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, three.js
- Back End: Java, Node.js, Next.js, Python, Selenium, PHP, ASP, EJB
- Database: PostgreDB, Sqlite, DynamoDB, Firebase Storage
- System: AWS, Firebase, GoogleCloud, Vercel
- Desktop App: Visual C++, C#, Matlab, Java, Delphi
- Cryptocurrency: Move Smart Contract

EDUCATION

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

Soongsil University, Seoul, Korea — Advisor: Jim Min Kim
Physics 학사, 2004
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, 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, 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), 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, 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 2014 – 2017
수석 연구 과학자, Principal Research Scientist

- 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, PostgreDB)

Computer Science and Artificial Intelligence Lab, MIT 2017
방문과학자, Visiting Scholar, Advisor Erik Demaine

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

Morphing Matter Lab, Carnegie Mellon University 2017
연구원, Research Affiliate, Advisor Lining Yao

- 2개의 대학 연구소들과의 공동 프로젝트를을 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 2011 – 2014
연구조교, Graduate Research Assistant, Advisor Daniela Rus 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 2005 – 2006
연구개발자, Research Engineer, Advisor Se-Jong Kahng

- 나노 현미경 개발 프로젝트 운영, 개발
- Visual C++

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

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

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

- 프로젝트 및 시스템 설계, 운영 및 개발 방법 연구
- IBM Rational Rose

TEACHING EXPERIENCE

Computational Physics, Physics Department, Soongsil University 2003
교육조교, Teaching Assistant

WORK EXPERIENCE

공동창업자, Co-Founder, Bashan Networks Co. 2001 – 2003

- 소프트웨어 설계 및 개발 컨설팅 회사 설립
- IBM Rational Software 와 컨설팅 협력 채결
- 정부기관과 대기업 (정보통신부, 현대자동차 등)의 프로젝트 설계, 운영, 개발 컨설팅
- Visual C++, Java, EJB, Delphi, IBM Rational Rose

공동창업자, Co-Founder, IFCOM Tec. 1999 – 2001

- 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

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, *pdf*

[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, ON, 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, 358: eaao2648, 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), Snowbird, UT, USA, 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), 7(2):021013, 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, 2(2):59-70, 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), Columbus, OH, USA, 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), Hong Kong, China, 2014, *pdf video*

[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

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