

Dr. Michael M. Stanisic

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Education

B.S.M.E. 1980, M.S.M.E. 1982, Ph.D. 1986, - Purdue University.

Continuing Education

NSF Workshop, Computer Graphics in Undergraduate Education,
Clemson University, 1989.

Professional Experience

1993-pres. Associate Professor, AME Dept., Notre Dame.
1988-1993 Assistant Professor, AME Dept., Notre Dame.
1986-1988 Assistant Professor, ME Dept, Univ. of Illinois at Chicago.
1980-1986 Teaching Assistant, School of ME, Purdue University.

Recognition by Peers

7/04 Session Chair, Methods in Kinematics,
9th Intl. Meeting of *Advances in Robot Kinematics*, Genoa.
3/04 External Member of Ph.D. Examination Committee of Philip Vogelwede,
Woodruff School of Mechanical Engineering, Georgia Tech.
9/03 Paper Review Coordinator, Robotics,
2004 ASME 28th *Biennial Mechanisms Conference*, Salt Lake City.
1/03 Paper Review Coordinator, Mechanisms and Robotics Symposiums,
2003 ASME *Design Automation Conference*, Chicago.
9/02 Paper Review Coordinator, Robot Mechanics Symposium,
2002 ASME 27th *Biennial Mechanisms Conference*, Montreal.
7/02 Session Chair, Redundancy, Singularity and Self-Motion,
8th Intl. Meeting of *Advances in Robot Kinematics*, Barcelona.
10/00 Session Organizer and Chairman, Challenges of Developing Hardware
in an Academic Environment, *CRCD Conference*, NSF, Arlington.
5/00 Session Chair, Parallel Mechanisms and Screw Algebra,
7th Intl. Meeting of *Advances in Robot Kinematics*, Piran.
1/00 Conference Co-Chairman, 7th Intl. Meeting of *Advances
in Robot Kinematics*.
1/00 Paper Review Coordinator, Kinematic Theory and Spatial Linkages
Symposium, 2000 ASME 26th *Biennial Mechanisms Conference*, Baltimore.

- 9/98 Elected to the Mechanisms Committee of ASME.
- 7/98 Review Panel Member, Combined Research and Curriculum Development Program, National Science Foundation, Arlington.
- 8/96 Session Chair, Parallel Mechanisms I, 5th Intl. Meeting of *Advances in Robot Kinematics*, Piran.
- 8/94 Session Chair, Kinematic Performance, 4th Intl. Meeting of *Advances in Robot Kinematics*, Ljubljana.
- 9/92 Keynote Speaker, 3rd Intl. Meeting of *Advances in Robot Kinematics*, Ferrara.
- 9/92 Session Chair, Motion Planing I, 3rd Intl. Meeting of *Advances in Robot Kinematics*, Ferrara.
- 9/92 Session Chair, General Robotics I, 1992 ASME 22nd *Biennial Mechanisms Conference*, Scottsdale.
- 9/92 Session Chair, Mechanism Synthesis V, 1992 ASME 22nd *Biennial Mechanisms Conference*, Scottsdale.
- 9/90 Session Chair, Kinematically Redundant Manipulators, 2nd Intl. Meeting of *Advances in Robot Kinematics*, Linz.
- 6/90 Review Panel Member, Engineering Research Equipment Grants, NSF, Dynamic Systems and Controls Program.
- 11/89 Session Chair, Robot Dynamics II, 1st Intl. Conference on *Applied Mechanisms and Robotics*, Cincinnati.
- 3/89 Summer Faculty Research Fellow, AFOSR.
- 9/88 Session Chair, New Methods in Robot Kinematics, 1st Intl. Meeting of *Advances in Robot Kinematics*, Ljubljana.
- 9/88 Appointed to the International Scientific Committee for *Advances in Robot Kinematics*, Ljubljana.
- 9/88 Invited Speaker, 1st Intl. Meeting of *Advances in Robot Kinematics*, Ljubljana.

Undergraduate Mentoring Achievements

- 9/02 Faculty Advisor to E. Schearer (Class of '02), First Prize, *ASME Student Mechanism Design Competition*, Montreal.
- 5/99 *Academic Club Advisor of the Year*, Notre Dame.
- 5/98 Faculty Advisor to J. Wiitala, J. Schmiedeler and B. Rister (Class of '96), First Prize, *ASME Old Guard Design Competition*.
- 4/98 Nominated by ME Class of '98 for the *Senior Fellow Award*, Notre Dame
- 9/94 Faculty Advisor to M. Caradonna (Class of '95), First Prize, *ASME Student Mechanism Design Competition*, Minneapolis.
- 4/94 Faculty Advisor to K. Etzel (Class of '94), National Winner, *BFGoodrich Collegiate Inventors Award*, Akron.
- 4/93 Nominated for the *Minority Engineering Program Outstanding Faculty Award*, Notre Dame.

Recognitions of Teaching

- 4/03 *Ruth and Joel Spira Award for Excellence in Teaching*, Aerospace and Mechanical Engineering Dept., Notre Dame.
- 4/01 *Kaneb Teaching Award*, Notre Dame.
- 6/96 *Departmental Teaching Award*, AME Dept., Notre Dame.
- 5/95 *College of Engineering Outstanding Teacher of the Year*, Notre Dame.
- 4/91 *Departmental Teaching Award*, AME Dept., Notre Dame.
- 4/88 Finalist for the *Silver Circle Award for Excellence in Teaching* The University of Illinois at Chicago.

Professional Membership and Service

- 1986-pres. Associate Member, American Society of Mechanical Engineers
- 1998-2004 ASME Mechanisms Committee

University of Notre Dame Service

- 1989-1990 Minority Student Faculty Mentor
- 1989-1991 ASME Student Chapter Faculty Advisor
- 1994-2002 SAE Student Chapter and Mini-Baja Team Faculty Advisor

Research Funding

- \$5,000 Space Grant Fellowship, Indiana Space Grant Consortium, 5/03, PD/PI.
- \$5,000 NSF REU, 6/98, PD/PI.
- \$5,000 NSF REU, 6/99, PD/PI.
- \$400,464 Vision-Based Control of Dextrous Manipulators in High Precision Tasks, NSF, 7-15-97 to 7-15-2000, PD/PI
- \$500 Development of a Manipulator Arm, South Bend Police Dept., 10/92 to 10/93, PD/PI.
- \$69,993 The Kinematic Analysis and Preliminary Design of Singularity-Free Manipulation Systems, NSF, 6/90 to 11/92, PD/PI.
- \$20,000 Achieving Stable Grasps with the UTAH/MIT Dextrous Hand, Universal Energy Systems.
- \$ 9,158 The Kinematic Analysis of a New Type of Spherical Robot Arm, Jesse H. Jones Faculty Research Fund, Notre Dame Office of Research, 3/89 to 2/90, PD/PI.

Corporate Gifts

- \$185,000 Two GMF S-500 Six Axis Industrial Manipulators, IBM Corporation w/ T.J. Mueller
- \$80,000 Two Fanuc Model 1 Three Axis Industrial Manipulators, w/ S.B. Skaar and T.J. Mueller.
- \$50,000 Two Automatix Four Axis Industrial Manipulators, GM Delco-Remy.

Book

Advances in Robot Kinematics, eds. J. Lenarcic and M.M. Stanisic, Kluwer Academic Publishers, 2000.

Book Chapter

Stanisic, M.M. and Pennock, G.R., “Canonical Solutions to the Inverse Velocity and Acceleration Problems of a Planar Two-Link Open-Chain”, *The Kinematics of Robot Manipulators*, ed. J.M. McCarthy, pp. 80-89, MIT Press, 1987.

Manuscript in Review

C.M. Goehler and M.M. Stanisic, “Singular Planes of Manipulators”, submitted for review, *Mechanism and Machine Theory*.

Journal Publications

C.M. Goehler, M.M. Stanisic and V.M. Perez, “A Generalization of T_1 Motion Applied to the Synthesis of Planar Mechanisms”, *Mechanism and Machine Theory*, Vol. 39, No. 11. pp. 1223-1244, 2004.

Lenarcic, J. and Stanisic, M.M. “A Humanoid Shoulder Complex and the Humeral Pointing Kinematics”, *IEEE J. of Robotics and Automation*, Vol. 19, No. 3, pp. 499-506, 2003.

Stanisic, M.M., Wiitala, J.M. and Feix, J.T., “A Dexterous Humanoid Shoulder Mechanism”, *J. of Robotic Systems*, Vol. 18, No. 20, pp. 737-745, 2001.

Wiitala, J.M. and Stanisic, M.M., “Design of an Overconstrained and Dexterous Spherical Wrist”, *ASME J. of Mechanical Design*, Vol. 122, No. 1 pp. 347-353, 2000.

Lorenc, S.J., Stanisic, M.M., and Hall, A.S., “Application of Instantaneous Invariants to the Path Tracking Control Problem of Planar Two Degree-of-Freedom Systems: A Singularity-Free Mapping of Trajectory Geometry”, *Mechanism and Machine Theory*, Vol. 30, No. 6, pp. 883-896, 1995.

Di Caprio, F., and Stanisic, M.M., “The Kinematic Control Equations of a Singularity-Free Six Degree-of-Freedom Manipulator” ASME, *J. of Mechanical Design*, Vol. 116, No. 1, pp. 17-22, 1994.

Remis, S.J., and Stanisic, M.M., "Design of a Singularity-Free Articulated Arm-Subassembly", *IEEE J. of Robotics and Automation*, Vol. 9. No. 6, pp. 816-824, 1994.

Stanisic, M.M., Lodi, K., and Pennock, G.R., "The Application of Curvature Theory to the Trajectory Generation Problem of Robot Manipulators", *ASME, J. of Mechanical Design*, Vol. 114, No. 4, pp. 677-680, 1992.

Stanisic, M.M., and Gupta, K.C., "Closed Form Solutions to the Spherical Joint Attachment Problem", *ASME J. of Mechanical Design*, Vol. 114, No. 2, pp. 269-273, 1992.

Yan, J., Stanisic, M.M., and Beard, J., "An Improved Technique for Optimizing Attachments of Spherical Joints in Spatial Linkages", *Mechanism and Machine Theory*, Vol. 26, No. 3, pp. 741-750, 1991.

Stanisic, M.M., and Duta, O., "Symmetrically Actuated Double Pointing Systems - the Basis of Singularity-Free Robot Wrists", *IEEE J. of Robotics and Automation*, Vol. 6, No. 5, pp. 562-569, 1990.

Stanisic, M.M. and Mirusky, W.F., "Optimization of Spherical Joint Attachment in Spatial Linkages", *ASME J. of Mechanisms, Transmission and Automation in Design*, Vol. 110, No. 440-445, pp. 440-445, 1988.

Stanisic, M.M., "Coordinate Systems and the Inverse Velocity Problem of Manipulators with Spherical Wrists", *Intl. J. of Robotics Research*, Vol. 7, No. 2, pp. 62-64, 1988.

Stanisic, M.M., Pennock, G.R. and Krousgrill, C.M., "Canonical Solutions of the Inverse Velocity and Acceleration Problems of Serial Robot Arm Subassemblies Using the Canonical System", *Intl. J. of Robotics Research*, Vol. 7, No. 1, pp. 29-41, 1988.

Stanisic, M.M. and Pennock, G.R., "Canonical Solutions to the Inverse Velocity and Acceleration Problems of a Planar Two-Link Open-Chain", *Intl. J. of Robotics Research*, Vol. 5, No. 2, pp. 82-90, 1986.

Stanisic, M.M. and Pennock, G.R., "A Non-Degenerate Kinematic Solution of a Seven-Jointed Robot Manipulator", *Intl. J. of Robotics research*, Vol. 4, No. 2, pp. 10-20, 1985.

Conference/Symposium Papers

Goehler, C.M. and Stanistic, M.M., "Singular Planes of the Articulated Arm-Subassembly", 9th Intl. Meeting of *Advances in Robot Kinematics*, ed. J. Lenarcic and C. Galleti, pp. 275-282, Kluwer Academic Publishers, Genoa, July 2004.

Lenarcic, J., Stanistic, M.M. and Schearer, E., "Humanoid Humeral Pointing Kinematics", 8th Intl. Meeting of *Advances in Robot Kinematics*, ed. J. Lenarcic and F. Thomas, pp. 79-88, Kluwer Academic Publishers, Barcelona, July 2002.

Lenarcic, J., Stanistic, M.M. and Parenti-Castelli, V., "A Four Degree of Freedom Parallel Mechanism Simulating the Motion of the Human Sternum-Clavicle-Scapula Complex", 7th Intl. Meeting of *Advances in Robot Kinematics*, ed. J. Lenarcic and M.M. Stanistic, pp. 325-333, Kluwer Academic Publishers, Piran, July 2000.

Lenarcic, J., Stanistic, M.M. and Parenti-Castelli, V., "Kinematic Design of a Humanoid Shoulder Complex", *IEEE Intl. Conf. on Robotics and Automation*, pp. 27-32, San Fransisco, May 2000.

Wiitala, J.M. and Stanistic, M.M. "Kinematics of a Split-Equator Symmetrically Actuated Double Pointing System Used in a Robotic Wrist", 6th Intl. Meeting of *Advances in Robot Kinematics*, ed. J. Lenarcic and M. Husty, pp. 237-246, Kluwer Academic Publishers, Salzburg, July 1998.

Khanuja, S.S. and Stanistic, M.M., "Manipulators with Articulated Fixtures for Singularity Avoidance", 4th *National Applied Mechanisms and Robotics Conf.*, paper no. AMR 95-025-01, Cincinnati, Dec 1995.

Lorenc, S.J. and Stanistic, M.M., "Singularity Free Nature of Coordination", 24th *Midwestern Mechanics Conference*, pp. 355-357, Iowa State Univ., Oct., 1995.

Lorenc, S.J. and Stanistic, M.M. "A Second-Order, Geometry-Based, Path Tracking Control Industrial Manipulator Arm-Subassemblies", 23rd ASME *Biennial Mechanisms Conf.*, DE-Vol. 72, pp. 301-306, Minneapolis, Sept. 1994. Nesnas, I.A.D. and Stanistic, M.M. "Robotic Software Development Using Object-Oriented Design", 1994 ASME *Design Automation Conf.*, DE-Vol. 69-1, pp. 83-92, Minneapolis, Sept. 1994.

Lorenc, S.J. and Stanistic, M.M. "Third-Order Control of a Planar System Tracking Constant Curvature Paths", 4th Intl. Meeting of *Advances in Robot Kinematics*, ed. J. Lenarcic and B. Ravani, pp. 229-238, Kluwer Academic Publishers, Ljubljana,

July 1994.

Remis, S.J. and Stanasic, M.M. "A Comparison of Two Minimally Singular Articulated Arm-Subassemblies", 4th Intl. Meeting of *Advances in Robot Kinematics*, ed. J. Lenarcic and B. Ravani, pp. 351-358, Kluwer Academic Publishers, Ljubljana, July 1994.

Remis, S.J. and Stanasic, M.M. "Geometric Approach to the Design of a Singularity-Free Articulated Arm-Subassembly", *IEEE Intl. Conf. on Robotics and Automation*, pp. 3342-3347, San Diego, May 1994.

Stanasic, M.M. and Lorenc, S.J., "A Second-Order Geometric Control of Planar Path Tracking Manipulators", 3rd Intl. Meeting of *Advances in Robot Kinematics*, eds. J. Lenarcic and V. Parenti-Castelli, pp. 37-43, Antenna Verde Publishing, Ferrara, Sept. 1992.

Di Caprio, F. and Stanasic, M.M. "The Kinematic Control Equations of a Singularity Free Six Degree of Freedom Manipulator", 22nd ASME *Biennial Mechanisms Conf.*, DE-Vol. 45, pp. 1-6, Scottsdale, Sept. 1992.

Stanasic, M.M., Lodi, K. and Pennock, G.R., "An Application of Curvature Theory to the Trajectory Generation Problem of a Two-Link Manipulator", 22nd ASME *Biennial Mechanisms Conf.*, DE-Vol. 45, pp. 479-483, Scottsdale, Sept. 1992.

Di Caprio, F., Khanuja, S.S., Stanasic, M.M. and Duta, O., "A Singularity Free Six Degree of Freedom Manipulator", 2nd Intl. Meeting of *Advances in Robot Kinematics*, eds. S. Stifter and J. Lenarcic, pp. 128-135, Springer Verlag, Linz, Sept. 1990.

Canales, L. and Stanasic, M.M., "Preliminary Design of an Exoskeleton Shoulder Joint Without Dead Positions", *IEEE Intl. Conf. on Systems Engineering*, Pittsburgh, August 1990.

Stanasic, M.M. and Gupta, K.C., "Closed-Form Solutions to the Spherical Joint Attachment Problem", 21st ASME *Biennial Mechanisms Conference*, pp. 177-182, Chicago, 1990.

Wright, A.K. and Stanasic, M.M., "Exoskeletal Control of the UTAH/MIT Dextrous Hand", *IEEE Intl. Conf. on Systems Engineering*, Pittsburgh, August 1990.

Repperger, D.W. and Stanasic, M.M. "Determination of a Simulator's Capability Using Work Volume Techniques", *American Control Conference*, San Diego, May

1990.

Beard, J.E., Pennock, G. and Stanisic, M.M., "The Effects of the Design Parameters on the Generalized Curvature and Displacement of Epitrochoidal Gerotor Pumps", SAE Paper No. 891831, *Intl. Off-Highway and Powerplant Congress and Exposition*, Milwaukee, Sept. 1989.

Stanisic, M.M. and Engelberth, J.W., "A Cartesian Description of Arm-Subassembly Singularities in Terms of Singular Surfaces", 20th ASME *Biennial Mechanisms Conf.*, pp. 325-332, Orlando, Sept. 1988.

Stanisic, M.M. and Mirusky, W.F., "Optimization of Spherical Joint Attachment in Spatial Linkages", 20th ASME *Biennial Mechanisms Conf.*, pp. 463-470, Orlando, 1988.

Stanisic, M.M. and Engelberth, J.W., "A Geometric Description of Manipulator Singularities in Terms of Singular Surfaces", 1st Intl. Meeting of *Advances in Robot Kinematics*, ed. J. Lenarcic, pp. 132-141, Ljubljana, Sept. 1988.

Stanisic, M.M. and Duta, O., "A New Double Jointed Spherical Robot Wrist with Increased Dexterity", 1st Intl. Meeting of *Advances in Robot Kinematics*, ed. J. Lenarcic, pp. 53-61, Ljubljana, Sept. 1988.

Stanisic, M.M. and Pennock G.R., "Canonical Form of the Solutions to the Inverse Velocity Problem of a 3R Open-Chain", ASME paper No. 86-DET-104, 19th ASME *Biennial Mechanisms Conf.*, Columbus, Sept. 1986.

Ryuh, B.S., Pennock, G.R. and Stanisic, M.M., "The Inverse Velocity and Acceleration Solutions of Programmable Five-Bar Robot Positioners", *Applied Robotics and Factory Automation Conference*, pp. IV-2.1 to IV-2.9, St. Louis, Nov. 1986.

Stanisic, M.M. and Pennock, G.R., "A Non-Degenerate Orientation Solution of a Four-Jointed Wrist", *IEEE Intl. Conf. on Robotics and Automation*, pp. 998-1003, St. Louis, 1985.

University and Institute Seminars

"Inverse Humeral Pointing Equations of a Humanoid Shoulder Complex", ME Dept. Univ. of Iowa, March 27, 2003.

"Humanoid Humeral Pointing Kinematics", Jozef Stefan Institute, Ljubljana, Slovenia, October 24, 2002.

“Design of a Dextrous Manipulator”, Jozef Stefan Institute, Ljubljana, Slovenia, May 4, 2000.

“Design of a Dextrous Manipulator”, University of Bologna, Bologna, Italy, May 9, 2000.

“Design of a Dextrous Manipulator”, Swiss Institute of Technology, Zurich, Switzerland, May 15, 2000.

“Curvature Theory Applied to Manipulator Control and Some New Singularity-Free Manipulators”, ME Dept. Univ. of Iowa, Nov. 7, 1994.

Invited Lectures to Symposiums/Workshops

“Design of a Humanoid Shoulder Complex”, *Symposium on Mechanics and Mechatronics*, San Luis Potosi, Mexico, Jan. 2006..

“Synthesis of Two Degree of Freedom Function Generators”, *Symposium on Mechanics and Mechatronics*, San Luis Potosi, Mexico, Jan. 2006.

“Second-Order Geometric Control of Planar Path Tracking Systems”, 3^d Intl. Meeting of *Advances in Robot Kinematics*, Ferrara, Italy, Sept. 1992.

“A Geometric Description of Manipulator Singularities in Terms of Singular Surfaces”, 1st Intl. Meeting of *Advances in Robot Kinematics*, Ljubljana, Slovenia, Sept. 1988.

“A New Double-Jointed Spherical Robot Wrist with Increased Dexterity”, 1st Intl. Meeting of *Advances in Robot Kinematics*, Ljubljana, Slovenia, Sept. 1988.

Patents

US Patent No. 6,026,703 ”Dextrous Split-Equator Joint” .

US Patent No. 4,878,393 ”Dextrous Spherical Robot Wrist”.

Supervised Masters Theses

Kalpesh Patel, *A Parametric Study of Trajectory Generation with a Spatial Three-Link Open-Chain*, Univ. of Illinois at Chicago, Dec. 1987.

William F. Mirusky, *Optimization of Spherical Joint Attachment in Spatial Mech-*

anisms, Univ. of Illinois at Chicago, May 1988.

Jon W. Engelberth, *A Geometric Description of the Singularities of Three-Link Open-Chains with Application to Industrial Manipulator Arm-Subassemblies*, Univ. of Illinois at Chicago, June 1988.

Wei-Ming Lee, *Adaptive, Singularity-Avoiding, Trajectory Generating Algorithms for a Four-Jointed Wrist*, Univ. of Illinois at Chicago, July 1988.

Prakash Kantamani, *Canonical Solutions to the Inverse Velocity and Acceleration Problems of Rotatable Five-Link Closed-Chain Mechanisms*, Univ. of Illinois at Chicago, July 1988.

Jun Yan, *A Technique for Optimizing Attachment of Spherical Joints in Spatial Linkages*, , Univ. of Illinois at Chicago, July 1988.

Oprea Duta, " *A New Singularity-Free Spherical Robot Wrist*, Univ. of Illinois at Chicago, August 1988.

Robert C. Seaman, *Kinematic Analysis of a Singularity-Free Industrial Manipulator*, Univ. of Notre Dame, July 1989.

Fernando Di Caprio, *Kinematic Constraint Functions for the Singularity-Free Resolution of Redundant Spherical Wrists*, Univ. of Notre Dame, May 1991.

Sukhwant S. Khanuja, *Singularity Avoidance for Manipulators with Spherical Wrists using Articulated Workpieces*, Univ of Notre Dame, Aug. 1991.

Kamran Lodi, *Application of Curvature Theory to the Trajectory Generation Problem of a Planar Manipulator*, Univ. of Notre Dame, Aug. 1991.

Steven J. Lorenc, *Application of Instantaneous Invariants to the Path Tracking Control Problem of Planar Two Degree of Freedom Systems*, Univ. of Notre Dame, June 1992.

Issa Nesnas, *Vision-Based Curvature Theory Control of a Planar Manipulator*, Univ. of Notre Dame, Aug. 1993.

Jeffrey L. Eleff, *Internal Landing Gear Loads Generation for Fatigue Damage Analysis*, Univ. of Notre Dame, April 1993.

Jared M. Wiitala, *Design and Analysis of a Singularity-Free Robotic Wrist Sub-*

assembly, Univ. of Notre Dame, May 1998.

Jack T. Feix, *Design of Singularity-Free General Purpose Manipulator*, Univ. of Notre Dame, May 2000.

Brendan T. O'Connor, *Implementation of Inverse Kinematics and Control System of a Singularity-Free General Purpose Manipulator*, Aug 2003, Univ. of Notre Dame.

Doctoral Dissertations Supervised

Issa Nesnas, *Proper Kinematic Constraint for Smart Redundant Wrists*, Univ. of Notre Dame, July 1995.

Steven J. Lorenc, *Curvature Theory and the Kinematics of Manipulators and Machines*, Univ. of Notre Dame, May 1995.

Steven J. Remis, *Kinematic Constraint of Redundant Manipulators for Singularity Avoidance*, Univ. of Notre Dame, May 1994.

Current Doctoral Students

Craig Goehler, *Design of a Humanoid Arm/Shoulder System*, expected completion May 2006.

Abigail Mitchell, *Analysis of a Double Platform Mechanism*, expected completion May 2007.