

John-Paul Donlon

Curriculum Vitae

Center for Applied Biomechanics

University of Virginia

4040 Lewis and Clark Drive

Charlottesville, Virginia 22911

(434) 297-8067

(434) 297-8083 (fax)

donlon@virginia.edu

www.centerforappliedbiomechanics.org

Education

Master of Science, Department of Mechanical and Aerospace Engineering

University of Virginia, Graduation Expected December 2018

Thesis – *Pending*

Cumulative GPA: 3.6/4.0

Bachelor of Science, Department of Mechanical Engineering

University of Virginia – Magna Cum Laude, December 2016

Thesis – *Reducing Risks for Wrists: A Physical Simulator to Practice Management of Distal Radius “Colles” Fractures* (technical report) and *Mortal Morals: How Should We Use Human Cadavers?* (sociotechnical research paper)

Cumulative GPA: 3.8/4.0

Associate of Science in Engineering

Piedmont Virginia Community College – Summa Cum Laude, May 2014

Cumulative GPA: 3.9/4.0

Work Experience

University of Virginia, Center for Applied Biomechanics Graduate Research Assistant	2017-Present
Arts et Métiers ParisTech, Institut de Biomécanique Humaine Georges Charpak Visiting Undergraduate Researcher	Summer 2015
University of Virginia, Center for Applied Biomechanics Undergraduate Research Assistant	2012-2017

Projects

- Biomechanics of Foot and Ankle Injuries** 2017-Present
Refinement, validation, and application of a finite element model of the human lower extremity for the prediction of forefoot, midfoot, and ankle injuries in elite athletes. Experiments and LS-DYNA simulations will be used to recommend countermeasures to reduce incidence of high ankle sprains, Lisfranc sprains, turf toe, and Jones fractures.
PI: Professor Richard Kent (Mechanical and Aerospace Engineering, University of Virginia)
- Occupant Impacts after Low Acceleration Time Extended (LATE) Events** 2016-Present
Parametric simulation of occupant response to far-side lateral and oblique impacts following low acceleration time extended events (e.g., extreme lateral oscillation). Pre-impact occupant kinematics and kinetics identified in volunteers by the Children's Hospital of Philadelphia were used to parametrize pre-impact occupant posture in post-mortem human surrogates subjected to simulated frontal impacts.
PI: Professor Richard Kent (Mechanical and Aerospace Engineering, University of Virginia)
- Distal Radius Fracture Reduction Simulator** 2014-2016
Development of a methodology for the construction of a mechanical simulator to assist in training medical professionals on techniques for manually reducing distal radius fractures. A proof-of-concept prototype was developed, consisting of rapid-prototyped (3D-printed) bone structures connected with elastic material and surrounded by a simulated flesh layer.
PI: Doctor Aaron Freilich (Orthopaedic Surgery, University of Virginia)
Co-PI: Jason Forman (Mechanical and Aerospace Engineering, University of Virginia)
- Biomechanics of High Ankle Sprains** 2013-2017
Validation of human lower extremity finite element model using experiments on biological specimens. Experiments and LS-DYNA simulations were used to recommend countermeasures to reduce incidence of high ankle sprains in professional athletes.
PI: Professor Richard Kent (Mechanical and Aerospace Engineering, University of Virginia)
- Thoracic Response to Localized Lateral Impact** 2013-2014
Evaluation of modified THUMS v1.4 50th percentile male occupant model against post-mortem human surrogate impact responses in constant-velocity localized lateral impact tests, and use of this model to determine apportionment of impact energy between deformation and translation of the vehicle occupant for various side impact conditions.
PI: Professor Richard Kent (Mechanical and Aerospace Engineering, University of Virginia)

Injury Simulation of Occupant Impacts 2012-2014
Evaluation of THUMS v4 50th percentile male occupant model against post-mortem human surrogate impact responses in frontal sled tests with standard and force-limiting belts and lateral sled tests with a rigid wall and with an airbag.
PI: Professor Richard Kent (Mechanical and Aerospace Engineering, University of Virginia)

Fracture Mechanics of Rib Cortical Bone 2012-2013
Material characterization of human rib cortical bone. Stress-strain response of bone coupons manufactured from human ribs from post-mortem human surrogates was measured under tensile load.
PI: Professor Damien Subit (Mechanical and Aerospace Engineering, University of Virginia)

Research Interests and Activities

- Integration of active and passive safety systems to prevent automotive injury
- Automotive occupant protection in vulnerable populations (e.g., the elderly)
- Human body modeling and simulation in injurious and non-injurious activities
- Morphometric and anthropometric analysis across populations

Special Skills

- Segmentation of bone geometry from computed tomography (CT) scans
- Data analysis, management, and visualization in MATLAB
- Biological (cadaver) tissue handling

Publications

A. Refereed Journal Publications

Donlon JP, Poulard D, Lessley DJ, Riley P, Subit D (2014). Understanding how scapula position and spine posture affect injury outcome in side impact sled tests using a new tool for visualization of PMHS kinematics. *Journal of Biomechanics*, DOI: 10.1016/j.jbiomech.2014.12.042.

Mait AR, Mane A, Forman JL, **Donlon JP**, Nie BB, Kent RW (2017). Transient and long-time kinetic responses of the cadaveric leg during internal and external foot rotation. *Journal of Biomechanics* 53, 196-200.

Nie BB, Forman JL, Mait AR, **Donlon JP**, Panzer MB, Kent RW (2017). Searching for the “sweet spot”: The foot rotation and parallel engagement of ankle ligaments in maximizing injury tolerance. *Biomechanics and Modeling in Mechanobiology* (*accepted*).

Nie BB, Panzer MB, Mane, A, Mait A, **Donlon JP**, Forman JL, Kent RW (2017). Determination of the *in situ* mechanical behavior of ankle ligaments. *Journal of the Mechanical Behavior of Biomedical Materials* 65, 502-512.

Nie BB, Panzer MB, Mane A, Mait AR, **Donlon JP**, Forman JL, Kent RW (2016). A framework for parametric modeling of ankle ligaments to determine the *in situ* response under gross foot motion. *Computer Methods in Biomechanics and Biomedical Engineering* 19(12): 1254-1265.

Poulard D, Subit D, Nie BB, **Donlon JP**, Kent RW (2015). The contribution of pre-impact posture on restrained occupant finite element model response in frontal impact. *Traffic Injury Prevention* 16(Suppl. 2): S87-S95.

Pipkorn B, Subit D, **Donlon JP**, Sunnevang C (2014). A computational biomechanical analysis to assess the trade-off between chest deflection and spine translation in side impact. *Traffic Injury Prevention* 15(Suppl. 1): S231-S237.

Poulard D, Subit D, **Donlon JP**, Kent RW (2014). The contribution of pre-impact spine posture on human body model response in side impact with and without countermeasure. *Stapp Car Crash Journal*, 58: 385-422.

Poulard D, Subit D, **Donlon JP**, Kent RW (2014). Development of a computational framework to adjust the pre-impact posture of a whole-body model based on cadaver tests data. *Journal of Biomechanics*, DOI: 10.1016/j.jbiomech.2014.12.050.

B. Refereed Conference Publications

Nie BB, Forman JL, Mait AR, **Donlon JP**, Kent RW (2017). Foot position shifts injury initiation among ankle ligaments during external rotation. IRCOBI Conference Proceedings, Paper IRC-17-103.

Nie BB, Panzer MB, Forman JL, Mane A, Mait AR, **Donlon JP**, Kent RW (2016). A fiber-based modelling approach of ankle ligament *in situ*. IRCOBI Conference Proceedings, Paper IRC-16-117.

Park G, Kim T, Subit D, **Donlon JP**, Crandall JR, Svenderson A, Saunders N, Markusic C (2014). Evaluation of biofidelity of finite element 50th percentile male human body model (GHBMC) under lateral shoulder impact conditions. IRCOBI Conference Proceedings.

C. Conference Publications

Donlon JP, Joodaki H, Toczyski J, Lessley DJ, Forman JL (2016). Biofidelity corridors using arc-length parametrization. 44th International Workshop on Human Subjects for Biomechanical Research, National Highway and Traffic Safety Administration (*presenter*).

Donlon JP, Kent RW, Subit D, Sunnevang C, Pipkorn B (2013). Hold that pose: The effect of posture on thoracic skeletal structures in cadaver tests. 4th Annual Student Symposium, Association for the Advancement of Automotive Medicine (*presenter*).

Mait AR, **Donlon JP**, Nie BB, Forman JL, Anderson R, Cooper MT, Kent RW (2016). Foot flexion alters ankle injury patterns and tolerance during forced external rotation. 44th International Workshop on Human Subjects for Biomechanical Research, National Highway and Traffic Safety Administration.

Nie BB, Poulard D, **Donlon JP**, Forman JL, Kent RW (2014). Experimental and Computational investigation of contemporary seatbelt payout behaviors in frontal impacts. 42nd International Workshop on Human Subjects for Biomechanical Research, National Highway and Traffic Safety Administration.

Subit D, Poulard D, **Donlon JP**, Kent RW (2013). A method to evaluate the performance of computational models: Application to the THUMS model in side impact. 41st International Workshop on Human Subjects for Biomechanical Research, National Highway and Traffic Safety Administration.

Subit D, Poulard D, **Donlon JP**, Kent RW, (2014). Multi-metric evaluation of THUMS in frontal and side impacts. 2014 THUMS USA Users' Meeting, JSOL Corporation.

Toczyski J, **Donlon JP**, Boruah S, Subit D, (2013). Investigation of fracture mechanisms in rib cortical bone. 41st International Workshop on Human Subjects for Biomechanical Research, National Highway and Traffic Safety Administration.