Ambarish Goswami

E-mail: *ambarish@ambarish.com*
Website: *www.ambarish.com*

Scientific Publications

Notes: Most of these articles can be downloaded from http://www.ambarish.com.
All Google Scholar citations (only $>$20 are indicated here) are from November, 2013.
Total Google Scholar citations: 4260

Journal Articles

1. J. Chiu and **A. Goswami**
   Critical Hitch Angle for Jack-Knife Avoidance During Slow Backing-up of Vehicle-Trailer System
   Vehicle System Dynamics Vol. 52, No. 7, 2014.

2. **A. Goswami**, S.-K. Yun, U. Nagarajan, S.-H. Lee, K. Yin and S. Kalyanakrishnan
   Direction Changing Fall Control in Humanoid Robots: Theory and Experiments
   Journal of Autonomous Robots Vol. 36, No. 3, March 2014.

3. D. Orin, **A. Goswami** and S.-H. Lee
   Centroidal Dynamics of Humanoid Robots
   Journal of Autonomous Robots Vol. 35, No. 2, October 2013.

4. A. Sanyal and **A. Goswami**
   Dynamics and Balance Control of the Reaction Mass Pendulum (RMP): A 3D Inverted Pendulum with Extended Body Inertia
   ASME Transactions of Dynamic Systems Measurements and Control Vol. 136, No. 2, November 2013.

5. S.-H Lee and **A. Goswami**
   Fall on Backpack: Damage Minimizing Humanoid Fall on Targeted Body Segment Using Momentum Control
   Journal of Computational and Nonlinear Dynamics. Vol. 8, Issue 2, April 2013.

6. S.-H Lee and **A. Goswami**
   A Momentum-based Balance Controller for Humanoid Robots on Non-level and Non-stationary Ground
   Journal of Autonomous Robots Volume 33, Number 4, November 2012.

7. T. Koolen, T. de Boer, J. Rebula, **A. Goswami** and J. Pratt
   Capturability Based Analysis and Control of Legged Locomotion, Part 1: Application to Three Simple Gait Models
   International Journal of Robotics Research. Vol. 31 No. 9, August 2012.

8. G. Aguirre-Ollinger, J. E. Colgate, M. A. Peshkin, and **A. Goswami**
   Inertia Compensation Control of a One-Degree-of-Freedom Exoskeleton for Lower-Limb Assistance: Initial Experiments
   IEEE Transactions on Neural Systems & Rehabilitation Engineering Vol. 20, No. 1, January 2012.

9. S. Kalyanakrishnan and **A. Goswami**
   Learning to Predict Humanoid Fall
   The International Journal of Humanoid Robotics Vol. 8, No. 2, June 2011.

10. G. Aguirre-Ollinger, J. E. Colgate, M. A. Peshkin, and **A. Goswami**
    Design of an Active 1-DOF Lower-Limb Exoskeleton with Inertia Compensation
    The International Journal of Robotics Research Vol. 30, No. 4, April 2011.

11. G. Aguirre-Ollinger, J. E. Colgate, M. A. Peshkin, and **A. Goswami**
    A 1-DOF Assistive Exoskeleton with Inertia Compensation: Effects on the Agility of Leg Swing Motion
    Proceedings of the Institution of Mechanical Engineers,
    Part H, Journal of Engineering in Medicine Vol. 225, No. 3, 2011.

12. R. C. Browning, J. R. Modica, R. Kram and **A. Goswami**
    The effects of adding mass to the legs on the energetics and biomechanics of walking
    Medicine and Science in Sports and Exercise, March, 2007.
    Google Scholar citation: **88**

13. M. B. Popovic, **A. Goswami**, and H. Herr
    Ground Reference Points in Legged Locomotion: Definitions, Biological Trajectories and Control Implications
    International Journal of Robotics Research Vol. 24, No. 12, 2005.
    Google Scholar citation: **137**

14. S. Goldenstein, M. Karavelas, D. Metaxas, L. Guibas, E. Aaron, and **A. Goswami**
    Scalable Nonlinear Dynamical Systems for Agent Steering and Crowd Simulation
    Computer and Graphics Vol. 25, No. 6, 2001.
    Google Scholar citation: **59**

15. D. Tolani, **A. Goswami** and N. I. Badler
    Real-Time Inverse Kinematics Techniques for Anthropomorphic Limbs
    Graphical Models Vol. 62, No. 5, 2000.
    Google Scholar citation: **495**

16. N. I. Badler, D. N. Metaxas, G. Huang, **A. Goswami** and S. Huh
    Dynamic Simulation for Zero-Gravity Activities
    Aviation, Space, and Environment Medicine Journal, 2000.

17. **A. Goswami** and M. A. Peshkin
    Mechanically implementable accommodation matrices for passive force control
    International Journal of Robotics Research Vol. 18, No. 8 (August), 1999.

18. **A. Goswami**
    Postural stability of biped robots and the foot rotation indicator (FRI) point
    International Journal of Robotics Research Vol. 18, No. 6 (June) 1999.
    Google Scholar citation: **414**

19. **A. Goswami**, B. Thuilot, and B. Espiau
    A study of the passive gait of a compass-like biped robot: symmetry and chaos
    International Journal of Robotics Research Vol. 17, No. 12 (December) 1998.
    Google Scholar citation: **359**

20. **A. Goswami**
    A new gait parameterization technique by means of cyclogram moments:
    Application to human slope walking
    Gait & Posture, Vol. 8, No. 1 (August), 1998.
    Google Scholar citation: **66**

21. **A. Goswami**, B. Espiau, and A. Keramane
Limit cycles in a passive compass gait biped and passivity-mimicking control laws
Journal of Autonomous Robots, Vol. 4, No. 3, 1997.
Google Scholar citation: **288**

22. T. C. Kienzle III, S. D. Stulberg, M. A. Peshkin, A. Quaid, J. Lea, **A. Goswami**, and C-H Wu
Total Knee Replacement
IEEE Engineering in Medicine and Biology, May/June, 1995.
Google Scholar citation: **42**

23. **A. Goswami** and J. R. Bosnik
On a relationship between the physical features of robotic manipulators and the kinematic parameters produced by numerical calibration
ASME Journal of Mechanical Design, December 1993.

24. **A. Goswami**, A. Quaid, and M. A. Peshkin
Identifying robot parameters using partial pose information
IEEE Control Systems (**invited article**), October 1993.
Google Scholar citation: **26**

Book Sections and Reports

1. S-H. Lee and **A. Goswami**
   The reaction mass pendulum (RMP) model for humanoid robot gait and balance control
   Humanoid Robots (Editor: Ben Choi)
   In-Tech, Austria, February 2009.

2. **A. Goswami** and E. Cordier
   Moment-based parameterization of evolving cyclograms on gradually changing slopes
   Computer Methods in Biomechanics & Biomedical Engineering - v.2
   Middleton J., Jones M.L. and Pande G.N. Eds.
   Gordon and Breach Science Publishers 1998.

3. **A. Goswami**, B. Thuilot, and B. Espiau
   Compass-like biped robot Part I: Stability and bifurcation of passive gaits
   INRIA Research Report No. 2996, October 1996.
   Google Scholar citation (October 1, 2010): **206**

4. T. C. Kienzle III, S. D. Stulberg, M. A. Peshkin, A. Quaid, J. Lea, **A. Goswami**, and C-H Wu
   A computer-assisted total knee replacement surgical system using a calibrated robot
   Computer Assisted Surgery, Ed. R. H. Taylor et al. MIT Press. 1995.
   Google Scholar citation: **51**

Refereed Conference Proceedings

1. J. Chiu and **A. Goswami**
   Design of A Wearable Scissored-Pair Control Moment Gyroscope (SP-CMG) for Human Balance Assist
   ASME 2014 International Design Engineering Technical Conferences (IDETC), Buffalo, NY, August 2014

2. S.-K. Yun and **A. Goswami**
   Tripod Fall: Concept and Experiments of a Novel Approach to Humanoid Robot Fall Damage Reduction
   International Conference on Robotics and Automation (ICRA), 2014, Hongkong, May 2014

3. F. L. Moro, M. Gienger, **A. Goswami**, N. G. Tsagarakis and D. G. Caldwell
   An Attractor-based Whole-Body Motion Control (WBMC) System for Humanoid Robots
   Humanoids 2013, Atlanta, GA, October 2013

4. J. Chiu and **A. Goswami**
   Driver Assist for Backing-Up a Vehicle with a Long-Wheelbase Dual-Axle Trailer
   The 11th International Symposium on Advanced Vehicle Control (AVEC '12), Seoul, Korea, September 2012

5. S.-K. Yun and **A. Goswami**
   Humanoid Robot Safe Fall Experiments using Aldebaran NAO
   International Conference on Robotics and Automation (ICRA), 2012, St. Paul, Minneapolis, May 2012

6. A. K. Sanyal and **A. Goswami**
   Dynamics and Control of the Reaction Mass Pendulum (RMP) as a 3D Multibody System:
   Application to Humanoid Modeling
   2011 ASME Dynamic Systems and Control Conference (DSCC)
   Arlington, VA, October 2011.

7. S.-K. Yun and **A. Goswami**
   Momentum-Based Reactive Stepping Controller on Level and Non-level Ground for Humanoid Robot Push Recovery
   IROS 2011, San Francisco, California, September 2011.

8. S-H. Lee and **A. Goswami**
   Fall on Backpack: Damage Minimizing Humanoid Fall on Targeted Body Segment Using Momentum Control
   ASME 2011 International Design Engineering Technical Conferences (IDETC)
   Washington D.C., August 2011.

9. S-H. Lee and **A. Goswami**
   Ground reaction force control at each foot: A momentum-based humanoid balance controller for non-level
   and non-stationary ground
   IROS 2010, Taipei, Taiwan, October 2010.

10. A. Dutta and **A. Goswami**
    Human postural model that captures rotational inertia
    The 33rd Annual Meeting of the American Society of Biomechanics , ASB 2010, Providence, Rhode Island, USA, August, 2010.

11. S. Kalyanakrishnan and **A. Goswami**
    Predicting falls of a humanoid robot through machine learning
    Innovative Applications of Artificial Intelligence, IAAI-10, Atlanta, Georgia, USA, July, 2010.

12. U. Nagarajan and **A. Goswami**
    Generalized Direction Changing Fall Control of Humanoid Robots Among Multiple Objects
    ICRA 2010, Anchorage, Alaska, USA, May 2010.

13. S.-K. Yun, **A. Goswami** and Y. Sakagami
    Safe Fall: Humanoid robot fall direction change through intelligent stepping and inertia shaping
    ICRA 2009, Kobe, Japan, May 2009.
    Google Scholar citation: **22**

14. S. Stramigioli, V. Duindam, G. van Oort and **A. Goswami**
    Compact Analysis of 3D Bipedal Gait Using Geometric Dynamics of Simplified Models
    ICRA 2009, Kobe, Japan, May 2009.

15. **A. Goswami**
    Kinematic and dynamic analogies between planar biped robots and the reaction mass pendulum (RMP) model
    Humanoids 2008, Daejeon, Korea, December 2008.

16. D. Orin and **A. Goswami**
    Centroidal Momentum Matrix of a Humanoid Robot: Structure and Properties
    IROS 2008, Nice, France, September 2008.

17. J. Rebula, J. Pratt and **A. Goswami**
    Learning Capture Point for Improved Humanoid Push Recovery
    Humanoids07, Pittsburgh, PA, U.S.A., November 2007.
    Google Scholar citation: **41**

18. G. Aguirre-Ollinger, J. E. Colgate, M. A. Peshkin, and **A. Goswami**
    A 1-DOF Assistive Exoskeleton with Virtual Negative Damping: Effects on the Kinematic Response of the Lower Limbs
    IROS 2007, San Diego, CA, U.S.A., 2007.

19. G. Aguirre-Ollinger, J. E. Colgate, M. A. Peshkin, and **A. Goswami**
    Active impedance control of a lower-limb assistive exoskeleton
    10th Int. Conf. on Rehabilitation Robotics (ICORR'07), Noordwijk, the Netherlands, Jun 13-15 2007, 2007.
    Google Scholar citation: **27**

20. S-H. Lee and **A. Goswami**
    Reaction Mass Pendulum (RMP): An explicit model for centroidal angular momentum of humanoid robots,
    IEEE Int. Conf. on Robotics and Automation, Rome, Italy, April 2007.
    Google Scholar citation: **33**

21. J. Pratt, J. Carff, S. Drakunov and **A. Goswami**
    Capture Point: A Step toward Humanoid Push Recovery
    Humanoids06, Genoa, Italy, December 2006.
    Google Scholar citation: **175**

22. M. Abdallah and **A. Goswami**
    A biomechanically motivated two-phase strategy for biped upright balance control
    IEEE Int. Conf. on Robotics and Automation, Barcelona, Spain, April 2005.
    Google Scholar citation: **82**

23. R. C. Browning, J. Modica, R. Kram and **A. Goswami**
    The effects of added leg mass on the biomechanics and energetics of walking
    American Society of Biomechanics (ASB), April 2004.

24. **A. Goswami** and V. Kallem
Rate of change of angular momentum and balance maintenance of biped robots
IEEE Int. Conf. on Robotics and Automation (ICRA), New Orleans, April 2004.
Google Scholar citation: **145**

25. **A. Goswami**
Kinematic quantification of gait symmetry based on bilateral cyclograms
XIXth Congress of the International Society of Biomechanics (ISB), Dunedin, New Zealand, July 2003.

26. S. Goldenstein, M. Karavelas, D. Metaxas, L. Guibas, and **A. Goswami**
Scalable Dynamical Systems for Multi-Agent Steering and Simulation
IEEE Int. Conf. on Robotics and Automation, Seoul, Korea, May 2001.
Google Scholar citation: **46**

27. H. Sun, **A. Goswami** and D. Metaxas
Cyclogram planarity is preserved in upward slope walking
17^{th} *Congress of the International Society of Biomechanics (ISB)*
Calgary, Canada, August 1999.

28. **A. Goswami**
Foot rotation indicator (FRI) point: A new gait planning tool to evaluate postural stability of biped robots
IEEE Int. Conf. on Robotics and Automation, Detroit, MI, May 1999.
Google Scholar citation: **116**

29. L. Roussel, C. Canudas de Wit, and **A. Goswami**
Generation of energy-optimal complete gait cycles for biped robots
IEEE Int. Conf. on Robotics and Automation, Leuven, Belgium, May 1998.
Google Scholar citation: **169**

30. M. Mata-Jimenez, B. Brogliato, and **A. Goswami**
On the control of mechanical systems with dynamic backlash
CDC Conf., San Diego, CA, December 1997.

31. M. Mata-Jimenez, B. Brogliato, and **A. Goswami**
Analysis of PD control of mechanical systems with dynamic backlash
2nd Int. Symp. MV2 on Active Control in Mechanical Engineering, Lyon, France, October 1997.

32. C. Canudas de Wit, L. Roussel, and **A. Goswami**
Periodic stabilization of a 1-dof hopping robot over nonlinear compliant surface
IFAC Symp. on Robot Control (SyRoCo), Nantes, France, September 1997.

33. **A. Goswami** and E. Cordier
Moment-based parameterization of cyclograms of slope-walking
XVIth Congress of the Int. Society of Biomechanics, Tokyo, Japan, August 1997
(**finalist for the Best Young Investigator award**).

34. B. Espiau and the BIP team
BIP: A joint project for the development of an anthropomorphic biped robot
8th Int. Conf. on Advanced Robotics (ICAR), Monterey, CA, July 1997.

35. C. Canudas de Wit, L. Roussel, and **A. Goswami**
Comparative study of methods for energy-optimal gait generation for biped robots
Int. Conf. on Informatics and Control, St. Petersburg, Russia, June 1997.

36. E. Cordier, **A. Goswami**, and M. Bourlier
Kinematic parameterization of natural slope walking
13th Int. Symp. on "Posture and Gait", Paris, France, June 1997.

37. **A. Goswami** and E. Cordier
Moment-based parameterization of evolving cyclograms on gradually changing slopes
3rd Int. Symp. on Computer Methods in Biomechanics & Biomedical Engr, Barcelona, May, 1997.

38. B. Thuilot, **A. Goswami**, and B. Espiau
Bifurcation and chaos in a simple passive bipedal gait
IEEE Int. Conf. on Robotics and Automation, Albuquerque, NM, April 1997.
Google Scholar citation: **62**

39. K. Kedzior, A. Morecki, M. Wojtyra, T. Zagrajek, T. Zielinska, **A. Goswami**, M. Waldron, and K. Waldron
Development of a mechanical simulation of human walking
ROMANSY, Udine, Italy, July 1996.

40. **A. Goswami**, B. Espiau, and A. Keramane
Limit cycles and their stability in a passive bipedal gait
IEEE Int. Conf. on Robotics and Automation, Minneapolis, MN, April 1996.
Google Scholar citation: **190**

41. **A. Goswami**, J. T. Lea, A. Quaid, M. A. Peshkin, T. C. Kienzle III, and S. D. Stulberg
Achieving surgical accuracy with robots using parameter identification
First Medical Robotics and Computer Assisted Surgery (MRACS) Symposium, Pittsburgh, PA, 1994.

42. B. Espiau and **A. Goswami**
Compass gait revisited
IFAC Symp. on Robot Control (SyRoCo), Capri, Italy, September 1994.
Google Scholar citation: **33**

43. M. A. Peshkin, **A. Goswami**, and J. M. Schimmels
Force-guided assembly
31st Annual Allerton Conf. on Communication, Control, and Computing,
Urbana-Champaign, IL, October 1993.

44. **A. Goswami** and M. A. Peshkin
Task-space/joint-space damping transformations for passive redundant manipulators
IEEE Int. Conf. on Robotics and Automation (**invited session**), Atlanta, GA, April 1993.

45. **A. Goswami** and M. A. Peshkin
Mechanical computation for passive force control
IEEE Int. Conf. on Robotics and Automation, Atlanta, GA, April 1993.
Google Scholar citation: **22**

46. **A. Goswami**, A. Quaid, and M. A. Peshkin
Complete parameter identification of a robot using partial pose information **(20)**
IEEE Int. Conf. on Robotics and Automation, Atlanta, GA, April 1993.
Google Scholar citation: **35**

47. **A. Goswami**, A. Quaid, and M. A. Peshkin
Calibration and parameter identification of a 6-DOF robot using a ball-bar system
IEEE Int. Conf. on Systems, Man, and Cybernetics (**invited session**), Chicago, IL, September 1992.

48. **A. Goswami** and M. A. Peshkin
Implementation of passive force control with redundant manipulators
IEEE Int. Conf. on Systems, Man, and Cybernetics, Charlottesville, VA, October 1991.

49. **A. Goswami** and M. A. Peshkin
A task-space formulation of passive force control
IEEE Int. Symp. on Intelligent Control (**invited session**), Alexandria, VA, October 1991.

50. **A. Goswami**, M. A. Peshkin, and J. E. Colgate
Passive robotics: An exploration of mechanical computation
IEEE Int. Conf. on Robotics and Automation, Cincinnati, OH, April 1990.
(*American Control Conference*, San Diego, CA, **invited session**), May 1990.
Google Scholar citation: **71**

51. **A. Goswami** and J. R. Bosnik
Interpretation of redundant kinematic parameters in robotic manipulator calibration algorithms
ASME Biennial Mechanisms Conference, Orlando, FL, September 1988.

Patents Issued

1. Machine Learning Approach for Predicting Humanoid Robot Fall
   Ambarish Goswami and Shivaram Kalyanakrishnan
   US Patent No. 8,554,370, Issued October 8, 2013

2. Humanoid Fall Direction Change Among Multiple Objects
   Ambarish Goswami, Yoshiaki Sakagami and Umashankar Nagarajan
   US Patent No. 8,369,991, Issued February 5, 2013

3. Inertia shaping for humanoid fall direction change
   Ambarish Goswami, Seung-kook Yun, Kangkang Yin, Yoshiaki Sakagami
   US Patent No. 8,352,077, Issued January 8, 2013

4. Intelligent stepping for humanoid fall direction change
   Ambarish Goswami, Seung-kook Yun, Yoshiaki Sakagami
   US Patent No. 8,332,068, Issued December 11, 2012

5. Learning capture points for humanoid push recovery
   Jerry Pratt, **Ambarish Goswami**, John Rebula, Fabian Canas
   US Patent No. 8,195,332, Issued June 5, 2012

6. Systems and Methods for Controlling a Legged Robot Based on Rate of Change of Angular Momentum
   Ambarish Goswami and Vinutha Kallem
   US Patent No. 78,060,253, Issued November 15, 2011

7. Determination of Foot Placement for Humanoid Push Recovery
   Jerry Pratt, **Ambarish Goswami**
   US Patent No. 7,949,430, Issued May 24, 2011

8. Systems and methods for controlling a legged robot using a two-phase disturbance response strategy
   Ambarish Goswami and Muhammad E. Abdallah
   US Patent No. 7,835,822, Issued November 16, 2010

9. Controller for an assistive exoskeleton based on active impedance
   Gabriel Aguirre-Ollinger, **Ambarish Goswami**, J. Edward Colgate, Michael A. Peshkin
   US Patent No. 7,731,670, Issued June 8, 2010

10. Characterization and classification of pose in low dimension
    Ambarish Goswami
    US Patent No. 7,580,774, Issued August 25, 2009

11. Kinematic quantification of gait asymmetry based on bilateral cyclograms
Ambarish Goswami
US Patent No. 7,503,900, Issued March 17, 2009