

Sangbae Kim

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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			1994 - 2001	
Seoul, Korea				
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Experience	Massachusetts Institute of Technology			
	Professor in Mechanical Engineering dept.			2020-
	Associate professor in Mechanical Engineering dept.			2014 - 2020
	Assistant professor in Mechanical Engineering dept.			2009 - 2014
	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	Defense Science Study Group	2019
	Best conference Paper and Student paper Finalist for IEEE ICRA	2018
	Best Paper Award for the IEEE/ASME Transactions on Mechatronics	2016
	Ruth and Joel Spira Award for Distinguished Teaching	2015
	NSF Career Award	2014
	DARPA Young Investigator Award	2013
	Edgerton Career Development Chair	2010 ~ 2013
	Best Paper Award for the IEEE Transactions on Robotics, for the year 2008	2009
	Best Student Paper Award and Best Conference paper finalist for the IEEE International Conference on Robotics & Automation 2007	2007
	Selected among TIME magazine's Best Inventions of 2006	2006
	Best video Award at IEEE International Conference on Robotics and Automation	2006
	Media	The MIT Cheetahs : Bio-inspired quadruped -Featured in New York Times, CNN cover, Time magazine, National Geographic, MIT Technology Review, and IEEE Spectrum, CBS, AP news, Jimmy Fallon Tonight's show and more than 300 other media
Stickybot : Gecko-inspired climbing robot Featured on The Discovery channel: <i>Weird Science</i> , History channel: <i>Modern Marvels- "Sticky Stuff"</i> , PBS Wired science: <i>Geek Beat</i> , ABC "Good morning America" , National Geographic- " <i>Design by Nature</i> ", Forbes magazine- " <i>7 Amazing robots that will change your life</i> " and more than 50 other media coverage: Presented at Google Zeitgeist Science Fair, DARPA Tech, American Association for the Advancement of Science Annual meeting 2007		2006
Spinybot: insect-inspired climbing robot Featured on ABC news and ARTE documentary		2006
iSprawl: Cockroach-inspired running robot Featured on Science central, ARTE documentary, DiscoveryChannel: Daily Planet		2005
Patents	1. Device and method for handling an object of interest using a directional adhesive structure in South Korea Appl. No. :10-2007-0025602, Sangbae Kim, Jin Lee	
	2. Climbing with dry adhesive : Stickybot. Patent No.: 7762362 B2, Jul. 27, 2010, Mark R Cutkosky, Sangbae Kim	
	3. Biologically inspired climbing device Patent No.: 8066088, Nov. 29, 2011, Mark R Cutkosky, Sangbae Kim, Alan Asbeck	
	4. Variably Flexible pipe and manipulator, Yong Jae KIM, Shan Bao Cheng, Sang Bae Kim, Karl Iagnemma.	
	5. Arm unit and robot having the same (US 2013-0312564 A1), Yong Jae KIM, Sang bae Kim, Shan bao Cheng, Karl Iagnemma	
	6. Sensing sytem, Kim et. al. USPTO appl. No. 16409537 pending	
	7. Actuator USPTO appl. No. 16410887 pending	

Selected Invited talk

1. Keynote speech IROS 2019, “Robots with Physical Intelligence”
2. 2018 **Davos World Economic Forum** “Idea labs on Intelligent Cyber-Physical Systems for Health with MIT” Davos, Switzerland
3. "Introduction to MIT Cheetah 3", **AMAZON MARS** meeting
4. “How to build robots from the lessons from animals: design challenges of the MIT Cheetah”, Symposium talk at American Association for the Advancement of Science (**AAAS**), 2014 Meeting, Chicago IL.
5. "Future of Humanoids", **AMAZON MARS** event, Palm Spring, CA March 2016
6. "Ground mobility: Physical interaction with world", Annual meeting of the MIT presidential CEO advisory board, MIT, 2017
7. "MIT Cheetah: New Design Paradigm for Mobile Robots", **Frontiers of Engineering Symposium**, Irvine, CA, 2016.
8. “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
9. April, 2016, "MIT Cheetah: A legged Robot for Disaster Response; How Robotics Can Help to Automate Operations, Maintenance & Emergency Response in Nuclear Plants", **Plenary** talk at the International Congress on Advances in Nuclear Power Plants (ICAPP), 2016
10. “Learn from Nature: Innovation toward Future Robots”, SBS Seoul Digital Forum 2014, Seoul, Korea.
11. "Robots in Hazardous Environments", British Consulate General RUKUS(Robotics in the UK & US) event, Boston, 2016.

Publications

-Selected Refereed
Journal

Ramos, J., and S. Kim, "Dynamic locomotion synchronization of bipedal robot and human operator via bilateral feedback teleoperation", *Science Robotics*, vol. 4, 2019.

Boussema, C., M. J. Powell, G. Bleedt, A. J. Ijspeert, P. M. Wensing, and S. Kim, "Gait Emergence and Disturbance Recovery for Legged Robots via the Feasible Impulse Set", *IEEE Robotics and Automation Letters*, 05/2019.

J. Ramos, and S. Kim, Humanoid Dynamic Synchronization through Whole-Body Bilateral Feedback Teleoperation, *IEEE Transactions in Robotics*, 34(4), 2018

P. Wensing, A. Wang, S. Seok, D. Otten, J. Lang and S. Kim, Proprioceptive Actuator Design: Impact Mitigation and High-Bandwidth Physical Interaction for Dynamic Legged Robots, *IEEE Transactions in Robotics*, 33(3), 2017.

S. Seok, A. Wang, M. Chuah, D. Hyun, J. Lee, D. Otten, Design Principles for En- ergy Efficient Legged Locomotion and Implementation on the MIT Cheetah Robot *IEEE/ASME Transactions on Mechatronics*, 20(3):1-13, 2014 - **Best paper award**.

D. Hyun, S. Seok, J. Lee and S. Kim, High Speed Trot-running: Implementation of a Hierarchical Controller using Proprioceptive Impedance Control on the MIT Cheetah, *International Journal of Robotics Research*, 33(11), pp. 1417-1445, Aug. 2014.

Y. Kim, S. Cheng, S. Kim, and K. Iagnemma, A Novel Layer Jamming Mechanism with Tunable Stiffness Capability for Minimally Invasive Surgery, *IEEE Transactions on*

Robotics ,29(4); 1031 - 1042, Aug. 2013

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

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

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 – **best paper award**

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

-Refereed conference proceeding

Bledt, G., and S. Kim, "Extracting Legged Locomotion Heuristics with Regularized Predictive Control", 2020 IEEE International Conference on Robotics and Automation (ICRA), Paris, France, 06/2020.

M. Chuah, L. Epstein, D. Kim, J. Romero, and S. Kim, "Bi-Modal Hemispherical Sensor: A Unifying Solution for Three Axis Force and Contact Angle Measurement", IEEE/RSJ International Conference on Intelligent Robots and Systems, Macau, 2019.

B. Katz, J. Di Carlo, and S. Kim, "Mini Cheetah: A Platform for Pushing the Limits of Dynamic Quadruped Control", International Conference on Robotics and Automation (ICRA), May 2019.

G. Bledt, P. Wensing, S. Ingersoll, and S. Kim, Contact Model Fusion for Event-Based Locomotion in Unstructured Terrains, In Proc. of IEEE International Conference on Robotics and Automation 2018 – **Best conference paper and student paper finalist.**

G. Bledt, M. J. Powell, B. Katz, J. Di Carlo, P. M. Wensing, and S. Kim, MIT Cheetah 3: Design and Control of a Robust, Dynamic Quadruped Robot, Proc. of the 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2018

G. Bledt, P. M. Wensing, and S. Kim, Policy-regularized model predictive control to stabilize diverse quadrupedal gaits for the MIT cheetah, Proc. of the 2017 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2017

Park, H-W., P. M. Wensing, and S. Kim, Online Planning for Autonomous Running Jumps Over Obstacles in High-Speed Quadrupeds, Robotics: Science and Systems, 2015.

- A. Wang, and S. Kim, Directional Efficiency in Geared Transmissions: Characterization of Backdrivability Towards Improved Proprioceptive Control, In Proc. of IEEE International Conference on Robotics and Automation 2015.
- H. Park, S. Park, and S. Kim, Variable-speed Quadrupedal Bounding Using Impulse Planning: Untethered High-speed 3D Running of MIT Cheetah 2, In Proc. of IEEE International Conference on Robotics and Automation 2015
- S. Yim, and S. Kim, Printable, Foldable, and Wearable Tele-operation Devices for Micro-robotic Application, In Proc. of IEEE International Conference on Robotics and Automation 2015
- 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, pp 3307 – 3312, Germany, 2013.
- 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.
- 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.
- 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, 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 - **best paper award**
- 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.