Kevin W. Hollander, PhD
Senior Engineering Consultant
Augspurger Komm Engineering, Inc.
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EDUCATION

Ph.D. in Mechanical Engineering, Arizona State University, 2005
M.S. in Mechanical Engineering, University of New Mexico, 1997
B.S. in Mechanical Engineering, University of Missouri, 1994

SUMMARY

For more than 25 years Dr. Hollander has had extensive experience in analyzing and modeling, both biological and mechanical systems, as well as their interactions. This experience has included the design and development of numerous mechanical devices, robots and electronic measurement instruments.

At Augspurger Komm Engineering, Inc. his broad skill set and knowledge has been applied to the analysis of vehicular accidents/reconstruction, tire failures, equipment fires/failures and related personal injury.

At SpringActive, Inc. his knowledge and skill have been applied to managing and leading the creation and development of multiple wearable robotic products. Dr. Hollander has been involved in all aspects of this development from concept creation, to government funding acquisition, to licensing of technology to manufacturing/marketing partners.

EXPERIENCE

2006-Present	Augspurger Komm Engineering, Inc., Senior Engineering Consultant
2006-2019	SpringActive, Inc., Owner/Director of Product Development/Senior Engineer
2002-2005	Infinea Solutions, Inc., Owner/President
1998-2002	Barnes-Jewish Hospital, Clinical Research Manager/Engineer
1997	Saint Charles Community College, Adjunct Faculty in Mechanical Design
1996-1997	Independent Consulting
1992	Union Electric, Co. – Rush Island Power Plant, Engineer
1991	GenCorp Automotive, Engineer

PROFFESIONAL AFFILIATIONS

American Society of Mechanical Engineers (ASME Member)
American Society of Testing and Materials (ASTM) International
Mechanical Engineering Graduate Association (MEGA), President 1996-1997
Society of Automotive Engineers (SAE Member) International –
UNM Formula Car Team Advisor 1996-1997

SEMINARS

SFPE Annual Conference & Expo, Nashville, TN, October 28-30, 2018
Fire & Evacuation Modeling Technical Conference, Gaithersburg, MD, October 11-3, 2018
Forensic Photography Techniques, Michael Wilson, Phoenix, AZ, December 18, 2008
Vehicle Accident Reconstruction Methods, April 19-20, 2007 – Society of Automotive Engineers (SAE), Detroit, MI.
Introduction to PC Crash and PC-Rect, August 22-23, 2006 – MEA
Introduction to Major Testing Techniques for Plastics, September 20-22, 2005
ASTM International, San Diego, CA.

AWARDS

2010 Outstanding Paper Award Winner, "Robotic Transtibial Prosthesis with Biomechanical Energy Regeneration"
2005 Second Place, ASME Student Mechanism Design Competition (Graduate Division)
1997 Regional Award, ASME New Mexico Senior Section Web Page

PROFESSIONAL ACTIVITIES

Current-2015 Advisory Board Member, Paradise Valley High School Crest Program
2019 Subject Matter Expert, Grand Canyon University, Advanced Robotics & Lab (ESG-430) Course Development
2014 ASME IDETC Session Co-Chair
2005 ASME IDETC Session Co-Chair
Reviewer for various IEEE, ASME Conference and Journal Publications

THESIS TOPICS

2005 Ph.D. Thesis**,** Development of Compliant Actuation Systems for Wearable Robotics Applications
1997 Masters Thesis, Mechanical Loading of Tendon: Experimental Apparatus and Modeling
1994 Undergraduate Research, Cortical Bone as an Engineering Material

RESEARCH SUPPORT

2022 WEARTECH, *Quasi-Active Robotic Exoskeleton Suit,* ($500,000), 1 year, (Key Personnel/Lead Designer/Co-Inventor)
2020 CDMRP, *Myoelectrically Controlled Power-Assist Upper Extremity Exoskeleton*, ($1,499,973), 3 years, (Key Personnel)
2019 Air Force, *Exoskeletons for Aerial Porters*, ($1,230,963), 2 years, (Key Personnel/Co-Inventor)

RESEARCH SUPPORT - Continued

2017 Army, STTR Phase I, *Passive SPARKy-P Prostheses (Spring Ankle with Regenerative Kinetics).* ($150,000), 6 months (Key Personnel/Co-Inventor)
2016 ASU – Piper Seed Grant, *developing a powered Ankle Foot Orthosis to enhance gait performance and decrease falls following stroke*. ($50,000), 7 months, (Subcontract PI/$10,000)
2015 Army –TATRC, *Ruggedized Odyssey Ankle for Soldiers* – Contract Extension, ($370,000), 12 months, (Co-Investigator)
2015 National Science Foundation (NSF), SBIR Phase I, ($150,000), 6 months (Key Personnel/Co-Inventor)
2015 DARPA, *Hip Exoskeleton for Superior Assistance (HeSA)*, ($548,903), 14 months, (Subcontract PI/$237,378)
2014 National Institutes of Health (NIH), SBIR Phase II, *Powered Walk/Run Prosthetic Ankle*, ($1,123,625), 2 years, (Co-Investigator)
2013 DARPA, *Joint Torque Augmentation Robot (JTAR) for Soldier Assistance 2.0*, ($680,156), 1 year, (Primary Investigator)
2012 Army - TATRC, *Ruggedized Odyssey Ankle for Soldiers*, ($1,364,587), 2 years, (Primary Investigator/Co-Investigator)
2012 National Science Foundation (NSF), SBIR Phase IIB, *Compliant Jack Spring Actuators for Lower Limb Mobility*, ($353,091), 18 months, (Primary Investigator)
2011 DARPA, *Joint Torque Augmentation Robot (JTAR) for Soldier Assistance* 1/1B Extension, ($621,600), 1 year, (Primary Investigator)
2011 National Institutes of Health (NIH), SBIR Phase I, *Powered Walk/Run Prosthetic Ankle, PWR Ankle*, ($110,832), 16 months, (Primary Investigator)
2010 Army- West Point, *West Point Bionic Ankle – Running Prosthetic Development*, ($50,000), 8 months. (Subcontract PI, $47,000 subcontract)
2010 National Science Foundation (NSF). *Compliant JackSpring Actuators for Lower Limb Mobility*. SBIR Phase II ($500,000), 2 years, (Primary Investigator)
2010 Army – Natick Soldier Systems, *Soldier Power Regeneration Kit (SPaRK)*, Phase II, ($430,000), 1 year, (Subcontract PI/$330k subcontract)
2009 Army - Natick Soldier Systems, *Soldier Power Regeneration Kit (SPaRK)*, ($150,000), 1 year, (*Subcontract PI*/$99k subcontract)
2009 Nation Science Foundation (NSF). *Compliant Jack Spring Actuators for Lower Limb Mobility*. SBIR ($100,000), 6 months. (*Primary Investigator*)
2006 Army - TATRC/Walter Reed Hospital, *SPARKY-Spring Ankle with Regenerative Kinetics*, ($605,000), 3 years. (*Consultant*)
2005 National Institutes of Health (NIH). *Robotic Spring Ankle for Gait Assistance, Development and Evaluation*. ($359,000). 2 years. (*Consultant*)
2003 National Institutes of Health (NIH). *Radio Frequency Motion Tracking System*. SBIR ($95,002), 1 year. (*Inventor/Author/ Consultant*)

INVITED TALKS

2022 Hollander, KW, 2022, "Failure Analysis and Testing Considerations in the Development of Wearable Robotic Systems," ASTM International, Symposium of Medical Devices of the Future, New Orleans, November 1-2.
2022 Hollander, KW, Martin, WP, Kinney, D, 2022, "PhenEx the Workplace Exo," Sunrise Rotary Club, Scottsdale, AZ, October 20.
2022 Hollander, KW, Martin, WP, 2022, "Aerial Porter Exoskeleton (APEx) Development and Controls," Wearable Robotics Association, WearRACon 22, Scottsdale, AZ, April 25-26.
2021 Hollander, KW, 2021, "Wearable Robot Design, Control and Applications," Northern Arizona University Department of Mechanical Engineering, Seminar Lecture, Flagstaff, AZ, April 14.
2020 Hollander, KW, Sugar, TG, 2020, "Robots Augmenting Humans," International Conference on Robotics (IROS) 2020, Workshop: State of the Art in Robotic Leg Prostheses: Where We Are and Where We Want to Be, Las Vega, NV, October 25-29.
2016 WearRACon, Wearable Robotics Association Conference, Spotlight Demonstration. "SpringActive." Phoenix, AZ, February.
2015 American Orthotics and Prosthetics Association (AOPA), National Assembly, Spotlight Symposium. "Wearable Robotics: Lessons Learned," San Antonio, TX, October.
2005 MAE Seminar. "Robotic Tendon for Ankle Gait Assistance." Arizona State University, February.
2003 Lecture. "Current Research in Robotics." Tempe Public Library, September.
2003 Lecture Series. "MAE 446: Lectures on ANSYS/FEA." Arizona State University, Spring.

PATENTS

2022 Wearable Mechanical Robotic Device, U.S. Provisional Appl. 63359059, submitted
2021 Hip Exoskeleton Structure for Lifting and Pushing, U.S. Provisional Patent 63/122,022
2021 Hip Exoskeleton for Lifting and Pushing, U.S. Patent Appl. PCT/US2021/017406
2020 Automatic Reversing Mechanism for A Rock Drill, U.S. Patent 11,415,186
2019 System and Method of Bidirectional Compliant Joint Torque Actuation, U.S. Patent 10,449,105
2017 Joint torque augmentation system and method for gait assistance, U.S. Patent 9,662,262
2016 Gravitational Load Support System, U.S. Appl. 20160023350
2014 Systems and methods for gravitational load support, U.S. Appl. 20140259798
2014 Quasi-active prosthetic joint system, US 9,289,316
2011 Method and Apparatus for Harvesting Energy from Ankle Motion, U.S. 8,716,877
2011 Adjustable Stiffness Jack Spring Actuator, U.S. 8,322,695
2004 Adjustable Stiffness Jack Spring Actuator, U.S. 7,992,849
2004 Adjustable Stiffness Leaf Spring Actuators, U.S. 7,527,253
2003 Method and Apparatus for Determining the Position and Orientation of an Object using a Doppler Shift of Electromagnetic Signals, U.S. Appl. 20040196184

BOOKS/CHAPTERS

Sharbafi, Mazier A.; Lee, David; Sugar, Thomas G; Ward, Jeffrey; Hollander, Kevin W; Hosoda, Koh, Seyfarth, Andre'; Chapter 9 – Conclusion – Bioinspired Legged Locomotion, Butterworth-Heinemann, 2017
Sugar, TG, Fernandez, E, Kinney, D, Hollander, KW and Redkar, S, 2017, "HeSA, Hip Exoskeleton for Superior Assistance," Wearable Robotics: Challenges and Trends, Springer International Publishing, pp. 319-323.
Hollander, KW, and Sugar TG, 2007, "Chapter 12: Powered Human Gait Assistance," In Kommu, SS, (ed.), *Rehabilitation Robotics*, I-Tech Education and Publishing, pp. 203-220.

JOURNAL PUBLICATIONS

J15. Martin, WB, Boehler, A, Hollander, KW, Kinney, D, Hat, JK, Kuduo, JK, Sugar, TG, 2022, "Development and testing of the Aerial Porter Exoskeleton," Wearable Technologies, 3.

J14. Grimmer, M, Holgate, M, Holgate, R, Boehler, A, Ward, J, Hollander, KW, Sugar, TG and Seyfarth, A, 2016, "A Powered Prosthetic Ankle Joint for Walking and Running," BioMed Eng OnLine, 15(3):37-52.

J13. Sugar, TG, Hollander, KW, Boehler, A, Ward, J, 2013, "Comparison and Analysis of a Robotic Tendon and Jackspring™ Actuator for Wearable Robotic Systems," ASME Journal of Medical Devices.

J12. Van Ham, R, Sugar, TG, Vanderborght, B, Hollander, KW, Lefeber, D, 2009, "Review of Actuators with Passive Adjustable Compliance / Controllable Stiffness for Robotic Applications," IEEE Robotics & Automation Magazine, 16(3), pp. 81-94, September.

J11. Hitt, J, Holgate, M, Bellman, R, Sugar, TG, Hollander, KW, 2009, "Robotic Transtibial Prosthesis with Biomechanical Energy Regeneration", Industrial Robot: An International Journal, 36(5), pp. 441-447. **(Outstanding Paper Award Winner, 2010)**

J10. Van Ham, R, Sugar, TG, Vanderborght, B, Hollander, KW and Lefeber, D, 2009, "Compliant Actuator Designs," IEEE Robotics & Automation Magazine, 16(3), pp. 81-94.

J9. Vanderborght, B, Van Ham, R, Sugar, TG, Hollander, KW and Lefeber, D, 2009, "Comparison of Mechanical Design and Energy Consumption of Adaptable Passive Compliant Actuators." International Journal of Robotics Research, 28(1), pp. 90-103, January.

J8. Ward, J, Boehler, A, Shin, D, Hollander, KW and Sugar, TG, 2008, "Control Architectures for a Powered Ankle Foot Orthosis," International Journal of Assistive Robotics and Mechatronics, 9(2), pp. 2-13.

JOURNAL PUBLICATIONS – Continued

J7. Hollander, KW, Ilg, R, Sugar, TG, Herring, DE. 2006. "An Efficient Robotic Tendon for Gait Assistance." ASME Journal of Biomechanical Engineering, 128(5), pp. 788-791, October.

J6. Hollander, KW and Sugar, TG. 2006. "Design of Lightweight Lead Screw Actuators for Wearable Robotic Applications." ASME Journal of Mechanical Design, 128(5), pp. 644-648, May.

J5. Engsberg, JR, Lenke, LG, Hollander, KW, Uhrich, ML, Commean, PK, Lee, JR, Bae, KT. 2003. "Methods to Locate Center of Gravity in Scoliosis". Spine, 28(23), pp. E483-489, December.

J4. Hampton, DA, Hollander, KW, Engsberg, JR. 2003. "Equinus Deformity as a Compensatory Mechanism for Ankle Plantarflexor Weakness," Journal of Applied Biomechanics, 19(4), pp. 325-339.

J3. Engsberg, JR, Lenke, LG, Reitenbach, AK, Hollander, KW, Bridwell, KH, Blanke, K. 2002. "Prospective Evaluation of Trunk Range of Motion in Adolescents with Idiopathic Scoliosis Undergoing Spinal Fusion Surgery," Spine. 27(12), pp.1346-1354.

J2. Engsberg, JR, Wagner, JM, Reitenbach, AK, Hollander, KW, Standeven, JW. 2001. "A Measure of Motor Control at the Knee in Cerebral Palsy." Journal of Applied Biomechanics. 17(4), pp.335-343.

J1. Engsberg, JR, Ross, SA, Hollander, KW, Park, TS, 2000, "Hip Spasticity and Strength in Children with Spastic Diplegia Cerebral Palsy", Journal of Applied Biomechanics, 16(3), pp. 221-233.

CONFERENCE PUBLICATIONS/PRESENTATIONS

C33. Martin, BW, Boehler, A, Hollander, KW, Kinney, D, Hitt, JK, Kudva, J, Sugar, TG, 2020, "Aerial Porter Exoskeleton (APEx) for Lifting and Pushing," WeRob 2020, paper 50, October 13-16.

C32. Sugar, TG, Hollander, KW, and Redkar, S, 2016, "HeSA, Hip Exoskeleton for Superior Assistance," WeRob 2016, Proceedings of the International Workshop on Wearable Robotics, La Granja, Segovia, Spain, October.

C31. Churchwell, R, Hollander, KW and Theisen, C, 2015, "The Use of Additive Manufacturing to Fabricate Structural Components for Wearable Robotic Devices", ASME IDETC 2015, DETC2015-47448, Boston, MA, August.

CONFERENCE PUBLICATIONS/PRESENTATIONS – Continued

C30. Hollander, KW, Ward, JA and Sugar, TG, 2014, "Comparison of Exoskeleton Ankle Assistance to Downhill Walking Energetics and Biomechanics", WeRob 2014, Proceedings of the International Workshop on Wearable Robotics, Baiona, Spain, September.

C29. Hollander, KW, Ward, JA and Sugar, TG, 2014, "Comparison of Exoskeleton Ankle Assistance to Downhill Walking Energetics and Biomechanics", WeRob 2014, Proceedings of the International Workshop on Wearable Robotics, Baiona, Spain, September.

C28. Hollander, KW, Cahill, N, Holgate, R, Churchwell, RL, Clouse, PC, Kinney, D, Boehler, A, and Ward, J, 2014, "A Joint Torqure Augmentation Robot (JTAR) for Ankle Gait Assistance," ASME IDETC 2014, DETC2014-35653, Buffalo, NY, August.

C27. Hollander, KW, Cahill, N, Holgate, R, Churchwell, RL, Clouse, PC, Kinney, D, and Boehler, A, 2014, "A Passive and Active Joint Torque Augmentation Robot (JTAR) for Hip Gait Assistance," ASME IDETC 2014, DETC2014-35654, Buffalo, NY, August.

C26. Hollander, KW, Clouse, P, Cahill, N, Boehler, A, Sugar, TG, Ayyar, A, 2012, "Design of the Orthotic Load Assistance Device (OLAD), Dynamic Walking, Pensacola, FL.

C25. Sugar, TG, Hollander, KW and Hitt, JK, 2011, "Walking with Springs", Proceedings of SPIE 7976, San Diego, California, March.

C24. Hitt J, Merlo, J, Johnston, J, Holgate, M, Boehler, A, Hollander, KW, and Sugar, TG, 2010, "Bionic Running for Unilateral Transtibial Military Amputees," 27th Annual Army Science Conference, Orlando, FL, Nov/Dec.

C23. Hitt, J, Brechue, W, Boehler, A, Ward, J, Hollander, KW, Sugar, TS, Audet, D and Kanagaki, G, 2010, "Dismounted Soldier Biomechanical Power Regeneration," 27th Annual Army Science Conference, Orlando, FL, Nov/Dec.

C22. Hollander, KW, 2010, "Compliant Jack Spring™ Actuators for Lower Limb Mobility," National Science Foundation (NSF) Grantee Conference, Baltimore, MD, May.

C21. Hollander, KW, Werner, M, Boehler, A, Sugar, TG, 2010, "Powered Bionic Ankle with Regenerative Kinetics, the RT Ankle", Proceedings of the 36th Academy Annual Meeting & Scientific Symposium, American Academy of Orthotists and Prosthetists (AAOP), Chicago, IL, February 24 - 27.

C20. Beebe, E, Hollander, KW, Komm, DS, Springer, T, 2009, "Non-destructive examination techniques of plastics", Proceeding of the ASME Early Career Technical Conference, Arlington, TX, April.

CONFERENCE PUBLICATIONS/PRESENTATIONS - Continued

C19. Holgate, M, Hitt, J, Bellman, R, Sugar, TG, Hollander, KW, 2008, "The SPARKy (Spring Ankle with Regenerative Kinetics) Project: Choosing a DC Motor Based Actuation Method", IEEE International Conference on Biomedical Robotics and Biomechatronics (BIOROB2008), Scottsdale, AZ, October.

C18. Komm, DS, Hollander, KW, Beebe, EA, McSpadden, HJ, 2008, "Steps Used to Analyze the Failure of an Exterior Suspended Ceiling," International Symposium on Safety Science and Technology (2008ISSST), Beijing, China, September.

C17. Boehler A, Hollander K, Sugar T, Shin D, 2008, "Design, Implementation and Test Results of a Robust Control Method for a Powered Ankle Foot Orthosis (AFO)", IEEE International Conference on Robotics and Automation (ICRA2008), Pasadena, CA, May.

C16. Hitt, J, Bellman, R, Holgate, M, Sugar, TG, Hollander, KW, 2007, "The SPARKy (Spring Ankle with Regenerative Kinetics) Project: Design and Analysis of a Robotic Transtibial Prosthesis with Regenerative Kinetics",#DETC2007-34512, ASME International Design Engineering Technical Conference (IDETC2007), Las Vegas, NV, September.

C15. Hollander, KW, Sugar, TG. 2007. "A Robust Control Concept for Robotic Ankle Gait Assistance" International Conference of Rehabilitation Robotics (ICORR2007), Noordwijk, Netherlands, June.

C14. Hitt, J, Oymagil, AM, Sugar, T, Hollander, K, Boehler, A, Fleeger, J,. 2007. "Dynamically Controlled Ankle-Foot Orthosis (DCO) With Regenerative Kinetics: Incrementally Attaining User Portability." IEEE International Conference on Control and Automation (ICRA2007), Roma, Italy, April.

C13. Hollander, KW, Sugar, TG, Herring, DE. 2005. "A Robotic 'Jack Spring' for Ankle Gait Assistance." #DETC2005-84492, ASME International Design Engineering Technical Conference (IDETC2005), Long Beach, CA, September.

C12. Hollander, KW and Sugar, TG. 2005."Design of Lead Screw Actuators for Wearable Robotic Applications." #DETC2005-84595, ASME International Design Engineering Technical Conference (IDETC2005), Long Beach, CA, September.

C11. Hollander, KW, Sugar, TG, Herring, DE. 2005. "Robotic 'Jack Spring' for Ankle Gait Assistance." International Conference of Rehabilitation Robotics (ICORR2005), Chicago, IL, June.

C10. Hollander, KW, Sugar, TG. 2005. "Design of the Robotic Tendon." Design of Medical Devices Conference (DMD2005), Minneapolis, MN, April.

CONFERENCE PUBLICATIONS/PRESENTATIONS - Continued

C9. Bharadwaj, K, Hollander, KW, Mathis, C, Sugar, TG. 2004. "Spring over Muscle (SOM) Actuator for Rehabilitation Devices." IEEE Engineering in Medicine and Biology Society (EMBS2004), San Francisco, CA, September.

C8. Hollander, KW, Sugar, TG. 2004. "Concepts for Compliant Actuation in Wearable Robotic Systems," Invited Paper, US-Korea Conference on Science, Technology and Entrepreneurship (UKC2004), Research Triangle Park, NC, August.

C7. Standeven, JW, Engsberg, JR, Lefrak, SS, Wagner, JM, Hollander, KW, Cooper, JD. 2004. "Quantifying Pulmonary Function During Gait Using Video Motion Capture," Gait and Clinical Movement Analysis Society (GCMAS2004), Lexington, KY, April.

C6. Wang, Z, Hollander, KW, Sugar, TG. 2003, "A Novel Omni-Directional Perturbation Platform," Proceedings of Intelligent Robots and Systems (IROS2003), Las Vegas, NV, October.

C5. Engsberg, JR, Lenke, LG, Hollander, KW, Uhrich, ML, Comean, PD, Bae, KT. 2002. "Center of Gravity (COG) in Scoliosis," Presented at the Scoliosis Research Society annual meeting. Seattle, WA

C4. Engsberg, JR, Lenke, LG, Hollander, KW, Uhrich, ML, Bridwell, KH. 2002. "Changes in Trunk Range of Motion following Anterior or Posterior Spinal Fusion in Adolescent Idiopathic Scoliosis." Presented at the Scoliosis Research Society annual meeting. Seattle, WA

C3. Engsberg, JR, Lenke, LG, Hollander, KW, Reitenbach, AK, Bridwell, KH. September, 2001. "Trunk Motion in Adolescents Undergoing Scoliosis Spinal Fusion," Presented at the Scoliosis Research Society Annual Meeting. Cleveland, Ohio.

C2. Engsberg, JR, Ross, SA, Hollander, KW, Park, TS, September, 2000. "Hip Abductor/ Adductor Spasticity and Strength in Children with and without Cerebral Palsy." Presented at the American Academy of Cerebral Palsy and Developmental Medicine Annual Meeting, Toronto, Canada.

C1. Wagner, JM, Engsberg, JR, Hollander, KW, Olree, KS. August, 1999, "A Method for Quantitative Analysis of Continuous Kinematic Gait Variables," Presented at the International Society of Biomechanics Convention. Calgary, Canada.