

Jesung Koh, Ph. D

Curriculum Vitae

Assistant Professor,
Department of Mechanical Engineering,
Ajou University
(kjsmirr@gmail.com, jskoh@ajou.ac.kr)

Research Interest

Printable & Origami Inspired Robotics
Biologically Inspired Designs & Mechanisms for Robotic Applications
Micro Robots Based on the Fiber Reinforced Composite
Microfabrication & Assembly
Artificial Muscle Actuators (e.g. Shape Memory Alloy actuators)

Education

Ph.D. and M.S. **Seoul National University**, Seoul, South Korea
, Integrated Course School of Mechanical and Aerospace Engineering.
(Aug. 2014) *Advisor : Prof. Kyu-Jin Cho, Biorobotics Laboratory.*
Dissertation: "Water Strider Inspired At-scale Water Jumping Robot"

B.E. (Aug. 2008) **Seoul National University**, Seoul, South Korea
School of Mechanical and Aerospace Engineering.

Professional Appointments

2015-2017 **Postdoctoral Fellow**,
Microrobotics Laboratory (*Advisor: Prof. Robert J. Wood*),
School of Engineering and Applied Sciences and Wyss Institute for
Biologically inspired Engineering,
Harvard University

2014 **Postdoctoral Fellow**,
Biorobotics Laboratory (*Advisor: Prof. Kyu-Jin Cho*)
School of Mechanical and Aerospace Engineering.
Seoul National University

Honors and Awards

Aug. 2014 **Compliant Mechanisms-Application Award in ASME/IDETC 2014**
Paper title : "Self-Folding Origami using Torsion Shape Memory Alloy Wire
Actuators", in *ASME IDETC/CIE*, 2014.

Oct. 2013 **Best Conference Video Award in IROS 2013**
Paper title : "Meso-scale Robot Assembly using Shape Memory Polymer Rivet
Fastener", IEEE/RSJ IROS 2013

Apr. 2011 **Most Cited Articles Award, 2009 to 2010**
International Journal of Precision Engineering and Manufacturing,
Paper title: "Review of manufacturing processes for soft biomimetic robots"

Sep. 2010 **Best Student Paper Awards in BIOROB 2010**
Paper title: "Towards a Bio-mimetic Flytrap Robot Based on a Snap-Through

June 2003 Mechanism", IEEE BIOROB 2010
 First Place Winner in ROBOCON, Seoul National University
 Participated in World ROBOCON, Nagoya, Japan.

Research/Development Experience

2013-2015 Developing the 'At-scale' Robotic Water strider Jumping on Water – Published at *Science Journal*, Highlighted at Multiple Science news, NYT, BBC, etc.
Nov. 2012 - Visiting Research in *Harvard Microrobotics Lab.* (Prof. R. J. Wood)
 Jan. 2013
2009-2012 Developing the Flytrap inspired bi-stable composite structures
2009-2013 Developing the Flea inspired jumping robot
2008-2012 Developing the Inchworm inspired small scale crawling and climbing robot

Publication

Dissertation

Je-Sung Koh, "Water Strider Inspired At-scale Water Jumping Robot", Seoul National University, Republic of Korea. 2014

International Journal

- [1] Mustafa Boyvat*, **Je-Sung Koh***, Robert J. Wood*, "Addressable wireless actuation for multijoint folding robots and devices", *Science Robotics*, vol. 2, no. 8, 2017.
- [2] Yong-Jai Park, Jong-Gu Lee, Sangwon Jeon, Heejin Ahn, **Je-Sung Koh**, Junghyun Ryu, Maenghyo Cho, and Kyu-Jin Cho, "Dual-stiffness structures with reconfiguring mechanism: Design and investigation", *Journal of Intelligent Material Systems and Structures*, vol. 27, no. 8, pp. 995-1010, 2016
- [3] **Je-Sung Koh***, Eunjin Yang*, Gwang-Pil Jung, Sun-Pill Jung, Jae Hak Son, Sang-Im Lee, Piotr G. Jablonski, Robert J. Wood, Ho-Young Kim and Kyu-Jin Cho. "Jumping on Water: Surface Tension-Dominated Jumping of Water Striders and Robotic Insects.", *Science*, vol.349, no. 6247, 517-521, 2015.
- [4] Ryu, Seok Chang, Zhan Fan Quek, **Je-Sung Koh**, Pierre Renaud, Richard J Black, Behzad Moslehi, Bruce L Daniel, Kyu-Jin Cho and Mark R Cutkosky. "Design of an Optically Controlled Mr-Compatible Active Needle." *Robotics, IEEE Transactions on (TRO)*, vol, 31, no. 1, pp. 1-11, 2015.
- [5] Jung, Sun-Pill, Gwang-Pil Jung, **Je-Sung Koh**, Dae-Young Lee and Kyu-Jin Cho. "Fabrication of Composite and Sheet Metal Laminated Bistable Jumping Mechanism.", *Journal of Mechanisms and Robotics*, vol. 7, no. 2, pp. 021010-021010, 2015.
- [6] Lee, Jong-Gu, Junghyun Ryu, Seung-Won Kim, **Je-Sung Koh**, Kyu-Jin Cho and Maenghyo Cho. "Effect of Initial Tool-Plate Curvature on Snap-through Load of Unsymmetric Laminated Cross-Ply Bistable Composites." *Composite Structures*, vol.122, pp. 82-91, 2015.
- [7] Seung.-Won Kim, **Je-Sung Koh**, Jong-Gu Lee, Junghyun Ryu, Maenghyo Cho and K.-J. Cho, "Flytrap-inspired robot using structurally integrated actuation based on bistability and a

developable surface”, *Bioinspir. Biomim.*, vol 9, no. 3, p 036004, 9 2014.

- [8] Ji-Suk Kim, Dae-Young Lee, **Je-Sung Koh**, Gwang-Pil Jung and Kyu-Jin Cho, “Component assembly with shape memory polymer fastener for microrobots”, *Smart Mater. Struct.*, vol 23, no 1, p 015011, 1 2014.
- [9] Gwang-Pil Jung, **Je-Sung Koh** and K. Cho, “Underactuated Adaptive Gripper Using Flexural Buckling”, *IEEE Transactions on Robotics (TRO)*, vol 29, no. 6, pp 1396–1407, 12 2013.
- [10] Dae-Young Lee, **Je-Sung Koh**, Ji-Suk Kim, Seung-Won Kim and Kyu-Jin Cho, "Deformable-wheel robot based on soft material", *International Journal of Precision Engineering and Manufacturing*, Vol. 14, No. 5, pp. 1439-1445, Aug. 2013.
- [11] **Je-Sung Koh**, and Kyu-Jin Cho, "Omega-shaped Inchworm-inspired Crawling Robot with Large-Index-and-Pitch (LIP) SMA Spring Actuators", *IEEE/ASME Transactions of Mechatronics (TMech)*, Vol. 18, No. 2, pp. 419-429, Apr. 2013.
- [12] Minkyun Noh, Seung-Won Kim, Sungmin An, **Je-Sung Koh**, Kyu-Jin Cho, "Flea-inspired catapult mechanism for miniature jumping robots", *IEEE Transactions on Robotics (TRO)*, Vol. 28, No. 5, pp. 1007-1018, Oct. 2012.
- [13] Kyu-Jin Cho, **Je-Sung Koh**, Sangwoo Kim, Won-Shik Chu, Yongtaek Hong, Sung-Hoon Ahn, "Review of manufacturing processes for soft biomimetic robots", *International Journal of Precision Engineering and Manufacturing (IJPEM)*, Vol. 10, No. 3, pp. 171-181, 2009. **Most Cited Articles Award, 2009 to 2010.**

Refereed International Conference

- [14] **Je-Sung Koh**, Daniel M. Aukes, Brandon Araki, Sarah Pohorecky, Yash Mulgaonkar, Micheal T. Tolley, Vijay Kumar, Daniela Rus and Robert J. Wood, "A Modular Fold ed Laminate Robot Capable of Multi Modal Locomotion", *International Symposium on Experimental Robotics (ISER 2016)*, Tokyo, Japan, Oct., 2016
- [15] Yash Mulgaonkar, Brandon Araki, **Je-Sung Koh**, L. Guerrero-Bonilla, D. M. Aukes, A. Makineni, M. T. Tolley, D. Rus, R. J. Wood, and V. Kumar, "The flying monkey: A mesoscale robot that can run, fly, and grasp," 2016 IEEE International Conference on Robotics and Automation (ICRA), Stockholm, pp. 4672-4679, 2016
- [16] **Je-Sung Koh**, Sa-Reum Kim and Kyu-Jin Cho, “Self-folding origami using the torsion shape memory alloy wire actuators”, in *ASME 2014 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference IDETC/CIE, 2014. Compliant Mechanisms-Application Award*
- [17] Gwang-Pil Jung, Ji-Suk Kim, **Je-Sung Koh**, Sunpill Jung and Kyu-Jin Cho, “Role of Compliant Leg in the Flea-Inspired Jumping Robot”, in *2013 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2013, To appear.
- [18] **Je-Sung Koh** and Kyu-Jin Cho, “Development of an Insect Size Micro Jumping Robot”, in *Biomimetic and Biohybrid Systems (Living Machines 2014)*, Springer International

Publishing, 2014, pp 405–407.

- [19] Ji-Suk Kim, Gwang-Pil Jung, **Je-Sung Koh** and Kyu-Jin Cho, “Meso-scale robot assembly using shape memory polymer rivet fastener” *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp. 2032, 2013. **Best Conference Video Award**
- [20] Gwang-Pil Jung, Useok Jeong, **Je-Sung Koh** and Kyu- Jin Cho, “The Development of a Scalable Underactuated Gripper based on Flexural Buckling”, *Proceedings of the IEEE International Conference on Intelligent Robots and Systems (IROS)*, pp. 2077, 2013
- [21] **Je-Sung Koh**, Sun-Pil Jung, Rorbert J. Wood and Kyu-Jin Cho, “A jumping robotic insect based on a torque reversal catapult mechanism”, in *2013 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2013, pp 3796–3801.
- [22] Dae-Young Lee, Ji-Suk Kim, Sa-Reum Kim, **Je-Sung Koh**, Kyu-Jin Cho, "The Deformable Wheel Robot using Magic-Ball Origami Structure", *Proceedings of the ASME 2013 IDETC/CIE*, 2013.
- [23] **Je-Sung Koh**, Sun-Pill Jung, Min-Kyun Noh, Seung-Won Kim, and Kyu-Jin Cho, "Flea Inspired Catapult Mechanism with Active Energy Storage and Release for Small Scale Jumping Robot", *Proceedings of the IEEE International Conference on Robotics and Automation (ICRA)*, May. 2013.
- [24] **Je-Sung Koh**, Dae-Young Lee, Seung-Won Kim and Kyu-Jin Cho, "Deformable soft wheel robot using hybrid actuation", *the IEEE International Conference on Intelligent Robots and Systems (IROS2012)*, Oct. 2012.
- [25] Junghyun Ryu, Jong-Gu Lee, Meanghyo Cho, Seung-Won Kim, **Je-Sung Koh** and Kyu- Jin Cho, "Snap-through behavior of bi-stable composite structure using SMA spring actuator", in *52nd AIAA/ASME/ASCE/AMS/ASC SDM conference*, 2011.
- [26] Seung-Won Kim, **Je-Sung Koh**, Maenghyo Cho and Kyu-Jin Cho, "Design & Analysis a Flytrap Robot using Bi-stable Composite", *Proceedings of the 2011 IEEE International Conference on Robotics and Automation(ICRA)*, 2011
- [27] **Je-Sung Koh** and Kyu-Jin Cho, "Endoskeletons using Composite Flexure Joint for BioMimetic Meso-scale Robot", *Proceedings of the 2011 IEEE International Conference on Robotics and Automation(ICRA)*, 2011.
- [28] J. Ryu, S. Ahn, **J. Koh**, K. J. Cho, M. Cho, "Modified Brinson model as an equivalent one-dimensional constitutive equation of SMA spring", in *Proceedings of SPIE*, vol. 7981, p. 79813W, 2011.
- [29] **Je-Sung Koh** and Kyu-Jin Cho, "Omegabot: Crawling robot inspired by Ascotis Selenaria," *2010 IEEE International Conference on Robotics and Automation (ICRA)*, pp.109-114, 2011.
- [30] Seung-Won Kim, **Je-Sung Koh**, Maenghyo Cho and Kyu-Jin Cho, "Towards a Bio-mimetic Flytrap Robot Based on a Snap-Through Mechanism", *Proceedings of the 2010 3rd IEEE*

RAS/EMBS International Conference on Biomedical Robotics and Biomechanics(BIOROB), pp.534-539, 2010. **Best Student Paper Award**

- [31] **Je-sung Koh**, Hong-Jip Kim, Gwang-pil Jung, Kyu-jin Cho, "Crawling robot inspired by Inchworm using SMA spring actuator and flexure joint," ***International Symposium on Nature-Inspired TECHNOLOGY 2010***.
- [32] **Je-Sung Koh**, Sung-Min An, and Kyu-Jin Cho, "Finger-sized climbing robot using artificial proleg," in ***Biomedical Robotics and Biomechanics (BioRob), 2010 3rd IEEE RAS and EMBS International Conference on***, 610-615, 2010.
- [33] **Je-Sung Koh** and Kyu-Jin Cho, "Omegabot: Biomimetic Inchworm Robot using SMA coil actuator and Smart Composite Microstructures(SCM)", ***Proceedings of the 2009 IEEE International Conference on Robotics and Biomimetics(RoBio 2009)***, 2009, pp.1154-1159.

Select Media Coverage

- Science News: "Tiny robot walks, jumps on water", Jul.30, 2015
- BBC News: "Robot can leap from water's surface", Jul.30, 2015
- NBC News: "Scientist create robotic insect that can jump on water", Jul.30, 2015
- NY Times, Sciencetake: "Never mind walking, some insects can jump on water", Aug. 3, 2015
- Reuters: "Minority Report-type insect robots jump on water", Jul.30, 2015
- Popular Science: "Insect-like robot can jump on water", Jul.30, 2015

Mentoring and Advising

- Brandon Araki, REU student, MIT, Topic "Printable robot capable of multi-modal locomotion"
- Jenny Horing, Undergraduate intern student, Harvard Univ., Topic "Mantis Shrimp inspired Impulsive system"
- Mary Zuo Ke, REU student, UPenn, Topic "Data acquisition for Bio-inspired Impulsive system"