Julius M. Roberts M.S., P.E.

Director, Senior Managing Consultant

Mr. Julius Roberts is a Senior Managing Consultant and Director with Engineering Systems Inc. (ESi). His background includes mechanical engineering with expertise in accident reconstruction and biomechanics. Mr. Roberts is a licensed Professional Engineer and completed SAE's Accident Reconstruction Certificate Program. He specializes in accident investigation and reconstruction of recreational, passenger, and commercial vehicles including accessing and interpreting Event Data Recorders (EDR) in light and heavy vehicles, heavy vehicle air brake systems, vehicle dynamics instrumentation, mechanical testing, data acquisition and analysis, and three-dimensional laser scanning. Mr. Roberts has extensive experience with biomechanical instrumentation, incorporating the use of motion capture technologies to measure and visualize biological motion during complex interactions within the human-machine-environment.

Mr. Roberts' graduate studies focused on automotive crashworthiness, occupant protection and safety systems, impact biomechanics, injury mechanisms, injury tolerance, and musculoskeletal biomechanics. Mr. Roberts has experience in mathematical modeling, finite element methods, and computational simulation.

Licenses & Certifications

- State of Michigan P.E. License No. 6201069558
- State of California P.E. License No. 38073

Positions Held

Engineering Systems Inc., Ann Arbor, Michigan

- Director, 2024 – Present
- Senior Managing Consultant, 2023 – Present
- Senior Consultant, 2020 – 2023
- Senior Staff Consultant, 2016 – 2020
- Staff Consultant, 2015 – 2016
- Associate Consultant, 2013 – 2015
- Engineering Intern, 2012 – 2013

University of Michigan Orthopaedic Clinical Research, Ann Arbor, Michigan

- Research Assistant, 2011 – 2013

Julius M. Roberts
Director, Senior Managing Consultant

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ESi MI – Ann Arbor
1174 Oak Valley Dr.
Ann Arbor, MI 48108

Education

M.S., Mechanical Engineering. Wayne State University. 2020

B.S.E., Mechanical Engineering. University of Michigan. 2013

Areas of Specialization

Accident Investigation & Reconstruction

Imaging & Analyzing Event Data Recorders for Light & Heavy Vehicles

Mechanical & Biomechanical Testing

Injury Tolerance & Analysis

Data Acquisition & Data Analysis

Certified Heavy Vehicle Brake Inspector (49 CFR-396.25)

3-Dimensional Modeling

Certified FARO Operator

International Automotive Component, Southfield, Michigan

- Advanced and Safety Engineering Intern, 2011

Publications

Sensitivity Analysis of Virtual Crash Simulation Software Using Design of Experiments (DOE)

J.M. Roberts, N.E. Civitanova, J.A. Stegemann, D.A. Buzdygon, and K.R. Thobe. SAE International, SAE Technical Paper, 2025. 2025-01-8693, doi:10.4271/2025-01-8693.

Elevator Passenger Accelerations During Emergency Stops, Normal Elevator Travel, and Everyday Activities

A.C. Mathias, G.A. Hazime, H. Chan, **J.M. Roberts**, M.E. Kelley. Biomedical Sciences Instrumentation, 62nd Annual Rocky Mountain Bioengineering Symposium, St. George, UT. April 2025. Biomedical Sciences Instrumentation Journal, Volume 61(1).

The Kinematic Analysis of Occupant Excursions and Accelerations During Staged Low Speed Far-Side Lateral Vehicle-to-Vehicle Impacts

P.A. Shibata, **J.M. Roberts**, J.K. Sprague, A.E. Light, J.A. Stegemann, M. Meza-Arroyo, and S.P. Capser. SAE International, SAE Technical Paper, April 2, 2019.

Stump Grinder Accident Reconstruction and Design Testing Methodologies

D.B. Brickman, A.C. Mathias, **J.M. Roberts**, “Proceedings of The XXXth Annual International Occupational Ergonomics and Safety Conference, Pittsburgh, PA, pp. 007-012, June 7-8, 2018.

Analysis of an Unexpected Impact to the Crown of the Head

P.A. Shibata, A.L. Stern, **J.M. Roberts**, J.A Stegemann. Proceedings of The XXVIIIth Annual International Occupational Ergonomics and Safety Conference, Chicago, IL, pp. 126-131, June 9-10, 2016.

Automatic Sliding Door Sensor Safety Analysis

D.B. Brickman, **J.M. Roberts**, C.A. Fox. Proceedings of The XXVIIIth Annual International Occupational Ergonomics and Safety Conference, Chicago, IL, pp. 29-35, June 9-10, 2016.

Presentations

How and When to Effectively Utilize Technology to Your Advantage

J.M. Roberts and E.J. Tuczak, Property and Liability Resource Bureau (PLRB) 2024 Central Regional Adjusters Conference, St. Louis, MO, August 27-28, 2024.

The Kinematic Analysis of Occupant Excursions and Accelerations During Staged Low Speed Far-Side Lateral Vehicle-to-Vehicle Impacts

Co-Presenter, SAE International, Detroit, MI, April 9-11, 2019.

Building Damage from Vehicle Impacts

E.J. Tuczak, **J.M. Roberts**, International Association of Special Investigation Units, Michigan Chapter, Livonia, MI, October 18, 2018.

Human Factors: Answering the 'How' and 'Why' Questions

J.L. Auflick, **J.M. Roberts**, Aviva Insurance, Toronto, ON, October 5, 2018.

Automotive Failure Analysis: How They Crash, How They Break

J.K. Sprague, **J.M. Roberts**, MDTC, Webinar, May 31, 2018.

Automatic Sliding Door Sensor Safety Analysis

Presenter, Case Studies and Applications – I, XXVIIIth Annual International Occupational Ergonomics and Safety Conference, Chicago, IL, June 9, 2016.

A Picture is Worth 1000 Words: Demonstrative Exhibits in Litigation

Co-Presenter, XXVIIIth Annual International Occupational Ergonomics and Safety Conference, Chicago, IL, June 9, 2016.

Continuing Education

- ADAS Application: Automatic Emergency Braking - Certificate of Achievement, SAE International, Detroit, MI, 2025
- Injuries, Anatomy, Biomechanics & Federal Regulations - Certificate of Achievement, SAE International, 2023
- Event Data Recorder Update and Analysis - Ruth Consulting, Atlanta, GA, 2023
- Accident Reconstruction, the Autonomous Vehicle and ADAS - Certificate of Achievement, SAE International, Troy, MI, 2022. SAE Accident Reconstruction Certificate Program, Elective Course
- Applying Automotive EDR Data to Traffic Crash Reconstruction - Certificate of Achievement, SAE International, 2021. SAE Accident Reconstruction Certificate Program, Required Course
- Traffic Signal Timing Records Interpretation and Analysis - Traffic Signal Academy, University of Tennessee, 2020
- Sunbelt Rentals, Aerial Work Platforms - Certificate of Training, Ypsilanti, MI, 2019
- Accessing and Interpreting Heavy Vehicle Event Data Recorders - Certificate of Achievement, SAE International, Appleton, WI, 2019. SAE Accident Reconstruction Certificate Program, Required Course
- Applied Vehicle Dynamics Course - Autobahn Country Club, Joliet, IL, 2018

  Photogrammetry and Analysis of Digital Media - Certificate of Achievement, SAE International, Troy, MI, 2018. SAE Accident Reconstruction Certificate Program, Elective Course
- Human Factors in Traffic Crash Reconstruction - Institute of Police Technology and Management, University of North Florida, Fort Myers, FL, 2017
- Understanding Bloodstain Pattern Analysis - Bevel, Gardner & Associates, Ann Arbor, MI, 2017

  Vehicle Dynamics for Passenger Cars and Light Trucks - Certificate of Achievement, SAE International, Troy, MI, 2016. SAE Accident Reconstruction Certificate Program, Required Course
- Traffic Crash Reconstruction I - Northwestern University for Public Safety, Ann Arbor, MI, 2015

- Vehicular Crash Reconstruction Methods Seminar - Certificate of Achievement, SAE International, Troy, MI, 2014. SAE Accident Reconstruction Certificate Program, Required Course
- Collision Safety Institute, Crash Data Retrieval (CDR) Technician Level 1 - Certificate of Training, Fort Myers, FL, 2014
- FARO Focus 3D Operator - Certificate of Training, Atlanta, GA, 2014
- Bendix Spicer, Truck Air Brake Systems, Heavy Truck Brake Inspector (49 CFR-396.25) - Certificate of Achievement, Owosso, MI 2014

Professional Affiliations/Honors

ASTM International

- Member

Society of Automotive Engineers (SAE)

- Member
- Technical Reviewer

American Society of Mechanical Engineers (ASME)

- Member

International Society for Occupational Ergonomics & Safety (ISOES)

- Member

Wayne State University Master's Scholarship

- Recipient, 2018-19, 2019-20

Wayne State University Workforce Development Scholarship

- Recipient, 2018

University of Michigan General Dynamics Scholarship

- Recipient, 2008

University of Michigan Maize and Blue Scholarship

- Recipient, 2008

Project Experience

Investigations

Vehicle Impact Analysis – Vehicle to Vehicle

- Performed inspections of the site and involved vehicles and captured data in the forms of photographs, videos, three-dimensional laser scan data, aerial photography, and event data recorder information.
- Analyzed the vehicle collision to determine area of impact and orientation at impact.
- Performed a momentum analysis to determine speed at impact and energy of the impact.
- Performed a time-distance analysis to determine the coordinated motion of each vehicle and to analyze contributing factors related to environmental and human factors.

- Prepared technical reports, static and dynamic visual aids, and expert opinions summarizing findings, methodologies, and conclusions in a manner suitable for litigation support, including deposition and trial presentation.

Line-of-Sight Analysis – Vehicle v. Pedestrian

- Performed full analysis of driver's field of regard, including blockages due to vehicle components and structure.
- Performed human kinematics study utilizing laser scanning for static positions, and full motion capture for dynamic aspects of both driver and pedestrian.
- Generated animation exhibits based on physics and motion capture depicting the accident reconstruction and biomechanical analyses. Exhibits conveyed view and conspicuity from perspective of all parties, as well as first availability of warning stimulus to driver.
- This approach has been successfully utilized in cars, heavy trucks, municipal buses, and delivery vehicles.

Analysis of Heavy Truck Air Brake System

- Performed full accident reconstruction analysis including an assessment of the heavy truck's air brake system.
- Calculated the braking efficiency of the heavy truck.
- Determined whether the braking efficiency contributed to the vehicle crash.

Biomechanical Analysis – Vehicle v. Vehicle

- Analyzed the alleged injuries sustained during a motor vehicle collision.
- Analyzed the severity of the motor vehicle collision.
- Compared the severity of the motor vehicle collision to activities of daily living.

Biomechanical Analysis – Trip and fall on a premise

- Analyzed the injuries allegedly sustained during a trip and fall event.
- Performed a videogrammetry analysis of the surveillance video to analyze gait and path leading up to the event and partially captured the event.
- Completed a biomechanical analysis to determine the location of the fall.
- Analyzed the intrinsic and extrinsic factors that could have contributed to the fall.

Reconstruction, Biomechanical, and Analysis of Industry Safety Standards - Automatic Door

- Inspected, tested and measured the subject automatic door and captured data in the forms of photographs, videos, laser scans, force data, and field of regard from the safety sensors.
- Compared the measurements taken at the time of the inspection with the industry safety standards.
- Analyzed the injuries allegedly sustained during the fall event.
- Reconstructed the incident with a videogrammetry analysis as supporting basis.
- Prepared technical reports, static visual aids, and expert opinions regarding how the incident occurring with respect to the human-machine-environment interaction along with compliance with the industry safety standards.