research focuses on mathematical modeling of the postural control system for standing and walking. My emphasis is on models that illuminate key aspects of postural control such as multisensory fusion and feedback control. The development of models uses system identification, in which empirical data is used to directly develop and test models, and concepts from control theory, such as optimal state estimation.

Jae Kun Shim, Ph.D.

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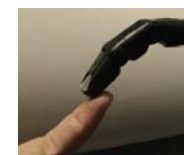
Our research is currently focused on neuromechanics of (1) hand and digits and (2) running of persons with lower extremity amputations as well as their applications to medicine, rehabilitation, and ergonomics. We use techniques of biomechanics, motor control, neurophysiology, and exercise physiology: kinematic analysis using motion capture systems, kinetic/dynamic analysis, neuromuscular training, TMS, EMG, MEG, MRI, optic fiber Bragg grating (FBG) force sensors, 6-D kinetic pen, cardiovascular exercise, neuromuscular training, epidemiology, etc.



Marcio A. Oliveira, Ph. D

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My research focuses on examining developmental changes in the neuromechanic variables as motor control develops. Specifically, I am interested in the neuromuscular factors affecting hand strength and finger force control in typically developing individuals and those with neurodevelopment disorders. Current research projects have examined age-related changes and effects of multi-digit tasks experience to understand the underlying deficits in children with Developmental Coordination Disorder (DCD).



Rodolphe Gentili, Ph.D.

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My research focuses on the investigation of functional non-invasive brain biomarkers, which assess the level of cognitive-motor performance and learning when humans interact with new dynamics or kinematics tools. Another aspect of my research is to develop bio-inspired control systems able to learn to manipulate anthropomorphic robot limbs (arm/finger), while at the same time incorporating the main biomechanical features of human movement. These two research fields contribute to the development of next generation smart prosthetics.

Research Group

Jane E. Clark, Professor
Ph.D in Motor Development
University of Wisconsin, Madison, 1976

Jose L. Contreras-Vidal, Associate Professor
Ph.D in Cognitive & Neural Systems
Boston University, 1994

Rodolphe Gentilli, Research Assistant Professor
Ph.D in Sciences and Techniques of Physical Activities and Sport
University of Burgundy, 2005

Bradley D. Hatfield, Professor
Ph.D in Exercise and Sport Psychology
Penn State University, 1982

Amy Hafler, Research Assistant Professor
Ph.D in Exercise and Sport Psychology
University of Maryland, 1997

John J. Jeka, Professor
Ph.D in Psychology
Florida Atlantic University, 1992

Tim Kiemel, Research Assistant Professor
Ph.D in Applied Mathematics
Cornell University, 1990

Marcio A. Oliveira, Research Assistant Professor
Ph.D in Motor Development and Motor Control
Federal University of Rio Grande do Sul, Brazil, 2003

Jae Kun Shim, Assistant Professor
Ph.D in Biomechanics and Motor Control
Penn State University, 2005

Related Graduate Programs

Neuroscience and Cognitive Science
www.nacs.umd.edu

Bioengineering
www.bioe.umd.edu/

Cognitive Motor Neuroscience

The Cognitive Motor Neuroscience Research Group focuses on behavioral, neural, mechanical, and higher-level mechanisms underlying the selection, planning, learning, initiation, and execution of movement. Using an interdisciplinary approach, these processes are studied from infancy to the end of the lifespan, and in health and disease. Research programs in the laboratory include adaptive sensorimotor control and integration, exercise psychophysiology, perceptual motor development, movement disorders, computational motor neuroscience, smart neuroprosthetics, and neuromechanics. Our research programs are funded by National Institute(s) of Health (NIH), National Science Foundation (NSF), Defense Advanced Research Projects Agency (DARPA), Army Research Office (ARO), and other industrial companies. The Laboratory also has a Cooperative Research and Development Agreement in place with the Army Research Laboratory (Human Research and Engineering Directorate) located at the Aberdeen Proving Ground, Aberdeen, MD

Graduate Studies

We are looking for excellent and highly motivated graduate students to apply to our program and join our research teams.

Our admission requirements are at least an undergraduate GPA of 3.0, strong GRE scores, and excellent recommendations.

Graduate teaching assistantships, research assistantships, and fellowships are available for outstanding students.

Contact Information

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