Byoungkwon An (Kwon An)

CONTACT INFORMATION

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EDUCATION

Duke University, Durham, NC, USA
Ph.D. Student in Computer Science, 2017 - Present

Massachusetts Institute of Technology, Cambridge, MA, USA — Advisor: Daniela Rus
S.M. in Computer Science, September 2011
Thesis: Sticker Controller and Programming for Smart Sheets (Self-Folding Sheets)

Soongsil University, Seoul, Korea — Advisor: Jim Min Kim
B.A. in Physics, February 2004
Thesis: Scaling of Dynamic Surface Growth Model on Fractal Dimension

PUBLICATIONS

[19] Wang, W. , Chen, S., **An, B.**, Huang, K., Bai, T., Xu, M., Bellot, G., Ke, Y., Xiang, Y., and Wei, B., *Complex wireframe DNA nanostructures from simple building blocks*, Nature Communications, 10:1067, 2019,

[18] **An, B.**, Miyashita, S., Ong, A., Aukes, D., L., Tolley, M., Demaine, E., Demaine, M., Wood, R., Rus, D., *An End-to-End Approach to Self-Folding Origami Structures*, IEEE Transactions on Robotics, 34(6): 1409-1424, 2018, *pdf*

[17] **An, B.**, Tao, Y., Gu, J., Cheng, T., Chen, X., Zhang, X., Zhao, W., Do, Y., Takahashi S., Wu, H., Zhang, T., Yao, L., *Thermorph: Democratizing 4D Printing of Self-Folding Materials and Interfaces*, ACM CHI Conference on Human Factors in Computing Systems (CHI), Montreal, QC, Canada, 2018, *pdf*

[16] Wang G., Cheng, T., Do, Y., Yang, H., Tao, Y., Gu, J., **An, B.**, Yao, L., *Printed Paper Actuator: A Low-cost Reversible Actuation and Sensing Method for Shape Changing Interfaces*, ACM CHI Conference on Human Factors in Computing Systems (CHI), Montreal, QC, Canada, 2018, *pdf*

[15] **An, B.**, Demaine, E., Demaine, M., Ku, J., *Computing 3SAT on a Fold-and-Cut Machine*, Canadian Conference on Computational Geometry (CCCG), Ottawa, Ontario, Canada, 2017, *pdf*

[14] Han, D., Qi, X., Myhrvold, C., Wang, B., Dai, M., Jiang, S., Bates, M., Liu, Y., **An, B.***, Zhang, F.*, Yan, H.*, Yin, P.* (* indicates corresponding authors), Single-Stranded DNA and RNA Origami, Science, Vol. 358, 2017, *pdf*

[13] **An, B.**, Han, D., Bates, M., Zhao, Wei., Wang, M., Tinnus, M., Zyracki, M., Wang, M., Yin, P., *Computational Design and Self-Assembly for Single Stranded DNA Origami*, Foundations of Nanoscience: Self-Assembled Architectures and Devices (FNANO), 2016, abstract, **selected oral presentation**

[12] Miyashita, S., DiDio, I., Ananthabhotla, I., **An, B.**, Sung, C., Arabagi, S., Rus D., *Folding Angle Regulation by Curved Crease Design for Self-Assembling Origami Propellers*, Journal of Mechanisms and Robotics (JMR), 2015, *pdf*

[11] Niiyama., R., Sun, X., Sung, C., **An, B.**, Rus, D., Kim, S., *Pouch Motors: Printable Soft Actuators Integrated with Computational Design*, Soft Robotics, 2015, *pdf*

[10] Khosla, A., **An, B.**, Lim, J., Torralba, A., *Looking Beyond the Visible Scene*, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), 2014, equal contribution, *pdf*

[9] **An, B.**, Miyashita, S., Tolley, M., Aukes, D., Meeker, L., Demaine, E., Demaine, M., Wood, R., Rus, D., *An End-to-End Approach to Making Self-Folded 3D Surface Shapes by Uniform Heating*, IEEE International Conference on Robotics and Automation (ICRA), 2014, *pdf video*

[8] **An, B.**, Rus, D., *Designing and Programming Self-Folding Sheets*,Robotics and Autonomous Systems, 2014, *pdf video*

[7] Mehta, A., Bezzoy N., **An, B.**, Gebhardy, P., Lee, I., Kumary, V., Rus, D., *A Design Environment for the Rapid Specification and Fabrication of Printable Robots*, International Symposium on Experimental Robotics (ISER), 2014, *pdf*

[6] **An, B.**, Rus, D., *Programming and Controlling Self-Folding Robots*, IEEE International Conference on Robotics and Automation (ICRA), 2012, *pdf*

[5] **An, B.**, Benbernou, N., Demaine, E., Rus, D., *Planning to Fold Multiple Objects from a Single Self-Folding Sheet*, Robotica, 29(1): 87-102, 2011, *pdf*

[4] Paik, J., **An, B.**, Rus, D., Wood, R., *Robotic Origamis: Self-Morphing Modular Robots*, International Conference on Morphological Computation (ICMC), 2011, *pdf*

[3] Hawkes, E., **An, B.**, Benbernou, N., Tanaka, H., Kim, S., Demaine, E., Rus, D., Wood, R., *Programmable Matter by Folding*, Proceedings of the National Academy of Sciences (PNAS), 107(28): 12441-12445, 2010, *pdf video*

[2] **An, B.**, Rus, D., *Making Shapes from Modules by Magnification*, IEEE/RSJ International Conference on Intelligent Robots and System (IROS), 2010, *pdf video*

[1] **An, B.**, *EM-Cube: Cube-shaped, Self-Reconfigurable Robots Sliding on Structure Surface*, IEEE International Conference on Robotics and Automation (ICRA), 2008, *pdf video1 video2*

Research Experience

Computer Science Department, Duke University
Graduate Research Assistant, Advisor John Reif 2017 – Present

Autodesk Research 2014 – 2017
Principal Research Scientist

Computer Science and Artificial Intelligence Lab, MIT
Visiting Alumni Scholar, Advisor Daniela Rus 2011 – 2014
Graduate Research Assistant, Advisor Daniela Rus 2008 – 2011

Nanophysics Lab, Korea University 2005 – 2006
Research Engineer, Advisor Se-Jong Kahng

Statistical Physics Lab, Soongsil University 2002 – 2003
Undergrad Research Assistant, Advisor Jin Min Kim

Software Engineering Lab, Soongsil University 2001
Undergrad Research Assistant, Advisor Nam-Yong Lee

Teaching Experience

Computational Physics, Physics Department, Soongsil University 2003
Teaching Assistant

Work Experience

Co-Founder, Bashan Networks Co. 2001 – 2003

- Founded software engineering consulting company with Professor Nam-Yong Lee
- Established partnership with IBM Rational Software to share consulting and education expertise
- Consulted and trained on object-oriented analysis and design (OOAD), and software architecture for government institutes and companies, including the Institute of Information Technology Advancement in the Ministry of Information and Communication of Korea, and Hyundai Motor Company

Co-Founder, IFCOM Tec. 1999 – 2001

- Designed and developed a distributed system of information sharing, internet broadcast and communication for investment and securities companies
- Designed and developed a distributed system of interactive internet broadcast

Art Exhibition

An, B. and Rus, D.,*Self-Folding Sheet*, Modern By Design, Atlanta High Museum of Art, GA 2011
An, B. et al., *Programmable Matter Design Pipeline*, Programmable Materials, MIT Keller Gallery, MA 2015

Honors and Awards

2nd Place for *1st Planetary Contingency Challenge*, IEEE International Conference on Robotics and Automation, Pasadena, CA, USA, 2008
Best Undergraduate Thesis, Physics Department, Soongsil University, 2003
Four Year Full Tuition Scholarship, Soongsil University, 1999

Professional Activity

Reviewer, IEEE International Conference on Robotics and Automation (ICRA) 2010 – 2016

Reviewer, Robotica, Cambridge Journal, 2014

PATENT

An, B., *FET (Field Effect Transistor) Nerve Electronic Chip*, 10-0765960, KR, 2006

MEDIA COVERAGE (SELECTED)

MIT News (MIT Main), Bake Your Own Robot, May 30, 2014
NBC News, *Right Out of the Oven: MIT Scientists Bake Self-Building Origami Robots*, May 30, 2014
Science Daily, *New printable robots could self-assemble when heated*, May 30, 2014
CNN, *Edge of Discovery, Transformers could be a reality!*, June 1, 2011
MIT News (MIT Main), *Shape-Shifting Robots*, August 4, 2010
Discovery News, Origami Robot Makes Shapes on Demand, July 7, 2010
CNET, Robotics meet origami in self-folding sheets, June 29, 2010
Nature News, *Origami that folds itself*, June 28, 2010
MSNBC, *Programmable matter may shape future tools*, June 28, 2010
Popular Science, *Video: Smart Sheets Can Self-Assemble Into Airplanes, Boats*, June 28, 2010
Phys.org, *Shape-shifting sheets automatically fold into multiple shapes*, June 28, 2010
Harvard Gazette, *Shape-shifting sheets automatically fold into multiple shapes*, June 28, 2010