

UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE PATENT TRIAL AND APPEAL BOARD

Verizon Connect Inc.,
Petitioner

v.

Omega Patents, LLC,
Patent Owner

Case No.: IPR2023-01162
Patent No.: 8,032,278

Filing Date: July 3, 2007
Issue Date: October 4, 2011

**Title: VEHICLE TRACKING UNIT WITH DOWNLOADABLE CODES
AND ASSOCIATED METHODS**

SUPPLEMENTAL DECLARATION OF DR. AZIM ESKANDARIAN

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EXHIBIT LIST

Exhibit	Description
1001	U.S. Patent No. 8,032,278 to Flick
1002	Declaration of Azim Eskandarian
1003	U.S. Patent No. 6,756,885 to Flick
1004	U.S. Patent No. 6,606,561 to Flick
1005	U.S. Patent Application Publication No. 2006/0161315 to Lewis
1006	U.S. Patent Application Publication No. 2003/0182003 to Underdahl
1007	U.S. Patent No. 6,011,460 to Flick
1008	U.S. Patent No. 6,812,829 to Flick
1009	File History of Application No. 11/773,272, which issued as U.S. Patent No. 8,032,278 to Flick
1010	03-25-2021 Order Granting the Reexamination (Appl. No. 90/014,675)
1011	06-21-2021 Examiner's Non-Final Office Action (Appl. No. 90/014,675)
1012	08-21-2021 Declaration of Joseph C. McAlexander III
1013	08-23-2021 Response to Non-Final Office Action (Appl. No. 90/014,675)
1014	04-01-2022 Patent Owner's Appeal Brief (Appl. No. 90/014,675)
1015	12-01-2022 Decision on Appeal (Appl. No. 90/014,675)
1016	Application No. 11/076,259 to Flick
1017	Application No. 10/383,496 to Flick
1018	Application No. 09/859,972 to Flick
1019	Application No. 60/264,811 to Flick
1020	Application No. 60/258,005 to Flick
1021	Application No. 60/251,552 to Flick
1022	Application No. 60/252,125 to Flick
1023	Application No. 60/236,890 to Flick
1024	Application No. 60/246,463 to Flick
1025	Application No. 60/222,777 to Flick
1026	Application No. 60/205,178 to Flick
1027	10-03-2014 Plaintiff's Opposition to CalAmp's Motion for

	Claim Construction, 6:13-cv-1950-ORL-40-DAB
1028	02-20-2015 Order on Claim Construction, 6:13-cv-1950-ORL-40-DAB
1029	<i>In Ex Parte A. James Smith, Jr.</i> , 2010 WL 3269939 (BPAI August 17, 2010)
1030	07-23-2024 Deposition of Joseph C. McAlexander, III, P.E.
1031	07-19-2024 Deposition of Christian Tregillis
1032	07-26-2024 Deposition of Kenneth E. Flick
1033	Supplemental Declaration of Dr. Azim Eskandarian
1034	02-17-2016 Trial Transcript, Omega Patents, LLC v. CalAmp Corp., Case No. 6:13-cv-1950 (Exhibit 3 to Flick Deposition)
1035	08-21-2021 Declaration of Joseph C. McAlexander, III, Reexamination Control No. 90/014,675 (Exhibit 12 to McAlexander Deposition)
1036	OnStar Wholesale Reference Manual
1037	Publication, “Honda, GM’s OnStar and XM Radio Agree to Offer In-Vehicle Services to US Drivers”, May 24, 2000
1038	Bcusack, “USA: Mercedes-Benz first with Telematics for 2001”, September 14, 2000
1039	Goebel, “Ford RESCU Program”, March 1, 1996
1040	Final Written Decision Determining All Claims Unpatentable, <i>Geotab USA, Inc. et al. v. Omega Patents, LLC</i> , IPR2023-00504
1041	09-14-2021 Federal Circuit Opinion, <i>Omega Patents, LLC v CalAmp Corp.</i> , 2020-1793, 2020-1794
1042	U.S. Patent No. 5,223,844
1043	U.S. Patent No. 5,515,043

I, Azim Eskandarian, declare:

1. I have been retained by Nixon Peabody LLP, counsel for Verizon Connect Inc. (“Petitioner”), to analyze Claims 1-22 (“the challenged claims”) of U.S Patent No. 8,032,278 in light of various prior art references and my knowledge and experience in connection with the above captioned *Inter Partes* Review of Claims 1-22 of the ’278 Patent. I am being compensated for my time working on this matter. My compensation is not dependent in any way upon the outcome of this proceeding. I hold no financial interest in the Petitioner or Omega Patents, LLC (“Patent Owner” or “Omega”).
2. I previously provided a declaration for the Petition submitted by Petitioner. Ex.1002. I incorporate by reference my statements therein.

I. PERSONAL AND PROFESSIONAL BACKGROUND

3. I have been a Professor of Mechanical Engineering and Alice T. and William H. Goodwin Jr. endowed Chair and Dean of the College of Engineering at Virginia Commonwealth University (VCU) since August 2023. I am establishing the Autonomous Robots and Vehicles Laboratory at VCU. Before this position, I was a Professor and Head of the Mechanical Engineering Department at Virginia Polytechnic Institute and State University (“Virginia Tech”). At Virginia Tech, I was named the Nicholas and Rebecca Des Champs Chair in Mechanical Engineering and established

the Autonomous Systems and Intelligent Machines laboratory. My current *curriculum vitae* is attached as Appendix A, with some highlights as follows.

4. I received a Bachelor of Science (B.S.) in 1982 from George Washington University, a Master of Science (M.S.) in 1983 from Virginia Tech, and a Doctor of Science (D.Sc.) in 1991 from George Washington University, all in mechanical engineering.
5. I was an engineer and project manager from 1983 to 1989 before becoming an Assistant Professor in Mechanical Engineering at Pennsylvania State University in 1989. I began a long and successful career at George Washington University in 1993 when I become a Professor of Engineering and Applied Science. At George Washington University, I was the Founding Director of the Center for Intelligent Systems Research from 1996 to 2015, the Director of the Transportation Safety and Security University Area of Excellence from 2002 to 2015, the Co-Founder of the National Crash Analysis Center in 1992, and later the Director of the National Crash Analysis Center from 1998 to 2002 and 2013 to 2015.
6. As a professor at George Washington University, I taught graduate level courses on Vehicle Dynamics, Intelligent Transportation Systems, Intelligent Systems Theory and Applications, Analytical Mechanics: Dynamics, and System Dynamics Modeling and Control, among others. I have also directed

doctoral dissertations covering connected vehicles and cooperative autonomous vehicle safety.

7. In addition, I developed a number of laboratories, including the Vehicle Driving Simulator Laboratory, Traffic and Networks Laboratory, Vehicle Modeling Laboratory, Truck Driving Simulator, Mobile Robotics Lab, and High Performance and Parallel Computing Laboratory. Through these laboratories, I researched and simulated connected vehicles, collision avoidance, monitoring and data acquisition systems in vehicles, sensor integration for network monitoring and controls, and vehicle structure and mechanical components, among a number of other automotive engineering topics.
8. My research portfolio includes over \$28.6 million in funding from government and industry entities such as the Department of Transportation, General Motors, and Ford Motor Co. I have pioneered research in autonomous vehicles, advanced driver assistance systems, human/driver cognition, and robotics. For example, the Department of Transportation sponsored a nearly \$1.5 million research project from 1999-2004 in which I researched vehicle controls, driver assistance, collision avoidance, and inter-vehicular and vehicle-infrastructure networks.

9. I have also served as an editor for the following journals: IEEE Intelligent Transportation Systems Transactions (Editor-in-Chief, 2019-present; Senior Editor, 2017-2018; Associate Editor, 2004-2016); ASME Journal of Dynamic Systems, Measurement, and Control (Associate Editor, 2016-2018); International Journal of Automotive Technology (Associate Editor, 2003-2016); Journal of Multi-body Dynamics of Institution of Mechanical Engineers (Editorial Board, 2000-2015); International Journal of Vehicle Autonomous Systems (Editorial Board, 2005-2015); International Journal of Vehicle Information and Communication Systems Editorial Board, (2005-2014).
10. My 39 years of academic and engineering experience in dynamics and control, intelligent systems, and applied mechanics, with applications in intelligent vehicles, vehicle dynamics and control, and automotive safety, has given me a detailed appreciation of the technology involved with the '278 Patent.
11. In writing this Declaration, I have considered the following: my own knowledge and experience, including my work experience in the above fields; my experience in teaching those subjects; and my experience in working with others involved in those fields. In addition, I have analyzed

the publications and materials described in Section II of this declaration, as well as the other materials I cite in my declaration.

12. I have no financial interest in either party or in the outcome of this proceeding. I am being compensated for my work as an expert on an hourly basis, for all tasks involved.
13. My opinions, as explained below, are based on my education, experience, and background in the fields discussed above. Unless otherwise stated, my testimony below refers to the knowledge of a POSITA in the fields as of the time of the invention of the '278 Patent.

II. MATERIALS REVIEWED AND CONSIDERED

14. My findings contained in this declaration are based on my education, research, experience, and background in the field of automotive engineering, and specifically, to the fields of intelligent vehicles, vehicle dynamics and control, and automotive safety, as well as my investigation and study of prior art references and other documents disclosed in this declaration. In forming my opinions, I have studied and considered the documents identified in the Exhibit List contained in this declaration on page ii after the Table of Contents.

III. MOTIVATION TO COMBINE

15. I understand that Patent Owner has asserted that “GPS in vehicles was relatively new” as of July 2007. Ex. 2044, ¶ 12. I disagree. By July 2007, GPS in vehicles was well-known in vehicle systems.
16. For example, the '278 Patent describes the use of GPS in vehicles in the prior art:

A number of patents disclose various systems and approaches to tracking vehicles. For example, U.S. Pat. No. 5,223,844 discloses a tracking system including a control center and a mobile unit installed in the vehicle. The mobile unit may send security warnings to the command center via a wireless transceiver. Position information for the vehicle is determined using a GPS receiver at the vehicle.

U.S. Pat. No. 5,515,043 discloses a similar system which may send one or more preprogrammed telephone messages to a user when away from the vehicle. The user may remotely access location information or cause certain commands to be carried out by entering a personal identification number (PIN).

Ex. 1001, Background of the Invention, col. 1 ln. 47-59; see also Ex. 1004.

17. The '561 Patent similarly describes the existence of the use of GPS in vehicles. The inventor recited in Flick '561 the same description of the prior art described in paragraph 16. See Ex.1004, Flick '561, Background of the Invention, col. 1 ln. 42-54.

18. In addition, GPS in vehicles was in actual commercial use by July 2007. For example, Lewis describes a number of commercial GPS systems in vehicles:

Many systems offer vehicle security and tracking. Systems such as Trackn, OnStar, and TrimTrac offer remote lock mechanisms and roadside assistance. Subscription services are required for these systems. The present system offers vehicle tracking using a well-established GSM/GPRS network and also offers performance tracking for the host vehicle, which can be monitored over the web.

Ex. 1005, ¶ 87.

19. OnStar was a popular vehicle tracking system owned by General Motors that was in use prior to the filing of the '278 Patent. A 1997 OnStar Manual described OnStar as utilizing GPS technology in vehicles: “The OnStar System integrates on-board advanced vehicle electronic architecture with Global Positioning System (GPS) satellite technology and a hands-free, voice activated cellular phone.” Ex. 1036, at 4. The manual included a

number of publications demonstrating the widespread press coverage of OnStar. *Id.* at 13. At that time, OnStar was available in several vehicle makes and models, including the Cadillac Eldorado, Cadillac DeVille, and Cadillac Seville. *Id.* at 22. In 2000, General Motors announced that OnStar would be available on Honda and Acura vehicles. Ex. 1037, at 1.

20. Similarly, Mercedes-Benz developed the Tele Aid telematics system that included GPS technology for vehicle tracking: “Pressing this button also transmits crucial information about the client to ATX, including the precise location of the vehicle (through GPS satellite tracking), the model of the car and its color (to help emergency services visually locate the car quickly).” Ex. 1038, at 4.
21. Ford also developed the RESCU system utilizing GPS technology for vehicle tracking prior to the ’278 Patent. Ex. 1039, at 2 (“The Ford system relies on the GPS . . .”). These systems were in use before July 2007.
22. In my opinion, the use of GPS technology in vehicles was well-established by the time of the filing of the ’278 Patent in July 2007.
23. I understand that Patent Owner has asserted that vehicle tracking and vehicle security systems targeted different problems before July 2007. Ex. 1033, ¶ 23. I disagree. Vehicle security systems using vehicle tracking technology existed prior to July 2007.

24. For example, General Motors' OnStar, Mercedes-Benz's Tele Aid, and Ford's RESCU all used vehicle tracking technology to address vehicle security problems:

- "OnStar services include automatic notification of air bag deployment, *stolen vehicle tracking*, emergency services, roadside assistance with location, remote door unlock, remote diagnostics, route support, OnStar Concierge, and convenience services locator." Ex. 1037, at 2-3 (emphasis added).
- "[T]he standard Tele Aid system incorporates three useful new features for 2001:
 - remote diagnostics – if an owner reports a problem, the status of the car's electronic systems can be accessed remotely via Tele Aid from Mercedes-Benz Roadside Assistance.
 - emergency door unlock – if the owner locks the keys in the car, arrangements can be made to unlock the car from the Client Assistance Center, or directly from the MBUSA website.
 - anti-theft alarm notification – if the anti-theft alarm is triggered, the system notifies ATX Technologies, who contacts the owner."

Ex. 1038, at 5.

- “A fourth benefit of the Tele Aid system is stolen vehicle tracking, which can actually help authorities locate the car once the owner reports it stolen.” Ex. 1038, at 3.
- “For increased security and faster emergency assistance, Ford is the first carmaker to offer satellite-based security system; its innovative RESCU (Remote Emergency Satellite Cellular Unit) feature is available in the ’96 Lincoln Continental. The Ford system relies on the GPS and a 24-hour operator response center[.]” Ex. 1039, at 2.
- “The FBI reports 25,000 carjackings annually, so Ford’s RESCU system includes an anti-carjacking procedure. Each RESCU owner is issued a password. To cancel an emergency call, the driver must give the password when the operator makes contact. If the code isn’t given, the operator places a 911 call to the closest police station while the GPS continues tracking the vehicle.” Ex. 1039, at 2.

25. In my opinion, by July 2007, vehicle security systems utilizing vehicle tracking technology were well-established in vehicle telematics systems. These systems also used data bus technology to provide vehicle diagnostics and remote control functionality.

IV. CONCLUSION

26. This declaration represents the supplemental opinions that I have formed to date and based on the material currently available to me. I reserve the right to supplement this Declaration to address any new information offered by Patent Owner or provided by the Board. I also reserve the right to supplement this Declaration insofar as Patent Owner is permitted to supplement the record with any opinions or arguments.
27. In signing this declaration, I understand that the declaration will be filed as evidence in a review proceeding before the Board. I acknowledge that I may be subject to cross examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will appear for cross examination within the United States during the time allotted for cross examination.
28. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like punishable by fine or imprisonment, or both, under Section 1001 of the Title 18 of the United States Code.

Executed August 21, 2024 in Richmond, Virginia

A handwritten signature in black ink, appearing to read "Eskandarian", written over a horizontal line.

Azim Eskandarian, D.Sc.

EXHIBIT A

CURRICULUM VITAE

Azim Eskandarian, D.Sc., ASME & IEEE Fellow
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Virginia Commonwealth University
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Education

D.Sc., 1991, Mechanical Engineering, The George Washington University, Washington, D.C.
M.S., 1983, Mechanical Engineering, Virginia Polytechnic Institute and State University, Blacksburg, VA.
B.S., 1982, Mechanical Engineering (with senior award), The George Washington University, Washington, D.C.

Professional Appointments

Academic

8/2023-Present **Virginia Commonwealth University (VCU), Richmond, VA**
Dean, College of Engineering, and Alice T. and William H. Goodwin Jr. Endowed Chair
Professor of Mechanical Engineering

8/2015-7/2023 **Virginia Polytechnic Institute and State University, Blacksburg, VA (Virginia Tech)**
8/2015-7/2023 **Department Head and Professor, Mechanical Engineering Department**
4/2018-7/2023 Nicholas and Rebecca Des Champs Chair/Professor of Mechanical Engineering
3/2021-7/2023 Electrical and Computer Engineering Professor (Courtesy Appointment)
8/2023-present Adjunct Professor, Mechanical Engineering

5/2022-Present **National Science Foundation, Alexandria, VA**
Part-time NSF Expert, Civil, Mechanical, and Manufacturing Innovation Division (CMMI)

1993-7/2015 **The George Washington University, Washington, DC (GWU)**
2003-7/2015 Professor of Engineering and Applied Science
2000-2003 Associate Professor of Engineering and Applied Science
1993-2000 Associate Research Professor of Engineering and Applied Science
Appointments in the Civil and Environmental Engineering Department (CEE) and Mechanical and Aerospace Engineering Department (MAE), and earlier in the ME program of Civil, Mechanical, and Environmental Engineering (CMEE) Department
[in 1999, CMEE was reorganized into two Departments of CEE and MAE]

Previous Academic Leadership and Administrative Roles (GWU)

1996-7/2015 Director and Founder, Center for Intelligent Systems Research (CISR), GWU
5/2013-7/2015 Director, National Crash Analysis Center (NCAC), GWU; 1992 Co-founder
1998-2002
2003-7/2015 Director & Founder, GW Area of Excellence in Transportation Safety and Security
1998- 2003 Co-Founder and Co-Director, GW Transportation Research Institute
2012-7/2015 Chair of the Department's Graduate Programs Committee
2000-2007

1989-1992 **Pennsylvania State University, York, PA**
1990-1992: Assistant Professor, Mechanical Engineering (ME), and MET and IET programs
1989-1990: Instructor, Mechanical Engineering (ME), and MET and IET programs

1982-1983 **Virginia Polytechnic Institute and State University, Blacksburg, VA**
Research Assistant, Mechanical Engineering Department

Industry

1986-1988 **VSE Corporation, Alexandria, Virginia**; Mechanical Engineer
1983-1986 **Phillips Cartner and Co., Inc., Alexandria, Virginia**; Project Engineer

Areas of Specialty and Interest

Basic Areas

- Dynamic Systems and Controls
- Intelligent Systems
- Machine Learning and AI
- Multi-body and Impact Dynamics
- Applied Mechanics and Nano-mechanics
- Non-linear Dynamic FEM and Meshless Methods

Applications

- Autonomous and Intelligent Vehicles
- Collision Avoidance and Driver Assistance
- Vehicle Dynamics, Control, and Active Safety
- Robotics; Neurodynamics
- Intelligent Transportation Systems
- Vehicle Crashworthiness and Occupant Injury Biomechanics

Honors, Awards, and Recognitions

- | | |
|-----------|--|
| 2021 | Vincent Bendix Automotive Electronics Engineering Award; Society of Automotive Engineers; for the 2020 best paper award in the SAE International Journal of Connected and Automated Vehicles |
| 2021 | Elected Board of Governors of IEEE Intelligent Transportation Systems Society (2022-24) |
| 2021 | VT College of Engineering Torgerson Presentation Award by the advisee's (Vanshaj Khattar) Research |
| 2021 | Best student paper award in IEEE ITS Conference, top three, co-authored/won by the advisee (Ce Zhang) |
| 2019-24 | Editor-in-Chief, IEEE Transactions on ITS |
| 2018 | Nicholas and Rebecca Des Champs Chaired (Endowed) Professor |
| 2017 | IEEE ITS Society's Outstanding Research Award |
| 2017 | Vice-President of Administrative Activities, IEEE ITS Society |
| 2013 | Fellow of ASME (American Society of Mechanical Engineers) |
| 2013 | Senior Member of IEEE (Institute for Electrical and Electronics Engineers) |
| 2013 | Article in IEEE Transactions on ITS among "Top 10 Best Research Papers" in 10 years 2000-09 |
| 2012 | Best Student Paper Award, second place, ASME 2012 IMECE, Houston, TX, Nov. 9-15, 2012 (Volume 8: Mechanics of Solids, Structures, and Fluids) |
| 2011 | Distinguished Researcher Award, School of Engineering and Applied Science, GWU |
| 2011 | Certificate of Appreciation, ASME Dynamic Systems and Controls Division for Local Arrangement Chairmanship of ASME DSC Conference |
| 2010 | Among the highest cited authors of IEEE Transactions on ITS (documented by the editorial board) |
| 2007-2013 | Board of Governors of IEEE Intelligent Transportation Systems Society, twice elected |
| 2006 | SAE (Society of Automotive Engineers) Ten-Year Service Recognition |
| 2003 | Recognition Award for Services as Director of FHWA/NHTSA National Crash Analysis Center 1998-02 |
| 2000-2002 | President of GW-Chapter of Sigma-Xi Scientific Research Society (Secretary during 1999-00) |
| 1988-1989 | NASA PREST program Fellowship award at GWU |
| 1982 | Superior Achievement Award in ME Design at the "Annual Senior Design Award Competition," GWU |
| 1982 | Pi Tau Sigma Engineering Fraternity |
| 1981 | Tau Beta Pi, Engineering Honor Society |

Experience Summary

- 39 years of progressive academic (33) and professional (6) experience with academic leadership roles.

Virginia Commonwealth University (VCU)

- As the Dean, leading the College of Engineering through transformative changes in interdisciplinary engineering without boundaries, focusing on selected thematic areas of excellence, experiential learning, and creative endeavors to meet industry needs, address current global problems, and shape the future of engineering education. Reshaping the organization of the college of 130 full-time and affiliate faculty, 47 staff, and over 2,400 students; executing several new initiatives to collaborate across several schools/colleges internally and internationally; establishing research and academic collaborations across VCU colleges, including medical school; initiating several new engineering undergraduate and graduate degree programs- largest since the inception of the school of engineering; expanding the DEI efforts, and creating new pathways for students to receive credits for experiential learning and fulfilling degree requirements while at internships and coops.

Virginia Tech

Administration and Budget

- Led the Mechanical Engineering Department with 68 faculty, 46 affiliate and adjunct faculty, and 25 staff, serving over 1140 undergraduate (sophomore to senior) and 300 graduate students, 180 at PhD level; ranked the fifth largest in the nation in graduating Mechanical Engineers (ASEE 2020 Data), awarding about 400 BS ME degrees each year. Supervising an annual budget of over \$32M, including \$18+M in research expenditures, which increased by 47% over seven years and is steadily growing.
- The department is ranked 17th (10th in public schools) in undergraduate and 17th (9th in public schools) for graduate programs in Mechanical Engineering by the US News and World Report College rankings and ranked 51-100 in the World QS survey among all ME departments worldwide (13th among the US Public Schools ME Departments.)
- Increased faculty by 30%; recruited 30 new faculty (9 from underrepresented groups and female) and 16 new staff (replacements and new hires); promoted 22 successful P&T cases. Planning to hire more faculty next year.
- Obtained two new and two re-allocated fully funded endowed positions, awarded four Faculty Professorships, and revived and awarded four ME endowed Faculty Fellows. Department has 16 endowed Professorships and Faculty Fellowships (five more Honorifics appointments than in 2015) and one National Academy of Engineering (NAE) member.
- Completed a new strategic plan within the first year and commissioned new initiatives for improvements in both graduate and undergraduate academic policies and curricula, enhancing diversity, equity, inclusivity, and scholarship in the department; expanded the development and outreach activities through the college Development Office; and developed/enhanced new facilities and new labs, among other activities.
- Reorganized staff for improved service; created a new position for departmental communications and outreach activities, initiating an effective departmental communications campaign, and multiple other positions for facilities management, additional advising capacity (two), instructional lab and capstone design lab support, and one for graduate programs in the Washington DC area to expand graduate programs.

Research Enhancement

- Enhanced departmental research resources with substantial investments (internal and external), infrastructure/labs by acquiring new spaces (over 20,000 SF), and research culture and coordination through establishing five thrust areas and the corresponding collaborations among faculty.
- Provided highly competitive research start-ups, cost-share, student, post-docs, and scientist support, course releases, and equipment matching funds for single-PI, multi-PI, and interdisciplinary proposals.
- Established partnerships within the University with VT Institutes (e.g., ICTAS, VTTI, Fralin Biomedical, etc.), the university selected Destination Areas (Intelligent Infrastructure and Human-Centered Communities), medical school, and various internal competitions, creating new research and collaboration opportunities.
- Contributed to the Universities OVPR's Master Agreements with major industries (e.g., Lockheed Martin, Ford, Rolls Royce, General Dynamics, etc.) Cultivated and established partnerships with external industries through the University Link program and independently (e.g., Torc, Aerospace Corporation.)
- Expanded the departmental faculty and presence strategically at VT in Washington, DC area with six faculty and a new Program Coordinator, offering graduate programs and outreach activities to enhance research.

Samples of Successful Results

- Over 47% increase in Research Expenditures within six years to nearly \$19M/yr; Scholarship and publications have increased substantially.
- Thirteen (13) ME Faculty won Young Investigator and NSF CAREER awards in the past seven years.
- Three NSF I/UCRCs have been re-established; committed administrative advances to bridge funding gaps, dedicated resources, and personnel to support the centers' successful operations.
- Two new research centers initiated with substantial multi-year internal investment: 1) Health and Disease Mechanics and 2) Advanced Manufacturing.
- The Rolls Royce University Technical Center (UTC) was established in 2020 for power and propulsion research. A new Rolls Royce, Pratt Whitney, and Virginia Tech research master agreement was executed in 2022.
- Established one of the nation's prominent ME-based Robotics and Autonomy programs with twelve ME faculty, complemented with 20+ COE faculty, resulting in several research labs, sponsored projects, student competition successes, and a remarkable increase in graduate students in this area.

- Established the most comprehensive additive manufacturing resource and research lab in the State of Virginia (and competitive nationwide) with a full range of 3-D printing facilities, including a new metal printing machine through a DoD MURI award; Contributed to the collaborative Materials initiatives and shared facilities at VT. Additive manufacturing has been selected as a college-wide research initiative with new faculty lines and resources.

Academics and Innovations

Graduate:

- Created a new structure of graduate studies with five thrust areas to improve collaborations, communications, academic programming, research, and consultation among faculty. It has resulted in enhanced dialogue, significant collaborative proposals and scholarship activities, and improved academic programs.
- Expanded the ME graduate program in the Washington area with six faculty members. Hired a new faculty and a new Graduate Program Coordinator for ME at VT in Washington Area.
- Established a new state- and university-approved Online Distance Learning ME and NE graduate program in collaboration with VT's College of Engineering (COE) and Technology-Enhanced Learning and Online Strategies (TLOS) Center of VT.
- Created a new ME Professoriate Certificate program to train and certify graduate students for academic positions. Developed a new *ME Professoriate Preparation* course for this program personally.
- Strategized for a shift in support of PhD students and increasing PhDs per faculty.
- Established a new *Graduate Research Symposium* with awards.

Undergraduate:

- Department revised its UG curriculum significantly, including establishing three new instructional laboratories for revised courses and enhancing experiential and hands-on learning: Fluid Mechanics, Mechanical Design, and Control Systems. Created a new UG instructional Robotics and Mechatronics lab.
- Started two new ME undergraduate Majors in *Robotics and Mechatronics* and *Automotive Engineering* and a Minor in *Nuclear Engineering*. Created a new sequence of *AI and Machine learning* courses for ME at both undergraduate and graduate levels.
- Enhanced the industry support of Senior Capstone Design, leading to over 51% (23/45) of industry-sponsored projects, compared to 6.7% in 2015.
- Established the Commercialization, Entrepreneurship, and Leadership in Mechanical Engineering (CEL-ME) program in 2020 for undergraduate and graduate students' training.
- Established a new *Undergraduate Research and Project Showcase* with awards.

Diversity, Equity, and Inclusion

- Created and led a new Diversity Committee, IDEA (Inclusiveness, Diversity, and Equity for All), to enhance diversity, equity, and inclusivity in all aspects of the ME Department, with specific goals and action items.
- Served at the University diversity and inclusivity committee and participated in the college initiatives leading to new diverse faculty and student recruitments.
- Recruited nine new faculty (nearly 1/3rd of new hires) from underrepresented groups while utilizing the university's Target of Talent and Future Faculty programs for two positions.
- Markedly expanded the ME Advisory Board, Faculty, and Staff diversity. For the first time in decades, the ME Department has multiple African Americans, Hispanic, and female faculty, who comprise 23% of the faculty.
- Initiating a new UG/G pathway and exchange program with Virginia State University (an HBCU, a public historically Black land-grant university in Ettrick, Virginia.)

Advancement and Alumni Relations

- Total 5-year (2016-2021) philanthropic donations to the Department increased by 48% to \$19.8M compared to the previous 5-year period.
- Examples: Obtained over \$4M of new endowments, including two new \$2M endowed professorships and \$3.5M in new undergraduate scholarships, \$400K of new graduate Student (current use) Fellowships, \$600K endowed graduate student support for faculty fellows, \$330K of operational gifts for lab improvements and student support, and another \$150K of current use funds, among others, in collaboration with the college and university advancement team, in addition to the regular stream of annual gifts.
- Established a new *ME Society of Distinguished Alumni* in 2018 and inducted 29 members, including 16 legacy members who were also members of the COE Academy of Academic Excellence.

- Established frequent and regular communications with alums through personal contact and newsletters, Annual Reports, ME Momentum Magazine (a digital quarterly), and many other routine publications reflecting students, faculty, staff, alums, and departmental achievements.
- Engaging alums in campus activities and student life through periodic lectures, visits, and industry advising/recruiting.

Faculty and Staff Support, Developments, and Recognitions

- Numerous ME Faculty and staff have been nominated and won various University (VT) and College performance-related awards each year, exceeding 34.
- Enhanced communications, collaborations, and dialogue through the Thrust Area coordination and additional consultation in all departmental matters with various cognizant committees.
- Substantially increased the frequency of departmental engagements, meetings, retreats, and electronic communications (*increased faculty participation is evidence of success compared to prior years.*)
- Expanded the Department's mentoring program for Tenure-Track faculty, creating a new guideline for improved mentoring practices.
- Developed a new mentoring/advising guideline to improve advisor-advisee communications and relationships.
- Created a new Departmental Award to recognize outstanding sponsored research performance every three years. Sixteen (16) faculty were awarded in 2017 and 2021 (post Covid-19 pandemic.)
- Encouraged and increased Fellow nominations and external awards.
- Encouraged, financially supported, and significantly advanced staff training and development.
- Improved staff evaluations and annual merit-based rewards procedures, with substantial funds dedicated to salary adjustments annually.
- Engaged and encouraged Staff Diversity training; several ME staff are Diversity Allies and received various certificates.
- Reestablished Staff retreats, dialogue, and engagements.

International Programs

- Supported the expansion of major international Exchange Programs, e.g., Technical University of Darmstadt, Germany, University of Nottingham, UK, Nuclear Engineering with Slovenia, and a new collaboration with Brunei, among others, each led by ME faculty members.
- Created a new Dual MS degree with the Technical University of Darmstadt (TUD,) Germany.
- Department created three new international research collaborations with MOUs. One major international initiative involves a newly titled/chaired position in a collaborative center with India and ME for Frontier of Materials research.
- Developing two new international UG/G 3+2 programs with two Indian Institutions; working towards a third G 1+1) program in collaboration with the VT's VP for International Programs.
- Supported the VT India international program resulting in new sponsored research for faculty from the Indian industry and a new industrial partnership.

Current Personal Research and Scholarship

- Was awarded the inaugural Nicholas and Rebecca Des Champs Chaired Professorship in 2018. Total career research sponsorship of \$28.6M.
- Established a new Autonomous Systems and Intelligent Machines Lab at Virginia Tech's Mechanical Engineering Department, equipped with multiple state-of-the-art autonomous mobile robots, a smart city emulation environment, an in-house autonomous car, and multiple cooperative driving simulators and EEG and Eye-Monitoring systems for driver interface, cognitive behavior, neuro-engineering, and autonomous driving research. The lab has already received significant publicity in the news media in five broadcasted pieces.
- Editor-in-Chief of IEEE Transactions on ITS, among the highest impact factor journals in the transportation field.
- Advised 19 graduate students and post-docs and several rotating undergraduate students at VT.

George Washington University

- Founded/co-founded and directed two research centers, forming an institute and a university/school academic **area of excellence**. At some periods, directed a research team of over 50 people, including 28 faculty, scientists, post-docs, technicians, and over 22 students, and raised the annual research budget above \$3 million/year.

- Published extensively with sponsored funding of \$27.3 million (\$11.5 million as PI and \$15.8 million as primary Co-PI). Editor, Associate editor, and board member of five journals.
- Advised and directed/co-directed 18 PhD dissertations, 18 master theses, 12 post-docs, and 36 graduate student projects, involved in 142 student projects and examinations. **Nine alumni hold faculty positions.**
- 1996-2015: Founded and directed the **Center for Intelligent Systems Research (CISR)**, conducting research in intelligent systems, dynamics, and controls, focusing on intelligent vehicles and active safety systems, and established four new labs, including two full-size Driving Simulators and a mobile robotics lab.
- 2003-2015: Founded and directed the GW Transportation Safety and Security program, one of only seven University and School **areas of excellence** through an intramural competition, with a university investment of over \$3 million over the years. Developed a cross-disciplinary academic and research scholarship program involving faculty from four engineering departments with diverse backgrounds.
- May 2013-2015 & 1998-2002: (Co-founded in 1992); Directed the **FHWA/NHTSA National Crash Analysis Center (NCAC)** at GW, sponsored by the US Department of Transportation and industry for automotive and highway safety research. The research included impact dynamics and computational mechanics for simulation and analysis of vehicle and barrier crashes, injury biomechanics, vehicle test and design, and accident reconstruction. Significantly increased productivity, scholarship, publications, external funds, client portfolio, and the center's external partnerships.
- Was instrumental in developing a unique automotive safety curriculum at CMEE Department (1994) and later introduced a new graduate option in intelligent vehicles and transportation systems and an undergraduate concentration in transportation engineering at CEE Department.
- Developed and revised 12 new courses. Established four new laboratories and significantly enhanced four more at GW. Offered an on-line course for three years. At Penn State York, assisted the university-industry liaison with local industries and developed two new labs and four new short courses and seminars for industrial training.
- Maintained two student exchange programs for 15 years with the University of Stuttgart, Germany, and the University of Valenciennes, France, and initiated a new MOU with KAIST, Korea, in 2011.
- Assisted GW's VP for Government Relations during 1998-2001 in fundraising and presented to Congress members and various government agencies, resulting in a \$28 million building at GW, Virginia Campus.
- 1983-1988: Industry experience at two companies; as a Mechanical Engineer, performed mechanical and structural analysis and design of military vehicles and other systems using FEM. Developed software for design functions and provided analytical support for design, fabrication, assembly, and prototype production. Initiated the company's first CAD and FEM capability, which significantly improved responsiveness to clients. Performed structural tests, experimental stress analysis, and verification with theory and FEM models. Provided project management and client support.

Sponsored Research and Scholarship

Total Research Awards: \$28.669 million; \$12.869 million as PI & \$15.8 million as Co-PI or a Key Investigator:

<u>2020-2022</u> US DOT, Through VTTI Safe-D national UTC	(PI) Cooperative Perception of Connected Vehicles for Safety (\$195,350 cost-shared); through VTTI, UTC PI: Zac Dorzaph, VT	\$390,700
<u>2019-2021</u> Nuclear Regulatory Agency	(PI) Faculty Development Program in Nuclear Engineering at Virginia Tech; Co-PI Juliana Duarte Pacheco, (\$150K cost-share; total \$650K)	\$450,000
<u>2022 (awarded in 2020)</u> <u>IEEE</u>	(PI) Develop an Experts' Workshop on Advances and Challenges of Connected Autonomous Vehicles (CAVs)	\$90,000
<u>2018-2020</u> General Motors	(PI) ME Capstone Design- Flexible Automated Mobility; Co-PI Robin Ott Educational Support	\$25,000
<u>2018-present</u>	(PI) Endowed Professorship; Des Champs fund, Research on Autonomous Vehicles and Mobile Robots	\$317,859

VA Tech Foundation		
<u>2015-2018</u> Virginia Tech	(PI) Internal Research Initiation Fund	\$260,000
<u>2013-2014</u> US DOT FHWA & NHTSA	(PI) Advanced Crash Analysis to Improve Safety and Security 5/2013-12/2014	\$2,880,606
<u>2010-2013</u> US DOT FHWA, 23% cost shared	(Co-PI) Nano Material Modeling and Simulation by New Multiple Length/Time Scale Theories and Algorithms. (PI, Dr. James Lee, MAE Department, GWU.)	\$1,302,000
<u>2007-2008</u> US DOT FHWA, 50% cost shared	(PI) Communications Considerations in the Simulation of Vehicle Infrastructure Integration (VII)-Enabled Applications. (Co-PI, Dr. J. Blum) Subcontractor: UVA.	\$668,332
<u>2005-2007</u> US DOT FHWA, 50% cost-shared	(PI) Development and Evaluation of an Advanced Vehicle Speed Adaptation System (AVSAS).	\$802,000
<u>2003-2005</u> US DOT FMCSA	(PI) Advanced Driver Fatigue Study. Signal processing and pattern recognition for unobtrusive driver drowsiness detection and monitoring systems	\$700,000
<u>2004-2006</u> NSF	(Co-PI) Predicting and Optimizing Nano/Micro Sensor Material Behavior in Extreme Environments (PI & Co-PI: Dr. Y. Chen and Prof. James Lee)	\$310,000
<u>2005-2007</u> Ford Motor Co.	(Investigator) Rollover Dynamics Modeling and Simulation (PI, Dr. K. Digges)	\$250,000
<u>2002-2015</u> GWU, Internal Funds	(PI) "GW Initiative for Excellence in Transportation Safety and Security," an internal major GW and SEAS cross-disciplinary area of academic excellence, including faculty from four Engineering Departments.	\$3,100,000
<u>1999-2004</u> US DOT FHWA and NHTSA	(PI) Automotive Safety Research Initiative. Areas: - Collision avoidance, driver assistance, and vehicle controls - Vehicle active suspension, and dynamics modeling of vehicle rollover - ITS and inter-vehicular and vehicle-infrastructure networks - Impact dynamics and FEM for smart airbags/vehicle-occupant interactions.	\$1,464,900
<u>2001-2004</u> Santos Foundation	(Co-PI) Development of Improved Vehicle Roof Crush Test Procedures (Co-PI: K. Digges).	\$400,000
<u>2004-2005</u> NTSB	(PI) Evaluation and Development of Tire Models.	\$15,000
<u>2004-2006</u> US DOT	(PI) Faculty Advisor- obtained Dwight Eisenhower Fellowship Award for a doctoral student.	\$65,000
<u>1999-2002</u> NAS, NCHRP	(PI) Improving the Compatibility of Vehicles and Roadside Safety Hardware.	\$300,000
<u>2002, 6 Months</u> NAS, TRB	(PI) Safety Evaluation and Crash Testing of Secure Mailboxes.	\$25,000
<u>1998-2002</u> US DOT FHWA	(PI) Advanced Methods in Transportation. Projects: Inverse Analysis of Structures under Impact Load; Analysis of Sleep Deprived Drivers Experimental Data; Analysis of Driver Speed Profiles.	\$374,240
<u>1996-2000</u> US DOT FHWA	(PI) Advanced Engineering Systems Research in Transportation. Projects: Optimization and inverse design methods for structures under impact; Simulation and human factors study of traffic control in construction zones.	\$337,150

<u>1999-2001</u> Union Switch and Signal (DOT/FRA)	(PI) Intelligent Optimum Route Planning and Scheduling for Rail Systems. Used intelligent agents, AI, and optimization methods for route planning.	\$175,000
<u>2001-2002</u> US DOS	(PI) Evaluation and development of anti-ram barrier design concepts for safety installations.	\$700,000
<u>1999-2002</u> EPRI and US DOD/Army Research	(Co-PI) Stochastic Analysis of Network Performance. (PI: N. Singhpurwalla) Joint effort with GW's Institute for Reliability and Risk Analysis, in a consortium with Cornell Univ., UC Berkeley, Univ. of Wisconsin, Univ. of Illinois, and Washington State Univ. Analysis of complex interactive networks using stochastic modeling and neural networks for improving reliability, fault tolerance, and prevention and control of failures.	\$1,350,000
<u>1998-2002</u> <u>1992-1997</u> US DOT FHWA & NHTSA, DOS	(Co-PI) Operation and Maintenance of FHWA/NHTSA National Crash Analysis Center (NCAC). (<u>1998-2002</u> , Co-PI and Director); (<u>1992-1997</u> , Deputy Director and Director of Simulation and Modeling) Impact dynamics; computational methods for transient and non-linear response of materials using non-linear FEM with applications in automotive crashworthiness; Meshless computational methods; Inverse analysis and optimum design of multi-bodies and structures under impact; Automotive safety systems analysis including airbag-dummy/occupant interactions; Occupant biomechanics and injury analysis; Vehicle reverse engineering; vehicle and barrier modeling and performance evaluation by crash simulation and tests.	\$6,343,000 \$5,738,300
<u>1996-1997</u> RAFAEL	(PI) Airbag and Dummy Simulation.	\$5,000
<u>1997, 1 month</u> The University of Mississippi	(PI) Three-dimensional FE Modeling of Pavement and Truck Tire.	\$2,000
<u>1996, 3 months</u> VSE Corporation, Alexandria, VA	(PI) Thickness and Contour Determination of Critical Vehicle Parts for Impact FEM.	\$17,600
<u>1992-1994</u> NASA Goddard Space Flight Center	(Co-PI) Development of Generic Software Tools for Simulation and Testing of Spacecraft Control Systems. Under the joint GWU and NASA PREST program.	\$80,000
<u>1994, 3 months</u> VSE Corporation, Alexandria, VA	(Co-PI) Material Characterization of Vehicle Components for Dynamic Impact Analysis.	\$15,000
<u>1992-1993</u> Penn State Univ.	Robot Parameter Identification and Dynamics Modeling.	
<u>1989-1990</u> NSF SBIR: ATR Corporation	(Consultant)- An Advanced Hybrid Neural Network for Robot Dynamics Modeling.	

Additional Major Contributions to Research/Scholarship:

- Contributed significantly to the winning technical proposals for the National Crash Analysis Center's competitive contract (2009-2013) for \$16M and cooperative agreement (2003-2008) for over \$10M, as part of GW's Transportation Safety and Security Area of Excellence. *These are in addition to the above-listed items.*
- Contributed to the GW's award from NSF in 1999 for High-Performance Connectivity under the Washington Research and Education Network. This allowed GW's involvement and usage of vBNS and increased GW's data transmission capacity.

Teaching

Courses at Virginia Tech

Undergraduate

- ME 4015, 4016: ME Capstone Design Course

Graduate:

- ME 6014- Mechanical Engineering Professoriate Preparation

Courses Taught at The George Washington University

- Introduced a new graduate area of specialty in Intelligent Vehicles and Transportation Systems.
- Contributed significantly to the development of a new graduate master's and Doctoral concentration in Automotive Safety since 1994 in the ME program of the Civil, Mechanical, and Environmental Engineering (CMEE) Department and later in 1999 in the Civil and Environmental Engineering Department.
- Established a new undergraduate curriculum and option for Transportation Engineering within Civil Engineering (2004) at GWU as part of a new *area of excellence* for the University and SEAS.
- Consistently received high ratings in student evaluations.

Undergraduate:

- Introduction to Mechanics of Solids (Including a new on-line version)
- Introduction to Engineering (Revised)
- Mechanical Design
- Engineering Systems Design
- Analysis and Synthesis of Mechanisms

Graduate:

- System Dynamics Modeling and Control (New)
- Analytical Mechanics: Dynamics (Revised)
- Robotic Systems
- Vehicle Dynamics (New)
- Simulation and Visualization [Computational Sciences] (New)
- Numerical Methods in Engineering
- Intelligent Transportation Systems (New)
- Intelligent Systems Theory and Applications (New)
- Special Topics

Also serve as coordinator for four (4) more courses.

Courses Taught at Penn State York Campus

Undergraduate:

- Production Design [and Laboratory]; formerly: Robotics and Automation (New)
- Computer Numerical Control Systems and Sensors [and Laboratory] (New)
- Product Design (Revised)
- Manufacturing Processes [and Laboratory] (Revised)
- Manufacturing Materials and Processes [and Laboratory]

Special Short Courses for Industry:

- Computer Integrated Manufacturing (CIM); 30-Hour Short Course (New)
- Computer Integrated Manufacturing; 8-Hour Seminar/Workshop (New)
- Computer Numerical Control (CNC) Systems with Lab; 30-Hour Short Course (New)
- Computer Numerical Control Systems; 8-Hour Seminar/Workshop (New)

Laboratories Developed (and Enhanced)

Virginia Commonwealth University

1. Robotics, Autonomy, and Mechatronics (RAM) research group labs

- I) Mobile Autonomous Robotics and Drone test bed, II) Dual-integrated Driving Simulator Lab, III) Autonomous Car

Virginia Tech

2. **Autonomous Systems and Intelligent Machines (ASIM) Lab** (Established 2016): I) Multiple autonomous mobile robots for cooperative control, collision avoidance, connected vehicle, and traffic emulation; II) Dual integrated state-of-the-art Driving Simulators (one Full-Cabin), EEG, Eye-monitoring, and other sensors for driver interface, performance, and cognitive behavior testing. Capable of simulating mixed autonomous and manual driving. A connected autonomous car was developed, and is under testing.

GWU

3. **Mobile Robotics Lab** (GW/CISR Established 2013): Multi mini mobile robots for trajectory control, wireless motion coordination, collision avoidance, and simulated connected vehicles.
4. **Vehicle Driving Simulator Laboratory** (GW/CISR, Established 1998): A full-size passenger vehicle simulator with driver monitoring, eye-tracking, and physiological (EEG) testing capabilities.
5. **Truck Driving Simulator** (GW/CISR, Established 2004): A full- truck cabin vehicle simulator with all monitoring and data acquisition systems.
6. **Virtual Realty Laboratory** (GW/CISR, Established 2003): Interactive virtual 3-D embedded stereoscopic environment.
7. **Traffic and Networks Laboratory** (GW/CISR, established 2004): Equipped with networks and traffic simulation software, PCs, video surveillance, millimeter wave radar, and acoustic sensors, among others, for research in sensor integration for network monitoring, modeling, and controls.
7. **NCAC Crash Test Film and Data Library** (GW/NCAC, upgraded)
This unique national resource of 19,000 crash test films and data allows investigation of the crash performance of vehicles. Equipped with a motion analyzer, a variety of video editing and reproduction hardware, and software tools for crash test film analysis. Initiated a complete film digitizing system in 1999 for public on-line search and download access.
8. **Vehicle Modeling Laboratory** (GW/NCAC, upgraded)
A complete vehicle reverse-engineering and digitizing laboratory. CAD files containing geometric and assembly data of the entire vehicle structure and mechanical components are generated. CAD files are preprocessed, and finite element mesh is generated. Vehicle FE models are developed and validated by crash tests. The lab was equipped with robotic measurement arms, scanners, cutting tools, ultrasonic thickness measurement instrumentation, computer workstations, and related software.
9. **High Performance and Parallel Computing Laboratory** (GW/NCAC, upgraded)
Provided the computing resources required for crash simulations and many other intensive numerical calculations. In 2001-02, it was upgraded with a new 32-processor Origin 3800 Silicon Graphics parallel processing machine and several other donated parallel computers (e.g., HP).

Penn State

10. **Computer Integrated Manufacturing (CIM) Cell** (Established 1991 at Penn State York Campus)
Developed and operated a new CIM cell for training and education using internal campus funds and Penn State/MANTECH resource center. Developed an associated CNC and robotics laboratory.

Academic Advising

Involved in advising and examinations of 152 graduate students and researchers as follows:

Doctoral Dissertations (62):	Directed/Co-Directed: 21+4 in progress ; Plus, Reader/Examiner: 37
Masters Theses (47):	Directed/Co-Directed: 24+ 4 in progress ; Plus, Reader/Examiner: 19
Student Projects (37):	Directed: 37
Post-Docs and Research Scientists (23):	Directed and Co-Directed: 23; Visiting Scholars: 4

Eight former students are now faculty in US and abroad.

Undergraduate students (numbers, pending on the year)

Advised over 30 undergraduate students per semester at Penn State York from 1989-92.

Recent Post-Docs Directed

Virginia Tech

1. Dr. Prasenjit Ghorai (June 2019-2023)
2. Dr. Yuan Lin (March 2016- August 2018)
3. Dr. Lirong Wang (August 2016-17)

Visiting Scholars (Faculty) Hosted:

1. Dr. Young-Keun Kim, School of Mechanical and Control Engineering, Handong Global University, Pohang, Rep., Korea (2019-2020)

Visiting Scholars (Students):

2. Chaoxian Wu (2017-2019)
3. Chuanyang Sun (2018-2019)
4. Xi Wang (2017-2018)

Doctoral Dissertations Directed (Co-Directed where indicated)

Virginia Tech

1. Zhang, Ce, May 2023: *Autonomous Vehicle Perception Quality Assessment*.
2. Mehr, Goodarz, in progress, Research Area: Estimation and Cooperative Coordination of Connected Vehicles
3. Nayak, Anshul, in progress, Research Area: Connected Vehicle Cooperative Perception
4. Sivashangaran, Shathushan, in progress, Research Area: Autonomous vehicles navigation, behavior, and learning
5. Ding, Ning, in progress, Research area Autonomous vehicles safety with human integration

GWU

6. Goli, Mohammad, December 2018: *Vehicle Platooning: Multi-vehicle Merging and Control*.
7. Radwan, Randa Samaha, February 2015, *Real World Derived Simulation Methodology for the Evaluation of Fleet Crash Protection of New Vehicle Designs*.
8. Sengoz, Kivanc, defended 2014, finalized Jan 2017, (co-directed), *Development of a Generalized Isotropic Yield Surface for Pressure Insensitive Metal Plasticity Considering Yield Strength Differential Effect in Tension, Compression, and Shear Stress States*.
9. Ruparel, Tejas, December 2014, *Multiple Grid Multiple Time-Scale (MGMT) Simulations in Linear Structural Dynamics*.
10. Tahan, Fadi, December 2013 (co-directed), *An Integrated Approach to Identify Thoracic Injuries in Rollover Crashes*.
11. Buyuk, Murat, August 2013 (co-directed), *Development of a Tabulated Thermo-Viscoplastic Material Model with Regularized Failure for Dynamic Ductile Failure Prediction of Structures under Impact Loading*.
12. Kildare, Shaun, May 2012 (co-directed), *Multiple Frontal Impacts Prevention, Prediction and Protection*.
13. Soudbakhsh, Damoon, May 2011, *Development of a Novel Steering Collision Avoidance System*.
14. Sahraei, Elham, *Protection of Rear Seat Occupants in Frontal Crashes, Assessment Methodology, and Injury Metrics* (co-directed)
15. Mahadevaiah, Umashankar, January 2009 (co-directed), *Development and Validation of a New Contact Algorithm for Use in Explicit Finite Element Codes*.
16. Mohan, Pradeep, June 27, 2008 (co-directed), *Development of Objective Metrics to Improve Vehicle Compatibility in Frontal Collisions*.
17. Stephen Arhin, December 2007, *Development and Evaluation of an Advanced Speed Adaptation System*.
18. Ali Mortazavi, May 2007, *Intelligent Drowsy Driver Detection and Warning for Commercial Vehicle Operations*.
19. Blum, Jeremy, May 2005 (co-directed), *CARAVAN: A Communications Architecture for Reliable Adaptive Vehicular Ad Hoc Networks*.
20. Soltani, Hamed, May 2004, *Rollover Simulation, Validation, and Control, Using Vehicle Dynamics Models*.
21. Sayed, Riaz A. S., August 2003, *Driver Drowsiness and Fatigue Detection by Experimental Analysis and Neural Network Modeling*.
22. Chen, Youping, December 2002 (Co-directed), *From Atomic Model to Continuum Theory*.

23. Kurtaran, Hassan, May 2001, *Design Optimization of Structures under Impact Loading with Approximation Methods*.
24. Omar, Tarek, May 1999 (Co-directed), *Recurrent Artificial Neural Networks for Modeling Vehicles Impacts*.
25. Marzougui, Dhafer, 1998 (Co-directed), *Implementation of a Fracture Failure Model to a Three-Dimensional Dynamic Finite Element Code (DYNA3D)*.

➤ Reader and Examiner for **30 additional Doctoral Dissertations**

Masters Theses Directed (Date indicates graduation, Co-directed where indicated)

Virginia Tech

1. Darshit Patel, June 2023, *Sampling-Based Motion Planning for Autonomous Vehicles In Non-Signalized Intersections*
2. Prajakta Wale, in progress, Research area: Hybrid Manual and Autonomous Vehicle Remote Control
3. Xuelai Du, in progress, Research area: Autonomy Data Development, Segmentation, and Characterization
4. Apoorva Khairnar, in progress, Research area: Autonomous Robot/Vehicle Navigations in Unknown Terrains
5. Omkar Shinde, in progress, Research area: Autonomous Vehicle Trajectory Controls
6. Khattak, Vanshaj, May 2021, ECE, *Threat Assessment and Proactive Decision-Making for Crash Avoidance in Autonomous Vehicles*
7. Wu, Xihui, July 2020, *Predictive Path Planning for Vehicles at Intersections*.
8. Merrill, Nicholas, May 2020, *Modified Kernel Principal Component Analysis and Autoencoder Approach to Unsupervised Anomaly Detection*.
9. Sridhar, Srivatsan, September 2017, *Cooperative Perception in Autonomous Ground Vehicles Using a Mobile Robot Testbed*.

GWU

10. Panzer, Florian, December 2014, *Structural Optimization of a Surrogate Test Vehicle using Honeycomb Material*.
11. Wehler, Thomas, December 2014, *Evaluation of Composites for Light-Weighting of Highly Loaded Components in Dynamic Impacts of Vehicles*.
12. Rittner, Markus, December 2014, (co-directed), *An Investigation of Force Characteristics of Various Vehicle Roof Shapes in Jordan Rollover Tests using Simulations*.
13. Riahi, Pouria, August 2014, *A Steady-State Visual Evoked Potential Brain-Computer Interface System Evaluation as an In-Vehicle Warning Device*.
14. Bonnevie, Simon, 2011 (co-directed), *Vehicle Dynamics Modeling and Simulation Approach for Safety Performance Evaluation, Design Selection, and Critical Placement of Cable Barriers in Curves*.
15. Karcher, Jullien, December 2009 (co-directed), *Vehicle Dynamics Modeling and Simulation for the Safety Evaluation, Selection, and Placement of Cable Barrier System*.
16. Galli, Richard M., August 2008, (co-directed), *Development and Validation of Finite Element Models and Analysis of Critical Parameters of High-Tension Cable Barrier Systems*.
17. Laoufi, Morione, 2005, *Development of a Comprehensive Vibration Model for Evaluation of Rumble Strips*.
18. Guerra Sa, Rodolfo C., 2004, *A Methodology for Vehicle Finite Element Modeling Incorporating Robust Fine Uniform Mesh and Comprehensive Interior*.
19. Hedayati, S. Amirahmad, 2004, *Analysis of Vehicle Rollover Using Finite Element Models and Crash Test Data*.
20. Bousquet, Melaine, 2004, *Study of the Importance of the Height of a W-Beam Guardrail in a Vehicle to Guardrail Crash Test*.
21. Sayyar, Arash, 2004, *Structural Modeling and Optimization of Thriebeam Guardrail for Vehicle Safety*.
22. Amini, Mahmoudreza, 2004, *Analysis of Soil and Wood Post Interactions Using Dynamic Finite Element Models*.
23. Burel, Jean-Yves P., 2004 (Co-Directed), *Dynamic Analysis of Occupant Behavior in Vehicle Rollover Event*.
24. Tahan, Fadi, 2004, *Secure Mailboxes Safety Assessment using Finite Element Simulations and Crash Testing*.
25. Godrick, Daniel, 2003 (Co-Directed), *An Analysis of Light Truck Rollover Examining Real World Accidents and Controlled Crash Tests*.

26. Delaigue, Pierre, Fall 2002, *A Comprehensive Vehicle Braking Model for Prediction of Stopping Distances*.
 27. Yonten, Karma, Fall 2002 (Co-directed), *Constitutive and Numerical Modeling of Concrete for Crashworthiness Simulation of Roadside Safety Hardware*.
- Committee Chair, Reader, or Examiner for **19 additional Master's Theses**

Student Projects Directed (Masters Level or Internship)

Virginia Tech

1. Lang, Yifan, May 2021 (MS-Non thesis Project, VA Tech) *Hybrid maps to improve SLAM in autonomous driving*
- #### ***GWU***
2. Lesueur, Maxime, 2014, *On the Development of a nonlinear Visco-Elastic Model Coupled with Progressive Damage for Modeling the Mechanical Behavior of Fiber-Reinforced Polymers (FRP)*.
 3. Dony, Lucian, 2014, *Simulation of the Influence of the Parameters of Driver Models in Lane Keeping*.
 4. Gross, Nicholas, 2013, *Influence of Electronic Stability Controls on Vehicles on Curves*.
 5. Fahmy, Ismail, 2012, *Control Systems and Analysis of Driver-vehicle Integrated Models*.
 6. Noblet, Clements, 2011, *Experimentation and Measurement Methods for Driver Reaction Time*.
 7. Bonnevie, Simon, 2008, *Vehicle Dynamics Modeling and Applications in Simulink*.
 8. Kerisit, Christopher, 2008, *Vehicle Dynamics Modeling of Critical Surface Maneuvers*.
 9. Moreau, Johann, 2007, *Implementation of a Vehicle Integrated Infrastructure Network Simulation for a Traffic Management Application*.
 10. Karcher, Jullien, 2007 (Co-directed), *Data Analysis of Driver and Chest Injuries in Planar Impact Rollovers*.
 11. Linder, Thorsten and Stiehle, Ursula, 2005, *Enhanced Vehicle Active Steering System for Collision Avoidance Maneuvers*.
 12. Laoufi, Morione, 2005, *Traffic Networks Safety and Queue Modeling*.
 13. Shayesteh, Yassman, (ECE) 2004, *Development of a Wireless Integrated Sensor Module for Traffic Monitoring*.
 14. Negri, Berangere, 2002, *Validation of a Dodge Neon Reduced FE Model, Including a US SID Side Impact Simulation on LS-Dyna*.
 15. Poncet, Fredrick, 2002, *Validation of Dodge Neon Finite Element Model and Airbag Unfolding in out of Position Situations*.
 16. Chuiki, Mohammed, 2002, *Validation of a Chevrolet S-10 Vehicle Finite Element Model for a Full-Frontal Crash Impacts*.
 17. Bauer, Mathias, Fall 2002 (Co-directed), *Robust Control Design of Vehicle Active Steering in Evasive Maneuvers*.
 18. Malcher, Daniel, 2002. (Co-directed), *Robust Control of Active Suspension for Vehicle Rollover Avoidance*.
 19. Schawrz, Stephan, Fall 2002. (Co-directed), *Comparison of LS-DYNA and MSC-DYTRAN Simulation of an Out-of-position Airbag Deployment*.
 20. Yepremyen, L., 2002. (Co-directed EMSE), *Piecewise Linear Approximations in R^m and Their Applications to Optimization*.
 21. Burel, Jean-Eves, 2001, *Rollover and Driver Injuries*.
 22. Delaigue, Pierre, 2001, *Vehicle Brake Dynamic Modeling in MATLAB*.
 23. Glaster, Manuel, 2001, *Investigation of Drivers' Inattentiveness and Distraction*.
 24. Vahidi, Ardalan, 2001, *Predictive Time Delay Controls for Vehicle Suspensions*.
 25. Demrican, Emere, 1999, *Modeling and Regression Analysis of Driver Speed Profiles on Curves*.
 26. Remigio, Mylene; Computational Sciences, 1999, *Intelligent Agents and Optimization for Railroad Traffic*.
 27. Gan, Lin, CS, 1997, *Virtual Reality Visualization of UTCD and Highway Construction Zones*.
 28. Schmitz, Heinz-Georg, 1997, *Finite Element Analysis and Evaluation of Guardrail Systems*.

Other Directed Graduate Student Projects without Documented/Published Reports

29. Ali, Imran, 2004, *Driving Simulator Scenario Development Projects*.

30. Khan, Nadeem, 2004; *Driving Simulator Analysis Projects*.
31. Khan, Wisal, 2003, *Driving Simulator Scenario Development*.
32. Ganganala, Nagendra, 2002, *FE Automotive Safety Project*.
33. Jain, Prashant, 2002, *Multibody Dynamics project*.
34. Mohan, Pradeep, MS, 2002, *Finite Element Modeling for Crash Analysis*.
35. Moinuddin, Sayed, 2002, *Finite Element Modeling*.
36. Kutznetov, Alexander, CS, 2002 (co-advised), *Software Development for Crash Data Analysis*.
37. Shrestha, Deepak, 1995, *ITS Research Project*.

Recent Undergraduate Students Project Advised

Virginia Tech

1. Omkar Shinde
2. Nakhil Reddy
3. Xuelai Du
4. Timothy Ryan
5. Curtis Mussen
6. John Kuempel
7. Ali El Beshbishi

Dissertation and Thesis Committee Service:

Virginia Tech

1. Gibran, Ali, PhD, Dec 2022 [Advisor Mehdi Ahmadian, ME]
2. Avid Dayal, PhD, Sep 2021 [Advisor Jerry Reed, ECE]
3. Vishnu Vardhan, PhD, June 2020 [Advisor, Harpreet Dhillon, ECE]
4. Jobin Jose, MS, Sep 2021 [Advisor John Ferris, ME]
5. Morteza Banagar, PhD Prelim, Apr 2021 [Advisor, Harpreet Dhillon, ECE]

Professional Activities: External Service

Journal Editorship

- Editor-in-Chief, IEEE Intelligent Transportation Systems Transactions (2019-4/2024)
- Advisory Board, ASME Journal of Autonomous Vehicles and Systems (2021-)
- Senior Editor, IEEE Intelligent Transportation Systems Transactions (2017-2018)
- Associate Editor, IEEE Intelligent Transportation Systems Transactions (2004-2016)
- Associate Editor, ASME Journal of Dynamic Systems, Measurement, and Control (2016-2018)
- Advisory Member, ASME Press Robotics Engineering Book Series (2013-)
- Associate Editor, International Journal of Automotive Technology (2003-2016)
- Editorial Board of Journal of Multi-body Dynamics of Institution of Mechanical Engineers (2000-2015)
- Editorial Board of International Journal of Vehicle Autonomous Systems (2005-2015)
- Editorial Board of International Journal of Vehicle Information and Communication Systems (2005-2014)

Conference Editorial and Leadership/Organizing Activities

- International Advisory Committee, IEEE ITSC 2023, Bilbao, Spain, Sep. 24-28, 2023
- Associate Editor, IEEE Intelligent Vehicle (IV) Symposium 2023, Anchorage, Alaska, June 4-7, 2023.
- **Workshop Chair and Organizer**, IEEE ITS Society and Virginia Tech sponsored Workshop on “Connected and Autonomous Vehicles Impact on Safety, Mobility, Traffic, and Environment: Advances and Challenges,” Tysons Corner, October 27-28, 2022.
- International Advisory Committee, Member, IEEE ITSC 2022, Macau, China, Oct. 8-12.

- Associate Editor, IEEE Intelligent Vehicle (IV) Symposium 2022, Aachen, Germany, June 5-9.
- Workshop Chair and Associate Editor, IEEE ITSC 2021, Columbus, Ohio, Oct. 2021.
- Senior Adviser and Associate Editor, IEEE Intelligent Vehicle Symposium (IV) 2021, July 2021, Virtual.
- Program Committee, IEEE ITSC 2020, Virtual.
- Program Committee, IEEE ITSC 2019, Auckland, New Zealand.
- **Conference General Chair**, ASME Dynamic Systems and Control Conference, Tysons Corner, VA, Oct. 2017.
- International Program Committee, 20th IEEE Intelligent Transportation System Conf., Yokohama, Japan, Oct. 16-19, 2017.
- Technical Program Committee, Associate Editor, IEEE Intelligent Vehicle Symposium, Redondo Beach, CA, June 2017.
- Invited Panelist, Advancing Diversity Workshop at Virginia Tech, the Increasing Equity in Faculty Recruitment session, Blacksburg, VA, Jan 10, 2017.
- International Program Committee, 19th IEEE Intelligent Transportation System Conf. Rio de Janeiro, Brazil, Nov.1-4, 2016.
- Session Co-chair, Communications and Protocols in ITS, 19th IEEE ITS Conf. Rio de Janeiro, Brazil, Nov.1-4, 2016
- International Program Committee, IEEE Intelligent Vehicle Symposium, Gothenburg, Sweden, June 19-22, 2016.
- **Conference Invited Sessions Chair**, 8th ASME Dynamic Systems and Control Conference, Columbus, Ohio, 2015.
- Session Co-Chair, Human-Robot Interaction, 8th ASME Dynamic Systems and Control Conference, Columbus, Ohio, 2015.
- Program Co-Chair, IEEE Intelligent Vehicle Symposium, Korea, June 2015.
- Program Chair (one of three), 17th IEEE Intelligent Transportation System Conf. Qingdao, China, Oct. 2014.
- Chair session, "Cooperative Driving, Intelligent and Autonomous Vehicles," the 3rd International Conference on Connected Vehicles and Expo, November 3-7, 2014, Vienna, Austria.
- Program Committee, 16th IEEE Intelligent Transportation System Conf. Hague, Netherlands, Oct. 6-9, 2013.
- Program Committee, TRB 16th International Conference on Road Safety on Four Continents, Beijing, China, May 15-17, 2013.
- **Conference General Chair**, 14th IEEE Intelligent Transportation System Conf. Washington, DC, Oct. 5-7, 2011.
- **Local Arrangement Chair**, ASME Dynamic Systems and Control Conference, Arlington, VA, Nov. 2011.
- Co-Chair Session, Vehicle Dynamics and Control 2, ASME Dynamic Systems and Control Conference, Arlington, VA, Nov. 2011.
- Scientific Committee, the 3rd International Conference on Impact Loading of Lightweight Structures, ICILLS, Valenciennes, France, June 28-July 1, 2011.
- Program Committee, IEEE Intelligent Transportation System Conf. Madeira, Portugal, Sep. 2010.
- Program Committee, IEEE Intelligent Vehicles Symposium, San Diego, CA, June 21-24, 2010.
- Program Committee, TRB 15th International Conference on Road Safety on Four Continents, Abu Dhabi, UAE, March 28-30, 2010.
- Chair, Session on Engine Control and Identification, ASME Dynamic Systems and Control (DSC) 2009 Conference, Hollywood, CA, Oct. 12-14
- Co-Chair, Session on Advanced Powertrain Control and Ground Vehicle Dynamics, ASME Dynamic Systems and Control (DSC) 2009 Conference, Hollywood, CA, Oct. 12-14
- Co-organizer of the session on Modeling and Control of Vehicle Dynamics, ASME Dynamic Systems and Control (DSC) 2009 Conference, Hollywood, CA, Oct. 12-14
- Co-organizer of session on Control, Optimization and Identification of Advanced Automotive Systems, ASME Dynamic Systems and Control (DSC) 2009 Conference, Hollywood, CA, Oct. 12-14
- Co-Chair of Conference, IEEE Intelligent Vehicles Symposium, Xian, China, June 3-5, 2009.

- Chair, Session on Collision Detection/Avoidance in the 11th International IEEE Conference on Intelligent Transportation Systems, Beijing, China, October 12-15, 2008.
- Co-Chair, Session on Vehicle Control, IEEE Intelligent Vehicles Symposium, Eindhoven, The Netherlands, June 4-6, 2008.
- Technical Committee, IEEE Intelligent Vehicles Symposium, Eindhoven, Netherlands, June 4-6, 2008.
- Chair the Session, Poster PTP, IEEE Intelligent Vehicles Symposium, Istanbul, Turkey, June 11-15, 2007.
- Invited Panel Member, Future Truck and Bus Safety Research Directions Conference, TRB of National Research Council and Federal Motor Carrier Safety Administration of US DOT, Washington, DC, March 23-24, 2005.
- Organizing Technical Committee member and Invited Speaker, 1st International Conference on Traffic Safety, Tehran University, Iran, Dec. 22-25, 2005.
- Co-Chair of Session on "Safety," 8th International IEEE ITSC Conference, Vienna, Austria, Oct. 13-16, 2005.
- Chair of Special Sessions, 7th International IEEE ITSC Conference, Washington, DC, Oct. 3-6, 2004.
- Co-chair session with Ji, Q., "Non-intrusive and Real-time Driver Status Monitoring," 7th International IEEE ITSC Conference, Washington, DC, Oct. 3-6, 2004.
- Co-chair session with Behringer, R., "DARPA Grand Challenge on Autonomous Vehicles," 7th International IEEE ITSC Conference, Washington, DC, Oct. 3-6, 2004.
- Chair, Session on "Vehicle Dynamics, Ride and Handling II," Multi-Body Dynamics Symposium 3, Loughborough University, UK, July 12-13, 2004.
- **General Chair, Organizer, and Editor** of Intelligent Transportation Systems Safety and Security Conference, Miami, Florida, USA, March 24-25, 2004.
- Host and co-organizer of a Seminar in Virtual Reality in Transportation Safety and Security, The George Washington University, Virginia Campus, Ashburn, VA, June 10, 2004.
- Scientific Organizing Committee member of International Crashworthiness and Design Symposium, Lille France, Dec.2-4, 2003.
- Co-Chair, Session on Continuous Systems, Technical Committee on Vibration and Sound, ASME IMECE, New York, NY, Nov. 2001.
- Co-Chair and panel member for the session on Highway Safety Design, First Safety on the Road Conference, Cairo, Egypt, Nov. 2000.
- Co-Chair and panel member for the session on Traffic Congestion, Traffic Flow, and Safety, First Safety on the Road Conference, Cairo, Egypt, Nov. 2000.
- Chair, Workshop on Improving Compatibility of Vehicles with Roadside Hardware, GW, Virginia Campus. Under a sponsored research from the National Academy of Sciences, May 17, 2002.
- Co-Chair, the session on Today's Issues in Aviation and Automotive Safety, Ten-Year Anniversary Celebration of The George Washington University, Virginia Campus. December 3, 2000.
- Chair, Panel on Intelligent Transportation Systems, The George Washington University, Virginia Campus Tech. Expo 2000, Ashburn, VA, Apr. 24, 2000.
- Co-chair, FHWA sponsored Workshop on "Issues and Plans for Roadside Safety Features Research," The George Washington University, Virginia Campus, Ashburn, VA, April 11-12, 1997.
- **Organizer, Co-Chair, and Editor**, Neural Networks Applications in Highway and Vehicle Engineering Conference, The George Washington University, VA Campus, Ashburn, VA, April 10-11, 1996.
- Chair, the session on Simulation and Modeling, the International IEMS Conference, Coco Beach, Fl., Mar. 13-15, 1995.
- Contributor to various workshops of ITS America, National Automated Highway Systems Consortium, and National Cooperative Highway Research Program of TRB, 1994-1997.
- Hosted the first joint meeting of the Aggressivity and Compatibility Group of the crashworthiness sub-committee of the Motor Vehicle Research Advisory Committee (MVRAC) with the European Counterparts at GW, VA Campus, June 1998.
- Invited expert, "New and Future Car Safety Technology," a workshop of The Herbert Quandt Stiftung, the Foundation of BMW AG, Washington, D.C., July 1997.

- Invited expert to contribute to Strategic Plan for Improving Roadside hardware (NCHRP Project 17-13), for TRB of National Research Council of The National Academy of Sciences, TRB Annual Meeting, Washington, D.C., January 8, 1996.
- Attended the White House Briefing on NEXTEA (the National Economic Crossroads Transportation Efficiency Act- the Bill later passed as TEA21 by US Congress), 1997.

Peer Review for Government Panels

- NSF Review Panels, 2007-2013, 2019, 2020, 2021, 2022: Several for CMMI, CISE, and Engineering Directorate, CPS, and many major interdisciplinary programs.
- Expert Committee for the Canada Foundation for Innovation's 2017 *Innovation Fund competition* (Dec. 2016)
- CDC (Center for Disease Control and Prevention) Review Panel, 2012
- Canada Foundation for Innovation, Nov. 2008
- Canadian National Centers of Excellence, AUTO 21 NCE, Windsor, September 2007
- US DOT Eisenhower Fellowship Program, US DOT NHI, 2006
- Scientific Consultant and Reviewer to Arthur S. Flemming Award Commission, 2004-2011
- Canadian National Centers of Excellence, AUTO 21 NCE, Windsor 2000, and Toronto 2004
- National Research Council of The National Academy of Sciences, ITS-IDEA program of the Transportation Research Board (TRB) 1997-98.

Peer Review for Journals and Proceedings (selected list)

- National Academy of Engineering (NAE) Bridge Magazine
- ASME Journal of Dynamic Systems, Measurements, and Control
- SAE International Journal of Connected and Autonomous Vehicles (CAV)
- SAE International Journal of Transportation Safety
- SAE International Journal of Commercial Vehicles
- IEEE Transactions on Control Systems Technology
- IEEE Transactions on Neural Networks
- IEEE Transactions on Vehicular Technology
- IEEE Transactions on Intelligent Transportation Systems
- Journal of Vibration and Control
- IMechE Journal of Multibody Dynamics
- IMechE Journal of Automotive Engineering
- Neural Networks, the official Journal of the International Neural Networks Society
- Journal of Robotics Engineering
- International Journal of Robotics Research
- Journal of Computer Methods in Applied Mechanics and Engineering
- International Journal of Transportation Research, Part C
- Journal of Intelligent Transportation Systems
- Journal of Accident Analysis and Prevention
- ASCE Journal of Transportation Engineering
- Journal of Computer-Aided Civil and Infrastructure Engineering
- ASEE Journal of Engineering Technology
- Reviewer for proposals for ASME's new Book Series in Robotics, 2011
- Reviewer for John Wiley Book Series, 2011

Conference Proceedings

- Associate Editor and reviewer for all conferences listed in leadership roles above

- ▣ Transportation Research Board Annual Meeting, Washington, DC, 2015
- ▣ 7th Annual ASME DSC Conference, San Antonio, TX, 2014
- ▣ 3rd International Conference on Connected Vehicles and Expo, Vienna, Austria, 2014
- ▣ 17th IEEE Intelligent Transportation System Conf. Qingdao, China, 2014
- ▣ 16th IEEE Intelligent Transportation System Conf. Hague, Netherlands, 2013
- ▣ IEEE International Symposium on Robotic and Sensors Environments, 2013
- ▣ Transportation Research Board Annual Meeting, Washington, DC, 2013
- ▣ 5th Annual ASME DSC and 11th Motion and Vibration Conference, Fort Lauderdale, FL, 2012
- ▣ IEEE Forum on Integrated and Sustainable Transportation Systems (FISTS), Vienna, Austria, 2011
- ▣ IEEE ITSC 13th International Conference, Madeira, Portugal, 2010
- ▣ IEEE Intelligent Vehicles Symposium, San Diego, CA, 2010
- ▣ ASME DSC Conference, Hollywood, CA, 2009
- ▣ IEEE Intelligent Vehicles Symposium, Xian, China, 2009
- ▣ IEEE Intelligent Vehicles Symposium, The Netherlands, 2008
- ▣ IEEE Intelligent Vehicles Symposium, Istanbul, Turkey, 2007
- ▣ IEEE ITSC 9th International Conference, Toronto, Canada, 2006
- ▣ IEEE ITSC 8th International Conference, Vienna, Austria, 2005
- ▣ IEEE ITSC 7th International Conference, Washington, DC, 2004
- ▣ ASME IMECE, Chicago, IL, 2006
- ▣ ASME IMECE, Washington, DC, Nov. 2003
- ▣ ASME IMECE, New York, NY, Nov. 2001
- ▣ Transportation Research Board Annual Meeting, 2002
- ▣ Transportation Research Board publications (conference proceedings and TRB Papers over various years)
- ▣ 35th Hawaii International Conference on System Sciences, Critical Infrastructure Systems, 2001
- Invited reviewer for various proposals for national and international universities and agencies

External Committee Service

- Board of Governors, IEEE Intelligent Transportation System Society (ITSS) (2022-2024)
- Invited Steering Board member of USDOT sponsored project on Automated Vehicles For Rural Roads and Dense City Traffic Environments, Texas A&M University (2021-)
- Invited Advisory Board member of US DOT Center for Automated Vehicles Research with Multimodal AssurEd Navigation (CARMEN), Ohio State and UC Irvine Universities (2020-)
- VP Administration & Executive Committee Member, IEEE Intelligent Transportation System Society (5/2016-12/2018)
- Member of Executive committee of Department Chairs Committee, ASME (2017- 2019)
- Member, IEEE Committee on Transportation and Aerospace Policy (2009-2014)
- Member, ASME DSC Division, Automotive and Transportation Systems Committee (2005-)
- Member, ASME DSC Division, Mechatronics Committee (2005-)
- Member, IEEE ITSS, Intelligent Transportation System Society (2003-); elected to Board of Governors (2008-2010, 2011-2013)
- Member, IEEE CSS, Control Systems Society (2005-)
- Member, IEEE RAS, Robotics and Automation Society (2005-)
- Member of National Academy of Sciences Transportation Research Board Vehicle-Highway Automation Committee (2013-18)
- University Representative of the National Academy of Sciences Transportation Research Board (2008-2015)

- Motor Vehicle Safety Research Advisory Committee (MVSRAAC) of the National Highway Traffic Safety Administration (NHTSA) of DOT, Aggressivity and Compatibility Group of the Crashworthiness Subcommittee, membership by invitation from the government (1995-1999)
- Member of National Academy of Sciences Transportation Research Board, Computational Mechanics subcommittee of the committee for Roadside Safety Features (1994-2000)
- Advanced Vehicle Control and Safety System (AVCS) committee of the Intelligent Transportation Society (ITS) of America (1994-1996)

Professional Society Memberships

- Fellow of the American Society of Mechanical Engineers (ASME) and member of DSC Division (2013-Present)
- Senior Member of IEEE, affiliated with ITS, Robotics, and CS Societies (2013-Present)
- Member of IEEE Control Systems Society Technical Committee on Smart City (2019-Present)
- Member of the Society of Automotive Engineers (SAE)
- Associate Member of the American Society of Civil Engineers (ASCE) (ended 2007)
- Member of ITS America through organizational membership for GWU-CISR (2002-2014)
- Member of the Advanced Vehicle Control Systems (AVCS) Committee of ITS America (1996-97)
- Member of the American Society for Engineering Education (ASEE) (1992-95)
- Senior Member of the Society of Manufacturing Engineers (SME, CASA & RI Societies) (1990-95)

Consulting

1988-present: Consulting in system dynamics analysis and mathematical modeling and simulation, neural networks, intelligent transportation systems, stress, failure and Finite Element Analysis, intellectual property evaluation, and expert witness services for clients including universities, government agencies, manufacturers, and consulting companies. Sample clients: Carnegie Mellon University Robotics Institute, University of North Carolina Transportation Center, US DOT; Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, Palo Alto; Latham and Watkins, LLP, Washington, DC, Dickstein Schapiro, LLC, Washington, DC., and Frommer, Lawrence, and Haug, LLP, New York, NY and Washington, DC, Lewis Roca Rothgerber Christie LLP, Glendale, CA. RatnerPrestia, Philadelphia, PA. National Science Foundation, Alexandria, VA.

Internal University Service

Virginia Tech Service

- Invited member of university Management Plan Advisory Committee for Research and Innovation (2022-present)
- Invited member of the University Diversity and Inclusivity Committee (2016-present)
- Chair of the ME Department Diversity Committee (2016-2020); member (2020-present)
- Virginia Tech's Department Heads Executive Council (COE Representative), (2018-2020)
- College of Engineering Department Head's Subcommittee on P&T Expectations Document (2018-19)
- Invited Member of Intelligent Infrastructure and Human-Centered Communities (IIHCC) University Destination Area Committee (2016-2021); College Representative (2020-2021)
- Member of the University's Cluster Hire Search Committee, representing Inclusivity and Diversity for Intelligent Infrastructure and Human-Centered Communities (IIHCC) University Destination Area (2017-18)

GWU Service

Department

- **Chair** of Faculty Search Committees, CEE Department (2005, 2007-08, 2010-11, 2012-13)
- **Chair** of Graduate Programs Committee, CEE Department (2000-07; 2012-present)
- **Chair** of Faculty Search Committee for Water Resources area (2010-11)
- **Lead** CEE Colloquia (2010-11)

- Graduate Programs Committee, CEE Department (2007-12)
- Undergraduate Programs Committee, CEE Department (2007-08)
- Undergraduate Curriculum Committee, CEE Department (2002-04; 2007-09)
- Faculty Search Committee for External Recruiting of a new CEE Chair (2003-04)
- Faculty Search Committee for Structures area (2003-04)
- Faculty Search Committee for Transportation area (2004)
- CEE By-Laws Committee (2001)
- Committee for Strategic Planning CEE (2000)
- Faculty Search Committee for a structural faculty position (2000-01)
- Transportation Group Committee for a new initiative for SEAS-Industry Collaboration (1998-99)
- Mechanical Engineering Faculty committee for the Strategic Plan of the School of Engineering and Applied Science; Chair of the subcommittee for Virginia Campus (1998)

School

- Tenure and Promotion Sub-Committee (2014-16 & 2011-13)
- Research award selection committee (2012-13)
- **Chair**, Tenure and Promotion Sub-Committee (2011-12)
- **Chair**, Research award selection committee (2011-12)
- Finance Committee (2010-15)
- Teaching award selection committee (2010-11)
- Ethics Committee (2009-10)
- Dean Search Committee (2007-08)
- School Subcommittee for Tenure and Promotion procedures (2004-05)
- SEAS Graduate Programs Committee (2001-04)
- Committee for potential opportunities with the National Transportation Safety Board, NTSB (2001)
- SEAS committee on Intelligent Highway and Vehicle Systems (1994-96)

University

- University review panel for University Awarded Signature Programs (invited by Provost) (2012)
- University Advisory Research Committee (2010-13)
- University Hybrid Course Innovation Sub-committee, Task Force on Excellence Through Innovation (2010-11)
- University Search Committee for Chief Research Officer (2005-06)
- University Research and Instructional Technology Committee (RITC) (2002-07)
- University Research Advisory Council (RAC) (2003-2006)
 - Special Subcommittee of RAC on Research Enhancement Incentive Award (2003-04)
- Computational Sciences Program (CSP) interdisciplinary committee (1997-00)
 - **Chair** of the Budget and Resource committee of CSP
 - Admissions and Executive Committees of CSP
- Committee on Strategic Planning for Academic Information Technology (SPAIT) (2000-01)
 - Research Subcommittee for SPAIT
- Research and Instructional Technology Committee of the Instructional Technology Advisory Council (ITAC) of the University (1999-00)

Selected Other GWU Activities

- Contributed significantly to the successes of the University's Office of Government Relations and GW Virginia Campus Executive Dean in congressional and government fundraising. Prepared proposals and made presentations to US members of Congress, their staff, and government agencies. One significant effort resulted in constructing a new \$28 million building, housing the NTSB's training academy at GW, Virginia Campus.

- Contributed significantly to departmental graduate and undergraduate recruiting.
- Initiated a new internship program at GW-TRI with the ENSIMEV, University of Valenciennes, France (2000-2013), involving the exchange of 2-3 graduate students annually.
- Revived a graduate student exchange program (MOU) with Stuttgart University, Germany.
- Initiated a new Distinguished Speaker Series for GW-TRI (1999-2001) and continued with Seminars for an area of academic excellence (2002-present)
- Actively contributed to the conferences, seminars, presentations, annual technical expositions, PR events, and other activities to promote the GW Virginia Campus.

Selected Media Appearances

- Interviewed by IEEE Control Systems Magazine (Volume: 43, Issue: 2, April 2023), PP: 17 – 18, DOI: 10.1109/MCS.2023.3234351
- Interviewed for ASME DSCD Dynamic Systems and Control Division Podcast, July 31, 2022: <https://www.youtube.com/watch?v=1jWKvn4Z2R4>
- Interviewed by Voice of America on Autonomous Driving and VT Mechanical Engineering Department Research (July 2019.)
- Interviewed, cited by Virginia Business, Gary Robertson: AI advancements raise questions: Researchers consider ethical issues as they work on a variety of projects; Published June 29, 2018. <https://www.virginiabusiness.com/article/ai-advancements-raise-questions/>
- Interviewed by Justin Ward. Researchers use simulation to study self-driving cars.
MVT. <http://www.kmvt.com/content/news/426515351.html> (June 5, 2017.)
WHSV. <http://www.whsv.com/content/news/425950913.html> (June 2, 2017.)
WDBJ. <http://www.wdbj7.com/content/news/Virginia-Tech-advancing-autonomous-car-research-with-new-simulator-425397334.html> (May 30, 2017.)
- Appeared in the article, Virginia Tech mechanical engineering lab receives an autonomous driving simulator. *Augusta Free Press*. <http://augustafreepress.com/virginia-tech-mechanical-engineering-lab-receives-autonomous-driving-simulator/> (May 29, 2017.)
- Interviewed by Rosaire Bushey. Virginia Tech mechanical engineering lab receives an autonomous driving simulator. *Virginia Tech News*. <https://vtnews.vt.edu/articles/2017/05/autonomous-driving-simulator.html> (2017, May 25.)
- Invited interview, IEEE, ITS Podcast Episode 20: “Active Safety with Prof. Azim Eskandarian,” Dec. 1, 2014.
- Invited participant in NPR’s Dianne Rehm Show on *Driverless (Autonomous) Vehicles*, Sep. 27, 2012.
- Interviewed and quoted on-line, NOVA, PBC on *Drowsy Driving Warning*, 2013.
- GWU SEAS Video on Research; Vimeo, (<https://vimeo.com/74841453>), 2013.
- Interviewed and quoted on-line, Forbes and CNN Tech-WIRED on *Autonomous Vehicles* Sep. 2012.
- Interviewed and quoted in the IEEE Institute (IEEE newsmagazine), “Crash-Free Commutes: IEEE members work to make vehicles smarter and safer,” Kathy Kowalenko, January 6, 2012.
- GWU Video Clip, on GWU Office of VP Research, YouTube, and The Science Coalition (Tomorrow’s Innovators are in University Today: <http://innovators.sciencecoalition.org/video.php?id=381>), 2012.
- Interviewed and quoted in the article, “In-car Internet: Safety boost or driver danger?” November 9th, 2011, Mark Henricks; http://www.carinsurancequotes.com/articles/in_car_internet/.
- Interviewed and quoted by WTOP News concerning the safety issues of Distracted Driving, 2011.
- GW OVPR Experts Series broadcasted on-line at GW’s Research website and local ABC Channel 7 commercials: *Professor Azim Eskandarian spotlights research in automotive safety*.
- Interviewed and quoted in a USA Today article Study: Sleepiness a factor in 17% of road deaths, Nov. 23, 2010.
- Interviewed and quoted in BBC On-line article: “Car that drives itself gets closer to reality,” 2010.

- Washington Post Magazine, for simulation technology in education, Nov. 7, 2010. The same article also referenced in *First Bell*, the daily ASEE (American Society of Engineering Education)
- Local CBS News for driver distraction and drowsiness safety, June 2010.
- GW Today, online news interview, August 2010.
- Local CBS and NBC News channels for truck driver drowsiness detection research, 2006.
- Local Fox News channel for drowsy driver research, 2004.
- ABC discovery news; topic: road safety features concerning Princess Diana's fatal car accident.
- GW radio broadcasted 1999 and printed in *By George* (GW's Paper) on Feb. 3, 2000, issue, Topic: "The Anatomy of Accidents."
- Interviewed and a complete film produced entitled, "CYBERMASH," by Beyond Productions Pty Limited (Australia) for the TV program Beyond 2000-Episode 19- Tape 6/9/1999.
- Brazilian Science Discovery Channel, a program for auto safety research, 1996.

Penn State Service (Jan. 1989-1992)

Committee Service at Different Semesters:

- Academic Affairs Committee
- Faculty Affairs Committee
- Faculty Services Committee
- A faculty member of the Industrial Advisory Committee at Penn State York; actively participated in obtaining equipment and instrumentation grants for various laboratory courses from local industries and various university-sponsored programs.
- Assisted the Industrial Resource Center (MANTEC) of York County, Pennsylvania, to assess industrial training needs in the region through the continuing education department.
- Developed and taught new short courses and seminars in Computer Integrated Manufacturing (CIM) and Computer Numerical Control (CNC) for the Continuing Education Department.

Publications

240 published works: 94 referred journal and 126 refereed conference papers, 1 book and 1 edited reference handbook, 9 book chapters, 4 edited volumes, 4 other refereed publications, 1 patent and 2 pending (in-progress), 104 additional talks/presentations/abstracts, and over 37 technical reports.

Patents

1. Eskandarian, A. and Mortazavi, A., "Unobtrusive Driver Drowsiness Detection System and Method," Pub. No. US8519853 B2; Application number US 12/613,306; Publication date: Aug 27, 2013. (Licensed by a company.) Also Patented in Canada in 2015.
2. Provisional Patent application 63/483,413: Mehr, G., and Eskandarian, A. "Multi-Agent Cooperative Perception Through Probabilistic Classification Map Fusion."
3. Provisional Patent application 63/488,349: Ce, Z., and Eskandarian, A., "Perception Quality Evaluation Method of an Object Detection System."

Books

1. Eskandarian, A., Editor-in-Chief, Handbook of Intelligent Vehicles, Springer, March 2012. Springer: **803,000 accesses** (July 2024) and 514 citations <https://doi.org/10.1007/978-0-85729-085-4>. Also translated into Chinese. Section Editor for the following sections, each including multiple chapters:
 - Eskandarian, A., Section Editor, Vehicle Longitudinal and Lateral Control Systems, Section 2, Handbook of Intelligent Vehicles, Springer 2012, pp. 165-232.
 - Eskandarian, A., Section Editor, Driver Assistance, Section 5, Handbook of Intelligent Vehicles, Springer 2012, pp. 489-602.
 - Eskandarian, A., Section Editor, Drowsy and Fatigued Driver Detection, Monitoring, Warning, Section 7, Handbook of Intelligent Vehicles, Springer 2012, pp. 893-996.
2. Chen, Y., Lee, J., and Eskandarian, A., Meshless Methods in Solid Mechanics, Springer Verlag, May 2006.

Book Chapters

1. Eskandarian, A., Mehr, G., Nayak, A., and Shang, X., “Challenges and Algorithms for Connected and Autonomous Vehicle Safety and Mobility in Smart Cities,” Book Chapter in Springer’s Transportation Mobility in Smart Cities, edited by: Petros Ioannou and Andreas A. Malikopoulos; in-print.
2. Eskandarian, A., Intelligent and Autonomous Vehicles, Book Chapter in Springer’s **Robotics Encyclopedia**, 2022. https://doi.org/10.1007/978-3-642-41610-1_61-1
3. Eskandarian, A., Introduction to Intelligent Vehicles, Chapter 1, Handbook of Intelligent Vehicles, Springer, 2012, pp. 1-14.
4. Soudbakhsh, D., and Eskandarian, A., Vehicle Lateral and Steering Control, Chapter 10, Handbook of Intelligent Vehicles, Springer, 2012, pp. 209-232.
5. Eskandarian, A., Fundamentals of Driver Assistance, Chapter 19, Handbook of Intelligent Vehicles, Springer, 2012, pp. 491-536.
6. Blum, J., Eskandarian, A., and Arhin, S.A., Intelligent Speed Adaptation System, Chapter 22, Handbook of Intelligent Vehicles, Springer, 2012, pp. 581-602.
7. Eskandarian, A., Mortazavi, A., and Sayed, R.A., Drowsy and Fatigue Driving Problem Significance and Detection Based on Driver Control Functions, Chapter 36, Handbook of Intelligent Vehicles, Springer, 2012, pp. 941-974.
8. Sayed, R.A., and Eskandarian, A., and Mortazavi, A., Drowsy and Fatigued Driver Warning, Countermeasures, and Assistance, Chapter 37, Handbook of Intelligent Vehicles, Springer, 2012, pp. 975-996.
9. Wang, X., Li, J., Lee, J.D., and Eskandarian, A., A Multiscale Modeling of Multiple Physics, Handbook of Micromechanics and Nanomechanics, Editors: Shaofan Li and Xinlin Gao, Pan Stanford Pub. Pte Ltd, 2013.

Edited Volumes & Edited Journals

1. Eskandarian, A., and Abbas, M. (Editors), “Connected and Autonomous Vehicles Impact on Safety, Mobility, Traffic, and Environment: Advances and Challenges,” Proceedings of IEEE ITS Society and Virginia Tech Sponsored Workshop, Tysons Corner, VA, Oct. 27-28, 2022, IEEE Transactions on ITS, Special Issue, April 2024.
2. Eskandarian, A., Sayed, R., and Blum, J. (Editors) Intelligent Transportation Systems Safety and Security, Conference Proceedings, March 24-25, 2004, Miami, FL, USA. CD-ROM.
3. Eskandarian (Guest Editor), Adeli, H. (Editor-in-Chief), Special issue of Journal of Computer-Aided Civil and Infrastructure Engineering in Neural Networks in Highway and Vehicle Applications, 1998.
4. Oskard, M., Eskandarian, A., and Shapiro, F. (Editors), Neural Networks Application in Highway and Vehicle Engineering, Conference proceedings, FHWA Publication, No. RD96154, April 1996.

Refereed Journal Papers (Listed in two groups)

Group I. Dynamics, Controls, and Intelligent Systems (Applications in Intelligent/Autonomous Vehicles)

In review:

- Patel, D., and Eskandarian, A., “Sampling-Based Planning Algorithms at Non-Signalized Intersections with Traffic for Autonomous Vehicles,” IEEE Transactions on Intelligent Vehicles; in review at IEEE T-IV, 2023.
- Sivashangaran, S., and Eskandarian, A., “Exploration Without Maps via Zero-Shot Out-of-Distribution Deep Reinforcement Learning,” prepared for a robotics journal 2024.

Published

1. Nayak, A., Eskandarian, A., Doerzaph, Z., and Ghorai, P., “Pedestrian Trajectory Forecasting Using Deep Ensembles Under Sensing Uncertainty,” IEEE Transactions on Intelligent Transportation System, doi: 10.1109/TITS.2024.3382201, May 2024.
2. Chauhan, N.S., Kumar, N., Eskandarian, A., “A Novel Confined Attention Mechanism Driven Bi-GRU Model for Traffic Flow Prediction,” IEEE Transactions on Intelligent Transportation Systems, doi: 10.1109/TITS.2024.3375890. March 2024.
3. Sivashangaran, S., and Eskandarian, A., “Deep Reinforcement Learning for Autonomous Ground Vehicle Exploration Without A-Priori Map,” Advances in Artificial Intelligence and Machine Learning; Research 3 (2) 1198-1219, Accepted 17-6-2023; Published 24-6-2023

4. Ghorai, P., Eskandarian, A., Abbas, M., Nayak, A., "A Causation Analysis of Autonomous Vehicles Crashes," IEEE ITS Magazine, accepted April 2024; DOI:
5. Nayak, A., Eskandarian, A., "Cooperative Probabilistic Trajectory Prediction Under Occlusion," IEEE Transactions on Intelligent Vehicles, 2024; DOI: 10.1109/TIV.2024.3365651
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2. Nayak, A. and Eskandarian, A., "Cooperative Probabilistic Trajectory Forecasting under Occlusion," Accepted for poster presentation at 4 different workshops in 2023 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2023), October 1 – 5, 2023, Detroit, Michigan, USA.
3. Patel, D., and Eskandarian, A., "Probabilistic RRT Connect with intermediate goal selection for online planning of autonomous vehicles," IFAC Modelling Estimation and Control Conference 2023; Oct. 2-5, Lake Tahoe, CA.

4. Sivashangaran, S., Khairnar, A., and Eskandarian, A., "AutoVRL: A High Fidelity Autonomous Ground Vehicle Simulator for Sim-to-Real Deep Reinforcement Learning," IFAC Modelling Estimation and Control Conference 2023; Oct. 2-5, Lake Tahoe, CA.
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Group II. Applied Mechanics/Impact Dynamics (Applications in Vehicle Crashworthiness)

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91. Ruparel, T., Eskandarian, A., and Lee, J., "Concurrent Multiple-Time-Scale Simulations with Improved Numerical Dissipation for Structural Dynamics," ASME IMECE 2013, San Diego, CA, Nov. 15-21, 2013.
92. Samaha, R.R., Prasad, P., Marzougui, D., Chongzen, Cui, Kan, C.D., and Eskandarian, A., "An Integrated Modeling Method to Evaluate Fleet Safety Performance of New Vehicle Designs," ASME IMECE 2013, San Diego, CA, Nov. 15-21, 2013.
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94. Yang, Z., Wang, X., Lee, J., and Eskandarian, A., "Simulating Nano-Machining Process with Molecular Dynamics," ASME 2012 IMECE, Houston, TX, Nov. 9-15, 2012.
95. Chen, Y., Lee, J.D., Oskard, M., and Eskandarian, A., "Meshless Analysis of Crack Propagation in Multiphase Material," ICF11, the 11th International Conference on Fracture, in Turin, Italy, March 20-25, 2005.
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119. Marzougui, D., Kan, C.D., Eskandarian, A., "Safety Performance Evaluation of Roadside Hardware Using Finite Element Simulation," ASCE Fourteenth Engineering Mechanics Conference, Austin, Texas, June 2000. On CD ROM.
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126. Brown, E.F. and Eskandarian, A., "A Method for Propulsion Nozzle Design," International Conference on Inverse Design Concepts in Engineering Sciences, Austin, Texas, 1984.

Additional Presentations/Abstracts at Conferences (some are refereed) and Invited Talks

1. Eskandarian (invited Speaker), "Connected Autonomous Vehicles (CAV) Safety and Mobility," Penn State University, Feb. 23, 2024.
2. Eskandarian (invited Speaker), "Challenges and Algorithms for Connected and Autonomous Vehicles Safety and Mobility in Smart Cities," in *The Road to Emerging Mobility Systems for Smart Cities*, IEEE ITS Society Workshop, June 30 - July 1, 2023, Ayia Napa, Cyprus.
3. Eskandarian (invited Speaker), "Deep Reinforcement Learning for Autonomous Ground Vehicle Exploration without A-Priori Maps", Workshop on Adaptive Control to Intelligent Transportation Systems, June 29, The 31st Mediterranean Conference on Control and Automation, June 26-29, Ayia Napa, Cyprus.
4. Eskandarian, A., (Invited Distinguished Speaker), "Advances in Connected Autonomous Vehicles Safety and Mobility," Virginia Commonwealth University, March 17, 2023.
5. Eskandarian, A., (Invited Distinguished Speaker), "Methods for Selected Connected Autonomous Vehicles (CAV) Safety and Mobility Challenges," University of Houston, March 10, 2023.
6. Eskandarian, A., (Invited Speaker), "Connected Autonomous Vehicles Safety and Mobility Benefits," Mahindra and Mahindra Technical Center, Chennai (Madras), India, Feb. 17, 2023.
7. Eskandarian, A., (Invited Distinguished Speaker), "Connected Autonomous Vehicles Safety and Mobility Benefits," University of Delaware, Nov. 18, 2022.
8. Eskandarian, A., "Advanced Methods and Algorithms for Selected Connected Autonomous Vehicles Benefits," IEEE ITS Society and Virginia Tech Sponsored Workshop on Connected and Autonomous Vehicles Impact on Safety, Mobility, Traffic, and Environment: Advances and Challenges," Tysons Corner, VA, Oct. 27-28, 2022.
9. Eskandarian, A., (Invited Speaker), Virtual Lecture on "Autonomous Vehicles Safety," University of Michigan, Center for Connected and Automated Transportation, Nov. 30, 2021.

10. Eskandarian, A., (Invited Speaker), Virtual Lecture on "Autonomous Vehicles," University of Southern California, Civil Engineering Department, Oct. 2020.
11. Eskandarian, A., (Invited Speaker), "Advances in Vehicle Safety and Mobility Leading to Autonomous and Connected Driving," Rensselaer Polytechnic Institute (RPI), Troy, NY, Feb. 2020.
12. Eskandarian, A., (Invited Speaker & Panelist), "Advances, Benefits, and Challenges in Connectivity for Autonomous Driving," The 2nd ITSS-ITE Symposium, IEEE ITSC'19, Auckland, New Zealand, Oct 29, 2019.
13. Eskandarian, A., (Invited Speaker), "Advances in Vehicle Safety and Mobility Leading to Autonomous and Connected Driving," University of Texas, Dallas, October 2019.
14. Eskandarian, A., (Invited Speaker), "Advances in Vehicle Safety and Mobility Leading to Autonomous and Connected Driving," the University of Minnesota, April 24, 2019.
15. Eskandarian, A., (Invited Speaker), "Advances in Vehicle Safety and Mobility Leading to Autonomous and Connected Driving," SUNY Buffalo, March 2019.
16. Eskandarian, A., "ADAS for Occupant Protection: Progressing from Crashworthiness to Crash Avoidance and Autonomy," TRB, ANB45, P19-21259, Session: The Impact of Advanced Driver Assist Systems on Occupant Safety, Washington DC, January 2019.
17. Eskandarian, A., (Invited Speaker), "Advances in Vehicle Safety and Mobility Leading to Autonomous Driving," Case Western Reserve University, November 16, 2018.
18. Eskandarian, A., (Invited Keynote Speaker), "Advances in Vehicle Safety and Mobility Leading to Autonomous Driving," Daegu International Future Auto Expo 2018, Korea, Nov. 1, 2018.
19. Eskandarian, A., (Invited Speaker), "Vehicle Safety and Connectivity in the Autonomous Driving Era," Seoul National University, Korea, Oct. 31, 2018.
20. Eskandarian, A., (Invited Speaker), "Advances in Vehicle Safety and Mobility Leading to Autonomous Driving," NC State University, October 19, 2018.
21. Eskandarian, A., (Invited Keynote Speaker), "Safety, Mobility, and Connectivity to Autonomous Vehicles," FISITA 2018, Sponsored by SAE India, Chennai, India, Oct.3, 2018.
22. Lin, Y., and Eskandarian, A., "Inter-vehicular Communication to Safely Mitigate Emergency Braking in Vehicle Platoons," Automated Vehicle Symposium, Poster presentation, San Francisco, CA. July 15-18, 2018.
23. Eskandarian, A., Invited Speaker, "A Critical Perspective on Vehicle Safety and Mobility in the Era of Autonomy," PAMS (Pangyo Autonomous Motor Show) 2017 Session on Global trend and core technologies of Autonomous vehicles, Pangyo, Korea, Nov. 16, 2017.
24. Eskandarian, A., (Invited Speaker for Outstanding Research Award in ITS by IEEE ITS Society), "A perspective on safety and mobility," IEEE Intelligent Transportation Systems Conf., Yokohoma, Japan, Oct. 16-19, 2017.
25. Eskandarian, A., (Invited Speaker), Controls and Signal Processing for Driver Assistance and Semi-Autonomous Driving (Partial Automation) to Enhance Safety, University of Central Florida, Mechanical and Aerospace Engineering Department, April 15, 2016.
26. Eskandarian, A., (Invited Speaker), Controls and Signal Processing for Driver Assistance and Semi-Autonomous Driving (Partial Automation) to Enhance Safety, Texas A&M University, Mechanical Engineering Department, April 2016.
27. Eskandarian, A., (Invited Speaker), Controls and Signal Processing for Driver Assistance and Semi-Autonomous Driving (Partial Automation) to Enhance Safety, UC San Diego, Mechanical Engineering Department, May 26, 2016.
28. Riyahi, P. and Eskandarian, A., "Investigation of the Effect of Visual LED Stimuli as BCI Alert System on Subjects' (drivers) Brain Signals Detection in Emergency Situation," BMES Annual Meeting, Tampa, FL, Oct. 7-10, 2015.
29. Kan, A., Yonten, K., Eskandarian, A., Arispe, E.N., Summers, S. "Development and Validation of Finite Element Models of Midsize Sedan Including Interiors for Crashworthiness Simulations," 94th Annual Meeting of TRB, Washington DC, January 2015.
30. Yang, Z., Lee, J. D. and Eskandarian, A., "Objectivity in Molecular Dynamics Simulation: Objective Velocity, Temperature and Stress," American Physical Society March Meeting, Denver, CO, 2014.
31. Ruparel, T., Eskandarian, A., and Lee, J. "Multiple Length Scale and Multiple Time Scale Coupling for Linear Structural Dynamic Equations." Proceedings of the 12th U.S. National Congress on Computational Mechanics, Raleigh, NC, 2013.

32. Yang Z., Wang X., Lee, J. D. and Eskandarian A., "Atomistic Simulation of Multi-Grain Multi-Phase Polycrystalline Materials," 12th U.S. National Congress on Computational Mechanics, Raleigh, NC, 2013.
33. Eskandarian, A., (Invited Speaker), "Vehicle Active Safety Systems for Collision Avoidance," Clemson University, CU-ICAR Seminar, April 18, 2012.
34. Yang Z., Wang X., Lee J. D. and Eskandarian A., "Simulating Nano-Machining Process with Molecular Dynamics," ASME 2012 International Mechanical Engineering Congress & Exposition, Houston, TX, 2012.
35. Eskandarian, A., (Invited Keynote Speaker), "Active Systems to Semi-autonomous Driving for Vehicle Safety," Indo-US Seminar on Preventing Road Crash Injury Through Vehicle Safety Design, Indian Institute of Science, Bangalore, India, March 6-7, 2012.
36. Eskandarian, A., (Invited Speaker), "Active Systems to Semi-autonomous Driving for Vehicle Safety," Channabasaveshwara Institute of Technology, Gubbi, Tumkur, India, March 8, 2012.
37. Mahadevaiah, U., Marzougui, D., and Eskandarian, A., "Accurate Contact Algorithm for Explicit Finite Element Codes," 3rd International Conference on Impact Loading of Lightweight Structures, ICILLS, Valenciennes, France, June 28-July 1, 2011.
38. Eskandarian, A., (Invited Speaker), "Integrated Vehicle Safety and the Next Generation of Sensory Controls for Semi-Autonomous Driving," Seminar at Tufts University, March 17, 2011.
39. Soudbakhsh, D., and Eskandarian, A., "Development of a Collision Avoidance System Using Active Steering," The George Washington University SEAS 5th Annual Student Research and Development Showcase, Washington, DC. Feb. 2011.
40. Bonnevie S., Karcher, J., Marzougui, D., and Eskandarian, A., "Vehicle Dynamics Investigations to Develop Guidelines for the Selection and Lateral Placement of Cable Barriers on V-Shaped Medians," The George Washington University SEAS 5th Annual Student Research and Development Showcase, Washington, DC. Feb. 2011.
41. Eskandarian, A., (Invited Speaker), "A Signal Processing and Pattern Recognition Method for Drowsy and Fatigued Driver Assistance," Seminar at Johns Hopkins University, October 25, 2010.
42. Eskandarian, A. (Speaker and Host), Presentation of driving simulator and demonstrations of the dangers of texting and driving, The Society of Automotive Engineers' DC -Section monthly meeting, GWU, VSTC Campus, June 2010. The event and the simulations received coverage in both the Loudon Times and on the local CBS affiliate WUSA9.
43. Eskandarian, A., (Invited Speaker), "Integrated Vehicle Safety: The Challenges and Opportunities for Intelligent Vehicles," SEAS Seminar Series on Engineering Challenges of the 21st Century, The George Washington University, Washington, DC, March 23, 2010.
44. Eskandarian, A., (Invited Speaker), "Intelligent Vehicles Active Safety: A Signal Processing Method for Unobtrusive Detection of Driver Drowsiness," Seminar at the Robotics Institute of Carnegie Mellon University, Pittsburg, PA, February 19, 2010.
45. Soudbakhsh, D., and Eskandarian, A., "Design and Application of a Linear Quadratic Regulator in an Active Steering Control System," TRB 89th Annual Meeting, Washington, DC January 13-18, 2010.
46. Eskandarian, A., (Invited Speaker and Panelist), "Advanced Vehicle Speed Adaptation System, a New Approach to ISA," at the Special Session in Electronic Speed Enforcement/Control of the 15th World Congress on ITS, New York, NY, Nov. 16-20, 2008.
47. Eskandarian, A., (Invited Speaker), "Passive and Active Vehicle Safety Research," the California Center for Innovative Transportation (CCIT), University of California, Berkeley, October 7, 2008.
48. Eskandarian, A., and Blum, J., "ITS at GWU: Investigation of Communications Considerations in the Simulation of VII-Enabled Applications," final briefing to sponsor, Federal Highway Administration, US DOT (Project duration: 2007-08.), August 2008.
49. Eskandarian, A., "Transportation Safety and Security Research and Academic programs at GWU," Presentation to Nissan Motor Company at GW, VA Campus, August 29, 2008.
50. Eskandarian, A., "Transportation Safety and Security Research and Academic Programs at GW," Federal Highway Administration, Turner Fairbank Highway Research Center, Office of Traffic Operations, Delivered at GW VA Campus, Ashburn, Virginia, June 13, 2007.
51. Blum, J., and Eskandarian, A., "Investigation of Communications Considerations in the Simulation of Vehicle Infrastructure Integration (VII)-Enabled Applications," project presentation, Federal Highway Administration,

- Turner Fairbank Highway Research Center, Delivered at GW VA Campus, Ashburn, Virginia, June 2007.
52. Eskandarian, A., "Center for Intelligent Systems Research and Transportation Safety and Security Research and Academic Programs at GW," including demos of Driving Simulators to National Highway Traffic Safety Administration Representatives (human factors group), GW VA Campus, January 24, 2008.
 53. Eskandarian, A. CISR, and Transportation research capabilities and demonstrations of Driving Simulators, presented at GW Science, Technology, and Engineering Day, Feb. 26, 2008.
 54. Eskandarian, A., Arhin, S., and Blum, J. "Advanced Vehicle Speed Adaptation System (AVSAS)," final project presentation, Federal Highway Administration, Turner Fairbank Highway Research Center, McLean, Virginia, November 2007.
 55. Eskandarian, A., (Invited Speaker), "Vehicle Rollover Analysis, Modeling, and Simulation," Federal Highway Administration, Turner Fairbank Highway Research Center, McLean, Virginia, May 17, 2006.
 56. Eskandarian, A. (Invited Speaker and Panelist), Session on "Human Performance, Capability, and Behavior," TRB Conference on Future Truck and Bus Safety Research Opportunities, Arlington, VA, March 23-24, 2005.
 57. Eskandarian, A., (Invited Speaker), "From Collision Avoidance to Crashworthiness for Transportation Safety," School of Engineering, Embry Riddle Aeronautical University, Daytona Beach, FL, Feb. 2005.
 58. Eskandarian, A., "Virtual Reality in Transportation Safety and Security Modeling and Simulation," The Homeland Security and Defense Seminar, the George Washington University, VA Campus, June 10, 2004.
 59. Eskandarian, A. and Sayed, R.A., "An Improved Method for Detecting Driver Drowsiness," Real-time Non-intrusive Driver Status Monitoring session, 7th International IEEE ITSC Conference, Washington, DC, Oct. 3-6, 2004.
 60. Eskandarian (Invited Speaker), A., Soltani, H., "Dynamic Modeling of Vehicle in Real Rollover Cases," International Symposium on Multi-Body Dynamics: Monitoring and Simulation Techniques III, Loughborough University, UK, July 12-13, 2004.
 61. Eskandarian, A. (Invited Speaker), "Research and Education for Future Transportation Systems," DOT Event: Excellence in Science, Technology, and Mathematics Education (ESTME) Week, US DOT, Washington, D.C., March 15-20, 2004.
 62. Eskandarian, A. (Invited Speaker), "Center for Intelligent Systems Research," Thomas Jefferson High School, (Science and Technology magnet school), Virginia, USA, May 26, 2004.
 63. Sayed, R. and Eskandarian, A., "Driving Simulator Experiment: Detecting Driver Fatigue by Monitoring Eye and Steering Activity," Presented at the NDIA 3rd Annual Intelligent Vehicle Systems Symposium, Traverse City Michigan, June 9-12, 2003.
 64. Eskandarian, A., "Design of Safety Barriers Using Computer Simulation and Crash Testing," Transportation Safety and Security Workshop, sponsored by The International Emergency Management Society and GW's Institute for Crisis, Disaster, and Risk Management, Washington DC, January 28-29, 2003.
 65. Chen Y., Lee J. D., and Eskandarian A., "Multiscale Modeling of Polycrystalline Silicon," presentation only, IMECE'03 2003 ASME International Mechanical Engineering Congress & Exposition, Washington, D.C., November 16-21, 2003.
 66. Eskandarian, A., (Invited Speaker) "Simulation and Modeling for Crashworthiness and Collision Avoidance," University of Valenciennes, France, March 22, 2002.
 67. Chen, Y., Lee, J.D., and Eskandarian, A., "Applicability Analysis of Continuum Theories from Viewpoint of Phonon Dispersion Relations," presentation at US 14th Congress of Theoretical and Applied Mechanics, Blacksburg, Virginia, USA, June 22-27, 2002.
 68. Chen, Y., Lee, J.D., and Eskandarian, A., "Connecting Discrete Atomic Model to Micro-continuum Field Theories," Annual Meeting of Society of Engineering Science, Penn State Univ., State College, PA, Oct. 2002.
 69. Eskandarian, A., "Capabilities for Modeling Rollover and Vehicle Roof Crush," Presented to Santos Foundation, at GW, Virginia Campus, March 2002.
 70. Eskandarian, A., "GW Transportation Research Institute, Research, and Academic Programs," Presentation delivered to faculty and students at Shepherds College, West Virginia, at GW Virginia Campus, March 15, 2002.
 71. Eskandarian, A., "GW Transportation Research Institute, Research and Academic Programs," Presentation delivered to faculty and students at Shepherds College, West Virginia, at GW Virginia Campus, Dec. 2001.
 72. Eskandarian, A., "Presentation of CISR Driving Simulator," GW Virginia Campus Annual Tech Expo. 2002.

73. Eskandarian, A., "GW Transportation Research Institute, Research, and Academic Programs in Transportation Safety," Today's Issues in Aviation and Automotive Safety Session on Ten-Year Anniversary Celebration of Virginia Campus December 3, 2001.
74. Eskandarian, A. (Invited Speaker), "GW Transportation Research Institute, Research, and Academic Programs," Presentation delivered to Dean and Faculty of James Madison University, Harrisonburg, VA, May 10, 2001.
75. Eskandarian, A., "Issues of Roadside Hardware and Single Vehicle Crashes for Highway Safety," First Safety on the Road Conference, Session on Highway Safety Design, Cairo, Egypt, Nov. 13-19, 2000.
76. Eskandarian, A., "Intelligent Transportation System Concepts, Architecture, and Implementation to Improve Traffic Flow and Safety," First Safety on the Road Conference, Session on Traffic Congestion, Traffic Flow, and Safety, Cairo, Egypt, Nov. 13-19, 2000.
77. Marzougui, D., Bahouth, G., Eskandarian, A., Meczowski, L., and Taylor, H., "Evaluation of Portable Concrete Barriers Using Finite Element Simulation," Transportation Research Board Annual Meeting, Computer Simulation of Impact with Roadside Safety Features, Jan. 2000.
78. Eskandarian, A. (Invited Speaker), Marzougui, D., and Bahouth, G., "Issues in Simulation and Modeling of Vehicle Crashes," Society of Plastic Engineers First Annual International Automotive Safety Conference, Troy, MI., Feb. 7, 2000.
79. Eskandarian, A. (Invited Speaker), "Simulation of Rollover," University of North Carolina Transportation Research Center, FHWA Workshop/meeting on Rollover, Feb. 2000.
80. Eskandarian, A., "ITS Research at Center for Intelligent Systems Research at GW-TRI," GW Virginia Campus, Technology Expo. 2000, Apr. 26, 2000.
81. Eskandarian, A. "George Washington Transportation Research Institute and Academic Programs," Ansaldo Brada Company, Naples, Italy, Oct. 1999.
82. Eskandarian, A., "Vehicle Crashworthiness and Occupant Protection at the FHWA/NHTSA National Crash Analysis Center," Presented at The George Washington University Research Showcase, Jan. 26, 1999, Washington, D.C.
83. Eskandarian, A., "FHWA/NHTSA National Crash Analysis Center," US DOT Safety Integration Conference, Presented at FHWA, Turner Fairbank Highway Research Center, McLean, VA, March 22-26, 1999.
84. Tignor, S., Sobhi, N., Worhiedi, K., and Eskandarian, A., "Human Factor Study of Traffic Control in Construction and Maintenance Zones" Presented at Transportation Research Board 3D Visualization in Transportation Symposium and Workshop, Orlando, Florida, May 26-29, 1999.
85. Eskandarian, A., Invited Speaker, and panelist, "Safety Planning, Data and Technology," US Department of Transportation TEA21 Listening Session on Surface Transportation Safety, George Mason University, Johnson Center, Fairfax, VA, Sep. 18, 1998.
86. Eskandarian, A. and Marzougui, D., "Validation of Portable Concrete Barriers Model," Presented at the Workshop on Crashworthiness in the 21st Century, Sponsored by TRB Committee A204—Roadside Safety Features, National Cooperative Highway Research Program of TRB of NRC, and US DOT FHWA, Seattle, WA, Aug. 2-5, 1998.
87. Meczowski, L., Kan, C.D., Bedewi, N.E., and Eskandarian, A., "Validation Procedure of Finite Element Models Used for Simulation in Crash Impact Applications," Presented at Transportation Research Board 77th Annual Meeting, Washington, D.C., January 11-15, 1998.
88. Eskandarian, A., "A Collision Avoidance Method Using Neural Networks," Presented at The George Washington University, School of Engineering and Applied Science Research Showcase, Washington, D.C., March 3, 1997.
89. Eskandarian, A., (Invited Speaker), "Intelligent Transportation Systems," Washington Society of Engineers (WSE), Washington, D.C., Oct. 1996.
90. Eskandarian, A., Opening Speaker, Application of Neural Networks in Highway and Vehicle Engineering, sponsored conference by FHWA and GWU, Ashburn, Virginia, Apr. 1996.
91. Eskandarian, A., (Invited Speaker), "Application of Intelligent Systems -- Neural Networks, Fuzzy Logic to Highway Transportation," Federal Highway Administration, Turner Fairbank Highway Research Center, Mclean, Virginia, Apr. 1996.
92. Eskandarian, A., (Invited Speaker), "Application of Neural Networks for Driving Model and Driver Behavior Analysis," Federal Highway Administration, Turner Fairbank Highway Research Center, Office of Safety and Traffic Operations R&D, Mclean, Virginia, Feb. 1996.

93. Bedewi, N.E., C.D. Kan, A. Eskandarian, H. Schinke, D. Marzougui, and B. Zaouk, "Development of a Finite Element Model of a Chevy Pick-up Truck," Presented at the Transportation Research Board (TRB) Annual Meeting/Conference, Session on Computer Simulation of Impacts with Roadside Safety Features, Washington, D.C., Jan 1996.
94. Eskandarian, A., Marzougui, D., Gaith, A. and Bedewi, N.E., "Computer Simulation of Roadside Hardware Using LS-DYNA3D," Presented at the International IEMS Conference, Coco Beach, FL, Mar. 13-15, 1995.
95. Meczkowski, L., Bedewi, N.E., and Eskandarian, A. "Overview of On-Going Crash Simulation at The National Crash Analysis Center," Presented at the International IEMS Conference, Coco Beach, FL, Mar. 13-15, 1995.
96. Eskandarian, A., Marzougui, D. and Bedewi, N.E., "Material Characterization and Modeling for Failure Analysis of Small Sign Support Systems," Presented at the Transportation Research Board (TRB) Annual Meeting/Conference, Session on Computer Simulation of Impacts with Roadside Safety Features, Washington, D.C., Jan 1995.
97. Eskandarian, A., Marzougui, D., Gaith, A. and Bedewi, N.E., "Impact Simulation of Slip Base Mechanisms Using DYNA3D," Presented at the Transportation Research Board (TRB) Annual Meeting/Conference, Session on Computer Simulation of Impacts with Roadside Safety Features, Washington, D.C., Jan 1995.
98. Eskandarian, A., (Invited Speaker), "Intelligent Transportation Systems and Automated Highway Systems with a Safety Perspective," Colonial Boards Lecture Series Distinguished Speaker, GWU, VA Campus, 1994.
99. Eskandarian, A., Marzougui, D. and Bedewi, N.E., "Finite Element Impact Modeling of Highway Narrow Objects," Presented at the Transportation Research Board (TRB) Annual Meeting/Conference, Session on Computer Simulation of Impacts with Roadside Safety Features, Washington, D.C., Jan 11, 1994.
100. Eskandarian, A., and Bedewi, N.E., "National Crash Analysis Center and Safety Simulation Research," Presented at the Transportation Research Board (TRB) Annual Meeting/Conference, A2A04(1) Subcommittee on Computer Simulation, Washington, D.C., Jan 10, 1994.
101. Eskandarian, A., and Bedewi, N.E., "Research and Resources at the FHWA/NHTSA National Crash Analysis Center," Presented at the Transportation Research Board (TRB) Annual Meeting/Conference, A2A04 Committee on Roadside Safety Features, Washington, D.C., Jan 11, 1994.
102. Eskandarian, A., and Bedewi, N.E., "Progress on Finite Element Modeling of 4 Lb./Ft. U-Channel Post Sign Support Systems," Presented at the Transportation Research Board (TRB) A2A04 (1) Subcommittee Meeting on Computer Simulation, Washington, D.C., Oct. 14, 1993.
103. Eskandarian, A., and Bedewi, N.E., "Simulation and Modeling Research and Activities at the NCAC," Presented at the Transportation Research Board (TRB) A2A04(1) Subcommittee Meeting on Computer Simulation, Washington, D.C., July 20, 1993.
104. Eskandarian, A., and Bedewi, N.E., "Artificial Neural Networks and Applications," seminar series at the Department of Transportation, Federal Highway Administration, 1993-1994.

Technical Reports

Over 37 authored and co-authored research, analysis, design, and development technical reports.

Personal Data

Citizenship: USA

Primary Personal Activities and Hobbies: Family activities, community/charity services, playing and teaching classical music, readings in poetry and philosophy, among others, and sports: Swimming, amateur soccer leagues; past Martial Arts training and instructor; black belt in Tae Kwon Do; and physical training.