



## EDUCATION

### MIT Media Lab, PhD Sep 2013 - Present

Fluid Interfaces Group (advisor: Pattie Maes) GPA 5.0 / 5.0  
Human-computer Interaction, Robotic User Interfaces, Augmented Reality

### KAIST, MS Feb 2008 - Jan 2010

Dept of Electrical Engineering, GPA 4.12 / 4.3  
3D Computer Vision, Machine Learning

### KAIST, BS Mar 2004 - Feb 2008

Dept of Electrical Engineering, GPA 3.52 / 4.3 Cum Laude  
National Science and Technology Scholarship

### Gyeonggi Science High School Mar 2002 - Feb 2004

Early Graduation

## WORK EXPERIENCE

### Microsoft Research Redmond, WA, USA, Jun 2014 - Aug 2014

**Artist in Residence / Research Intern at Studio 99** supervised by Asta Roseway and Ann Paradiso.  
Created *Remnance of Form*, an interactive art installation comprising a series of vignettes designed to challenge our notion of reality through the manipulation of light and shadow.

### Samsung Electronics Suwon, Korea, Feb 2010 - Apr 2013

#### Software Engineer at Telecommunication Systems Division Feb 2010 - Apr 2013

##### *Social Media Services for Enterprise Environments*

Implemented server and client software for a real-time push message service. Managed the performance evaluation for large-scale concurrent messaging across thousands of mobile devices.

##### *SMT-i9100 Home Media Frame*

Android tablet device specialized for in-house use. Engineered the core Android framework modules, and managed the CTS verification and Google Approval of the device.

#### Creativity Lab - eyeCan Project Oct 2011 - Apr 2012

Developed a low-cost, open-source eye-mouse for Lou Gehrig's Disease/Lock-in-syndrome patients. I was in charge of the entire software implementation and interaction design. The device was distributed to over 200 people in Korea in collaboration with KODDI.

### Visual Communications Lab, KAIST Daejeon, Korea, Mar 2008 - Jan 2010

#### Research Assistant

##### *ISP Advanced Features*

Developed efficient and enhanced image processing algorithms for embedded systems.

##### *Development of Intelligent ISP Tool*

Implemented a software toolkit for automatically calibrating an ISP module.

### KAIST Mirae Hall Daejeon, Korea, Mar 2005 - Jun 2007

**Part-time Acoustic Engineer** for stage performances and lectures held in a school concert hall.

## TEACHING EXPERIENCE

MAS S66: Human machine symbiosis TA / Lecturer MIT, Spring 2016

Invited Lecture Hong-ik University, Apr 23 2012

*Invited to James Powderly's class (Former Professor at Hong-ik University)*

Pattern Recognition Course TA KAIST, Fall 2009

Digital Image Processing Course TA KAIST, Spring 2009

## STUDENTS

### undergraduate students supervised in research projects

2017 - Abhinandan Jain (EE), Michael Castillo (MechE), Suji Balfe (MechE), Matthew Love (MechE)

Harrison Allen (EE/CS), Kristen Ngan (MechE), Gabriel Valdes (MechE), Safa Jabri (MechE)

2016 - Yuhan Hu (MechE), Timothy Denton (MechE), Kush Parekh (RISD Product Design)

2015 - William Peebles (EE/CS), Magnus Johnson (EE/CS), Nicole Glabinski (EE/CS), Phil Cherner (EE/CS)

## TALKS

**CHI 2017**, *Morphological Interfaces: On Body Transforming Technologies* May 2017

**CHI 2016**, *Body Integrated Programmable Joints Interface* May 2016

**SXSW Interactive**, *Beyond Form: Designing with Fluid Objects* Mar 13 2016

**TEI 2015**, *THAW: Tangible Interaction with See-Through Augmentation for Smartphones on Computer Screens*  
Jan 2015

**Sebasi + PAN**, *Imagine by Inventing* Nov 20 2014

**Seoul Digital Forum**, *Samsung's eyeCan + Eyewriter: Co-writing a Recipe for Collaboration* May 1 2013

*Science Talk Show*, **Samsung Electronics** Nov 10 2012

*Soh-tong rak-seo: Passion Talk for Samsung Employees*, **Samsung Electronics** June 27 2012

*A Story about Technology that Changes Lives*, **Busan Tech Plus Forum** May 24 2012

*Dream to be a technology wizard in Korea*, **TEDxEonju**, Severance Hospital Apr 28 2012

*eyeCan: The Project Story*, **Samsung Medical Center** Dec 23 2011

*Developing an DIY Eye-Mouse for ALS Patients*, **TEDxSamsung 2nd Conference** COEX, Aug 16 2011

## PUBLICATIONS

### peer-reviewed

\*equal contribution

**S. Leigh**, H. Agrawal, and P. Maes. *Robotic Symbionts: Interweaving Actions by Human and Machine Extensions*, **IEEE Pervasive Computing - Special Issue [Augmenting Humans] (To Appear)**

**S. Leigh**, K. Parekh, T. Denton, W.S. Peebles, M.H. Johnson, and P. Maes. *Morphology Extension Kit: A Modular Robotic Platform for Physically Reconfigurable Wearables*, **TEI 2018 (To Appear)**

**S. Leigh**, and P. Maes. *Morphological Interfaces: On Body Transforming Technologies*, **Alt.CHI 2017**

**S. Leigh**, H. Sareen, H.L.C. Kao, X. Liu, P. Maes, *Body-Borne Computers as Extensions of Self*, **Computers 6 (1)**

**S. Leigh**, and P. Maes. *Body Integrated Programmable Joints Interface*, **CHI 2016 (Best Paper Honorable Mention - 4%)**

\*H. Agrawal, \***S. Leigh**, and P. Maes. *L'evolved: autonomous and ubiquitous utilities as smart agents*, **Ubicomp 2015**

**S. Leigh**, P. Schoessler, F. Heibeck, P. Maes, H. Ishii. *THAW: Tangible Interaction with See-Through Augmentation for Smartphones on Computer Screens*, **TEI 2015**

P. Schoessler, **S. Leigh**, K. Jagannath, P. van Hoof, H. Ishii, *Cord Uls: Controlling Devices with Augmented Cables*, **TEI 2015**

W. Kim, **S. Leigh**, N. Hur, J. Choi, *Feature-based detection of inverted-stereo for stereoscopic 3D viewing comfort*, **IEEE trans. on Broadcasting**

W. Kim, **S. Leigh**, G. Lee, N. Hur, J. Kim, *Automatic detection of pseudo-stereo*, **Int'l Conference on 3D Systems and Applications**

## PUBLICATIONS

## others

\*equal contribution

- Y. Hu, and **S. Leigh**. *Hand Development Kit: Soft Robotic Fingers as Prosthetic Augmentation of the Hand*, **UIST 2017 Demo**
- S. Leigh**, K. Parekh, T. Denton, W.S. Peebles, M.H. Johnson, and P. Maes. *Morphology Extension Kit: A Modular Robotic Platform for Customizable and Physically Capable Wearables*, **CHI 2017 Interactivity**
- S. Leigh**, and P. Maes. *Body Integrated Programmable Joints Interface*, **CHI 2016 Interactivity**
- \***S. Leigh**, \*H. Agrawal, and P. Maes. *A Flying Pantograph: Interleaving Expressivity of Human and Machine*, **TEI 2016 Arts Exhibition**
- S. Leigh**, H. Agrawal, and P. Maes. *Z-drawing: a flying agent system for computer-assisted drawing*, **SIGGRAPH 2015 Poster**
- H. Agrawal, **S. Leigh**, and P. Maes. *L'evolved: autonomous and ubiquitous utilities as smart agents*, **Ubicomp Demo 2015**
- S. Leigh**, A. Roseway, and A. Paradiso. *Remnance of Form*, **INTERACTIONS 2015, How was it made?**, Sep 2015
- S. Leigh**, A. Roseway, and A. Paradiso. *Remnance of Form*, **INTERACTIONS 2015, Demo Hour**, Jul 2015
- S. Leigh**, and P. Maes. *AfterMath: Visualizing Consequences of Actions through Augmented Reality*, **CHI 2015 Work-in-progress**
- S. Leigh**, A. Roseway, A. Paradiso, and Pattie Maes. *Remnance of Form: Interactive Narratives through Unexpected Behaviors of a Shadow*, **CHI 2015 Interactivity**
- S. Leigh**, A. Roseway, A. Paradiso, and Pattie Maes. *Remnance of Form: Interactive Narratives with Augmented Shadows*, **CHI 2015 Video Showcase**
- S. Leigh**, A. Roseway, A. Paradiso. *Remnance of Form: Altered Reflection of Physical Reality*, **TEI 2015 Arts Exhibition**
- S. Leigh**, P. van Hoof, K. Jagannath, P. Maes, H. Ishii, *L-Shift: Encoding and Shifting Material Properties and Functionalities with Phase-shifting Liquid*, **TEI 2015 WiP**
- \*C. Kao, \*E. Dreshaj, \*J. Amores, \***S. Leigh**, \*X. Benavides, P. Maes, K. Perlin, H. Ishii. *clayodor: Retrieving Scents through the Manipulation of Malleable Material*, **TEI 2015 WiP**
- S. Leigh**, P. Schoessler, F. Heibeck, P. Maes, H. Ishii. *THAW: Tangible Interaction with See-Through Augmentation for Smartphones on Computer Screens*, **UIST 2014 Demo**
- Y. Sekikawa, **S. Leigh**, K. Suzuki, *Coded Lens: Using Coded Aperture for Low-cost and Versatile Imaging*, **SIGGRAPH 2014 Poster**
- S. Leigh**, E. Dreshaj, A. Dementyev, P. Maes, V. M. Bove, *LIMBO: Reprogramming and Augmenting Muscle Activities using Electrical Stimulation*, **CHI 2014 Workshop on Assistive Augmentation**
- P. Schoessler, **S. Leigh**, K. Jagannath, P. van Hoof, H. Ishii, *Cord UI: Manipulating Data on its Flow Path with Augmented Cables*, **TEI 2014 WiP**
- S. Leigh**, *eyeCan: affordable and versatile gaze interaction*, **UIST 2013 Poster**
- S. Hwang, D. Kim, **S. Leigh**, K. Wohn, *NailSense: fingertip force as a new input modality*, **UIST 2013 Poster**
- S. Leigh**, *Unified Algorithm for Batch/Sequential Estimation of 3-D Structure and Motion*, **Master Thesis**, Feb 2010
- W. Kim, **S. Leigh**, S. Kim, N. Hur, J. Kim, *Pseudo-stereo Detection via Feature Extraction*, **2010 Image Processing and Image Understanding Workshop**
- S. Leigh**, S. Kim, *2D-to-2D Homography Based Camera Pose Estimation Method Using EM Algorithm*, **2009 Proc. of Institute of Electronics Engineering of Korea**
- S. Leigh**, *Odometry by Planar Homography in Catadioptric Images and Comparison with IMU Data*, **Undergraduate Thesis**

## EXHIBITIONS and DEMOS

SIGGRAPH Asia 2017 Art Gallery - *Remnance of Form* Nov 27 - 30 2017  
Re/pair (as part of The Big Anxiety Festival) - *Vicarious Movement* Nov 2017  
UIST 2017 Demo - *Hand Development Kit* Oct 23 -25 2017  
CHI 2017 Interactivity - *Morphology Extension Kit* May 6 - 11 2017  
MIT Hacking Arts 2016 - *A Flying Pantograph* Nov 12 2016  
CHI 2016 Interactivity - *Body Integrated Programmable Joints Interface* May 7 - 12 2016  
TEI 2016 Arts Exhibition - *A Flying Pantograph* Feb 14 - 17 2016  
MIT Hubweek - *A Flying Pantograph (prototype)* Oct 8 2015  
CHI 2015 Art Gallery/Interactivity - *Remnance of Form* May 18 - 23 2015  
TEI 2015 Arts Exhibition - *Remnance of Form* Jan 17 - 18 2015  
TEI 2015 Demo - *THAW, Cord Uls Projects* Jan 18 2015  
UIST 2014 Demo - *THAW Project* Oct 6 2014  
SUI 2014 Demo - *THAW Project* Oct 4 2014  
Microsoft Research Studio 99 - *Remnance of Form* Aug 22 - Sep 16 2014  
SXSW, *Science Fiction to Science Fabrication - LIMBO Project* Mar 2014  
UIST 2013 Student Innovation Contest - *LiquiDesk Project* Oct 10 2013

## PATENTS

*Display apparatus control system and method and apparatus for controlling a plurality of displays* EP2687947A1, CN103576854A, US20140022159  
*Method of controlling at least one function of device by using eye action and device for performing the method* WO2013133618A1, US20150015483  
*Photographing apparatus, photographing control method, and eyeball recognition apparatus* US20140022351A1, CN103581543A, EP2688287A2  
*Method for providing content and display apparatus adopting the same* EP2687946A1, CN103576853A, US20140022157  
*Method for controlling device on the basis of eyeball motion, and device therefor* WO2013133664A1  
*APPARATUS FOR ENHANCING IMAGE AND METHOD THEREFOR* KR20110054183(A)

## HONORS & AWARDS

Robotic Symbionts - Honorable Mention, Experimental/Student Categories, 2017 Fast Company Innovation by Design Awards Sep 11 2017  
CAMIT (Council for Arts at MIT) Grant 2017  
CHI 2016 Best Paper Honorable Mention 2016  
Cord Uls - Winner, Students Category, 2015 Fast Company Innovation by Design Awards Sep 14 2015  
THAW - Finalist, Experimental Category, 2015 Fast Company Innovation by Design Awards Sep 14 2015  
UIST 2014 People's Choice Best Demo Honorable Mention Oct 2014  
UIST 2013 Student Innovation Contest, 3rd Place People's choice Sep 2013  
Samsung Social Responsibility Award, Samsung Electronics Dec 2012  
Employee Pride in Samsung, Samsung Electronics Mar 2012  
National Science and Technology Scholarship (1st Class, 4-year support) KAIST, Mar 2004  
\*funded by Korea Science and Engineering Foundation  
Second Place Award, 2nd Korean Youth Physicist Tournament 2002

## REVIEW and COMMUNITY SERVICES

IEEE Pervasive Reviewer  
IEEE Transaction on Human-Machine Systems Reviewer  
UIST 2017 Reviewer  
CHI 2017 Reviewer  
TEI 2017 Arts and Work-in-Progress Reviewer  
CSCW 2017 Reviewer  
SIGGRAPH Asia 2016 E-Tech Reviewer  
ISS 2016 Reviewer  
UIST 2016 Reviewer  
MobileHCI 2016 Reviewer  
Augmented Human 2016 Reviewer  
AH 2016 Reviewer  
SIGGRAPH Asia 2015 E-Tech Reviewer  
CHI 2015 Work-in-Progress Reviewer  
What the Hack, Organizer *Samsung Electronics, Jan 15 2012*  
Samsung Frontier Membership Mentor *2011 - 2013*  
Samsung Super Rookie Membership Mentor *2011 - 2013*  
TEDxSamsung Organizer *Mar 2011 - Apr 2013*  
Samsung Frontier Membership *2004 - 2010*

## MEDIA COVERAGE selected

**Neural**, Flying Pantograph, pipelining transposed drawing *Aug 9 2017*  
**Copyright Agency**, Eight creators receive funding to help ignite their careers *May 31 2017*  
**Neural Issue 56**, Intelligently Weak, A Flying Pantograph in "new media" section *May 5 2017*  
**de Tijd**, Wie bang is voor de toekomst, schat het heden te hoog in *Apr 19 2017*  
**Fast Company**, MIT's Latest Project? Giving You An Extra Robot Hand *May 17 2016*  
**Discovery News**, Robotic Wrist-Worn Joint Gives You Another Hand *May 20 2016*  
**Daily Mail**, Need a hand? The mind controlled robot fingers you can strap on to do everything from hold a pad to help lift heavy objects *May 20 2016*  
**Technology Review (Ger)**, Zwei Hände sind nicht genug *Jul 2016*  
**Engadget**, Drawing drone mimics your sketches *Mar 28 2016*  
**WIRED**, MIT's Clever New Drone Draws What You Do. Mostly *Mar 27 2016*  
**PSFK**, Become a Graffiti Drone Artist Without Touching a Can of Paint *Mar 25 2016*  
**Artwort**, The Flying Pantograph – Il Drone Perfetto Per I Graffiti *Mar 10 2016*  
**CNET**, Tomorrow Daily *Mar 9 2016*  
**Fast Company**, Don't Tell Banksy, But MIT Invented The Perfect Drone For Graffiti *Mar 9 2016*  
**The Creators Project**, A Flying Pantograph *Mar 8 2016*  
**prosthetic knowledge**, A Flying Pantograph *Mar 8 2016*  
**prosthetic knowledge**, Remnance of Form *Dec 22 2015*  
**BBC**, Back to the Future: What will technology really look like? *Oct 21 2015*  
**MIT News**, Neighborhood of innovation *Oct 9 2015*

**MEDIA  
COVERAGE  
selected  
(continued)**

**CRN**, We Now Have Drones That Can Draw Oct 9 2015  
**Motherboard**, In the Future, Furniture Will Be Drones Oct 9 2015  
**Boston.com**, Watch this drone scribble on a canvas at HUBweek Oct 8 2015  
**de Tijd**, Een bezoekje aan de toekomst (A visit to the future) Oct 3 2015  
**PSFK**, 6 Brands Creating the Connected Life May 28 2015  
**WIRED**, MIT Inventors Turn Power Cords Into Gadget Interfaces Mar 6 2015  
**Gizmodo**, Pinchable Headphone Cords That Control Your Music Are a Brilliant Idea Feb 20 2015  
**PSFK**, Pinched Power Cables and Cords Double as Remote Controls Feb 12 2015  
**Fast Company**, 5 Ways MIT Is Reinventing Your Power Cord Feb 2 2015  
**Gizmodo**, *The 7 Most Important UI and UX Ideas of 2014* Dec 30 2014  
**WIRED**, *MIT's Slick New UI Lets Your Phone and Desktop Screens Behave as One* Sep 24 2014  
**Golem.de**, *Das Smartphone schnappt Dateien vom Bildschirm* Sep 22 2014  
**Engadget**, *MIT can turn your smartphone into a different kind of second screen* Sep 19 2014  
**Fast Company (Featured)**, *MIT Invents A Magic Lens That Combines All Your Screens Into A Single Experience* Sep 17 2014  
**CNET**, *Tomorrow Daily 053: Incredible multiscreen interaction from MIT's THAW project, and more* Sep 17 2014  
**CITEworld**, *How phones and computers can talk via sight* Sep 17 2014  
**Slate**, *MIT Researchers Are Using Smartphones to Interact With Other Screens* Sep 17 2014  
**Xataka**, *THAW, o cómo cree el MIT que teléfonos y ordenadores pueden relacionarse* Sep 16 2014  
**Gizmodo**, *MIT Made a Smartphone Control a Computer With a Simple Touch* Sep 15 2014  
**Design Boom**, *THAW: Seamlessly Combine Your Smartphone and Your Desktop Computer* Sep 15 2014  
**The Verge**, *Samsung releases source code for eyeCan, an eye-controlled mouse for the disabled* Feb 23 2012  
**The Korea Herald (1st page)**, *Samsung develops eye-controlled mouse* Feb 24 2012  
**Futura Science**, *EyeCan, souris à commande oculaire de Samsung, en open source* Mar 1 2012  
**The Tech Journal**, *Samsung's Virtual Mouse 'EyeCAN' For Hand Disabled People* Mar 1 2012  
**TEDActive 2012 Blog**, *Developments on Mick Ebeling's EyeWriter* Mar 6 2012  
**Wall Street Journal Blog**, *Samsung Develops Low-Cost "Eye Mouse"* Mar 22 2012

**SKILLS**

Software

Languages C, C++, C#, Java, Objective C, Python, MATLAB, Max/MSP, UE4, Unity

Platforms Windows, Linux, OSX, iOS, Android

Design software Solidworks, Rhino, Premiere, Unity, Unreal 4

Fabrication

DIY Guitar <http://www.sangww.net/2014/02/diy-telecaster.html>

How to Make (Almost) Anything [http://fab.cba.mit.edu/classes/863.14/people/sang\\_leigh/](http://fab.cba.mit.edu/classes/863.14/people/sang_leigh/)

**MUSIC**

Soundcloud - <https://soundcloud.com/sangww>

Starwars (Group Sound) Samsung Electronics, 2010 - 2013

Rockclassic (Rock+Classic Fusion Concert) KAIST, May 5 2007

Freshman Guitar Class Co-lecturer KAIST, 2007

INFINITE (Heavy Metal Club), KAIST, Guitarist (2004 - 2006) and Band Leader (2006)