

# 안병권

## SUMMARY

- MIT Computer Science 석사 출신, 18년 경력, 30여 프로젝트 설계, 컨설팅, 운영 및 개발 경력
- 다양한 개발 환경에서 Full Stack 설계 및 개발 가능 (프로그램을 숨쉬듯 설계, 운영, 개발)
- Computer Science 박사급 대우로 수석연구원으로 근무 경력
- Science 등, 해외 주요 학술지에 20여편의 논문 발표
- Front End: React.js, Next.js, JavaScript, TypeScript, three.js, WebGL
- Back End: Java, Node.js, Next.js, Python, Selenium, PHP, ASP, EJB
- Database: PostgreSQL, Sqlite, DynamoDB, Firebase Storage
- System: AWS, Firebase, GoogleCloud, Vercel, Docker
- Desktop App: Visual C++, C#, Matlab, Java, Delphi
- Cryptocurrency: Move Smart Contract

## EDUCATION

**Massachusetts Institute of Technology (MIT)**, Cambridge, MA, USA  
Computer Science 석사, 2011  
Advisor: Daniela Rus  
Thesis: Sticker Controller and Programming for Smart Sheets (Self-Folding Sheets)

**Soongsil University**, Seoul, Korea  
Physics 학사, 2004  
Advisor: Jim Min Kim  
Thesis: Scaling of Dynamic Surface Growth Model on Fractal Dimension

## PROJECTS

**최적화된 암호화폐 스왑 경로 검색 및 구매 시스템** 2023/4 – 2023/6

- 시스템 설계 및 알고리즘과 Front End / Back End 개발
- React.js, TypeScript, Move Smart Contract, Firebase (Auth, Hosting)

**쇼핑몰 크롤링 및 구매 시스템** 2023/4

- 시스템 설계 및 Back End 개발
- Python, Selenium, AWS EC2

**보안 문서 및 데이터 보관 시스템** 2022/9

- 시스템 설계 및 Back End 개발
- Node.js, TypeScript, Firestore Database, AWS S3

**보안 문서 및 데이터 열람 시스템** 2022/8 – 2022/9

- 시스템 설계 및 Front End / Back End 개발
- Next.js (React.js, REST API), TypeScript, Bootstrap, Firebase (Auth, Firestore Database, Storage), Vercel Hosting

**쇼핑몰 크롤링 및 구매 시스템** 2021/9 – 2022/8

- 시스템 설계 및 Front End / Back End / Workers 개발
- React.js, TypeScript, Python, Selenium, Firebase (Auth, Firestore Database), GoogleCloud, AWS EC2

**반응형 (Mobile/PC) 웹 사이트** 2021/3 – 2021/8

- Front End 개발
- JavaScript, Bootstrap, Github hosting

RESEARCH  
EXPERIENCE

**Autodesk Research**, Autodesk  
수석 연구 과학자, *Principal Research Scientist*

2014 – 2017

- 수석 연구과학자로서 박사급 대우로 근무
- 10개이상의 대학 연구소들과의 여러 공동 프로젝트들을 설계, 운영, 개발
- 프로젝트들의 핵심 알고리즘 개발
- Front End, Back End도 참여하여 함께 개발
- 프로젝트 결과들을 문서화하여 국제 학술지에 여러 논문으로 발표
- Airbus Generative Design 비행기 부품 경량화 프로젝트 수주
- React.js, Node.js (REST API), Python, JavaScript, three.js, PHP, Sqlite, AWS (EC2, DynamoDB, PostgreSQL), Docker

**Computer Science and Artificial Intelligence Lab**, MIT  
방문과학자, *Visiting Scholar, Advisor Erik Demaine*

2017

- 프로젝트를 설계, 운영, 개발
- 핵심 알고리즘 개발
- Front End 개발
- 프로젝트 결과들을 문서화하여 국제 학술지에 논문으로 발표
- React.js, Latex

**Morphing Matter Lab**, Carnegie Mellon University  
연구원, *Research Affiliate, Advisor Lining Yao*

2017

- 2개의 대학 연구소들과의 공동 프로젝트들을 설계, 운영, 개발
- 핵심 알고리즘 개발
- Front End, Back End 도 참여하여 함께 개발 영
- 프로젝트 결과들을 문서화하여 국제 학술지에 여러 논문으로 발표
- JavaScript, three.js, node.js

**Computer Science and Artificial Intelligence Lab**, MIT  
방문과학자, *Visiting Alumni Scholar, Advisor Daniela Rus*  
연구조교, *Graduate Research Assistant, Advisor Daniela Rus*

2011 – 2014

2008 – 2011

- 5개이상의 대학 연구소들과의 여러 공동 프로젝트들을 설계, 운영, 개발
- 핵심 알고리즘 개발
- Front End, Back End 도 참여하여 함께 개발 발
- 프로젝트 결과들을 문서화하여 국제 학술지에 여러 논문으로 발표
- Java, JavaScript, Matlab

**Nanophysics Lab**, Korea University  
연구개발자, *Research Engineer, Advisor Se-Jong Kahng*

2005 – 2006

- 나노 현미경 개발 프로젝트 운영, 개발
- Visual C++

**Statistical Physics Lab**, Soongsil University  
연구조교, *Undergrad Research Assistant, Advisor Jin Min Kim*

2002 – 2003

- 프랙탈 공간에서의 물리 시뮬레이션 프로젝트 설계, 운영, 개발
- Visual C++

	<b>Software Engineering Lab</b> , Soongsil University 연구조교, Undergrad Research Assistant, Advisor Nam-Yong Lee <ul style="list-style-type: none"> <li>프로젝트 및 시스템 설계, 운영 및 개발 방법 연구</li> <li>IBM Rational Rose</li> </ul>	2001
TEACHING EXPERIENCE	<b>Computational Physics</b> , Physics Department, Soongsil University 교육조교, Teaching Assistant	2003
WORK EXPERIENCE	<b>공동창업자, Co-Founder</b> , Bashan Networks Co. • 소프트웨어 설계 및 개발 컨설팅 회사 설립 • IBM Rational Software 와 컨설팅 협력 체결 • 정부기관과 대기업 (정보통신부, 현대자동차 등)의 프로젝트 설계, 운영, 개발 컨설팅 • Visual C++, Java, EJB, Delphi, IBM Rational Rose	2001 – 2003
	<b>공동창업자, Co-Founder</b> , IFCOM Tec. • 양방향 인터넷 방송 및 정보 공유 시스템 개발 회사 설립 • 양방향 인터넷 방송 프로젝트 설계, 운영 및 Front End / Back End 개발 • 정보 공유시스템 Front End 개발팀 운영 및 개발 • C++, Java, JavaScript, ASP, IBM Rational Rose	1999 – 2001
PUBLICATIONS	<p>[19] Wang, W. , Chen, S., <b>An, B.</b>, Huang, K., Bai, T., Xu, M., Bellot, G., Ke, Y., Xiang, Y., and Wei, B., <i>Complex wireframe DNA nanostructures from simple building blocks</i>, Nature Communications, 10:1067, 2019, <i>pdf</i></p> <p>[18] <b>An, B.</b>, Miyashita, S., Ong, A., Aukes, D., L., Tolley, M., Demaine, E., Demaine, M., Wood, R., Rus, D., <i>An End-to-End Approach to Self-Folding Origami Structures</i>, IEEE Transactions on Robotics, 34(6):1409-1424, 2018, <i>pdf</i></p> <p>[17] <b>An, B.</b>, Tao, Y., Gu, J., Cheng, T., Chen, X., Zhang, X., Zhao, W., Do, Y., Takahashi S., Wu, H., Zhang, T., Yao, L., <i>Thermorph: Democratizing 4D Printing of Self-Folding Materials and Interfaces</i>, ACM CHI Conference on Human Factors in Computing Systems (CHI), Montreal, QC, Canada, 2018, <i>pdf</i></p> <p>[16] Wang G., Cheng, T., Do, Y., Yang, H., Tao, Y., Gu, J., <b>An, B.</b>, Yao, L., <i>Printed Paper Actuator: A Low-cost Reversible Actuation and Sensing Method for Shape Changing Interfaces</i>, ACM CHI Conference on Human Factors in Computing Systems (CHI), Montreal, QC, Canada, 2018, <i>pdf</i></p> <p>[15] <b>An, B.</b>, Demaine, E., Demaine, M., Ku, J., <i>Computing 3SAT on a Fold-and-Cut Machine</i>, Canadian Conference on Computational Geometry (CCCG), Ottawa, ON, Canada, 2017, <i>pdf</i></p> <p>[14] Han, D., Qi, X., Myhrvold, C., Wang, B., Dai, M., Jiang, S., Bates, M., Liu, Y., <b>An, B.*</b>, Zhang, F.*, Yan, H.*, Yin, P.* (* indicates corresponding authors), <i>Single-Stranded DNA and RNA Origami</i>, Science, 358: eaao2648, 2017, <i>pdf</i></p> <p>[13] <b>An, B.</b>, Han, D., Bates, M., Zhao, Wei., Wang, M., Tinnus, M., Zyracki, M., Wang, M., Yin, P., <i>Computational Design and Self-Assembly for Single Stranded DNA Origami</i>, Foundations of Nanoscience: Self-Assembled Architectures and Devices (FNANO), Snowbird, UT, USA, 2016, abstract, <b>selected oral presentation</b></p> <p>[12] Miyashita, S., DiDio, I., Ananthabhotla, I., <b>An, B.</b>, Sung, C., Arabagi, S., Rus D., <i>Folding Angle Regulation by Curved Crease Design for Self-Assembling Origami Propellers</i>, Journal of Mechanisms and Robotics (JMR), 7(2):021013, 2015, <i>pdf</i></p> <p>[11] Niiyama., R., Sun, X., Sung, C., <b>An, B.</b>, Rus, D., Kim, S., <i>Pouch Motors: Printable Soft Actuators Integrated with Computational Design</i>, Soft Robotics, 2(2):59-70, 2015, <i>pdf</i></p> <p>[10] Khosla, A., <b>An, B.</b>, Lim, J., Torralba, A., <i>Looking Beyond the Visible Scene</i>, IEEE Conference on Computer Vision and Pattern Recognition (CVPR), Columbus, OH, USA, 2014, equal contribution, <i>pdf</i></p> <p>[9] <b>An, B.</b>, Miyashita, S., Tolley, M., Aukes, D., Meeker, L., Demaine, E., Demaine, M., Wood, R., Rus, D., <i>An End-to-End Approach to Making Self-Folded 3D Surface Shapes by Uniform Heating</i>, IEEE International Conference on Robotics and Automation (ICRA), Hong Kong, China, 2014, <i>pdf video</i></p>	

[8] **An, B.**, Rus, D., *Designing and Programming Self-Folding Sheets*, Robotics and Autonomous Systems, 62(7):976-1001, 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), Marrakech and Essaouira, Morocco, 2014, *pdf*

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

[5] Paik, J., **An, B.**, Rus, D., Wood, R., *Robotic Origamis: Self-Morphing Modular Robots*, International Conference on Morphological Computation (ICMC), Venice, Italy, 2012, *pdf*

[4] **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*

[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), Taipei, Taiwan, 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), Pasadena, CA, USA, 2008, *pdf video1 video2*

ART EXHIBITION	<b>An, B.</b> and Rus, D., <i>Self-Folding Sheet</i> , Modern By Design, Atlanta High Museum of Art, GA 2011 <b>An, B.</b> et al., <i>Programmable Matter Design Pipeline</i> , Programmable Materials, MIT Keller Gallery, MA 2015
HONORS AND AWARDS	2nd Place for <i>1st Planetary Contingency Challenge</i> , IEEE International Conference on Robotics and Automation, Pasadena, CA, USA, 2008 <i>Best Undergraduate Thesis</i> , Physics Department, Soongsil University, 2003 <i>Four Year Full Tuition Scholarship</i> , Soongsil University, 1999
PROFESSIONAL ACTIVITY	<b>Reviewer</b> , IEEE International Conference on Robotics and Automation (ICRA) 2010 – 2016 <b>Reviewer</b> , Robotica, Cambridge Journal, 2014
PATENT	<b>An, B.</b> , <i>FET (Field Effect Transistor) Nerve Electronic Chip</i> , 10-0765960, KR, 2006
MEDIA COVERAGE (SELECTED)	MIT News (MIT Main), <i>Bake Your Own Robot</i> , May 30, 2014 NBC News, <i>Right Out of the Oven: MIT Scientists Bake Self-Building Origami Robots</i> , May 30, 2014 Science Daily, <i>New printable robots could self-assemble when heated</i> , May 30, 2014 CNN, <i>Edge of Discovery, Transformers could be a reality!</i> , June 1, 2011 MIT News (MIT Main), <i>Shape-Shifting Robots</i> , August 4, 2010 Discovery News, <i>Origami Robot Makes Shapes on Demand</i> , July 7, 2010 CNET, <i>Robotics meet origami in self-folding sheets</i> , June 29, 2010 Nature News, <i>Origami that folds itself</i> , June 28, 2010 MSNBC, <i>'Programmable matter' may shape future tools</i> , June 28, 2010 Popular Science, <i>Video: "Smart Sheets" Can Self-Assemble Into Airplanes, Boats</i> , June 28, 2010 Phys.org, <i>Shape-shifting sheets automatically fold into multiple shapes</i> , June 28, 2010 Harvard Gazette, <i>Shape-shifting sheets automatically fold into multiple shapes</i> , June 28, 2010