



Todd Roescher, BSBME, MSHF



Forensic Engineer

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EDUCATION

- MSHF** Master of Science in Human Factors
California State University, Long Beach, 2023
Thesis: Nominal Driving Abilities and Driver Reaction Times Influence Motor Vehicle Accident Avoidance
- BSBME** Bachelor of Science in Biomedical Engineering
Concentration in Biomechanics and Human Performance
Drexel University, 2017
Capstone: Tremor Tracking and Analysis for Neonatal Abstinence Syndrome

PUBLICATIONS AND RESEARCH

- Grimes C, Roescher T, Suway J, Welcher J, “Comparing the Accuracy of Image Based Scanning Techniques to Laser Scanners,” Society of Automotive Engineers (SAE) World Congress and Exhibition, 2018, SAE Paper No. 2018-01-0525
- Roescher T, Randles B, Welcher J, “Estimation of Seated Driver Eye Height based on Standing Height, Weight, Seatback Angle, and Seat Bottom Angle,” Society of Automotive Engineers (SAE) World Congress and Exhibition, 2023, SAE Paper No. 2023-01-0838
- Roescher, T. (2023). Nominal driving abilities and driver reaction times influence motor vehicle accident avoidance [Master's Thesis]. California State University, Long Beach.
- Roescher T, “Detection and Recognition of Vehicle Geometries and Orientations during Occluded and Limited Exposure Observations” (Research in Progress)

MEMBERSHIPS

- Society of Automotive Engineers (SAE)
- Human Factors and Ergonomics Society (HFES)
- Perception and Performance Technical Group
 - Cognitive Engineering and Decision Making Technical Group
 - Forensics Professional Technical Group
- California Association of Accident Reconstruction Specialists (CAARS)
- Southwestern Association of Technical Accident Investigators (SATAI)
- Biomedical Engineering Society (BMES)



WORK EXPERIENCE

Jul. 2017 - Present **Aperture, LLC** – Long Beach, CA
Formerly Biomechanical Research and Testing, LLC
Biomechanical Engineer and Accident Reconstructionist

Responsible for the investigation and analysis of injury-causing events, which includes vehicle and site inspections, accident reconstruction, and necessary biomechanical engineering calculations. Conducts ongoing research to evaluate the accuracy of high precision measurement equipment and its applications within the biomechanical and accident reconstruction communities. Performs fully instrumented tests utilizing human subjects and/or human surrogates. Data collected and analyzed include accelerations, velocities, displacements, forces, high speed film/video, and vehicle crush and dynamics. Conducts biomechanical and accident reconstruction analyses and provides forensic consultation for automobile accidents and various events for purposes of litigation, including accident reconstruction, occupant kinematics, occupant force exposure, and injury potential.

Sept. 2015 - Mar. 2016 **Terumo Medical Corporation** – Elkton, MD
New Product Development Engineer I

Responsible for designing, executing and analyzing test method validations using a Gage R&R study in Minitab. Developed prototype high precision measurement equipment and methods used for inspecting incoming small-scale raw materials. Provided support to senior engineers via documentation, prototyping activities and machine programming.

ACCREDITATIONS, CERTIFICATIONS, AND AWARDS

Jun. 2013 Certificate of Career Studies – Orange-Ulster Career and Technical Education Center
Received a certificate for completing two-years in the Computer Assisted Design program. The program focused on engineering aspects of CAD. The course utilized software such as AutoCAD, Autodesk Inventor and 3D Studio Max

Nov. 2017 Certificate of Accomplishment – Engineering Dynamics Corporation
Received a certificate for completing the EDC HVE course titled “EDC Simulations.”

Apr. 2018 Certificate of Appreciation for Outstanding Service – Society of Automotive Engineers
Received a certificate of appreciation for presenting new research regarding photogrammetry and 3D laser scanning.

Apr. 2018 Crash Data Retrieval Technician – Collision Safety Institute
Received a certification in the Crash Data Retrieval Technician Course
(Recertified in Jan. 2022)

Jun. 2018 Certificate of Achievement – Crash Safety Solutions
Received a certificate for successful completion of the Human Factors and Traffic Crashes Seminar

Jul. 2018 Certificate of Completion – Video School Online Inc.
Received a certificate for successful completion of the Night Photography class.

Jul. 2018 Certificate of Completion – Associates in Forensic Investigations
Received a certificate for successful completion of the Basic Forensic Scene Photography course.

- Aug. 2020 Certificate of Completion – Ruth Consulting
Received a certificate for successful completion of the Event Data Recorder Analysis in Traffic Crash Reconstruction course.
- Nov. 2020 Certificate of Completion – ai2-3D
Received a certificate for successful completion of the CloudCompare online course.
- Oct. 2022 Accredited Traffic Accident Reconstructionist – ACTAR
Received Full Accreditation as a Traffic Accident Reconstructionist from the Accreditation Commission for Traffic Accident Reconstruction for demonstrating academic achievement, completion of accident specific training, applied experience in the field and successful completion of the ACTAR Full Accreditation Written and Practical Examination (ACTAR #3800)

CONTINUING EDUCATION, TRAINING, AND KEY PROJECTS

- Sept. 2017 *ARC Network & Collision Safety Institute (ARC-CSI) Crash Conference – Las Vegas, NV*
Topics included: pedestrian-vehicle impacts, consecutive collisions, low speed rear end collisions and head-on collisions, photography for crash reconstruction, use of NHTSA NASS crash database in reconstruction, safely working around hybrids/electric vehicles/newer safety systems, scene and vehicle data analysis to evaluate pre-crash brake application, and airbag deployment conditions.
- Nov. 2017 *EDC Simulations Training Course – Miami, FL*
Topics included: vehicle dynamics, tire dynamics, initial condition estimations, single vehicle simulations, tractor-trailer simulations, multi-vehicle simulations in EDMAC, EDSMAC4 and SIMON models, proper usage of specific simulation models, setting up a simulated environment, setting up a simulated vehicle and simulating a tire failure
- Feb. 2018 *2018 HVE Users Forum – Charleston, SC*
Topics included: Simulating vehicle impacts using SIMON, building a simulated vehicle, building advanced environments, simulating tire blow-outs and rollovers, vehicle-environment interaction, multiple vehicle events, data interpretation
- Feb. 2018 *2018 I.DRR Users Forum – Austin, TX*
Topics included: Night time visibility and human factors, path intrusion, perception-reaction time and its effects on vehicle impacts, plausibility of crash avoidance, effects of sun position on PRT, gap acceptance, headlight analysis and object recognition
- Apr. 2018 *Society of Automotive Engineers World Congress – Detroit, MI*
Topic included: Human factors and ergonomics as it pertains to operation of autonomous vehicles, research in improved areas of photogrammetry, videogrammetry, and laser scanning, accident reconstruction topics such as CDR data interpretation and methods for validating data integrity.
- Apr. 2018 *Vehicle Crash Reconstruction: Principles and Technology – El Segundo, CA*
Topics included: Forensic photography, acceleration and friction, momentum and crush analysis, planar impact mechanics, motorcycle crash reconstruction, pedestrian crash reconstruction, rollover crash reconstruction, EDR data analysis, Heavy truck crash reconstruction, video analysis and simulation

- Jun. 2018 *Human Factors and Traffic Crashes Seminar – East Hampton, CT*
Topics included: Night time visibility and recognition, perception response time in a variety of situations, cut-offs, path intrusions, lead vehicle scenarios, head light analysis, crash avoidance, effects of weather on perception-reaction time, sun and moon positions, gap acceptance, current research in the field of human factors, case studies, atypical objects, effect of object contrast and relative positioning on PRT, adapting research to be on point with case.
- Jul. 2018 *Night Photography: You Can Shoot Stunning Night Photos – Online Course*
Topics included: Manual camera setting for optimizing image quality and lighting. Selecting a lens for night time photography. Equipment typically used for shooting night time photography. Post-processing images. Exporting images for print and online use
- Jul. 2018 *Basic Forensic Scene Photography – Online Course*
Topics included: Evidence documentation, photograph enhancement vs manipulation, proper camera equipment, most descriptive photographs, handling non-descriptive photographs, documentation of photographs, image capture procedures, choosing proper cameras and lenses for a scene.
- May. 2019 *Perception and Attention – Long Beach, CA*
Topics included: Human information processing, visual perception, selective and divided attention, automatic processing, controlled processing, multiple task performance, relations between attention and memory, mental workload assessments, situational awareness, S-R tasks, implicit vs explicit learning
- May. 2020 *Human Factors Methods – Long Beach, CA*
Topics included: Quantitative and qualitative data analysis, analysis of human-machine systems, evaluation of functioning systems, techniques used to measure human performance
- Aug. 2020 *Event Data Recorder Analysis in Traffic Crash Reconstruction – Online Course*
Topics included: EDR regulations, Pre-crash data analysis, Delta-V accuracy, Delta-V analysis, Special circumstances in recorded data, Manufacturer specific data, Evidence admissibility
- Nov. 2020 *CloudCompare Online Course – Online Course*
Topics included: Pointcloud manipulation, combination of two or more clouds, point to point distance analysis, CloudCompare specific tools, image analysis and conversion, color and light analysis
- Dec. 2020 *Practicum in Human Factors – Long Beach, CA*
Topics included: sign visibility and conspicuity, gaze analysis, gait pattern analysis, premise human factors, slip, trip, and fall human factors, analysis of expert testimony, literature review, evidence presentation
- Dec. 2021 *Seminar in Cognition – Long Beach, CA*
Topics included: endogenous and exogenous attention, memory and memory inhibition, visual and auditory perception, perceptual load, perception-response, learning mechanisms, fluid intelligence, uncertainty effects on judgement, consciousness, automaticity, implementation intention effects, anticipation of end-state effects on initial responses

- Feb. 2022 *2022 SATAI Crash Conference – Glendale, AZ*
Topics included: instrumentation of human volunteers and crash testing vehicles, crash data retrieval and crash data analysis, threshold write events for several vehicle manufacturers, vehicle to barrier impacts, inline rear end vehicle to vehicle collisions, vehicle to scooter impacts, offset rear end impacts, side-swipe snag impacts, angled broadside impacts, idle speed testing and idle speed backing impact, Toyota Safety Sense, Lexus Safety Systems, 3D laser scanning, photogrammetry, 3D data processing, 3D data acquisition systems, Hybrid-III data analysis
- Mar. 2022 *2022 I.DRR Users Forum – San Diego, CA*
Topics included: human factors in motor vehicle accidents, new research in perception, updates to the I.DRR software, nighttime visibility, pedestrian detection, retroreflective tape analysis, accident configuration effects on perception, looming vs platoon motor vehicle accidents, color analysis
- Sept. 2022 *Simcenter Madymo Introduction – Signal Hill, CA*
Topics included: Madymo user interface, multibody systems and models, joint simulation, seat belt modeling and simulation, vehicle seat material characteristics, ATD positioning, FE modeling, contact definitions, airbag modeling, biomechanical data analysis, data visualization
- Dec. 2022 *Driver Distraction from Electronic Devices: Insights and Implications – Online Course*
Topics included: Driver distraction, attentional resources, forms of driver distraction, distractor risks, current research, legislation and policy regarding electronic devices, strategies and techniques to reduce driver distraction
- Feb. 2023 *2023 SATAI Crash Conference – Glendale, AZ*
Performed and participated in a series of six instrumented low speed rear-end impacts between a bullet Honda Civic and a target Ford Focus, with instrumented human driver and 50th percentile male Hybrid III and BioRID ATDs in the target vehicle and three human occupants in the bullet vehicle. Performed and participated in official SATAI conference crash tests utilizing instrumented vehicles, human volunteers, and ATDs, which included: high-speed remote-driven Ford Escape to ATD pedestrian impact; high speed remote-driven 50% frontal offset between a Ford Escape and Chevrolet Impala; a lane change side-swipe between a Subaru Outback and a Mazda 5; a T-swipe between a Subaru Outback front bumper and Mazda 5 side; a narrow offset angled collision between the right front of a Mazda 5 and the left front of a Subaru Outback; an impact between the right front of a Subaru Outback and the partially open Mazda 5 driver's door. Vehicle dynamics, vehicle damage, EDR data, and human/dummy occupants motions/loading were documented and analyzed. Pre and post full-body MRI scans were conducted on the instrumented human driver in the low speed rear-end tests. All tests were performed in Glendale, AZ. Results presented at SATAI Conference, March 1-4, 2023, Glendale, AZ
- Mar. 2023 *Development and Creation of the ModFid Driving Simulator – Signal Hill, CA*
Designed, sourced, and created a completely modular moderate fidelity driving simulator for Human Factors and Accident reconstruction research. Simulator is capable of matching the exact driving parameters of most on road vehicles including matching seats/seat belt systems, steering stiffness, brake stiffness, throttle stiffness, steering rebound, acceleration and braking performance. Software's utilized for research include OpenDS for manual driving task research and CARLA for automated driving research.

- Apr. 2023 *Society of Automotive Engineers World Congress – Detroit, MI*
Topic included: Driver eye positions and sight lines, perception and cognition of automotive hazards, perception of ADAS systems and warning lamps, negotiation of intersection, driver understanding and usage of automotive telematics, biomechanical loadings and kinematics of roll over motor vehicle accidents, biomechanical loading of the lumbar spine in rear end impacts. Presented research on estimation of seated driver eye position.
- Oct. 2023 *Principles of Data Acquisition – Signal Hill, CA*
Topics included: Active data acquisition, sensor setup, data processing, digital signal processing, filtering, sensor theory, common sensors, sensor limitations, shunt and empirical checks, sampling error, time synchronization, grounding and shielding.
- Jan. 2024 *Southwestern Association of Technical Accident Investigators (SATAI) – Glendale, AZ*
Topics Included: 3D Technologies for Crash Scene Documentation, Motorcycle Reconstruction Topics, Digital Forensics, The Biomechanics of Motorcycle Helmets, and Crash Test Data Review