

Curriculum Vitae

Sangbae Kim

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Cambridge, MA 02139

Education	Harvard University	MA, USA	2008 - 2009
	Post-doctorate fellow at Micro-robotics lab		
	Stanford University	CA, USA	2004 - 2008
	Doctorate, Department of Mechanical Engineering		
	Thesis: <i>Bio-inspired robot design with compliant underactuated system</i>		
	Advisor: Mark R. Cutkosky, Ph.D		
	Stanford University	CA, USA	2002 - 2004
	Master of science, Department of Mechanical Engineering		
	Yonsei University		
	Bachelor of science, Mechanical Engineering	Seoul, Korea	1994 - 2001

Experience	Massachusetts Institute of Technology		2009.6-
	Assistant professor in Mechanical Engineering dept.		
	Director of Biomimetic Robotics Lab		
	Post-doctorate fellow	Harvard University Cambridge, MA	2008 - 2009
	Worked on Soft robotics project		
	Chief Technology Officer	AromTech, Inc. Palo Alto, CA	2007 -
	Worked on improvement of glass manipulation with directional adhesive in LCD assembly process with LG Phillips.		
	Developed projects with Hasbro toy company utilizing the directional adhesive		
	Research Assistant	Stanford University Stanford, CA	2004 - 2008
	Designed of bio-inspired robots: Stickybot, Spinybot, iSprawl		
	Worked on DARPA Robots in Scansorial Environment Project		
	Researcher	Solutionix Inc. Seoul, Korea	2000 - 2001
	Developed the first prototype of 3-D scanner		
	Created the first product for the startup company		
	Drill Instructor	Military Service Nonsan, Korea	1995 - 1997
	Trained new recruits		

Award	DARPA Young Investigator Award 2013		
	Edgerton Career Development Chair 2010 ~ 2013		
	Best Paper Award for the IEEE Transactions on Robotics, for the year 2008		
	Best Student Paper Award and Best Conference paper finalist		
	IEEE International Conference on Robotics & Automation 2007		
	Selected among TIME magazine's Best Inventions of 2006		

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Media

Stickybot	Nov. 2006
<ul style="list-style-type: none"> ● Featured on The Discovery channel: <i>Weird Science</i> ● Featured on History channel: <i>Modern Marvels- "Sticky Stuff"</i> ● Featured on PBS Wired science: <i>Geek Beat</i> ● Featured on ABC "Good morning America" ● Featured in National Geographic- "<i>Design by Nature</i>" ● Featured in Forbes magazine- "<i>7 Amazing robots that will change your life</i>" ● Featured in more than 50 other media coverage: ● Presented at Google Zeitgeist Science Fair ● Presented at DARPA Tech ● Presented at American Association for the Advancement of Science Annual meeting 2007 	<p>Oct. 2008</p> <p>Jul. 2007</p> <p>Jan. 2007</p> <p>Mar. 2008</p> <p>Apr. 2008</p> <p>Sept. 2006</p> <p>Nov. 2006</p> <p>Aug. 2007</p> <p>Feb. 2007</p>
	2005
Spinybot	
<ul style="list-style-type: none"> ● World's first legged wall climbing robot using micro-spine array. ● Best video Award 	<p>Apr. 2006</p>
<ul style="list-style-type: none"> ● IEEE International Conference on Robotics and Automation 2006 ● Featured on ABC news ● Featured on ARTE documentary 	<p>Jul. 2005</p> <p>Jul. 2005</p>
	2003-2004
iSprawl	
<ul style="list-style-type: none"> ● Cockroach-inspired robot capable of running 15 body-lengths/s using flexible power transmission system ● Featured on Science central ● Featured on ARTE documentary ● Featured on The Discovery Channel: Daily Planet 	<p>Feb. 2005</p> <p>Jul. 2005</p> <p>May. 2006</p>

Patents

1. Climbing with dry adhesive : Stickybot (Patent No.: 7762362 B2, Jul. 27, 2010), Mark R Cutkosky, Sangbae Kim
2. Device and method for handling an object of interest using a directional adhesive structure (pending) in South Korea Appl. No. :10-2007-0025602, Sangbae Kim, Jin Lee
3. Biologically inspired climbing device Patent No.: 8066088, Nov. 29, 2011, Mark R Cutkosky, Sangbae Kim, Alan Asbeck
4. Variable Stiffness Mechanism for Hyper-redundant Manipulator Based on Particle Jamming (pending) Shanbao Cheng, Nadia Cheng, Karl Iagnemma, Sangbae Kim, Yong-Jae Kim
5. Tubular Mechanism Having Stiffening Characteristics (pending), Cheng, Shanbao; Iagnemma, Karl; Kim, Sangbae; Kim, Yong-Jae
6. Snake-Like Manipulator Having Adjustable Stiffness Capability (pending), Shanbao Cheng, Karl Iagnemma, Sangbae Kim, Yong-Jae Kim
7. Rotary Variable Compliance Joint (pending), Mojtaba Azadi, Sangbae Kim
8. Dual-coaxial robotic limb design high performance robots (pending), Sangbae Kim, Albert Wang, Sangok Seok, David Otten, and Jake McKenzie

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- Invited talk***
1. Compliance in bio-inspired robot design", Guest lecture at San Francisco State University - Engr 100 class 2007
2008
 2. Bio-inspired robot design", Boston Dynamics
 3. Bio-inspired robot design", Guest lecture at Stanford University - ME113 class
 4. Bio-inspired robot design", Guest lecture at MIT 2.002, 2.671, 2.12 2009
 5. Bio-inspired robot design". National Instrument workshop on Intelligent robotics in Seoul, Korea
 6. Bio-inspired robot design" Seminar at Samsung: mechatronics and manufacturing technology center (MMTC)
 7. Bio-inspired robot design" Samsung(SAIT),
 8. Bio-inspired robot design" Korea Institute of Science and Technology
 9. Bio-inspired robot design" Seminar at Seogang University.
 10. Bio-inspired robot design" Guest lecture at Yonsei University.
 11. Bio-inspired robot design" Seminar at Ulsan National Institute of Science and Technology (UNIST)
 12. Bio-inspired robot design and Hyper dynamic robotics" Seminar at Postech : Pohang University of Science and technology.
 13. Bio-inspired robot design" Seminar at Kyungbook University
 14. Bio-inspired robot design" Seminar at Seoul National University
 15. Bio-inspired robot design" Seminar at Korea Institute of Industrial Technology (Kitech).
 16. Bio-inspired robot design", Workshop on Mobile Robot Navigation (part of the IEEE International IROS), St. Louis, United States.
 17. Bio-inspired robot design and hyper dynamic robotics", Guest talk at DEKA
 18. Bio-inspired robot design and hyper dynamic robotics", Harvard concord field station
 19. Bio-inspired robot design and Manufacturing", Lab for manufacturing and productivity seminar at MIT
 20. Bio-inspired robot design for hyper dynamic robotics", Lecture at Draper lab
 21. Bio-inspired robot design for hyper dynamic robotics", Lecture and project development meeting at Lincoln lab 2010
 22. Bio-inspired robot design for hyper dynamic robotics", Mechanical Engineering Visiting Committee meeting
 23. Bio-inspired robot design for hyper dynamic robotics", Workshop on Modular
 24. Robotic at the IEEE International Conference of Robotics and Automation, Anchorage, AK, United States
 25. Bio-Inspired Robot Design for Legged Locomotion", Dynamic Walking conference, MIT
 26. Biomimetic Mobile Robot Design with NI Single-Board RIO", National Instruments Conference "NIWeek" Academic Forum
 27. Bio-Inspired Robot Design for Legged Locomotion", American Society of Biomechanics Conference, Machines Inspired by Animal Locomotion symposium
 28. Bio-inspired robot design for hyper dynamic robotics", Invited talk at University of Pennsylvania, GRASP Seminar Series
 29. Bio-inspired robot design and fabrication", Guest lecture at MIT, 2.671
 30. Bio-inspired robot design and fabrication", Guest lecture at MIT, MAS 863
 31. Bio-Inspired Robot Design for Hyper Dynamic Locomotion", Invited talk at Control, Instrumentation, and Robotics seminar series, MIT 2011
 32. Design inspiration from biology", invited talk at TTI/Vanguard conference 'Design As Strategy', February 24, 2011 in Los Angeles, California
 33. Bio-Inspired Robot Design for Hyper Dynamic Locomotion", invited talk at the IEEE International Conference of Robotics and Automation 2011 Workshop on Bio-mimetic and Hybrid Approaches to Robotics, Shanghai, China.
 34. Controlling HyperDynamic Quadruped Robotic Platform With LabVIEW and NI SingleBoard RIO ", National Instruments Conference "NIWeek" Academic

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- Forum.
35. Design challenges in cheetah inspired galloping quadruped", Invited talk at Dynamic Walking conference, Jena, Germany.
 36. Cheetah-inspired robot: Design challenges in cheetah inspired galloping quadruped", Invited talk at The International Symposium on Adaptive Motion of Animals and Machines (AMAM2011).
 37. Bio-inspired underwater adhesive system for underwater oil mining", Invited talk at the MITEI Fall Research Conference, Wong auditorium, Oct 6, 2011.
 38. Bio-inspired design and innovation", Invited talk at innovation of Product/Service through Design Thinking and Creative Organization" sponsored by Hyundai at D-school at Stanford University. 2012
 39. Cheetah inspired dynamic quadruped: actuation, structure, and control architecture", invited talk at Stanford University - BioE 393 Seminar.
 40. Bio-Inspired Robot Design for Hyper Dynamic Locomotion", invited talk at MIT Museum for Cambridge Science Festival.
 41. Bio-Inspired Robot Design for Hyper Dynamic Locomotion ", Invited talk at MIT Lincoln Lab, Cambridge.
 42. Optimal electromagnetic actuator choices ", Invited talk at Dynamic Walking conference 2012, Florida, USA.
 43. How we are built and how we build ", talk at ARO/NSF Locomotion Systems Science Workshop: Why are Animals Better?
 44. Toward highly dynamic locomotion : actuation, structure and control of MIT cheetah robot", ME Department Seminar at Tuft University, MA, USA
 45. Toward highly dynamic locomotion: actuation, structure and control of the MIT cheetah robot, Invited talk at EECS/IGERT seminar, University of California, Berkeley, CA. 2013
 46. Toward highly dynamic locomotion: design challenges in the MIT cheetah robot, Invited talk at Army Research Laboratory, Aberdeen Proving Ground, Maryland.
 47. Toward highly dynamic locomotion: design challenges in the MIT cheetah robot ", Keynote Talk, International Symposium on Adaptive Motions in Animals and Machines (AMAM2013), Darmstadt, Germany
 48. Toward highly dynamic locomotion: design challenges in the MIT cheetah robot, Invited talk at University of Pennsylvania, GRASP Seminar Series, Philadelphia, PA
 49. Toward highly dynamic locomotion: design challenges in the MIT cheetah robot, Invited talk at Georgia Institute of Technology, Nonlinear Science and Mathematical Physics Seminar Series, Atlanta, GA
 50. Learning from biology: actuation, structure and control of the MIT cheetah, Invited talk at Carnegie Mellon University, Robotics institute Seminar Series, Pittsburg, PA.
 51. How to Learn from Biology: a New Generation of Legged Robots for Disaster Response, Invited talk at MIT Industrial Liaison Program, Cambridge, MA.
 52. How to build robots from the lessons from animals: design challenges of the MIT Cheetah, Invited talk at Society of Integrative and Comparative Biology, 2014 Meeting, Austin TX. 2014

*Publications
-Refereed
Journal*

Y. Kim, S. Cheng, S. Kim, and K. Iagnemma, A Stiffness-Adjustable Hyper-Redundant Manipulator using a Variable Neutral-line Mechanism for Minimally Invasive Surgery IEEE Transactions on Robotics (Accepted)

M. Chuah and S. Kim, Enabling Force Sensing during High Speed Locomotion: A bio-inspired, multi-axis, composite force sensor using discrete pressure mapping IEEE Sensors (Accepted)

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M. Haberland, J.G.D. Karssen, S. Kim, and M. Wisse, The effects of swing leg retraction on running performance: analysis, simulation, and experiment Robotica 2013 (Accepted)

Y. Kim, S. Cheng, S. Kim, and K. Iagnemma, A Stiffness-Adjustable Hyper-Redundant Manipulator using a Variable Neutral-line Mechanism for Minimally Invasive Surgery IEEE Transactions on Robotics (accepted)

Yong Jae Kim, Shanbao Cheng, Sangbae Kim, Karl Iagnemma, "A Novel Layer Jamming Mechanism with Tunable Stiffness Capability for Minimally Invasive Surgery" IEEE Transactions on Robotics (accepted)

S. Kim, C. Lacshi and B. Trimmer, Review: Soft robotics - a new perspective in robot evolution, Trends in biotechnology, 31(5); 287-94, May 2013

M. Sitti, A. Menciassi, A.J. Ijspeert, L. Kin Huat and S. Kim, Survey and Introduction to the Focused Section on Bio-Inspired Mechatronics, IEEE/ASME Transactions on Mechatronics, 18(2); 409- 418, 2013

Ananthanarayanan, A., Azadi, M., Kim, S., "Towards the Bio-inspired Legs Design for High Speed Running", Bioinspiration and Biomimetics, Vol. 7, No. 4, Aug, 2012

S. Seok, C. D. Onal, R. Wood, D. Rus, and S. Kim, "A Peristaltic Soft Robot with Antagonistic Nickel Titanium Coil Actuators", IEEE/ASME Transactions on Mechatronics. (Accepted for publication, to appear.)

Cutkosky, M.R., Kim, S. Design and fabrication of multi-material structures for bioinspired robots. Philosophical Transaction Royal Society, A, 367, 1799-1813, 2009

S. Kim, M. Spenko, S. Trujillo, B. Heyneman, D. Santos, M.R. Cutkosky. Smooth Vertical Surface Climbing with Directional Adhesion. IEEE a special issue of transactions on Bio-Robotics, 24(1):65-74, Feb 2008.

D. Santos, M. Spenko, A. Parness, S. Kim, and M.R. Cutkosky. Directional Adhesion for Climbing: Theoretical and Practical Considerations. Journal of Adhesion Science and Technology, 21(12):1317-1341, 2007

S. Kim, J.E. Clark, and M.R. Cutkosky iSprawl: Design and Tuning for High-speed Autonomous Open-loop Running. Int. J. Robotics Research, 25(9): 903-912, 2006.

A.T.Asbeck, S. Kim, M.R. Cutkosky, W.R. Provancher, and M. Lanzetta. Scaling Hard Vertical Surfaces with Compliant Microspine Arrays Int. J. Robotics Research, 25(12):1165-1179, 2006

*-Refereed
conference
proceeding*

S. Seok, A. Wang, M. Chuah, D. Otten, J. Lang and S. Kim Design Principles for Highly Efficient Quadrupeds and Implementation on the MIT Cheetah Robot In Proc. of IEEE International Conference on Robotics and Automation, Karlsruhe, Germany, 2013.

Y. Kim, s. Cheng, S. Kim, K. Iagnemma, "Design of a Tubular Snake-Like Manipulator with Stiffening Capability by Layer Jamming", In Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 4251 – 4256, Oct

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2012, Vilamoura, Portugal.

G. A. Folkertsma, S. Kim, S. Stramigioli, "Parallel Stiffness in a Bounding Quadruped with Flexible Spine", In Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 2210 – 2215, Oct 2012, Vilamoura, Portugal.

S. Seok, A. Wang, D. Otten, S. Kim, "Actuator Design for High Force Proprioceptive Control in Fast Legged Locomotion", In Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 1970 – 1975, Oct 2012, Vilamoura, Portugal.

M. Chuah, M. Estrada, S. Kim, "Composite Force Sensing Foot Utilizing Volumetric Displacement of a Hyperelastic Polymer", In Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 1963 – 1969, Oct 2012, Vilamoura, Portugal.

R. Briggs, J. Lee, M. Haberland, S. Kim, "Tails in Biomimetic Design: Analysis, Simulation, and Experiment", In Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 1473 – 1480, Oct 2012, Vilamoura, Portugal.

A. Ananthanarayanan, S. Foong, S. Kim, A Compact Two DOF Magneto-elastomeric Force Sensor for a Running Quadruped, IEEE International Conference on Robotics and Automation, pp. 1398 – 1403, St. Paul, MN, U.S.A, May, 2012.

A. Valenzuela, S. Kim Optimally Scaled Hip-Force Planning: A Control Approach for Quadrupedal Running, In Proc. of IEEE International Conference on Robotics and Automation, pp. 1901 – 1907, St. Paul, MN, U.S.A, May, 2012

M. Haberland, J.G.D. Karssen, and S. Kim, M Wisse, The Effect of Swing Leg Retraction on Running Energy Efficiency, In Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, pp. 3957 – 3962, 25-30 September 2011, San Francisco, CA, USA.

J.G.D. Karssen, M. Haberland, M Wisse, and S. Kim, The Optimal Swing-Leg Retraction Rate for Running, In Proc. of IEEE International Conference on Robotics and Automation, pp. 4000 – 4006, 9-13 May 2011, Shanghai, China.

E. Hawkes, B. An, N. Benbernou, H. Tanaka, S. Kim, E.D. Demaine, D. Rus, and R.J. Wood, Programmable matter by folding. In Proc. of National Academic Science, 107 (28), pp. 12441-12445, 2010.

S. Seok, C. Onal, R. Wood, D. Rus, and S. Kim, Peristaltic locomotion in soft robotic platform, In Proc. of IEEE International Conference on Robotics and Automation, pp. 1228 – 1233, May 2010, Anchorage, AK.

S. Kim, E. Hawkes, K. Cho, M. Jolda, Matthew, J. T. Foley, and, R. J. Wood, Micro Artificial Muscle Fiber Using NiTi Spring for Soft Robotics, In Proc. of IEEE/RSJ International Conference on Intelligent Robots and Systems, October 11-15, 2009, Hyatt Regency St. Louis Riverfront, St. Louis, USA

D. Santos, B. Heyneman, S. Kim, N. Esparza, and M.R. Cutkosky, Gecko-Inspired Climbing Behaviors on Vertical and Overhanging Surfaces, In Proc. of IEEE International Conference on Robotics and Automation, Pasadena, CA, May 19-23,

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2008.

S. Kim, M. Spenko, S. Trujillo, B. Heyneman, V. Mattoli, M.R. Cutkosky Whole body adhesion: hierarchical, directional and distributed control of adhesive forces for a climbing robot, In Proc. of IEEE International Conference on Robotics and Automation, Rome, Italy, 10-14 April 2007, 1268-1273

D. Santos, S. Kim, M. Spenko, A. Parness, M. R. Cutkosky, Directional Adhesive Structures for Controlled Climbing on Smooth Vertical Surfaces, In Proc. of IEEE International Conference on Robotics and Automation, Rome, Italy, 10-14 April 2007, 1262-1267

S. Kim, A. Asbeck, W. Provancher, and M. R. Cutkosky, SpinybotII: Climbing Hard Walls with Compliant Micro-spines. In Proc. of IEEE International Conference on Advanced Robotics, Seattle, WA, July, 18-20, 2005.

A. T. Asbeck, S. Kim, W. R. Provancher, M.R. Cutkosky, and M. Lanzetta, Scaling Hard Surfaces With Microspine Arrays, In Proc. of Robotics: Science and Systems, MIT, June 8-10, 2005.

S. Kim, J.E. Clark, and M.R. Cutkosky, iSprawl : Autonomy, and the Effects of Power Transmission. In Proc. CLAWAR, Madrid, Spain, Sept. 22-24, 2004.S.