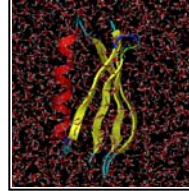
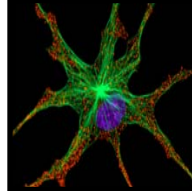
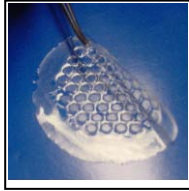




THE CENTER FOR BIOMEDICAL ENGINEERING SYSTEMS

at the University of North Carolina at Charlotte



The complexity of current issues in biomedicine requires collaborative and interdisciplinary efforts to make optimal advancements. At the University of North Carolina at Charlotte (UNC Charlotte), the **Center for Biomedical Engineering Systems (CBES)** was established in 2005 to address complex problems in healthcare through partnering academic researchers, clinicians, and industry. CBES research spans a number of applications ranging from the design of surgical devices; to engineering tissue and organ replacements; to computational and bioreactor systems for the design of pharmaceuticals.

CBES LEADERSHIP TEAM

CBES Director: Dr. Robin Coger (CBES@uncc.edu)

CBES Business Manager: Marvaleeta Blye (mmblye@uncc.edu)

CBES Focus Area Leaders:

Medical Therapies and Technologies: Dr. Charles Lee (cyclee@uncc.edu)

Molecular Engineering and Design: Dr. Donald Jacobs (djacob1@uncc.edu)

Biomechanics and Mobility Research: Dr. Richard Peindl (Richard.Peindl@carolinashhealthcare.org)

For additional information about CBES, please contact us:

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Affiliated Researchers – Medical Therapies & Technologies (MTT) Focus Area



Mark G. Clemens, Ph.D.
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 704-687-8682

CBES Area of Expertise:

Regulation of liver microcirculation, hepatic metabolic response to infection, application of imaging techniques to research in biology and engineered liver support systems.

CBES Area of Interest: Regulation of liver microcirculation: Role of stress-inducible vasoactive mediators (endothelin, nitric oxide synthase, heme oxygenase) in altering vascular responsiveness in the liver following oxidative or inflammatory stress. Mechanisms of control of sinusoid perfusion by hepatic stellate cells, especially related to components of phenotypic transformation in response to injury. **Hepatic metabolic response to infection.** Mechanisms of altered carbohydrate metabolism during sepsis, especially related to differentiation between inflammation-induced changes in gene expression and perfusion supply/demand ratio as mediators of decreased gluconeogenesis. **Application of imaging techniques to biological research.** *In vivo* video microscopy for study of liver microcirculation; application of quantitative fluorescence techniques to monitoring of cellular processes in intact organs or *in vivo*. **Engineered liver support systems:** Bioengineering Research Partnership.



Robin N. Coger, Ph.D.
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CBES Area of Expertise:

Design and testing of novel tissue bioreactors (e.g., liver); liver tissue engineering; cryopreservation; computational analysis of oxygen & heat transport within *in vitro* systems.

CBES Area of Interest: Dr. Coger's laboratory at UNC Charlotte is focused on solving a range of problems related to bioartificial liver devices. Such devices are targeted for clinical use as a bridge to transplantation, and for pharmaceutical testing of drugs that impact the liver. Through our research we are able to improve the design of these devices, how well they function, and methods for storing them safely. Furthermore, many of the innovations we develop are applicable to the engineering of other tissue and organ systems.

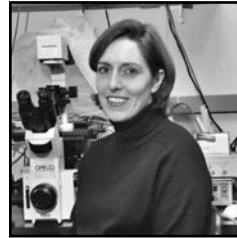


Didier Dréau, Ph.D.
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 704-687-8314

CBES Area of Expertise:

Modeling of solid cancer progression and metastasis; testing of specific targets associated with the angiogenic and immunologic mechanisms critical to tumor growth; optimization of drug delivery to prevent tumor progression.

CBES Area of Interest: My lab interests are centered on the biology of tumor metastasis. Specifically, we study tumor cell migration, the influences of the tumor microenvironment and the rate of metastasis. We seek to better understand key steps associated the cancer progression and develop diagnostic and prognostic tools to improve patient care. To successfully achieve the long-term objectives, my research team is involved in ongoing collaborative efforts involving multidisciplinary teams including clinicians, biologists and engineers.



Gloria D. Elliott, Ph.D.
 gdelliott@uncc.edu
 704-687-8365

CBES Area of Expertise:

Stabilization of mammalian cells in the dry or frozen state for long-term storage; determination of molecular mobility in sugar glasses; protein stabilization in ionic liquid formulations.

CBES Area of Interest: Dr. Elliott's research focuses on stabilizing mammalian cells in both the dry state and the frozen state for long-term storage. A portion of our experimental studies involve delivery, retention, and degradation of sugar-based protectants in biological cells. We also study the availability and mobility of water and small molecules in sugar glasses. Currently we are working on developing new protectants and preservation formulations. Work in my lab also involves modeling of various heat and mass transfer processes, such as solidification of biological tissues and diffusion in sugar glasses.



Nathaniel M. Fried, Ph.D.
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 704-687-8149

CBES Area of Expertise:

Laser tissue and biomedical optics.

CBES Area of Interest: His research specialty is in laser-tissue interactions and biomedical optics, specifically the development of new therapeutic and diagnostic applications of lasers in urology, including laser lithotripsy, laser incision of urethral strictures, laser vaporization of the prostate for treatment of BPH, optical imaging of the cavernous nerves in the prostate to preserve erectile function, laser treatment of female stress urinary incontinence, and endoscopic laser application of mid-infrared optical fibers.



Helen E. Gruber, Ph.D.
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 704-355-5665

CBES Area of Expertise:

Growth human disc cells in tissue culture; tissue engineering methods to test disc cell behavior and response to biologics.

CBES Area of Interest: The research underway in our lab focuses upon understanding the biology of the intervertebral disc and biologic therapies for disc degeneration and low back pain. These research topics are of interest to many physicians and scientists since the aim will be to develop therapies to treat the conditions in their early stages, with the potential to reverse and modify the disease state. Various approaches are currently underway, including altering the physiology of disc function through growth factor, cellular augmentation, and tissue engineering; these approaches continue our focus on the cellular basis of disc degeneration and low back pain.

CBES Affiliated Researchers – Medical Therapies & Technologies (MTT) Focus Area



Michael V. Klibanov, Ph.D.
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 704-687-2645

CBES Area of Expertise:
 Numerical solution of a parabolic inverse problem in optical tomography using experimental data.

CBES Area of Interest: Inverse problems for Partial Differential Equations. Applications to Medical Optical Imaging



Bharat Joshi, Ph.D.
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 704-687-8407

CBES Area of Expertise:
 Wearable medical systems (mobile and conformal information infrastructure) for measuring and recording patient vital signs and enabling intelligent decision-making strategies.



Aravind Kailas, Ph.D.
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 704-687-0146

CBES Area of Expertise:
 Telehealth and telemedicine, biologically-inspired wireless networking and information processing for biomechanics

CBES Area of Interest: Professor Kailas' research efforts are focused on the application of wireless technologies to advance human health. Some topics of current interest are algorithms and architectures for efficient monitoring and treatment support, diagnostic and therapeutic systems based on physiological observations, and the next generation of low power short communications and localizations for healthcare.



Charles Y. Lee, Ph.D.
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 704-687-8364

CBES Area of Expertise:
 Hypothermic machine perfusion preservation of organs for transplantation.

CBES Area of Interest: Research is in the area of improving organ preservation for transplantation. Currently, the number of patients waiting for transplants is exponentially increasing while the number of transplants remains stagnant. Our goal is to improve the technology of hypothermic machine perfusion for preservation of donor livers. There are many aspects to this goal including the preservation of healthy and marginal donor livers. Our group focuses on three main topics, improving the preservation of healthy livers, recovery of non-heart-beating donor livers, and improving the preservation of fatty livers.



Iain Hugh McKillop, Ph.D.
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 704-355-2846

CBES Area of Expertise:
 The design and testing of novel mechanisms to alter the rates of tumor growth and progression with minimal side effects in non-cancerous tissues.

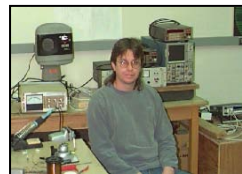
CBES Area of Interest: Focuses on providing a better understanding of the imbalance in mechanisms that regulate the rate of tumor cell growth (mitogenesis) and death (apoptosis). Using this information, Dr. McKillop's group seek to use novel bio-engineering approaches, such as cell transfection coupled with encapsulation, to perform high dose, target specific protein delivery to slow the rate of disease progression.



Patrick J. Moyer, Ph.D.
 pjmoyer@uncc.edu
 704-687-8148

CBES Area of Expertise:
 Nanoscale optical biophysics, development of novel instrumentation.

CBES Area of Interest: In our lab, we use high magnification laser imaging methods to study single protein dynamics, intracellular environments, and nanoparticle behavior in biological environments of relevance. Our high sensitivity instrumentation allows us to image single fluorescent molecules with high spatial precision. With this type of instrumentation, we can study biomolecules on the nanometer scale, which is very near to the atomic scale, a level of magnification not previously realizable with optical imaging methods.



Stuart T. Smith, Ph.D.
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 704-687-8351

CBES Area of Expertise:
 Design and development of new instrumentation techniques.

CBES Area of Interest: Instrumentation for physical measurements at nanometer and nano-Newton levels, metrology of molecular scale processes and traceability, connecting ratiometric diagnostics to absolute measures, mechanical interactions between mechanical probes and biological specimen.



Richard Souvenir, Ph.D.
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 704-687-8554

CBES Area of Expertise:
 Computer vision, image analysis, medical imaging and embedded systems.

CBES Area of Interest: The field of computer vision, specifically in the analysis of video of natural motions, such as MRI sequences of a heart beating. In my work, I am to understand and exploit the structure found in these natural image sets to improve motion analysis. This framework serves to make classical computer tasks, such as image segmentation, more useful for modern applications.

CBES Affiliated Researchers – Molecular Engineering and Design (MED) Focus Area



Andriy Baumketner

abaumket@uncc.edu
704-687-8294

CBES Area of Expertise:

Atomistic simulations of protein folding; computational studies of protein aggregation; theoretical models of chaperon-assisted folding; interactions of proteins with surfaces and models of folding kinetics.

CBES Area of Interest: The research interests of my group are in theoretical approaches to problems in biological and chemical physics. Our recent efforts have focused on **a)** atomistic simulations of protein folding, **b)** computational studies of protein aggregation, **c)** theoretical models of chaperon-assisted folding, **d)** interactions of proteins with surfaces and **e)** models of folding kinetics.



Wei Cai, Ph.D.

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704-687-4581

CBES Area of Expertise:

Development of fast numerical methods for electrostatics interactions and hybrid solvation models for biomolecules.

CBES Area of Interest: Biomedical applications that include multiscale modeling and computational biology.



Shaozhong Deng, Ph.D.

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704-687-6657

CBES Area of Expertise:

Computational structural biology, in particular, hybrid explicit/implicit solvent method for biomolecular simulations.

CBES Area of Interest: Working on computational structural biology, in particular, on hybrid explicit/implicit solvent method for biomolecular simulations.



Donald J. Jacobs, Ph.D.

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704-687-8143

CBES Area of Expertise:

Biophysical modeling involving development of algorithms for computational biology applications.

CBES Area of Interest: My research centers on biophysical modeling involving development of algorithms for computational biology applications. My main activity is funded by the National Institutes of Health to develop "FAST" software that provides a Flexibility and Stability Test for proteins with known three-dimensional structure to predict their thermodynamic and mechanical properties within a cellular environment. Our FAST predictions reveal Quantitative Stability/Flexibility Relationships (QSFR). A QSFR database augmented with bioinformatics and statistical analysis tools is being developed. Through FAST/QSFR we can obtain improved descriptions of protein structure/function relationships, protein-substrate association and the protein folding/unfolding process. Our methods will facilitate novel homology modeling schemes, better sequence and structural alignment tools, and prediction of protein oligomerization states and their associated changes in stability and flexibility. Together, our FAST software and QSFR database will support myriad biologically significant applications in pharmacology and rational protein design including engineering of highly stable enzyme catalysts for industrial purposes.



Ana Jofre, Ph.D.

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704-687-8175

CBES Area of Expertise:

Developing a technique for probing single molecules encapsulated within optically trapped femtoliter volume (10^{-12} ml) chemical containers.

CBES Area of Interest: are stable aqueous nanodroplets suspended in a fluorocarbon medium. An individual hydrosome can be optically trapped because its index of refraction is greater than that of the fluorocarbon. Using optical tweezers, we are able to hold the hydrosomes within a confocal observation volume, and use fluorescence excitation to probe the encapsulated molecule. The significance of this method is that it allows for long observation times while still allowing molecules within the hydrosomes to diffuse freely throughout the available volume. As such our hydrosome technique of molecule encapsulation and isolation is particularly promising for the study of proteins. A unique feature of hydrosomes as nanocontainers, is that they fuse on contact, thereby facilitating mixing of the encapsulated components.

CBES Affiliated Researchers – Molecular Engineering and Design (MED) Focus Area



Joanna Krueger, Ph.D.

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704-687-4913

CBES Area of Expertise:
Biophysical Chemistry

CBES Area of Interest: Structural information on biomolecular associations using the techniques of small-angle X-ray and neutron scattering, chemical cross-linking with peptide analysis by MS, selected-site mutagenesis and spectroscopy (FTIR, CD, UV-VIS); and visualized through the use of molecular modeling.



Dennis Livesay, Ph.D.

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704-687-7995

CBES Area of Expertise:
Protein functional site prediction algorithms; robust motif-based comparative bioinformatic strategies, and improved sequence alignment strategies.

CBES Area of Interest: Much of our work is focused in these areas, specifically development of: (a) protein functional site prediction algorithms, (b) robust motif-based comparative bioinformatic strategies, and (c) improved sequence alignment strategies.



Irina Nesmelova, Ph.D.

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704-687-8145

CBES Area of Expertise:
The application of NMR spectroscopy to study the structure, interactions and dynamics of proteins and small molecules.

CBES Area of Interest: My research is focused on understanding the dynamic pictures of how proteins interact with each other and with ligands (including DNA). This information is then used to re-engineer the interactions according to the need of specific biological system. The research is interdisciplinary in its nature, because it requires the knowledge of biologically important systems and of physical principles that govern biomolecular interactions.



Yuri Nesmelov, Ph.D.

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704-687-5886

CBES Area of Expertise:
Spectroscopy of electron paramagnetic resonance, optical spectroscopy, biophysics of molecular motors

CBES Area of Interest: My research interests are focused on biological molecular motors. I study myosin, the protein responsible for force generation in muscle, cell locomotion and intracellular trafficking. I combine protein mutagenesis, site directed labeling, multifrequency electron paramagnetic resonance (EPR) and transient time-resolved fluorescence resonance energy transfer (TR²FRET) to explore myosin functional dynamics on molecular and submolecular level. The ultimate goal of these studies is to determine the mechanism of force generation in myosin. I am also interested in manipulating of microwave field distribution in EPR cavity to maximize sensitivity of EPR measurement for aqueous samples, through the sample geometry optimization and usage of ferroelectric/dielectric cavity inserts.



Jerry Troutman, Ph.D.

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704-687-4494

CBES Area of Expertise:
Biosynthesis of membrane anchored polysaccharides and methods for inhibiting protein intracellular trafficking as it relates to human disease.

CBES Area of Interest: One of the core areas of my research is in the biosynthesis of complex polysaccharides by symbiotic intestinal microbes that are important for normal immunological functions of mammals. Specifically, I am interested in the enzymes responsible for the biosynthesis of these molecules and how they function together as a polysaccharide biosynthetic machine. My second core area of research is on the functional blocking of key signaling network proteins by inhibiting their post-translational modification. I am interested specifically in doing this with the protein isoprenylation system of mammals and the human parasite *Trypanosoma cruzi*.

CBES Affiliated Researchers – Biomechanics and Mobility Research (BMR) Focus Area



Mitchell L. Cordova, Ph.D.
 mcordova@uncc.edu
 704-687-4695

CBES Area of Expertise:
 Neuromechanical consequences of lower extremity joint injury and rehabilitation as applied to a clinical-based population.

CBES Area of Interest: My research has focused on understanding the neuromechanical implications of lower extremity joint injury and rehabilitation. Through these investigations, external ankle support's (EAS) effects on ankle / foot kinetics and kinematics under dynamic inversion loading has been gained. A deeper comprehension of how the leg musculature responds concomitantly with EAS in controlling joint motion during dynamic movements and sudden perturbations has been established. Our research has also allowed us to understand how EAS and chronic ankle injury influences modulation of spinal reflexes. My research has also assessed the efficacy of closed kinetic chain exercise on thigh and leg muscle activation as well as the effects of simulated knee and ankle joint effusion on leg muscle function.



Bruce V. Darden II, M.D.
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 704-332-2225

CBES Area of Expertise:
 Vertebral disc replacement technology; wear characteristics of cervical disc replacement.

CBES Area of Interest: Dr. Bruce Darden has been one of the lead clinical researchers in vertebral disc replacement technology. He has done sabbatical work in Belgium in 2002 and has been involved in the investigational clinical evaluation of cervical disc replacement. He has worked with Dr. Matthew Davies and his team on biomechanical testing of disc replacements in the cervical spine. His ongoing interests include the wear characteristics of cervical disc replacement.



Matthew A. Davies, Ph.D.
 madavies@uncc.edu
 704-687-8326

CBES Area of Expertise:
 Biomechanical testing and on applying techniques from precision metrology to orthopedic surgery.

CBES Area of Interest: Since coming to UNC Charlotte in the spring of 2001, Dr. Davies has become interested in manufacturing and measurement issues in Orthopedic implants and devices. Dr. Davies and his students have now started the Precision Orthopedic Engineering Laboratory which is working on a number of projects including testing the biomechanics of new disc implants for treatment for osteoarthritis in the neck, studying the effects of surgical misalignment on implant performance and clinical outcomes, development of devices to help surgeons precisely position hip implant components in surgery, and studies of soft-tissue loads in total knee replacement surgery.



Ahmed El-Ghannam, Ph.D.
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 704-687-7730

CBES Area of Expertise:
 Orthopedic tissue engineering; scaffolds for tissue replacement and cell and drug deliveries.



Hongbing Fang, Ph.D.
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CBES Area of Expertise:
 Crash simulation and design optimization

CBES Area of Interest: Design and manufacturing of orthopedic materials and quality assurance of orthopedic materials.



Alexander A. Fokin, M.D., Ph.D.
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 704-355-3454

CBES Area of Expertise: the surgical morphological and genetics aspects of congenital and

Acquired chest wall deformities such as pectus excavatum, carinatum, Poland's Syndrom, etc.

CBES Area of Interest: Another subject of his research is the complications of midline sternotomy and prevention methods, which includes determining optimal closure techniques for different sterna conditions, (such as osteoporotic or narrow sternum) to reduce the possibility of dehiscence. New options for prevention and treatment of aortic dilatation, focusing on minimizing surgical trauma by implementing mesh wrapping and minimally invasive approach, is also a subject of Dr. Fokin's research. Dr. Fokin is also involved in a research project that addresses revascularizing the ischemic myocardium in "no options" patients with coronary artery disease by enhancing collateral vessel development. Dr. Fokin has also studied the spread of infection via lymphatico-venous communications and the possibility of local interventions after injury with contaminated instruments.



R. Glenn Gaston, M.D.
 glenn.gaston@hotmail.com
 704-945-7728

CBES Area of Expertise:
 Biomechanics of synthetic biomimetic materials for future implants; development of new surgical tool designs.

CBES Affiliated Researchers – Biomechanics and Mobility Research (BMR) Focus Area



Mark Hirsch, Ph.D.
 Mark.Hirsch@carolinashealthcare.org
 704-355-7673

CBES Area of Expertise:
 Parkinson's disease, ageing, translational research.

CBES Area of Interest: Dr. Hirsch's research is conducted within the Carolinas Rehabilitation Research Laboratories at Carolinas Medical Center. Dr. Hirsch is a Neuroscientist with a multidisciplinary background in Education, Gerontology and Rehabilitation. Dr. Hirsch's research has focused on stroke, ALS, traumatic brain injury, aging and Parkinson's disease (PD) and the effect of high-intensity exercise in improving the cardinal signs and symptoms of PD (i.e., balance). His well-known work on PD has led him to conclude that a *damaged* brain is more likely to learn from experience than a brain that is intact, given optimal teaching and teachers. This has led to the continuous, high-intensity training changes the structure and function of the PD brain which, in turn, may slow or reverse the progression of the disease and lead to a more favorable outcome.



Tricia J. Hubbard, Ph.D.
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 704-687-6202

CBES Area of Expertise:
 Etiology of ankle injury.

CBES Area of Interest: My research area primarily examines the etiology of ankle injury. Currently I am examining three groups of ankle related injury: acute ankle injury, those with chronic (long term) ankle instability, and those with ankle osteoarthritis. In these populations I am measuring the amount of movement (laxity) they have in the bones in their ankle, and changes in muscle and nerve function. It is my goal to understand why we see so many ankle sprains but even more important why we see such a high rate of recurrence after the initial ankle sprain. By determining what the causes of ankle instability we can develop rehabilitation plans to prevent ankle instability and eventually ankle osteoarthritis.



Eric B. Laxer, M.D.
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 704-332-2225

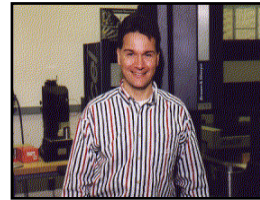
CBES Area of Expertise:
 Testing of new cervical disc implants.

CBES Area of Interest: Dr. Laxer has been involved in the clinical and biomechanical research for cervical disc replacement technology since 2004. He has done sabbatical work in Germany in 2002, spending time with Dr. Michael Mayer in Munich, who has been a leader in the field of cervical and lumbar disc replacements. He has worked with Dr. Matthew Davies and his team on biomechanical testing of disc replacements in the cervical spine, and continues to follow patients who he has performed cervical disc replacements on as part of an ongoing FDA study.



R. Alden Milam, IV, M.D.
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CBES Area of Expertise:
 Testing of new cervical disc implants.



Edward P. Morse, Ph.D.
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 704-687-8342

CBES Area of Expertise:
 Computational metrology, assembly modeling and analysis, geometric tolerancing and standards, computer aided manufacturing.

CBES Area of Interest: Dimensional quality of orthopedic implants, in-process measurement techniques to assist in surgery, and processing of dense digital data from optical and CT scans.



Brigid A. Mullany, Ph.D.
 bamullan@uncc.edu
 704-687-8343

CBES Area of Expertise:
 Polishing of non planar surfaces. Including freeform geometries. Potential application finishing of medical devices (e.g. hip implants).

CBES Area of Interest: Precision surface generation. This encompasses topics ranging from understanding the fundamentals of material removal and subsurface damage generation to developing more time efficient process.



Richard D. Peindl, Ph.D.
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 704-355-7084

CBES Area of Expertise:
 Thirty-five years of mechanical engineering experience working in both industrial and academic settings in the areas of manufacturing, product development, test engineering and both applied and basic science research.

CBES Area of Interest: The Orthopaedic Engineering Research Lab at Carolinas Medical Center conducts applied research projects that involve the evaluation of fracture fixation devices, joint replacement devices, and soft tissue attachment devices along with associated fracture fixation and joint modification and reconstruction techniques. These studies necessitate the use of a wide array of experimental instrumentation and techniques aimed at measuring stresses, strains, loads and deformations in implants and physiologic materials. Over the last 10 years, Dr. Peindl's lab has also been involved in basic science research involving the response of osteoblasts to simulated implant surfaces with varying surface topographies and the development of a new type of osmotic gradient bioreactor system for the growth of articular cartilage. Emerging areas of interest include research in computer/robotic-assisted surgery and utilization of joint motion analysis and dynamic posturography for quantitative evaluation of orthopaedic-related disability and surgical outcomes assessment.

CBES Affiliated Researchers – Biomechanics and Mobility Research (BMR) Focus Area



Erik A. Wikstrom, Ph.D.
 ewikstrom@uncc.edu
 704-687-3764

CBES Area of Expertise: Coordination of balance, Neuromechanical adaptations after lower extremity injury, restoration of neuromuscular impairments after injury

CBES Area of Interest: My research focuses on interactions between musculoskeletal biomechanics and sensorimotor control following injury with particular emphasis on the coordination of balance. In addition, my research has applied biomechanical and neurophysiologic principles to better understand the pathophysiology of ankle injuries, elucidate the mechanisms that lead to chronic ankle instability, and treat ankle osteoarthritis. A combination of techniques allows me to conduct hypothesis driven research that evaluates experimental results quantitatively rather than descriptively. As a result, my focuses and investigations cross multiple disciplines, including biomechanics, motor control, and rehabilitation sciences, but have the common goal of identifying impairments to neuromuscular control after lower extremity injury and developing effective evidence based interventions to restore the neuromuscular impairments.



Andrew Willis, Ph.D.
 arwillis@uncc.edu
 704-687-8420

CBES Area of Expertise: medical image processing; 3D imaging; **segmentation of structures within medical images.**

CBES Area of Interest: Dr. Willis' Charlotte Machine Vision Laboratory conducts research that seeks to create new ways to treat traumatic bone fractures, especially those that occur in the vicinity of bone joints where osteoarthritis can develop. Supported by National Institute of Health, lab researchers create software and algorithms that facilitate the semi-automatic reconstruction of these bone fractures within a virtual 3D environment. Such software may be used by doctors to perform pre-operative surgical planning. Additionally, the software enables heretofore unavailable methods of quantifying the severity of a given fracture case which is an important aspect for proper treatment which can be difficult to measure.



Nigel Zheng, Ph.D.
 nzheng@uncc.edu
 704-687-7301

CBES Area of Expertise: Orthopaedic Biomechanics, Biomotion Analysis, Biomechanical testing of implants in the area of Orthopaedics and Sports Medicine.

CBES Area of Interest: Biomechanics and Motion Analysis. Our research goal is to advance understanding of the musculoskeletal system by studying human body movement and joint biomechanics. By developing and using the latest technologies, we continue the search for better diagnosis and treatment of musculoskeletal disease. Our current research has been focused on sports injury mechanisms, post-injury and post-treatment alternations of human locomotion and joint biomechanics, and their long-term contribution to musculoskeletal disease such as premature osteoarthritis. In our lab, we use our state-of-art equipment and custom-coded software to study human movement during sports and daily activities. Other research topics include understanding injury mechanisms of throwing arm, 3-D motion analysis of human knee joint, knee modeling for rehabilitation exercises, and early detection of cartilage defects and evaluation of cartilage repair.