Protecting Vulnerable Road Users – Stapp Practicum

Children's Hospital of Philadelphia (CHOP)
Roberts Center for Pediatric Research
2716 South St., Philadelphia, PA 19146
Room 1120 A and B

MONDAY, NOVEMBER 9

Noon: **Lunch, Roberts Center for Pediatric Research, Room 1120A and B**

1:00 **Welcome**

SESSION 1: VRU RESEARCH AND POLICY

1:15 **Presentations**

Overview of NHTSA VRU Activities
Jason Stammen
Vehicle Research & Test Center, National Highway Traffic Safety Administration
U.S. Department of Transportation

The Steady March of Our Pedestrian Problem
Shaun Kildare
Director of Research
Advocates for Highway and Auto Safety

How Vehicle Regulations, Ratings, and Design Challenges Shape Pedestrian Safety
Christina Smith
Program Manager, Crashworthiness
Vehicle Safety Strategy & Communication
Mazda North American Operations

2:00 **Breakout Group Discussion**

2:30 **Reconvene for Group Discussion**

2:55 **Refreshment Break**

SESSION 2: ROADSIDE STRUCTURES, TESTING, AND TECHNOLOGY

3:15 **Presentations**

Capturing Vulnerable Road User and Roadside Hardware Interactions
Doug Gabauer
Bucknell University

Representing Road-User Diversity in VRU Testing
Michelle Fowler
Transportation Research Center Inc.

Toward Virtual Certification: What We Have Learned from Human Body Models and Vulnerable Road User Simulation
Scott Gayzik
Wake Forest University School of Medicine and
Elemance

The new frontier of PTW safety: Autonomous emergency steering field-tested on a motorcycle
Valentina Graci
Children's Hospital of Philadelphia (CHOP)

4:15 Breakout Group Discussion

4:45 Reconvene for Group Discussion

5:00 Adjourn

6:30 – 9:30 STAPP WELCOME RECEPTION SPONSORED BY HONDA
Sheraton Philadelphia University City Hotel
3549 Chestnut Street, Philadelphia, PA 19104
Fairmount Suite/Lower Lobby

2026 TECHNICAL PROGRAM

Children's Hospital of Philadelphia (CHOP)
2nd Floor, Morgan Center for Research and Innovation
2716 South St., Philadelphia, PA 19146
Room 2U100—2nd Floor

TUESDAY, NOVEMBER 10

7:00 **BREAKFAST, MORGAN CENTER FOR RESEARCH AND INNOVATION, Room 2U100–2nd Floor**

8:00 **Opening Remarks and Acknowledgment of 2026 DTS Student Travel Awardees**
General Chair, Jonathan Rupp, Emory University

KEYNOTE PRESENTATION

8:20 **Children Aren't Small Adult Occupants. Teens Aren't Young Adult Drivers.** *Child protection lessons for the urgent teen driver research agenda*
Flaura K. Winston, MD PhD
Children's Hospital of Philadelphia / Center for Injury Research and Prevention

FINITE ELEMENT & HUMAN BODY MODELING (PART 1 OF 2)

Co-Chairs: Saeed Barbat, Ford Motor Company
Frank Pintar, Medical College of Wisconsin

9:20 **FP: Voxel-Interpolation and Mapping Applied to Multiblock Hexahedral Finite Element Head Models Enables Response Metric Spatial Comparison**
Michael C. Bustamante, Duane S. Cronin
Department of Mechanical and Mechatronics Engineering, University of Waterloo

9:50 **BREAK**

10:05 **FP: Quantitative Assessment of Neck Injury Criteria Against Tissue-Level Response Using a Detailed Computational Neck Model in Frontal, Lateral, Rear, and Oblique Impacts**
Matheus A. Correia, Duane S. Cronin
Department of Mechanical and Mechatronics Engineering, University of Waterloo

10:35 **SC: Parametric Vehicle and Human Modeling for Crash Safety Assessment**
Jingwen Hu[1], Kyle Boyle[1], Sujata Khandare[1], Kamales Senthil Kumar[1], Aditya Belwadi[2], and Chirag Shah[3]
[1]University of Michigan Transportation Research Institute, [2]Tesla, Inc., [3]Humanetics

LOWER EXTREMITY INJURY BIOMECHANICS

Co-Chairs: John Cavanaugh, Wayne State University, Retired
Jonathan Rupp, Emory University School of Medicine

10:50 **FP: Factors and Mechanisms Related to Skeletal Ankle Injury during Frontal Motor Vehicle Collisions**
Devon L. Albert[1], Elizabeth M. McNeil[2], Warren N. Hardy[3]
[1]University of Michigan Transportation Research Institute; [2]National Highway Traffic Safety Administration; [3]The Ohio State University

11:20 FP: Response of the Male and Female PMHS Foot and Ankle to Axial Loading
Warren Hardy[1], Elizabeth McNeil[2], Devon Albert[3]
[1]The Ohio State University; [2]National Highway Traffic Safety Administration; [3]University of Michigan Transportation Research Institute

11:50 SC: Experimental and Numerical Investigation of Subject-Specific Distal Tibia Geometry on Fracture Under Axial Loading
Brock Watson[1], David Boyle[2], Yuyoung Kim[2], Yun-Seok Kang[2], Randee L. Hunter[2], Amanda M. Agnew[2], Zhaonan Sun[3], Duane S. Cronin[1]
[1]Impact Mechanics and Material Characterization Group, Mechanical and Mechatronics Engineering, University of Waterloo; [2]Injury Biomechanics Research Center, The Ohio State University; [3]Collaborative Safety Research Center, Toyota Motor North America

12:05 LUNCH

DATA ANALYSIS AND MODELING METHODS

Co-Chairs: Greg Crawford, General Motors
John Cavanaugh, Wayne State University, Retired

1:05 TP: Influence of Joint Structure in Multibody Model on Behavior Analysis of Crash Test Dummy
Masatoshi Usui, Yasuhiro Matsui, Naruyuki Hosokawa, Yoshinori Tanaka
National Traffic Safety and Environment Laboratory, Tokyo, Japan

1:25 TP: Video-based Accurate Kinematics Estimation from High-Speed Human Motion
Qiantailang Yuan, Svein Kleiven, Xiaogai Li
Division of Neuronic Engineering, KTH Royal Institute of Technology, Sweden

1:45 TP: Time-history Analysis of Model Validation and Corridor Comparison
Guy Nusholtz

2:05 BREAK

REAR IMPACT & SPINE BIOMECHANICS

Co-Chairs: John Bolte IV, Injury Biomechanics Global
Frank Pintar, Medical College of Wisconsin

2:20 FP: Biomechanical Responses and Injuries of Male Post Mortem Human Subject Seated in Production Seats in Moderate-to-High-Speed Rear Impacts
Yun-Seok Kang[1], Reed Finfrock[1], Angela Tesny[2], Angelo Marcallini Jr.[3], Timothy Wensink[1], Randee Hunter[1], Amanda Agnew[1], William Millis[2], Kevin Moorhouse[2]
[1]Injury Biomechanics Research Center, The Ohio State University; [2]National Highway Traffic Safety Administration, Vehicle Research and Test Center; [3]Transportation Research Center Inc.

2:50 FP: Evaluation of 50th Percentile Male ATD Biofidelity in Moderate-Speed Rear Impact Sled Tests Compared to PMHS
Angela Tesny[1], Randolff L. Carpenter[2], Angelo Marcallini[2], Yun Seok Kang[3], William Millis[1], Alexander Bendig[2], Colton Thomas[1], Laura Watkins[2], Kevin Moorhouse[1], Jason Stammen[1]
[1]National Highway Traffic Safety Administration, Vehicle Research and Test Center; [2]Transportation Research Center Inc.; [3]The Ohio State University, Injury Biomechanics Research Center

3:20 TP: Experimental Measurement of Spring and Damping of a Hybrid III Anthropometric Test Device Head / Neck Complex

Wyatt Y. Warner[1], Mark H. Warner[2], Nathan H. Benson[2], and Dr. Matthew S. Allen[1]
[1]Brigham Young University, [2]Collision Safety Engineering L.C.

3:40 SC: Investigation of Cushion Type for Mitigating Lumbar Spine Loads Caused by Under Body Blasts
Katerena Sirhan[1], Mark Shafer[2], David Weyland[2], Cameron Bass[1]
[1]Biomedical Engineering-Wayne State University, [2]GVSP Occupant Protection Team

3:55 TP: Historical Review of the use of the Hybrid III ATDs in rear impact Testing and Validation
Priya Prasad[1], David C. Viano[2], Chantal S. Parenteau[3], Saeed D. Barbat[4], Roger Burnett[3] and Ram Krishnaswami[4].
[1]Prasad Engineering, LLC, [2]Pro-Biomechanics, LLC, [3]Design Research Engineering, [4]Ford Motor Company

6:30 – 9:30 RECEPTION SPONSORED BY HUMANETICS
Mütter Museum | 19 S 22nd Street | Philadelphia, PA 19103

WEDNESDAY, NOVEMBER 11

7:00 BREAKFAST, MORGAN CENTER FOR RESEARCH AND INNOVATION, 2nd Floor

INVITED PRESENTATION

8:00 Moving Road Safety Forward, from Crisis to Commitment
Jessica Jermakian, ScD
Insurance Institute for Highway Safety

VULNERABLE ROAD USER SAFETY

Co-Chairs: Kristy Arbogast, Children's Hospital of Philadelphia
Yasuhiro Matsui, National Traffic Safety and Environment Laboratory

8:50 TP: Relevant Vehicle Front-End Components for Pedestrian Laboratory Testing to Address Real-World Pedestrian Injuries When Struck by Passenger Vehicles with High Hood Heights
Becky Mueller and Jessica Jermakian
Insurance Institute for Highway Safety

9:10 SC: The Relationship Between Pedestrian Injury Risk and PAEB Pulse Characteristics in Collisions Preceded by PAEB Activation
Maitland Witmer[1,2], David Kidd[3], Valentina Graci[1,2]
[1]Department of Biomedical Engineering, Sciences and Health Professions, Drexel University; [2]Children's Hospital of Philadelphia, Center for Injury Research and Prevention; [3]Insurance Institute for Highway Safety

9:25 SC: Injury Sources for Bicyclists Struck by Vehicles of Various Hood Heights in Common Crash Configurations
Becky Mueller and Jessica Jermakian
Insurance Institute for Highway Safety

9:40 SC: High Hood Leading Edge Vehicle Impact on Pedestrian Safety – A Vehicle Shape Study
Michal Suchozebrski[1], Neal Morgan[1], Katarzyna Rawska[1], Zhaonan Sun[2], Bronislaw Gepner[1]
[1]University of Virginia, [2]Toyota Motor North America

9:55 **SC: Pedestrian Injury Outcomes by Geometry-Oriented Vehicle Class: A Descriptive Comparison of German and U.S. In-Depth Crash Data**
Holger Staack[1], Volker Labenski[1], Rakshit Ramachandra[2]
[1]AUDI AG, [2]Volkswagen Group of America

10:10 **FP: Characterization of rider and powered two-wheeler kinematics in full-scale PMHS crash testing**
Daniel A. Meringolo[1], Yun-Seok Kang[1], Jolyon Carroll[2], Linus Lundin[3], Shiyang Meng[2], Erin Higinbotham[4], John H. Bolte IV[5]
[1]Injury Biomechanics Research Center, The Ohio State University; [2]Autoliv Research Sweeden; [3]Chalmers University of Technology; [4]830 Engineering Group LLC; [5]Injury Biomechanics Global Inc.

10:40 **BREAK**

CHILD SAFETY & CHILD RESTRAINT SYSTEMS

Co-Chairs: Kristy Arbogast, Children's Hospital of Philadelphia
John Bolte IV, Injury Biomechanics Global

10:55 **SC: Role of vehicle front-end height in blind zones associated with child frontover crash scenarios**
Becky Mueller[1], Jessica Drake[1], Amber Rollins[2], David Kidd[1], and Jessica Jermakian[1]
[1]Insurance Institute for Highway Safety, [2]Kids and Car Safety

11:10 **SC: Consumer Errors and Preferences Among Installation Methods for a Rear-Facing Only Infant Child Restraint System (CRS)**
Julie A. Mansfield, Gretchen H. Baker
Injury Biomechanics Research Center, School of Health and Rehabilitation Sciences, College of Medicine, The Ohio State University Wexner Medical Center

11:25 **SC: Caregiver Perceptions of Child Distraction and In-Vehicle Child Monitoring Technology**
Madison E. Rhodes, Thomas S. Seacrist
Center for Injury Research and Prevention, Children's Hospital of Philadelphia

11:40 **FP: Rotations of Rearward-Facing Child Restraint Systems and Excursions of the Paediatric Head During Frontal and Frontal-Oblique Impact Sled Tests**
Declan A. Patton
Center for Injury Research and Prevention, Children's Hospital of Philadelphia

12:10 – 1:25 **LUNCH**

69TH STAPP CAR CRASH CONFERENCE BEST PAPER AWARD

1:25 Presented to Gretchen H. Baker, Yun-Seok Kang, Angello Marcallini Jr., Ryan Lang, Amanda Agnew (Injury Biomechanics Research Center, The Ohio State University); and
Erin Hutter, Kevin Moorhouse (National Highway Traffic Safety Administration, Vehicle Research and Test Center) for their paper "*Female PMHS Thoracic Biomechanical Response Corridors with Preliminary Consideration of the influence of Breast Tissue in Frontal Impacts*"

SPECIAL ANNOUNCEMENT

1:35 Warren N. Hardy, President, Stapp Association

INVITED PRESENTATION

1:40 **What's Next for Dummies? An Industry Perspective on Policy and Regulation**
Paul Scullion, MS
Alliance for Automotive Innovation

ATD DEVELOPMENT, ATD MODEL DEVELOPMENT & BIOFIDELITY

Co-Chairs: Greg Crawford, General Motors
Jonathan Rupp, Emory University School of Medicine

2:10 FP: Biofidelity Evaluation of THOR-AV 50th Percentile Male Dummy in 50 km/h Impact Speed
Z. Jerry Wang[1], Matthew P. Reed[2]
[1]Humanetics Innovation Solutions, [2]University of Michigan Transportation Research Institute

2:40 SC: Preliminary Assessment of THOR-05F Thorax Design and Durability for Restraint Development
Derek Board, Raed El-Jawahri, Kevin Siasoco, Kevin Pline, Jessica Mack, and Martin Maginity
Ford Motor Company

2:55 SC: Chest Force Deflection of THOR-05F and THOR-50M FE Models Compared to Cadaveric Corridors
Raed El-Jawahri, Derek Board, Kevin Siasoco, Kevin Pline, Jessica Mack, and Martin Maginity
Ford Motor Company

3:10 BREAK

FINITE ELEMENT & HUMAN BODY MODELING (PART 2 OF 2)

Co-Chairs: Jingwen Hu, University of Michigan
Saeed Barbat, Ford Motor Company

3:30 TP: Parametric Investigation of the Effect of Brain Cortical Surface Representation on Strain Prediction: From a Smooth Cortex to Shallow Sulci in Multi-Block-Based All-Hexahedral Head Models
Sakib Ul Islam, Kewei Bian, Haojie Mao
Department of Mechanical and Materials Engineering, Faculty of Engineering, Western University

3:50 SC: Conversion and Validation of THUMS v4.1 Occupant to Pedestrian: A Step Towards Unified Human Body Modeling
Dhaval Jani[1], Pavel Jedlinsky[1], Karina Lehmann[1], Giacomo Marini[2], Holger Staack[2], and Christian Teichmann[2]
[1]VAIVA GmbH. [2]AUDI AG

4:05 SC: GHBMC M50 Knee Hyperextension Kinematics During Four-Point Bending
Anderson De Lima[1] and Ryan Gellner[2]
[1]General Motors – Vehicle Safety Research, [2]General Motors – AV Safety Metrics Policy

4:20 SC: CAE-Augmented Belted 2nd Row Female Injury Severity Prediction
Seth H. Mischo[1], Mitesh Lalwala[1], Susan Owen[1], Chin-Hsu Lin[1], Anderson De Lima[1], Kristen Cunningham[2], Stewart C. Wang[2], Wonhee Kim[1]
General Motors[1], International Center for Automotive Medicine, University of Michigan[2]

6:30 – 9:30 BANQUET SPONSORED BY KYOWA
Simeone Foundation Automotive Museum | 6825 Norwitch Dr, Philadelphia, PA

NOTE: The first bus to the Kyowa Banquet will leave from the Sheraton at 6:15pm

THURSDAY, NOVEMBER 12

7:00 BREAKFAST, MORGAN CENTER FOR RESEARCH AND INNOVATION, 2nd Floor

RECLINED & NON-NOMINAL OCCUPANT POSTURES

Co-Chairs: Warren Hardy, The Ohio State University
Kerry Danelson, Wake Forest University School of Medicine

8:00 SC: Kinematic Response of a Small-Female Human Body Model on Spring-Controlled and OEM Seats in a 32 km/h Frontal Impact
Ganesh Shete, Sachin Ratnaparkhi, Frank Pintar, Karthik Somasundaram
Medical College of Wisconsin

8:15 SC: Test Methods for Frontal Impact PMHS Sled Tests with Reclined Vehicle Seats
Jeesoo Shin[1], Rachel Newman[1], Timothy Edinger[1], Reagan Hollar[1], Sara Sochor[1], Adrian Caudillo-Huerta[1], Neal Morgan[1], Elizabeth McNeil[2a], Andrew Kemper[2b], Krystoffer Mroz[3a], Anders Jansson[3b], Olivier Richard[3b], Matthieu Debray[3b], Bronislaw Gepner[1]
[1]University of Virginia Center for Applied Biomechanics, [2a]National Highway Traffic Safety Administration; [2b]National Highway Traffic Safety Administration VRTC, [3a]Autoliv Development AB, [3b]Autoliv Sverige AB, [4]Forvia

8:30 SC: Non-Nominal Driver Postures under Conditional Automation: Initial Conditions for ATD- and HBM-Based Crash Assessment
Monica L.H. Jones, Sheila M. Ebert, and Matthew P. Reed
University of Michigan Transportation Research Institute

FIELD DATA ANALYSIS, RESTRAINT SYSTEMS, AND OCCUPANT KINEMATICS

Co-Chairs: Kerry Danelson, Wake Forest University School of Medicine
Yasuhiro Matsui, National Traffic Safety and Environment Laboratory

8:45 FP: Identifying Representative Front Crash Test Conditions from Event Data Recorder Pulses and Body-Region Injury Patterns
Matthew L. Brumbelow
Insurance Institute for Highway Safety

9:15 FP: The Use of a Pre-Pretensioner Belt to Reduce Forward Leaning in Vehicle Occupants in Anticipation of a Pre-Crash Maneuver
Maitland Witmer[1,2], Madeline Griffith[1], Valentina Graci[1,2]
[1]Center for Injury Research and Prevention, Children's Hospital of Philadelphia; [2]School of Biomedical Engineering, Science and Health System, Drexel University

9:45 BREAK

10:10 SC: A Preliminary Investigation of Front-Row Occupant Stature and Qualitative Seat Position in GIDAS
Markus Köbe, Giacomo Marini.
AUDI AG.

10:25 TP: A Dynamic Safety System for Mitigating the Severity of Motor Vehicle Accidents
William G. Broadhead[1], Theodore Zinke[1], Jacqueline G. Paver[2]
[1]Automotive Safety Research, Inc., [2]Center for Injury Research

10:45 **SC: Effects of Coordinated Emergency Maneuver Shaping and Active Suspension Control on Occupant Excursion**

Xianteng Cao[1], Huawei Niu[2]
[1]College of Mechanical and Vehicle Engineering, Hunan University; [2]College of Civil Engineering, Hunan University

11:00 **FP: Age-Associated Pediatric Head and Neck Injury Patterns in Motor Vehicle Crashes: A Multi-Source Descriptive Analysis**

Karthik Somasundaram[1,2]; Klaus Drieslein[1,2], Dale Halloway[1], Valentina Graci[3,4]
[1]Medical College of Wisconsin, [2]Marquette University; [3]Center for Injury Research and Prevention, Children's Hospital of Philadelphia; [4]School of Biomedical Engineering and Science, Howley College of Engineering and Computing, Drexel University

JOHN W. MELVIN STUDENT AWARD

11:35 Presented by Saeed Barbat, Ford Motor Company, and Jonathan Rupp, Emory University, representing the Stapp Education and Scholarship Subcommittee

11:45 **Closing Remarks**
2026 Conference Host and 2027 General Chair, Kristy Arbogast, Children's Hospital of Philadelphia

12:00 **ADJOURN AND LUNCH**
Boxed lunches will be provided for all attendees

12:45 **CHOP Lab Tours – Meet on the 1st Floor of the Morgan Center for Research and Innovation**