

# Roy Featherstone's Publications List

as of January 22, 2019

## Books:

1. Featherstone, R., *Robot Dynamics Algorithms*, Kluwer Academic Publishers, Boston/Dordrecht/Lancaster, 1987. DOI: 10.1007/978-0-387-74315-8
2. Featherstone, R., *Rigid Body Dynamics Algorithms*, Springer, New York, 2008. DOI: 10.1007/978-1-4899-7560-7

## Patents:

1. Featherstone, R., *Linear Drive Mechanism of the Screw and Nut Type With Perfect Rolling Contact*, Japanese Patent no. JP6400860, issued to Fondazione Istituto Italiano di Tecnologia, Oct. 3 2018. Document.

## Journal Articles:

1. Featherstone, R., "Calculation of Robot Joint Rates and Actuator Torques from End Effector Velocities and Applied Forces", *Mechanism and Machine Theory*, vol. 18, no. 3, pp. 193–198, 1983. DOI: 10.1016/0094-114X(83)90089-7
2. Featherstone, R., "The Calculation of Robot Dynamics using Articulated-Body Inertias", *Int. J. Robotics Research*, vol. 2, no. 1, pp. 13–30, 1983. DOI: 10.1177/027836498300200102
3. Featherstone, R., "Position and Velocity Transformations between Robot End Effector Coordinates and Joint Angles", *Int. J. Robotics Research*, vol. 2, no. 2, pp. 35–45, 1983. DOI: 10.1177/027836498300200203
4. Featherstone, R. & Khatib, O., "Load-Independence of the Dynamically-Consistent Inverse of the Jacobian Matrix", *Int. J. Robotics Research*, vol. 16, no. 2, pp. 168–170, 1997. DOI: 10.1177/027836499701600203
5. Featherstone, R., "A Divide-and-Conquer Articulated-Body Algorithm for Parallel  $O(\log(n))$  Calculation of Rigid-Body Dynamics. Part 1: Basic Algorithm", *Int. J. Robotics Research*, vol. 18, no. 9, pp. 867–875, 1999. DOI: 10.1177/02783649922066619
6. Featherstone, R., "A Divide-and-Conquer Articulated-Body Algorithm for Parallel  $O(\log(n))$  Calculation of Rigid-Body Dynamics. Part 2: Trees, Loops and Accuracy", *Int. J. Robotics Research*, vol. 18, no. 9, pp. 876–892, 1999. DOI: 10.1177/02783649922066628
7. Featherstone, R., & Fijany, A., "A Technique for Analysing Constrained Rigid-Body Systems, and its Application to the Constraint Force Algorithm", *IEEE Trans. Robotics & Automation*, vol. 15, no. 6, pp. 1140–1144, 1999. DOI: 10.1109/70.817679
8. Featherstone, R., "The Acceleration Vector of a Rigid Body", *Int. J. Robotics Research*, vol. 20, no. 11, pp. 841–846, 2001. DOI: 10.1177/02783640122068137
9. Featherstone, R., "Modeling and Control of Contact between Constrained Rigid Bodies", *IEEE Trans. Robotics & Automation*, vol. 20, no. 1, pp. 82–92, 2004. DOI: 10.1109/TRA.2003.820930
10. Featherstone, R., "An Empirical Study of the Joint Space Inertia Matrix", *Int. J. Robotics Research*, vol. 23, no. 9, pp. 859–871, 2004. DOI: 10.1177/0278364904044869
11. Featherstone, R., "Efficient Factorization of the Joint-Space Inertia Matrix for Branched Kinematic Trees", *Int. J. Robotics Research*, vol. 24, no. 6, pp. 487–500, 2005. DOI: 10.1177/0278364905054928
12. Teh, Y. H., & Featherstone, R., "An Architecture for Fast and Accurate Control of Shape Memory Alloy Actuators", *Int. J. Robotics Research*, vol. 27, no. 5, pp. 595–611, 2008. DOI: 10.1177/0278364908090951

13. Featherstone, R., “Exploiting Sparsity in Operational-Space Dynamics”, *Int. J. Robotics Research*, vol. 29, no. 10, pp. 1353–1368, 2010. DOI: 10.1177/0278364909357644
14. Featherstone, R., “A Beginner’s Guide to 6-D Vectors (Part 1)”, *IEEE Robotics & Automation Magazine*, vol. 17, no. 3, pp. 83–94, 2010. DOI: 10.1109/MRA.2010.937853
15. Featherstone, R., “A Beginner’s Guide to 6-D Vectors (Part 2)”, *IEEE Robotics & Automation Magazine*, vol. 17, no. 4, pp. 88–99, 2010. DOI: 10.1109/MRA.2010.939560
16. Fijany, A., & Featherstone, R., “A New Factorization of the Mass Matrix for Optimal Serial and Parallel Calculation of Multibody Dynamics”, *Multibody System Dynamics*, vol. 29, no. 2, pp. 169–187, 2013. DOI: 10.1007/s11044-012-9313-z
17. Bhalerao, K. D., Critchley, J., Oetomo, D., Featherstone, R., and Khatib, O., “Distributed Operational Space Formulation of Serial Manipulators”, *J. Comput. Nonlinear Dynamics*, vol. 9, no. 2, paper #021012, 2014. DOI: 10.1115/1.4025577
18. Azad, M., & Featherstone, R., “A New Nonlinear Model of Contact Normal Force”, *IEEE Trans. Robotics*, vol. 30, no. 3, pp. 736–739, 2014. DOI: 10.1109/TRO.2013.2293833
19. Azad, M., & Featherstone, R., “Angular Momentum Based Balance Controller for an Under-actuated Planar Robot”, *Autonomous Robots*, vol. 40, no. 1, pp. 93–107, 2016. DOI: 10.1007/s10514-015-9446-z
20. Featherstone, R., “Quantitative Measures of a Robot’s Physical Ability to Balance”, *Int. J. Robotics Research*, vol. 35, no. 14, pp. 1681–1696, 2016. DOI: 10.1177/0278364916669599
21. Focchi, M., del Prete, A., Havoutis, I., Featherstone, R., Caldwell, D. G., and Semini, C., “High-Slope Terrain Locomotion for Torque-Controlled Quadruped Robots”, *Autonomous Robots*, vol. 41, no. 1, pp. 259–272, 2017. DOI: 10.1007/s10514-016-9573-1
22. Featherstone, R., “A Simple Model of Balancing in the Plane and a Simple Preview Balance Controller”, *Int. J. Robotics Research*, vol. 36, no. 13–14, pp. 1489–1507, 2017. DOI: 10.1177/0278364917691114

#### Conference Papers, Book Chapters, Miscellaneous:

1. Featherstone, R., “Robot Control using On-Line Robot Dynamics Calculations”, IEE Colloquium on Control Theory in Robotics, London, 31st Oct., 1983.
2. Featherstone, R., “Robot Dynamics Algorithms”, *Ph. D. Thesis*, Edinburgh University, 1984.
3. Featherstone, R., “The Dynamics of Rigid Body Systems with Multiple Concurrent Contacts”, in Faugeras, O. & Giralt, G. (editors) *Robotics Research: The Third International Symposium*, pp. 189–196, MIT Press, 1986.
4. Featherstone, R., “Resolving Manipulator Redundancy by Combining Task Constraints”, Proc. 1st Int. Workshop on Advances in Robot Kinematics, Ljubljana, Yugoslavia, Sept. 19–21, pp. 122–130, 1988.
5. Featherstone, R., “Accurate Trajectory Transformations for Redundant and Nonredundant Robots”, Proc. IEEE Int. Conf. Robotics and Automation, San Diego, May 8–13, pp. 1867–1872, 1994. DOI: 10.1109/ROBOT.1994.351189
6. Featherstone, R., “Explicit Modelling of General Task Spaces for Inverse Kinematics”, in J. Lenarčič & B. Ravani (editors) *Advances in Robot Kinematics and Computational Geometry*, pp. 301–308, Kluwer Academic Publishers, Dordrecht/Boston/London, 1994.
7. Featherstone, R., “A Hierarchical Representation of the Space Occupancy of a Robot Mechanism”, in J.-P. Merlet & B. Ravani (editors) *Computational Kinematics '95*, pp. 183–192, Kluwer Academic Publishers, Dordrecht/Boston/London, 1995.
8. Featherstone, R., Sonck, S. & Khatib, O., “A General Contact Model for Dynamically-Decoupled Force/Motion Control”, Preprints 5th Int. Symp. Experimental Robotics, Barcelona, June 15–18, pp. 84–95, 1997.

9. Featherstone, R., Sonck, S. & Khatib, O., “A General Contact Model for Dynamically-Decoupled Force/Motion Control”, in A. Casals & A. T. de Almeida (editors) *Experimental Robotics V*, (Proc. 5th Int. Symp. Experimental Robotics, Barcelona, June 15–18, 1997), pp. 128–139, Springer-Verlag, Berlin/Heidelberg/New York, 1998.
10. Pitt-Francis, J. & Featherstone, R., “Automatic Generation of Sphere Hierarchies from CAD Data”, Proc. IEEE Int. Conf. Robotics and Automation, Leuven, Belgium, May 16–20, pp. 324–329, 1998. DOI: 10.1109/ROBOT.1998.676414
11. Featherstone, R., Sonck Thiebaut, S. & Khatib, O., “A General Contact Model for Dynamically-Decoupled Force/Motion Control”, Proc. IEEE Int. Conf. Robotics and Automation, Detroit, Michigan, May, pp. 3281–3286, 1999. DOI: 10.1109/ROBOT.1999.774098
12. Featherstone, R., & Orin, D. E., “Robot Dynamics: Equations and Algorithms”, Proc. IEEE Int. Conf. Robotics and Automation, San Francisco, CA, April 24–28, pp. 826–834, 2000. DOI: 10.1109/ROBOT.2000.844153
13. Featherstone, R., “On the Limits to Invariance in the Twist/Wrench and Motor Representations of Motion and Force Vectors”, Proc. Ball 2000 (Ball Centenary Symposium), Cambridge, UK, July 9–12, 2000. Access: [helix.gatech.edu/ball2000/](http://helix.gatech.edu/ball2000/)
14. Featherstone, R., “Rigid Body Dynamics Algorithm for Parallel Computers”, *ERCIM News*, no. 42, pp. 39–40, July 2000.
15. Featherstone, R., “A Dynamic Model of Contact between a Robot and an Environment with Unknown Dynamics”, preprints of 10th Int. Symp. Robotics Research, Lorne, Victoria, Australia, Nov. 9–12, pp. 341–348, 2001.
16. Shen, Y., & Featherstone, R., “Computer Simulation of Robot Closed-Loop Dynamics for Force Control Study”, Proc. Australasian Conf. Robotics & Automation, Auckland, New Zealand, Nov. 27–29, pp. 77–82, 2002. ACRA 2002. Paper.
17. Featherstone, R., “A Dynamic Model of Contact between a Robot and an Environment with Unknown Dynamics”, in R. A. Jarvis & A. Zelinsky (eds.), *Robotics Research: The Tenth International Symposium*, pp. 433–446, Springer, Berlin, 2003.
18. Shen, Y., & Featherstone, R., “The Effect of Ill-Conditioned Inertia Matrix on Controlling Manipulator Robot”, Proc. Australasian Conf. Robotics & Automation, Brisbane, Australia, Dec. 1–3, paper # 48, 2003. ACRA 2003. Paper.
19. Featherstone, R., “A Shape Memory Alloy Actuator”, Australian Provisional Patent Application No. 2004900618, filed in the name of the ANU on Feb. 9th, 2004.
20. Featherstone, R., & Teh, Y. H., “Improving the Speed of Shape Memory Alloy Actuators by Faster Electrical Heating”, Proc. 9th Int. Symp. Experimental Robotics, Singapore, June 18–21, paper ID 128, 2004.
21. Teh, Y. H., & Featherstone, R., “A New Control System for Fast Motion Control of SMA Actuator Wires”, Shape Memory And Related Technologies (SMART 2004), Singapore, Nov. 24–26, paper ID SMART-20, 2004. (Note: no published proceedings for this conference.)
22. Teh, Y. H., & Featherstone, R., “Experiments on the Performance of a 2-DOF Pantograph Robot Actuated by Shape Memory Alloy Wires”, Proc. Australasian Conf. Robotics & Automation, Canberra, Australia, Dec. 6–8, 2004. ACRA 2004. Paper.
23. Featherstone, R., & Teh, Y. H., “A Shape Memory Alloy Actuator”, International Patent Application No. PCT/AU2005/000154, filed in the name of the ANU on Feb. 8th, 2005.
24. Teh, Y. H., & Featherstone, R., “Experiments on the Audio Frequency Response of Shape Memory Alloy Actuators”, Proc. Australasian Conf. Robotics & Automation, Sydney, Australia, Dec. 5–7, 2005. ACRA 2005. Paper.
25. Featherstone, R., & Teh, Y. H., “Improving the Speed of Shape Memory Alloy Actuators by Faster Electrical Heating”, in M. H. Ang & O. Khatib (eds.), *Experimental Robotics IX: The 9th International Symposium on Experimental Robotics*, pp. 67–76, Springer, Berlin, 2006. DOI: 10.1007/11552246.7

26. Featherstone, R., “Plücker Basis Vectors”, Proc. IEEE Int. Conf. Robotics and Automation, Orlando, FL, May 15–19, pp. 1892–1897, 2006. DOI: 10.1109/ROBOT.2006.1641982
27. Teh, Y. H., & Featherstone, R., “Accurate Force Control and Motion Disturbance Rejection for Shape Memory Alloy Actuators”, Proc. IEEE Int. Conf. Robotics and Automation, Rome, Italy, April 10–14, pp. 4454–4459, 2007. DOI: 10.1109/ROBOT.2007.364165
28. Teh, Y. H., & Featherstone, R., “Frequency Response Analysis of Shape Memory Alloy Actuators”, Proc. Int. Conf. Smart Materials and Nanotechnology in Engineering, Harbin, China, July 1–4, Proc. SPIE vol. 6423, paper # 140, pp. 64232J, 2007. DOI: 10.1117/12.779881
29. Featherstone, R., “Robot Dynamics”, Scholarpedia, 2(10):3829, 2007. Article.
30. Featherstone, R., & Orin, D. E., “Dynamics”, in B. Siciliano & O. Khatib (eds.), *Springer Handbook of Robotics*, pp. 35–65, Springer, Berlin, 2008.
31. Bibalan, P. T., & Featherstone, R., “A Study of Soft Contact Models in Simulink”, Proc. Australasian Conf. Robotics & Automation, Sydney, Australia, Dec. 2–4, paper #125, 2009. ACRA 2009. Paper.
32. Azad, M., & Featherstone, R., “Modelling the Contact Between a Rolling Sphere and a Compliant Ground Plane”, Proc. Australasian Conf. Robotics & Automation, Brisbane, Australia, Dec. 1–3, paper #134, 2010. ACRA 2010. Paper.
33. Wensing, P., Featherstone, R., & Orin, D. E., “A Reduced-Order Recursive Algorithm for the Computation of the Operational-Space Inertia Matrix”, Proc. IEEE Int. Conf. Robotics & Automation, St. Paul, Minnesota, May 14–18, pp. 4911–4917, 2012. DOI: 10.1109/ICRA.2012.6224600
34. Azad, M., & Featherstone, R., “Angular Momentum Based Controller for Balancing an Inverted Double Pendulum”, in Padois, Bidaud & Khatib (eds.), *RoManSy 19 — Robot Design, Dynamics and Control*, pp. 251–258, Springer, Vienna, 2013. DOI: 10.1007/978-3-7091-1379-0\_31
35. Featherstone, R., “Analysis and Design of Planar Self-Balancing Double-Pendulum Robots”, in Padois, Bidaud & Khatib (eds.), *RoManSy 19 — Robot Design, Dynamics and Control*, pp. 259–266, Springer, Vienna, 2013. DOI: 10.1007/978-3-7091-1379-0\_32
36. Azad, M., & Featherstone, R., “Balancing and Hopping Motion of a Planar Hopper With One Actuator”, Proc. IEEE Int. Conf. Robotics & Automation, Karlsruhe, Germany, May 6–10, pp. 2027–2032, 2013. DOI: 10.1109/ICRA.2013.6630848
37. Featherstone, R., “Skippy: A Versatile 3D Hopper”, Dynamic Walking 2014, Zurich, Switzerland, June 10–13, 2014.
38. Azad, M., & Featherstone, R., “Balancing Control Algorithm for a 3D Under-actuated Robot”, Proc. IEEE/RSJ Int. Conf. Intelligent Robots & Systems, Chicago, Illinois, Sept. 14–18, pp. 3233–3238, 2014. DOI: 10.1109/IROS.2014.6943011
39. Khan, H., Featherstone, R., Caldwell, D. G., & Semini, C., “Bio-inspired Knee Joint Mechanism for a Hydraulic Quadruped Robot”, Proc. 6th Int. Conf. Automation, Robotics and Applications (ICARA), Queenstown, New Zealand, Feb. 17–19, pp. 325–331, 2015. DOI: 10.1109/ICARA.2015.7081168
40. Khan, H., Kitano, S., Frigerio, M., et al., “Development of the Lightweight Hydraulic Quadruped Robot — MiniHyQ”, Proc. Int. Conf. Technologies for Practical Robot Applications (TePRA), Woburn, MA, May 11–12, pp. 1–6, 2015. DOI: 10.1109/TePRA.2015.7219671
41. Featherstone, R., “Quantitative Measures of a Robot’s Ability to Balance”, Proc. Robotics: Science and Systems, Rome, Italy, July 13–17, 2015. DOI: 10.15607/RSS.2015.XI.026
42. Featherstone, R., “A New Simple Model of Balancing in the Plane”, Proc. Int. Symp. Robotics Research, Sestri Levante, Italy, Sept. 12–15, 2015. Access: [royfeatherstone.org/papers/isrr15paper.pdf](http://royfeatherstone.org/papers/isrr15paper.pdf)
43. Featherstone, R., & Orin, D. E., “Dynamics”, in B. Siciliano & O. Khatib (eds.), *Springer Handbook of Robotics* (2nd ed), pp. 37–66, Springer, Berlin, 2016.

44. Focchi, M., Featherstone, R., Orsolino, R. et al., “Viscosity-Based Height Reflex for Workspace Augmentation for Quadrupedal Locomotion on Rough Terrain”, Proc. IEEE/RSJ Int. Conf. Intelligent Robots & Systems, Vancouver, BC, Canada, Sept. 24–28, pp. 5353–5360, 2017. DOI: 10.1109/IROS.2017.8206430
45. Driessen, J. J. M., Featherstone, R. & Gkikakis, A. E., “An Actuator Design Criterion to Maximize Physical Balance Recovery”, Proc. IEEE/RSJ Int. Conf. Intelligent Robots & Systems, Madrid, Spain, Oct. 1–5, pp. 2829–2836, 2018. DOI: 10.1109/IROS.2018.8593729
46. Featherstone, R., “The Physics and Control of Balancing on a Point in the Plane”, in G. Venture, J.-P. Laumond & B. Watier (eds.), *Biomechanics of Anthropomorphic Systems*, pp. 211–234, Springer, 2019. DOI: 10.1007/978-3-319-93870-7\_10

#### **Book and Article Reviews:**

1. Featherstone, R., review of “A Geometric Investigation of Reach” by J. Korein, *Int. J. Robotics Research*, vol. 5, no. 1, p. 99, 1986.
2. Featherstone, R., review of “Computationally Efficient Kinematics...” by R. P. Paul & H. Zhang, in Khatib et al. (editors) *The Robotics Review 1*, pp. 303–305, MIT Press, 1989.
3. Featherstone, R. & Orin, D. E., review of “A Spatial Operator Algebra...” by G. Rodriguez et al., in Khatib et al. (editors) *The Robotics Review 2*, pp. 203–206, MIT Press, 1992.
4. Featherstone, R., review of “Recent Advances in Robot Kinematics” by Lenarčič & Parenti-Castelli (eds.), *Int. J. Robotics Research*, vol. 17, no. 10, p. 1126, 1998.
5. Featherstone, R., review of “Advances in Robot Kinematics: Analysis and Control” by Lenarčič & Husty (eds.), *Int. J. Robotics Research*, vol. 19, no. 1, p. 77, 2000.

#### **Dept. of Artificial Intelligence, University of Edinburgh:**

1. “Controlling a Robot Arm”, Working Paper no. 68, 1980.
2. “Position and Velocity Transformations between Robot End Effector Coordinates and Joint Angles”, Working Paper no. 92, 1981. (Superceded by Research Paper no. 176.)
3. “A Proposal for the Study of Robot Dynamics with Application to Simulation and Control”, Working Paper no. 97, 1981.
4. “Position and Velocity Transformations between Robot End Effector Coordinates and Joint Angles”, Research Paper no. 176, 1982.
5. “High Speed Velocity and Force Transformations for Robots with Three Intersecting Revolute Joint Axes at the Wrist”, Working Paper no. 115, 1982.
6. “A Program for Simulating Robot Dynamics”, Working Paper no. 116, 1982.
7. “The Calculation of Robot Dynamics using Articulated-Body Inertias”, Research Paper no. 181, 1982.
8. “Update on the Robot Simulator Program”, Working Paper no. 155, 1983.
9. “Spatial Notation: A Tool for Robot Dynamics”, Research Paper no. 213, 1984.
10. “The Simulator Verification Experiment”, Working Paper no. 178, 1985.

#### **Philips Laboratories, Briarcliff Manor, NY (excluding proprietary documents):**

1. “Spatial Notation: A Tool for Robot Dynamics”, MS-87-071, 1987.
2. “review of ‘Computationally Efficient Kinematics...’ by R. P. Paul & H. Zhang”, MS-87-074, 1987.
3. “Swept Bubbles: A Method of Representing Swept Volume and Space Occupancy”, MS-90-069, 1990.