



JAMES V. CARNAHAN, PH.D., P.E.

Ph.D. in Engineering Sciences

CURRENT EMPLOYMENT

Ruhl Forensic, Inc., since 1990.

Staff engineer performing forensic investigation of machine, job site/workplace, and vehicular accidents, as well as structural and mechanical failures. Retained consultant.

University of Illinois, Champaign-Urbana, Illinois, since 1983.

Adjunct Professor (10%) Department of Industrial and Enterprise Systems Engineering (formerly Department of General Engineering)	December 2004 – present
Lecturer and Adjunct Professor (50%) Department of General Engineering	August 2001 – November 2004
Coordinator of Project Design Activity (100%) Department of General Engineering	June 1993 – May 2001
Visiting Assistant Dean (50%) College of Engineering	August 1992- June 1993
Visiting Assistant Professor (50%) Department of General Engineering	August 1992 – June 1993
Visiting Assistant Professor (100%) Department of General Engineering	August 1990 – August 1992
Assistant Professor (100%) Department of General Engineering	August 1983- August 1990

Consultant

The Petran Group, Champaign, IL – reliability studies

FONA International, Geneva, IL – optimization of flavor manufacturing

PREVIOUS EMPLOYMENT

Carnahan Engineering and Surveying, Providence, Kentucky, 1979-1983

Ruhl Forensic, Inc .
1210 Lancaster Drive
Champaign, IL 61821-7028

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Principal professional in private practice of civil engineering and land surveying and was involved with every phase of the operation including client contact, project analysis, field data collection and reduction, final design, report preparation and presentation. Areas of practice included sanitary sewer design and construction supervision, surface mine planning, drainage and sediment control, hydrology, storage of waste, boundary surveying, analysis of property descriptions and developing topographic site depictions for housing projects.

General Motors Research Laboratories, Warren, Michigan, 1973-1979

Associate Senior Research Engineer. Transportation and Urban Analysis Department. Leader and principal investigator for research project which explored the relationship between vehicle size and accident frequency and injury probability. Evaluated car size with respect to other factors, which influence safety. Responded to requests from General Motors staffs (Engineering Staff, Environmental Staff, Legal Staff) for short-term studies of car safety. Participated in development and evaluation of macroscopic traffic flow models for urban areas; studied influences of changes in vehicles, road network and demand. Analyzed reliability and safety of a system of automated vehicles traveling at high speed and traffic density on a dedicated guide-way. Responsibilities included planning and conducting research, coordinating the research of others, and reporting the results by means of internal reports and presentations through the vice-presidential level. Participated in departmental budgeting, staff recruitment and annual report preparation.

Purdue University, West Lafayette, Indiana, 1968-1973

NDEA Fellow / Research Assistant. Department of Aeronautics, Astronautics and Engineering Sciences. Research for dissertation focused on the flow of pedestrian in a walkway. Developed analytical models for free flow and developed and validated a simulation model for congested flow. Collected data and modeled the disembarking process of airline passengers; studied the implications for facility design. Investigated the modal properties of a cantilever beam with an elastic support, comparing theoretical and experimental results. Authored a computer program to facilitate the analysis of housing data for the Lafayette Area Planning Commission.

Naval Avionics Facility, Indianapolis, Indiana, 1969

Research Engineer. Analyzed a terrain contour matching system used to update an airborne inertial navigation system; this system was the precursor for the navigation system in the cruise missile. Studied sources of error and means for propagation to obtain probabilistic statement of eventual position uncertainty. Security clearance obtained.

EDUCATION

Ph.D. 1973:	Purdue University
Major Field:	Engineering Sciences
M.S., 1970:	Purdue University
Major Field:	Engineering Sciences
B.S., 1968:	Purdue University (graduated with distinction)
Major Field:	Engineering Sciences

AWARDS

Engineering Council (Accenture) Award for Excellence in Advising, University of Illinois College of Engineering 2001, 2002
Anderson Consulting Award for Excellence in Advising, University of Illinois College of Engineering 1990, 1991, 1992, 1993, 1999, 2000
Department of General Engineering Outstanding Professor 1986, 1991, 2003
Finalist in Competition for Urbana-Champaign Campus award for Excellence in Undergraduate Teaching, 1990
Everitt Award for Undergraduate Engineering Teaching Excellence, 1989
(College of Engineering award, elected by engineering student societies)
Department of General Engineering, Outstanding Professor, 1986
(Elected by Gamma Epsilon, the department honorary society)

PROFESSIONAL CERTIFICATION

Professional Engineer, Illinois, Indiana, Michigan

PROFESSIONAL ASSOCIATIONS

National Society for Engineering Education (NSEE)
American Society for Civil Engineering (ASCE)
American Society for Quality Control (ASQC)

PRESENTATIONS

“How Well Can the Average Person and Police Estimate Distance Along a Roadway?”
Publication 12-01/2010. European Accident Reconstruction Group Conference, Wildhaus, Switzerland, June 25, 2010. Strauss, Mark G. and James V. Carnahan,

“The Ability of People to Estimate Distances Along a Roadway and How Their Education, Hobbies and Occupation Affect Accuracy.” Publication F2010-D-043. FISITA World Automotive Congress Proceedings, Budapest, Hungary, June 1, 2010. Strauss, Mark G. and James V. Carnahan,

“Observed Errors in Distance Estimates.” SAE Paper 2010-01-0046. SAE World Congress, Detroit, MI. 13 April, 2010. Strauss, Mark G. and, James V. Carnahan.

“The Experimental Study of the Air Flow Produced by Road Vehicles and its Potential Destabilizing Effect on Nearby Pedestrians.” SAE 2007 World Congress, Detroit, MI. 17 April 2007. Strauss, M.G., L.V. Inendino and J.V. Carnahan.

“Analysis Of A Common Cause Hypothesis In A Forensic Product Defect Analysis.” 2004 International Mechanical Engineering Congress RD&D Expo, Anaheim, CA, November 16, 2004. Carnahan, James V., Ruhl, Roland L., Strauss, Mark G., and Genson, Laura R.

"Factors Affecting the Friction Coefficients Between Wooden and Plastic Pallets and the Wooden Floor of a Van-Type Semi-trailer." SAE International Truck and Bus Meeting and Exhibition, Detroit, MI, November, 2002. Strauss, M.G., Carnahan, J.V., Inendino, L.V., Jayswal, R., Senalik, C.A., Southcombe, E.J.

"Experimental Study of Effects of Distance, Slope and Break on Putting Performance for Active Golfers." World Scientific Congress of Golf IV, St. Andrews, Scotland, July 22-26, 2002. Carnahan, J.V.

"The Relative Contribution of Department Ranking to College Ranking in Engineering Graduate Program Rankings Conducted By U.S. News and World Report." Proceedings of the 2002 American Society for Engineering Education Annual Conference & Exposition, Montreal, Canada, June, 2002.

"Factors Affecting the Friction Coefficients Between Wooden Pallets and the Wooden Floor of a Van-Type Semi-Trailer." SAE International Truck and Bus Meeting and Exhibition, Chicago, IL, November, 2001. Strauss, M.G., Carnahan, J.V., Inendino, L.V.

"Experiences with an Industrially Sponsored Undergraduate Project Course," *Proceedings of the 1992 Frontiers in Education Conference*, sponsored by IEEE and ASEE, Nashville, TN, November, 1992. Carnahan, J.V., Thurston, D.L., and Ruhl, R.L.

"Optimization of Design Utility," *Proceedings of the ASME Conference on Design Theory and Methodology (DTM'91)*, Miami, FL, September 22-25, 1991. Thurston, D L., Carnahan, J.V., and Liu, T.

"Experiences with Non-cemented Total Hip Replacements - Screw-In-Rings," *56th Annual Meeting of the American Academy of Orthopaedic Surgeons*, Las Vegas, Nevada, February 9-14, 1989, W. Capello, R. Colyer, C. Kernek, J. V. Carnahan, and L. Hile.

"Does PERT Need the Beta Assumption?" *ORSA/TIMS Joint National Meeting*, Denver, Colorado, October 23-26, 1988, p. 128, J. V. Carnahan.

"Beta Distribution Tails via Maximum Likelihood," *TIMS/ORSA Joint National Meeting*, Washington, DC, April, 25-27, 1988, p. 269, J. V. Carnahan.

"Parameter Estimation for the Beta Distribution," *ORSA/TIMS Joint National Meeting*, St. Louis, Missouri, October 25-28, 1987, p. 237, J. V. Carnahan.

"Optimizing Decisions for Pavement Maintenance," *TIMS/ORSA Joint National Meeting*, New Orleans, Louisiana, May 4-6, 1987, p. 195, J. V. Carnahan and W. J. Davis.

PUBLICATIONS

"The Ability of People to Estimate Distances Along a Roadway and How Their Education, Hobbies and Occupation Affect Accuracy." Publication F2010-D-043. FISITA World Automotive Congress Proceedings, Budapest, Hungary, 2010. Strauss, Mark G. and James V. Carnahan.

“How Well Can the Average Person and Police Estimate Distance Along a Roadway?”
Publication 12-01/2010. Accident Reconstruction Group Conference, Wildhaus, Switzerland,
2010. Strauss, Mark G. and James V. Carnahan.

“Observed Errors in Distance Estimates.” SAE Paper 2010-01-0046. SAE World Congress,
Detroit, MI, 13 April, 2010. Also published in Accident Reconstruction 2010, SAE SP2267.
Strauss, Mark G. and James V. Carnahan.

“The Experimental Study of the Air Flow Produced by Road Vehicles and its Potential
Destabilizing Effect on Nearby Pedestrians.” SAE paper 2007-01-0758. Strauss, Mark G.,
Inendino, Louis V. and Carnahan, James V. Also published in Pedestrian Safety, SAE SP-
2114.

“Analysis Of A Common Cause Hypothesis In A Forensic Product Defect Analysis.”
IMECE2004-59566, Proceedings of the 2004 International Mechanical Engineering Congress
and RD&D Expo, Anaheim, CA, November 13-19, 2004. Carnahan, James V., Ruhl, Roland
L., Strauss, Mark G., and Genson, Laura R.

“Factors Affecting the Friction Coefficients Between Wooden and Plastic Pallets and the
Wooden Floor of a Van-Type Semi-trailer.” SAE Paper 2002-01-3104, Detroit, MI, 2002.
Strauss, M.G., Carnahan, J.V., Inendino, L.V., Jayswal, R., Senalik, C.A., Southcombe, E.J.
Also published in SAE Transactions – Journal of Commercial Vehicles.

“Factors Affecting the Friction Coefficients Between Wooden Pallets and the Wooden Floor of
a Van-Type Semi-Trailer.” SAE Paper 2001-01-2755, Chicago, IL, 2001. Strauss, M.G.,
Carnahan, J.V., Inendino, L.V. Also published in SAE Transactions – Journal of Commercial
Vehicles, 110:2, 340-345 (2001)

Articles Published in Journals:

“Distance Estimation Error in a Roadway Setting.” The Police Journal 82(3):247-264, 2009.
Strauss, Mark G. and James V. Carnahan.

“The Relative Contribution of Department Ranking to College Ranking in Engineering
Graduate Program Rankings Conducted By U.S. News and World Report.” ASSE J. of
Engineering Education, 92:1, 65-72, 2003. Vojak, B.A., Price, R.L., and Carnahan, J.V.

“Machining Quality and Costs,” *ASME Journal of Manufacturing Science and Engineering*,
124:4, 840-851, 2002, P. Nicolaou, D. L. Thurston, J. V. Carnahan.

“Pollution prevention at Armstrong World Industries,” *Environmentally Conscious Design and
Manufacturing*, Vol. 8, No. 4, 1999, D. L. Thurston and J. V. Carnahan.

“Comparison of Failure Rates in Conduits for Underground Heat Distribution,” *ASCE Journal of
Transportation Engineering*, Vol. 124, No. 6, pp 589-593, 1998, J. V. Carnahan and C. Marsh.

“Comparative Life-Cycle Cost Analysis of Underground Heat Distribution System,” *ASCE
Journal of Transportation Engineering*, Vol. 124, No. 6, pp 594-605, 1998, C. Marsh and J. V.
Carnahan.

"Trade-off Modeling for Product and manufacturing Process Design for the Environment," *Journal of Industrial Ecology*, Vol. 2, No.1, pp. 79-91, 1998, J. V. Carnahan and D. Thurston

"Optimization of Design Utility," *ASME Journal of Mechanical Design*, Vol. 116, No. 3, pp. 801-808, 1994, Thurston, D. L., Carnahan, J.V., and Liu, T.

"Fuzzy Ratings for Multiattribute Design Decision-Making," *ASME Journal of Mechanical Design*, Vol. 116, No. 2, June 1994. Carnahan, J.V., Thurston, D.L., and Liu, T.

"Incorporating End-Users' Attitudes Towards Uncertainty into an Expert System," *ASME Journal of Mechanical Design*, Vol. 116. No. 2, pp. 511-512, 1994, Tian, Y.Q., Thurston, D.L., and Carnahan, J.V.

"Failure of the Mecron Screw-in Ring," *Journal of Bone and Joint Surgery*, Vol. 75, No. 1, pp. 485-86, 1993, W. Capello, R. Colyer, C. Kernek, J. V. Carnahan.

"Fuzzy Ratings and Utility Analysis in Preliminary Evaluation of Multiple Attributes," *ASME Journal of Mechanical Design*, Vol. 114, No. 4, pp. 648-658, 1992, D. L. Thurston, J. V. Carnahan.

"Intelligent Evaluation of Design for Manufacturing Cost," a chapter in *Concurrent Engineering: Automation, Tools and Techniques*, Andrew Kusiak , Ed., John Wiley and Sons, 1992, D.L. Thurston, J. V. Carnahan.

"Determining Gathering Belt Capacities for Bulk Conveyor Networks with Multiple Discrete Loading Sources," *Engineering Costs and Production Economics*, Vol. 22, No. 1, pp. 81-91, 1991, S. D. Thompson, J. V. Carnahan, P. Webster.

"Design Methods for Sizing Segregation Bins in Bulk Conveyor Systems with Multiple Discrete Loading Sources," *Engineering Costs and Production Economics*, Vol. 21, No. 1, pp. 69-80, 1990, J.V. Carnahan, S. D. Thompson, P. Webster.

"Cost Analysis of Leak Location and Repair in Underground Heat Distribution Systems," *ASCE Journal of Transportation Engineering*, Vol. 117, No. 3, 1991, pp. 265 - 280, J.V. Carnahan, K. Miller, and E. Segan.

"Maximum Likelihood Estimation for the Four-Parameter Beta Distribution," *Communications in Statistics - Simulation and Computation*, Vol. 8, No. 2, 1989, pp. 513-536, J. V. Carnahan.

"Nondestructive Evaluation and Characterization of Adhesive Bonded Connections in Wood Structures," *Nondestructive Testing and Evaluation for Manufacturing and Construction*, Hemisphere Publishing Corp., New York, New York, pp. 197- 207, 1989, H. Reis, F. Beall, J. V. Carnahan, M. Chica, K. Miller, and V. Klick.

"A Bayesian Approach for Analyzing the Results of Vehicle Collision Tests," *Decision Sciences*, Vol. 20, No. 4, 1989, pp.746-758, J. V. Carnahan and K. S. Krishnan.

"Analytical Framework for Optimizing Pavement Maintenance," *ASCE Journal of Transportation Engineering*, Vol. 114, No. 3, May 1988, pp. 307-322, J. V. Carnahan.

"A Simulation Approach to Evaluating Pier Arm Width," *Proceedings of the Eighth Annual Pedestrian Conference*, Boulder, Colorado, Oct. 1987, pp. 223-232, J. V. Carnahan.

"Optimal Maintenance Decisions for Pavement Management," *ASCE Journal of Transportation Engineering*, Vol. 113, No. 5, Sept. 1987, pp. 554-572, J. V. Carnahan, W. J. Davis, M. Y. Shahin, P. Keane and M. Wu.

"Decision Support for Road Surface Maintenance," *OMEGA: The International Journal of Management Science*, Vol. 15, No. 4, 1987, pp. 313-322, W. J. Davis and J. V. Carnahan.

"Analysis of the Effect of Car Size on Accident Injury Probability Using Automobile Insurance Data," *Accident Analysis and Prevention*, Vol. 17, No. 2, April 1985, pp. 171-177, K. S. Krishnan and J. V. Carnahan.

"An Injury Threshold Model for Two-Car Collisions," *Management Science*, Vol. 29, No. 8, Aug. 1983, pp. 909-926, K. S. Krishnan, J. V. Carnahan, and M. J. Beckmann.

Reports:

"Life Cycle Cost Analysis for Underground Heat Distribution Systems," Report to U. S. Army Construction Engineering Research Laboratory, December 1991, J.V. Carnahan.

"Methodology to Forecast Demand in Heat Distribution Systems," Report to U. S. Army Construction Engineering Research Laboratory, October 1989, J.V. Carnahan.

"Optimal Maintenance Decisions for Pavement Management," Report to U.S. Army Construction Engineering Research Laboratory, Champaign, Illinois, January, 1986, P. Keane, M. I. Wu, J.V. Carnahan, and W. J. Davis.

Reports written while employed at General Motors Research Labs, Warren, Michigan, 1973-1979:

"Estimates of Traffic Fatalities for the Years 1980 through 1995," (with K.S.Krishnan), January 21, 1980.

"Youthful Driving and Its Effect on Small Car Accident Rates," April 27, 1979.

"A Statistical Approach for Analyzing Test Results for a Vehicle Design," (with K. S. Krishnan), February 28, 1979.

"Analysis of the Effect of Car Size on Accident Injury Probability Using Automobile Insurance Data," (with K. S. Krishnan), February 22, 1979.

"An Injury Threshold Model for Two-Car Collisions," (with K. S. Krishnan and M. J. Beckman), February 8, 1979.

"Interpretation of Observed Accident Rate Variations with Car Weight," May 23, 1978.

"An Analysis of the Relationship between Car Size and Accident Frequency," February 10, 1978.

"An Analysis of the Relationship between Car Weight on Accident Frequency Using New York State Accident Data," (with K. S. Krishnan), November 16, 1977.

"Detection of Significant Changes in the Auto Fatality Toll Using Box-Jenkins Methods," (with D. H. Nash), June 17, 1977.

"An Approach to Estimating Injury Risk in Urban Versus Rural Travel," April 8, 1977.

"Analysis of Urban Traffic Congestion Using a Time Dependent Macroscopic Model," (with T. M. Karier and R. L. Tobin), October 20, 1976.

"A Dynamic Macroscopic Traffic Flow Model," (with R. L. Tobin), September 17, 1976.

"Analysis of Peak Hour Travel in Detroit Central Business District Using Macroscopic Traffic Flow Models," (with R. L. Tobin), September 7, 1976.

"Macroscopic Models of Urban Traffic on Heterogeneous Road Types with Comparison to Equilibrium Traffic Assignment," (with R. L. Tobin), August 26, 1976.

"A Model for Collision Likelihood on an Automated Guideway," May 9, 1975.

"Effects of Vehicle Size on Safety," March 17, 1975.

"Capacity and Safety Considerations for Automated Automobile Systems," (with R. L. Tobin and P. G. Smith), December 5, 1974.

GRANTS AND CONTRACTS ADMINISTERED

Department of General Engineering Industrially Sponsored Project Course, 1992- 2001, secured 299 projects resulting in \$1,986,000 in support from industry.

"Utility Tradeoffs and Statistical Analysis for Pollution Prevention," National Science Foundation, August 1996-August 1999, (with D. L. Thurston).

"Product and Process Design Tradeoffs for Pollution Prevention," Hazardous Waste Research and Information Center, January 1995-August 1996 (with D. L. Thurston).

"Underground Heat Distribution Leak Location and Repair," U.S. Army Construction Engineering Research Laboratory, May 1991-August 1991.

"Design Methodology for Pedestrian Walkways," University of Illinois Campus Research Board, January 1990-August 1990.

"Steam Plant Load Forecasting," U.S. Army Construction Engineering Research Laboratory, October 1988-September 1989.

"Steam Leak Location and Repair," U.S. Army Construction Engineering Research laboratory, October 1988-December 1988.

“An Integrated Decision-Making Methodology for Pavement Maintenance Strategies,” U. S. Army Construction Engineering Research Laboratory, January 1985-August 1985, (with W. J. Davis).

M.S. STUDENTS ADVISED

Danny Navarette, “Experimental Design and Response Surface Studies for Thermoforming Processes and Environmental Remediation Systems”, 2003

William J. Deligiannis, “An Analysis of the Effectiveness of Training Programs for Truck Drivers,” 1997.

Christopher F. Carson, “Modeling Airborne Emissions for Environmentally Conscious Decision-Making,” 1996, (co-advised with D. L. Thurston).

Tim L. Stuart, “A Simulation/Genetic Algorithm Approach to Replace PERT/CPM,” 1992.

Richard F. Sesek, “Design Methods Using Pedestrian Flow Simulation Implemented on a Microcomputer,” 1990.

Ethan T. Franklin, “Numerical Analysis of Parameter Estimation Schemes for the Beta Distribution,” 1990.

John A. Shonder, “Optimal pressure Control of a Branch of a District Steam System, “1988.

William J. Lenzi, “A Methodology for Determining Optimal Pavement Maintenance Strategies Subject to Budgetary Constraints,” 1986.

Paul L. Keane and Marion Wu, “An Integrated Decision-making Methodology for Optimal Pavement Maintenance,” 1985 (co-advised with W. J. Davis).

Susan Bowen, “A Simulation Study of Inventory Policies for the Manufacturing of Engines,” 1985, (co-advised with W. J. Davis).

Oscar Adrianzen, “Inventory Control for a High Volume Production Line with Lead Time Uncertainty,” 1984.

INDIVIDUALLY ADVISED UNDERGRADUATE PROJECTS

Improvement of Debris/Flash Cleaning System, Culligan International, 1998.

Dishwasher Dry Sensing System, General Electric Appliances, 1997.

Remediation of a Delamination Problem, Lindgren RF Enclosures, 1997.

Redesign of a Marine Sanitation System, Envirovac, Inc., 1997.

Feasibility of Glueless Packaging, Anheuser-Busch, 1996.

Design of Remote Oil Sump System, Cummins Engine Company, 1995.

Process Monitoring in Cold Heading, Elco Industries, Inc., 1995.

Design of a Coolant Filter Valve, Cummins Engine Company, 1994.

Inventory Reduction Feasibility, Sanford Corporation, 1994.
Uniform Finishing Standards for Low Carbon Steel Balls, Frantz/Sterling Steel Ball Division, 1994.
Building Maintenance Simulation, U.S. Army Construction Engineering Research Laboratory, 1993.
Microcomputer Implementation of a Life Cycle Cost Model for Underground Heat Distribution Systems, U.S. Army Construction Engineering Research Laboratory, 1992.
Exploration of Commercial Uses for Fluidized Bed Fly Ash, Archer Daniels Midland, 1991.
Device to Measure Quench Severity, Rock Island Arsenal, 1990.
Material Choice for a Metal Forming Problem, Frantz Manufacturing Company, 1990.
Analysis of Imbalance in a Clothes Washer, General Electric Corporation, 1989.
Analysis of Saturday Bus Routes, Champaign-Urbana Mass Transit District, 1988.
Physical Properties of Chewing Gum, Warner/Lambert, 1987.
An Experimental Configuration to Determine Refrigerator/Freezer Gasket Thermal Conductivity, Admiral Division of Magic Chef, Inc., 1986.
A Mathematical Model to Predict Heating Coil Temperature in a Clothes Dryer, General Electric Corporation, 1985.
The Determination of a Feasible Nitrous Oxide Sensor, Eaton Corporation, 1985.
Bulb Thermostat Modifications to Improve Ambient Temperature Compensation, Barber-Colman Company, 1984.
Specific Heat Properties of Production Glass, Owens-Illinois, 1984.

RECENT ACADEMIC, PROFESSIONAL AND PUBLIC SERVICE

Reviewer for:

Accident Analysis and Prevention
ASCE Journal of Transportation Engineering
European Journal of Operational Research
Transportation Research

Reviewer for proposals for:

National Science Foundation
University of Illinois Research Board

SERVICE

Consultant for U.S. Army Corps of Engineers Construction Engineering Research Laboratory, Champaign, Illinois.
Statistical consultant for several research projects in the Department of Orthopaedic Surgery, Indiana University Medical Center, Indianapolis, Indiana.
Supervisor for project to analyze Saturday bus rider ship for Champaign-Urbana Mass Transit District, Urbana Illinois.

AREAS OF RESEARCH INTEREST

Applied statistics, reliability, random processes