Location: Wake Forest University

**Project Title:** WIAMan: Warrior Injury Assessment Manikin Project

**Position Need:** 1 MS/PhD (PhD preferred), start May or August 2018

**Funding:** Funded via a GRA, contract in place

**Advisor:** Scott Gayzik, PhD
Associate Professor, Biomedical Engineering
VT-WFU Center for Injury Biomechanics
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www.CIB.vt.edu

**Specific Project Description:** Recent military operations have exposed a need for improved vehicle and soldier survivability from under body blast threats. The purpose of this project is to create a warrior-representative anthropomorphic testing device (ATD) with realistic biofidelic capabilities, focused on the analysis of injuries sustained from under body blasts. The unique attributes associated with under body blasts require the development and implementation of novel biomechanics techniques. WFU’s role on this project is to support the Biomechanics product team and is focused on: scaling methods for biomechanical data, development of novel methods for injury risk curve construction.

**Other Notes:** This research effort will be in the Center for Injury Biomechanics (CIB) and you will have the opportunity to work on a range of projects in the field of automobile safety, military restraints, and sports biomechanics. The CIB has two primary research facilities. The first is in the WFU School of Medicine in Winston-Salem, NC and the second is at Virginia Tech. The research at the CIB combines experimental testing, computational modeling, and case analysis to investigate human injury biomechanics.
2018 Faculty Advisor Request form for Graduate Student Position

Location: Wake Forest University

Project Title: Human Body Model Development for Trauma Research
Position Need: 1 MS/PhD (PhD preferred), start May or August 2018
Funding: Funded via a GRA, funding in place

Advisor: Scott Gayzik, PhD
Associate Professor, Biomedical Engineering
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Specific Project Description:
Computational modeling is a growing component of injury biomechanics and trauma research. This project is a multi-center effort developing a next generation set of human body finite element models for enhanced injury prediction and prevention systems. The student will be responsible for assisting in model development tasks including safety for autonomous vehicle seating configurations, active muscle algorithms, and morphing to account for aging. Responsibilities will also include reporting FEA model analysis and results, running analyses on distributed computing environments, simulating validation procedures, performing literature reviews, and reporting related research efforts through written and oral status updates. The student(s) will gain valuable experience in fields of trauma research, computer modeling, and injury biomechanics.

Other Notes: This research effort will be in the Center for Injury Biomechanics (CIB) and you will have the opportunity to work on a range of projects in the field of automobile safety, military restraints, and sports biomechanics. The CIB has two primary research facilities. The first is in the WFU School of Medicine in Winston-Salem, NC and the second is at Virginia Tech. The research at the CIB combines experimental testing, computational modeling, and case analysis to investigate human injury biomechanics.
2018 Faculty Advisor Request form for Graduate Student Position

**Location:** Wake Forest University

**Project Title:** Multi-Modality Anthropometry Study for Computational Model Generation

**Position Need:** 1 MS/PhD (PhD preferred), start May or August 2018

**Funding:** Funded via a GRA, renewal pending

**Advisor:** Scott Gayzik, PhD

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**Specific Project Description:** Computational models of the human body can be used to predict the relationship between a specific insult and the resulting tissue damage. These simulations require models with a high level of anatomic biofidelity that represent a population of interest. Models in use today were developed with limited imaging data. The WFU CIB is collecting multi-modality medical image and anthropometry data from a targeted population to be used in the development of wound prediction models. The student will have the opportunity to: participate in subject screening procedures, collect anthropometry data (segment length, landmark, and surface), image data, perform data processing, model development, prepare technical reports and participate in meetings with the sponsor.

**Other Notes:** This research effort will be in the Center for Injury Biomechanics (CIB) and you will have the opportunity to work on a range of projects in the field of automobile safety, military restraints, and sports biomechanics. The CIB has two primary research facilities. The first is in the WFU School of Medicine in Winston-Salem, NC and the second is at Virginia Tech. The research at the CIB combines experimental testing, computational modeling, and case analysis to investigate human injury biomechanics.
Location: Wake Forest University

Project Title: Development and Validation of Phantoms for Thermal Therapies
Position Need: 1 MS/PhD (PhD preferred), start August 2018
Funding: Internal – WFU Innovations

Advisor: Scott Gayzik, PhD
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Specific Project Description: An emerging area of interest is the study of bioheat transfer. In the CIB, we are interested in developing phantoms and models for treating a range of pathologies such as epilepsy, cancer, and potentially TBI. This project will focus on designing biofidelic phantoms for use in thermal therapy design. The student will conduct benchtop experiments for phantom design. Computational modeling of the system is included as well, to aid collaborators in the development of thermal therapies. The modeling component will leverage established finite difference and finite element solvers to optimize heating/cooling regimes and calculate the predicted transient temperature response of both the phantom and thus, the human body. Thermal dose calculations will be used to determine treatment efficacy.

Other Notes: This research effort will be in the Center for Injury Biomechanics (CIB) and you will have the opportunity to work on a range of projects in the field of automobile safety, military restraints, and sports biomechanics. The CIB has two primary research facilities. The first is in the WFU School of Medicine in Winston-Salem, NC and the second is at Virginia Tech. The research at the CIB combines experimental testing, computational modeling, and case analysis to investigate human injury biomechanics.
### Location: Wake Forest University

**Project Title:** Finite Element Model Development of ATD for Underbody Blast  
**Position Need:** 1 MS/PhD (PhD preferred), start May or August 2018  
**Funding:** Funded via a GRA, contract in place  

**Advisor:** Scott Gayzik, PhD  
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### Specific Project Description:  
Recent military operations have exposed a need for improved vehicle and soldier survivability from under body blast threats. This project focuses on a Finite Element Model of an anthropomorphic testing device (ATD) for use in under body blast applications. The unique attributes associated with under body blast loading regime require the development and implementation of newly innovated biomechanics techniques. The project is designed to operate concurrently with the design of the physical ATD, providing the student with hands-on training. WFU is part of a broader research team, but focused on the head and neck of the model in this collaborative model development effort.

### Other Notes:  
This research effort will be in the Center for Injury Biomechanics (CIB) and you will have the opportunity to work on a range of projects in the field of automobile safety, military restraints, and sports biomechanics. The CIB has two primary research facilities. The first is in the WFU School of Medicine in Winston-Salem, NC and the second is at Virginia Tech. The research at the CIB combines experimental testing, computational modeling, and case analysis to investigate human injury biomechanics.
2018 Faculty Advisor Request form for Graduate Student Position

Location: Wake Forest University

Project Title: Development and Validation of a Finite Element Model of a Modern Football Helmet

Position Need: 1 MS/PhD (PhD preferred), start August 2017

Funding: Funded via a GRA, contract in place

Co-Advisors: Scott Gayzik, PhD
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Specific Project Description:

Given the interest in head injury risk in contact sports such as football, and the growth of computational modeling to study injury, there is currently a need for validated, open source, finite element models of commonly used football helmets. Computer Aided Design (CAD) and Finite Element Analysis (FEA) are flexible, mature approaches that are used in the development of vast amounts of products. We take this approach to improve the human-product interface, and the product’s performance. The goal of the project is to create an open source FE model of a modern football helmet. The student will gain considerable experience in the areas of non-linear finite element analysis, model development, human surrogate development, and computational injury biomechanics.

Other Notes: This research effort will be in the Center for Injury Biomechanics (CIB) and you will have the opportunity to work on a range of projects in the field of automobile safety, military restraints, and sports biomechanics. The CIB has two primary research facilities. The first is in the WFU School of Medicine in Winston-Salem, NC and the second is at Virginia Tech. The research at the CIB combines experimental testing, computational modeling, and case analysis to investigate human injury biomechanics.