# **Ryo Suzuki** Curricumlum Vitae

ATLAS Institute
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## Research Interest

My research focus lies in the **intersection between robotics and human-computer interaction**. During my PhD, I have developed a novel physical interface made of swarm and soft robots, by leveraging the technique from both robotics and HCI. The goal of my research is to *make the physical environment more adaptive with the distributed swarm robots at all scales* (i.e., from mm- to m-scale).

keyword: tangible interface, swarm robots, soft robots, augmented reality

## Education

*08/2015 – present* **University of Colorado Boulder**
Ph.D. candidate in Human-Computer Interaction
Department of Computer Science

Dissertation: Adaptive Physical Environment with Distributed Swarm Robots
Advisors: Daniel Leithinger and Mark D. Gross;
Committee: Hiroshi Ishii, Takeo Igarashi, Tom Yeh

*04/2011 – 03/2013* **University of Tokyo**
M.A. in Economics and Game Theory
Department of Economics

Thesis: Diffusion Process and Take-off Conditions of Online Platforms
Advisor: Michihiro Kandori, Koji Yatani

*04/2007 – 03/2011* **Tokyo Institute of Technology**
B.Eng in Social Engineering
Department of Engineering

## Professional Experience

*08/2015 –* **University of Colorado Boulder**
Research Assistant in Department of Computer Science and ATLAS Institute
with Daniel Leithinger, Mark D. Gross, Tom Yeh

*05/2019 – 08/2019* **Adobe Research, Seattle**
Research Intern in Creative Intelligence Lab
with Rubaiat Habib, Li-Yi Wei, Stephen Diverdi, Danny Kaufman

*12/2017 – 10/2018* **University of Tokyo**
Research Intern in JST ERATO
with Yasuaki Kakehi, Yoshihiro Kawahara, Ryuma Niiyama

*05/2016 – 08/2016* **UC Berkeley**
Research Intern in BiD Group
with Bjoern Hartmann, Gustavo Soares, Elena Glassman

*05/2015 – 08/2015* **Stanford University**
Research Intern in HCI Group
with Michael Bernstein

*09/2014 – 05/2015* **University of Tokyo**
Research Assistant in IIS Lab
with Koji Yatani

*01/2015 – 03/2015* **AIST, Tsukuba**
Research Intern in Media Interaction Group
with Jun Kato, Masataka Goto

## Peer-Reviewed Conference Publications

Quick summary since 2016: First Author (9 + 2 in submission), Best Paper (1), CHI (3), UIST (2), ICSE (1), ASSETS (1), and other venues (5). 280 citations and 8 h-index based on Google Scholar (as of 11/2019) [a]

[a] https://scholar.google.com/citations?user=klWjaQIAAAAJ

*[-]* **Ryo Suzuki**, Rubaiat Habib, Li-Yi Wei, Stephen Diverdi, Daniel Leithinger. RealitySketch: Sketching Interactive Concept Visualizations in Augmented Reality. (**CHI '20** under review)

*[-]* **Ryo Suzuki**, Hooman Hedayati, James Bohn, Clement Zheng, Daniel Szafir, Ellen Yi-Luen Do, Mark D. Gross, Daniel Leithinger. RoomShift: Room-scale Dynamic Haptics for VR with Furniture-moving Swarm Robots. (**CHI '20** under review)

*[C12]* **Ryo Suzuki**, Ryosuke Nakayama, Dan Liu, Yasuaki Kakehi, Mark D. Gross, Daniel Leithinger. LiftTiles: Constructive Building Blocks for Prototyping Room-scale Shape-changing Interfaces. *In Proceedings of the ACM International Conference on Tangible, Embedded and Embodied Interaction*. ACM, 2020. (**TEI '20**, acceptance rate: 28%)

*[C11]* **Ryo Suzuki**, Clement Zheng, Yasuaki Kakehi, Tom Yeh, Ellen Do, Mark D. Gross, Daniel Leithinger. ShapeBots: Shape-changing Swarm Robots. *In Proceedings of the Annual ACM Symposium on User Interface Software and Technology*. ACM, 2019. (**UIST '19**, acceptance rate: 24%)

*[C10]* Ryosuke Nakayama*, **Ryo Suzuki***, Satoshi Nakamaru, Ryuma Niiyama, Yoshihiro Kawahara, Yasuaki Kakehi. (* equally contributed) MorphIO: Entirely Soft Sensing and Actuation Modules for Programming Shape Changes through Tangible Interaction. *In Proceedings of the ACM Conference on Designing Interactive Systems*. ACM, 2019. (**DIS '19**, acceptance rate: 25%)
**Best Paper Award (top 1%)**

*[C9]* **Ryo Suzuki**, Junichi Yamaoka, Daniel Leithinger, Tom Yeh, Mark D. Gross, Yoshihiro Kawahara, Yasuaki Kakehi. Dynablock: Dynamic 3D Printing for Instant and Reconstructable Shape Formation. *In Proceedings of the Annual ACM Symposium on User Interface Software and Technology*. ACM, 2018. (**UIST '18**, acceptance rate: 20%)

*[C8]* **Ryo Suzuki**, Koji Yatani, Mark D. Gross, Tom Yeh. Tabby: Explorable Design for 3D Printing Textures. *In Proceedings of the Pacific Conference on Computer Graphics and Applications*. Eurographics Association, 2018 (**PG '19**, acceptance rate: 26%)

*[C7]* **Ryo Suzuki**, Jun Kato, Mark D. Gross, Tom Yeh. Reactile: Programming Swarm User Interfaces through Direct Physical Manipulation. *In Proceedings of the CHI Conference on Human Factors in Computing Systems*. ACM, 2018. (**CHI '18**, acceptance rate: 25%)

*[C6]* Hyunjoo Oh, Tung D. Ta, **Ryo Suzuki**, Mark D. Gross, Yoshihiro Kawahara, Lining Yao. PEP (3D Printed Electronic Papercrafts): An Integrated Approach for 3D Sculpting Paper-based Electronic Devices. *In Proceedings of the CHI Conference on Human Factors in Computing Systems*. ACM, 2018. (**CHI '18**, acceptance rate: 25%)

*[C5]* **Ryo Suzuki**, Abigale Stangl, Mark D Gross, Tom Yeh. FluxMarker: Enhancing Tactile Graphics with Dynamic Tactile Markers. *In Proceedings of the International ACM SIGACCESS Conference on Computers and Accessibility.* ACM, 2017. (**ASSETS '17**, acceptance rate: 26%)

*[C4]* **Ryo Suzuki**, Gustavo Soares, Andrew Head, Elena Glassman, Ruan Reis, Melina Mongiovi, Loris D'Antoni, Bjoern Hartmann. TraceDiff: Debugging Unexpected Code Behavior Using Trace Divergences. *In Proceedings of the IEEE Symposium on Visual Languages and Human-Centric Computing*. IEEE, 2017. (**VL/HCC '17**, acceptance rate: 29%)

*[C3]* Andrew Head, Elena Glassman, Gustavo Soares, **Ryo Suzuki**, Lucas Figueredo, Loris D'Antoni, Bjoern Hartmann. Writing Reusable Code Feedback at Scale with Mixed-Initiative Program Synthesis. *In Proceedings of the ACM Conference on Learning at Scale*. ACM, 2017. (**L@S '17**, acceptance rate: 22%)

*[C2]* Reudismam Rolim, Gustavo Soares, Loris D'Antoni, Oleksandr Polozov, Sumit Gulwani, Rohit Gheyi, **Ryo Suzuki**, Bjoern Hartmann. Learning Syntactic Program Transformations from Examples. *In Proceedings of the International Conference on Software Engineering*. IEEE, 2017. (**ICSE '17**, acceptance rate: 19%)

*[C1]* **Ryo Suzuki**, Niloufar Salehi, Michelle S. Lam, Juan C. Marroquin, Michael S. Bernstein. Atelier: Repurposing Expert Crowdsourcing Tasks as Micro-internships. *In Proceedings of the CHI Conference on Human Factors in Computing Systems*. ACM, 2016. (**CHI '16**, acceptance rate: 23%)

## Peer-Reviewed Demo and Poster Publications

*[D7]* **Ryo Suzuki**. Collective Shape-changing Interfaces. *In Adjunct Proceedings of the Annual ACM Symposium on User Interface Software and Technology*. ACM, 2019. (**UIST '19** Doctoral Consortium)

*[D6]* **Ryo Suzuki**, Ryosuke Nakayama, Dan Liu, Yasuaki Kakehi, Mark D. Gross, Daniel Leithinger. LiftTiles: Modular and Reconfigurable Room-scale Shape Displays through Retractable Inflatable Actuators. *In Adjunct Proceedings of the Annual ACM Symposium on User Interface Software and Technology*. ACM, 2019. (**UIST '19** Poster)

*[D5]* **Ryo Suzuki**, Gustavo Soares, Elena Glassman, Andrew Head, Loris D'Antoni, Bjoern Hartmann. Exploring the Design Space of Automatically Synthesized Hints for Introductory Programming Assignments. *In Proceedings of the CHI Conference Extended Abstracts on Human Factors in Computing Systems*. ACM, 2017. (**CHI '17** Late-Breaking Work)

*[D4]* Stanford Crowd Research Collective (For the full author list, please see the publication), Daemo: A Self-Governed Crowdsourcing Marketplace. *In Adjunct Proceedings of the Annual ACM Symposium on User Interface Software and Technology*. ACM, 2015. (**UIST '15** Poster)

*[D3]* **Ryo Suzuki**. Toward a Community Enhanced Programming Education. *In Proceedings of the CHI Conference Extended Abstracts on Human Factors in Computing Systems*. ACM, 2015. (**CHI '15** Workshop Paper)

*[D2]* **Ryo Suzuki**, Interactive and Collaborative Source Code Annotation. *In Proceedings of the International Conference on Software Engineering*. IEEE, 2015. (**ICSE '15** Poster)

*[D1]* **Ryo Suzuki**, Network Thresholds and Multiple Equilibria in the Diffusion of Content-based Platforms. *In Proceedings of the International Conference on Web and Internet Economics*. Springer, 2014. (**WINE '14** Poster)

## Awards and Scholarships

### Awards

*2019* **DIS 2019 Best Paper Award**

*2013* **Tech Crunch Disrupt in Tokyo 2013** Finalist

*2012* **University of Tokyo Startup Competition** 1st Prize Winner

### Scholarship

*2015-2020* **CU Boulder Travel Grant** ($500-$1,200 for each conference travel)

*2015-2020* **Nakajima Foundation Scholarship** ($120,000 stipend for 5 years and 2 years tuition coverage)

*2013-2015* **JSPS Research Fellow DC1** ($72,000 stipend for 2 years)

*2011-2013* **JASSO Fellow (Total Exemption for Outstanding Students)** ($20,000 stipend for 2 years)

*2010* **Tohso Foundation Scholorship** ($3,600)

## Funding

*2019* **Ryo Suzuki**. Adaptive Physical Environments with Distributed Swarm Robots. *Ministry of Internal Affairs and Communications in Japan*, Innovation Research Funding, $30,000
https://www.inno.go.jp/en/

*2019* **Ryo Suzuki**. Adobe Gift Funding, $5,000

*2018* **Ryo Suzuki**. Dynamic Physical Interfaces. *JST in Japan*, ACT-I Funding for Young Scholars, $30,000 and Mentorship Opportunity (my mentor was Takeo Igarashi)
https://www.jst.go.jp/kisoken/act-i/en/index.html

*2018* **Ryo Suzuki**. Programmable Architecture with Soft Inflatable Actuator. *Leave a Nest Foundation in Japan*, Emerging Research Funding for AI and Interdisciplinary Research $5,000

*2013-2015* **Ryo Suzuki**. Network-based Diffusion Analysis for Online Community, *JSPS*, KAKENHI Grants-in-Aid for Scientific Research, $40,000

## Selected Press Coverage

*11/2019* Bouncy. *Swarm Robots that can Change Shape to Visualize Data*

*10/2019* Hackster.io. *Swarming Robots Can Change Their Configuration to Handle Different Tasks*

*09/2019* TechXplore. *ShapeBots: A Swarm of Shape-shifting Robots that Visually Display Data*

*09/2019* Hackaday. *Tiny Robots that Grow Taller and Wider*

*09/2019* Robotic Gizmo. *ShapeBots: Shape Changing Swarm Robots*

*09/2019* Gadgetify. *ShapeBots: Shape Changing Swarm Robots*

*10/2018* 3DPrint.com. *Dynablock: 3D Prints That Assemble and Disassemble in Seconds*

*10/2018* Hackster.io. *The Dynamic 3D Printing That Assembles and Disassembles Objects in Seconds*

*10/2018* Arduino Blog. *Create Shapes Over and Over with the Dynablock 3D Printer*

*10/2018* 3DRuck.com. *Dynablock: Dynamischer 3D-Drucker erstellt Objekte in Sekunden*

*10/2018* World Business Satellite (Japanese TV). *Repeatable 3D Printer*

*10/2018* Nikkei Newspaper, *Modeling 3D Objects with Magnet-Embedded Blocks*

*06/2016* Wired. *It's Not Just Robots: Skilled Jobs Are Going to Meatware*

## Invited Talks

*12/2019* **Adaptive Physical Environment with Distributed Swarm Robots**
ATLAS Institute, University of Colorado Boulder, Boulder, U.S.A. (ATLAS Seminar)

*11/2019* **Adaptive Physical Environment with Distributed Swarm Robots**
MIT CSAIL, Boston, U.S.A. (hosted by Stefanie Mueller)

*11/2019* **Adaptive Physical Environment with Distributed Swarm Robots**
MIT Media Lab, Boston, U.S.A. (hosted by Hiroshi Ishii)

*10/2019* **Distributed and Collective Robots as Ubiquitous Interfaces**
University of Tokyo, Tokyo, Japan (hosted by Takeo Igarashi)

*10/2019* **Distributed and Collective Robots as Ubiquitous Interfaces**
University of Tokyo, Tokyo, Japan (hosted by Jun Rekimoto)

*10/2019* **Distributed and Collective Robots as Ubiquitous Interfaces**
JST ERATO, Tokyo, Japan (hosted by Yoshihiro Kawahara)

*10/2019* **Distributed and Collective Robots as Ubiquitous Interfaces**
Takram, Tokyo, Japan (hosted by Hisato Ogata)

*10/2019* **Distributed and Collective Robots as Ubiquitous Interfaces**
ZOZO Research, Tokyo, Japan (hosted by Satoshi Nakamaru)

*10/2019* **Distributed and Collective Robots as Ubiquitous Interfaces**
Preferred Networks, Tokyo, Japan (hosted by Hironori Yoshida)

*10/2019* **Distributed and Collective Robots as Ubiquitous Interfaces**
Omron ScinicX Research Lab, Tokyo, Japan (hosted by Yoshitaka Ushiku)

*06/2019* **Real-time Binding between Physical and Digital Worlds**
Adobe Research, Seattle, U.S.A. (hosted by Wilmot Li)

*10/2018* **Dynamic Physical Media**
CU Boulder ATLAS Seminar, Boulder, U.S.A. (hosted by Mark Gross)

*06/2016* **Programming Environment for Physical Computing and Mixed Reality Era**
UC Berkeley BiD Seminar, Berkeley, U.S.A. (hosted by Bjoern Hartmann)

## Teaching and Mentoring

### Teaching Assistant

*Fall 2019* **CSCI 3002: Fundamentals of Human Computer Interaction (Undergraduate)**
Instructor: Prof. Shaun Kane
Department of Computer Science, University of Colorado Boulder

*Spring 2017* **ATLS 6000: Soft Robotics (Graduate)**
Instructor: Prof. Mark D. Gross
ATLAS Institute, University of Colorado Boulder

*Fall 2012* **Game and Network Theory (Graduate)**
Instructor: Prof. Michihiro Kandori
Department of Economics, University of Tokyo

*Fall 2012* **Dynamic Programming and Optimization (Graduate)**
Instructor: Prof. Kazuya Kamiya
Department of Economics, University of Tokyo

## Mentoring

*2019* **Chrystalina Pharr**
Undergraduate student in Mechanical Engineering
University of Colorado Boulder
Project: ceiling-based swarm robots

*2019* **James Bohn**
Undergraduate student in Computer Science
University of Colorado Boulder
Project: furniture-moving swarm robots

*2018* **Ryosuke Nakayama**
Master student in Media Design
Keio University (Now Sony)
Project: interactive soft robots and shape-changing inflatable structure

*2018* **Takayuki Hirai**
Undergraduate student in Media Design
Keio University
Project: shape-changing swarm robots

*2018* **Takumi Murayama**
Undergraduate student in Media Design
Keio University
Project: reprogrammable inflatable architectural structure

*2017* **Kevin Kuwata**
Master student in Electrical and Computer Engineering
University of Colorado Boulder (Now Sparkfun X)
Project: mm-scale swarm robots with electromagnetic actuation

*2017* **Zhixian Jin**
Undergraduate student in Electrical and Computer Engineering
University of Colorado Boulder
Project: tactile feedback with actuated magnetic marker

*2016* **Ruan Reis**
Master student in Computer Science
Federal University of Campina Grande
Project: automated hint generation for programming assignment

*2015* **Michelle Lam**
Undergraduate student in Computer Science
Stanford University
Project: micro-internship with repurposed crowdsourcing tasks

*2015* **Juan Marroquin**
Undergraduate student in Computer Science
Stanford University (Now Microsoft)
Project: micro-internship with repurposed crowdsourcing tasks

*2015* **Adam Ginzberg**
Undergraduate student in Computer Science
Stanford University (Now Coda.io)
Project: crowd research

## Service

*2016 – present* **Organizing Committee**
CHI '21 Social Media Chair
UIST '16 Web and Social Media Chair

*2016 – present* **Reviewer**
CHI 2016 - 2020
UIST 2017 - 2019
SCF 2019
SIGGRAPH ETech 2019

*2016 – 2017* **Student Volunteer**
CHI 2017
UIST 2016

## References

- **Daniel Leithinger**
Assistant Professor
ATLAS Institute, University of Colorado Boulder
daniel.leithinger@colorado.edu

- **Mark D. Gross**
Director
ATLAS Institute, University of Colorado Boulder
mdgross@colorado.edu

- **Hiroshi Ishii**
Professor and Associate Director
Media Lab, MIT
ishii@media.mit.edu

- **Takeo Igarashi**
  Professor
  Department of Computer Science, University of Tokyo
  takeo@acm.org

- **Tom Yeh**
  Assistant Professor
  Department of Computer Science, University of Colorado Boulder
  tom.yeh@colorado.edu

- **Bjoern Hartmann**
  Associate Professor
  Department of Electrical Engineering and Computer Science, UC Berkeley
  bjoern@eecs.berkeley.edu

- **Rubaiat Habib**
  Senior Research Scientist
  Adobe Research
  rhabib@adobe.com