

# Arvind Satyanarayan

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## EDUCATION

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- 2017 **Ph.D. Computer Science, Stanford University**  
*Thesis:* Declarative Interaction Design for Data Visualization  
*Advisor:* Jeffrey Heer (University of Washington)
- 2014 **M.S. Computer Science, Stanford University**
- 2011 **B.S. Computer Science with Honors, University of California, San Diego**  
*Thesis:* Using Overlays to Support Collaborative Interaction with Display Walls  
*Advisor:* James D. Hollan

## EMPLOYMENT

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- 2018 – **Assistant Professor, MIT EECS/CSAIL.**
- 2017 – 2018 **Postdoctoral Research Scientist, Google Brain Team**
- 2011 – 2017 **Graduate Research Assistant, Interactive Data Lab, Stanford Univ./Univ. of Washington**  
*With Prof. Jeffrey Heer*
- 2014 – 2016 **Co-Founder and Advisor, Apropose, Inc.**
- 2013 – 2014 **Co-Founder and Chief Architect, Apropose, Inc.**  
Led initial development of core infrastructure and prototype applications, culminating in a successful **\$1.9M seed round** backed by NEA and Andreessen Horowitz.
- Summer 2012, Spring 2016 **Research Intern, In Situ Lab, INRIA and LRI, Université Paris-Sud**  
*With Profs. Wendy Mackay and Michel Beaudouin-Lafon*  
Developed a prototype visualization substrate to enable collaborative interactive visual analysis between multiple users using heterogeneous devices and a large display wall.
- 2011 – 2012 **Graduate Research Assistant, HCI Group, Stanford University**  
*With Prof. Scott Klemmer*
- 2010 – 2011 **Undergraduate Research Assistant, DCog-HCI Lab, UC San Diego**  
*With Prof. James Hollan*  
Developed HIPerFace: a Java framework to combine interactions from multiple individual input device into novel composite interactions.
- Summer 2008 **Movable Type Product Intern, Six Apart Ltd.**  
Developed an extensible revision history framework for Movable Type objects with a time-travel slider and `diff`-style interfaces.
- 2004 – 2007 **Publisher and Developer, Movalog and Movalog Plugins**  
<http://www.movalog.com>  
Developed several popular plugins for Movable Type. One plugin, CustomFields, was **acquired** by Six Apart and was distributed as part of the core Movable Type package.  
  
Co-organized The Style Contest, a design contest for Movable Type blog themes. Six Apart, Adobe, and StyleMaster sponsored over \$17,000 in prizes. Judges included Derek Powazek, Jason Santa Maria, and John Allsopp.

## AWARDS & HONORS

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- 2020 NSF CAREER Award
- 2016 IEEE InfoVis Best Paper Award (Vega-Lite)
- 2016 – 2018 Google PhD Fellowship
- 2013 ACM CHI Best Paper Award (Webzeitgeist)
- 2011 – 2014 SAP Stanford Graduate Fellowship, *Stanford University*
- 2011 Outstanding Senior, *UC San Diego Alumni Association*
- 2011 Phi Beta Kappa, *UC San Diego*
- 2010 Undergraduate Summer Research Scholar, *Calit2, UC San Diego*
- 2009, 2010 Ernest Mort Award for Excellence in Leadership, *Revelle College, UC San Diego*
- 2009 Tau Beta Pi, *UC San Diego*
- 2008 – 2010 Provost's Honors, *Revelle College, UC San Diego*
- 2005 – 2007 Duke of Edinburgh Bronze, Silver and Gold Awards

## PUBLICATIONS

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- 2020 **VisualLint: Sketchy In Situ Annotation of Chart Construction Errors**  
 Aspen Hopkins, Michael Correll, [Arvind Satyanarayan](#)  
*Computer Graphics Forum (Proc. EuroVis)*, May 2020  
 [29% Acceptance Rate]
- Critical Reflections on Visualization Authoring Systems**  
[Arvind Satyanarayan](#), Bongshin Lee, Donghao Ren, Jeffrey Heer, John Stasko, John R. Thompson, Matthew Brehmer, Zhicheng Liu  
*IEEE Trans. Visualization & Computer Graphics (Proc. InfoVis '19)*, January 2020  
 [26% Acceptance Rate]
- 2019 **Sociotechnical Considerations for Accessible Visualization Design**  
 Alan Lundgard, Crystal Lee, [Arvind Satyanarayan](#)  
*Proc. IEEE Visualization Conference (VIS)*, October 2019  
 [32% Acceptance Rate]
- Sherlock: A Deep Learning Approach to Semantic Data Type Detection**  
 Madelon Hulsebos, Kevin Hu, Michiel Bakker, Emanuel Zgraggen, [Arvind Satyanarayan](#), Tim Kraska, Çağatay Demiralp, César Hidalgo  
*Proc. ACM Knowledge Discovery and Data Mining (KDD)*, August 2019  
 [14% Acceptance Rate]
- VizNet: Towards a Large-Scale Visualization Learning and Benchmarking Repository**  
 Kevin Hu, Neil Gaikwad, Madelon Hulsebos, Michiel Bakker, Emanuel Zgraggen, César Hidalgo, Tim Kraska, Guoliang Li, [Arvind Satyanarayan](#), Çağatay Demiralp  
*Proc. ACM Human Factors in Computing Systems (CHI)*, May 2019  
 [24% Acceptance Rate]
- 2018 **Altair: Interactive Statistical Visualizations for Python**  
 Jacob VanderPlas, Brian E. Granger, Jeffrey Heer, Dominik Moritz, Kanit Wongsuphasawat, [Arvind Satyanarayan](#), Eitan Lees, Ilia Timofeev, Ben Welsh, Scott Sievert  
*Journal of Open Source Software* 3(32), October 2018

**Augmenting Code with In Situ Visualizations to Aid Program Understanding**

Jane Hoffswell, Arvind Satyanarayan, Jeffrey Heer

*Proc. ACM Human Factors in Computing Systems (CHI)*, April 2018

[26% Acceptance Rate]

**The Building Blocks of Interpretability**

Chris Olah, Arvind Satyanarayan, Ian Johnson, Shan Carter, Ludwig Schubert, Katherine Ye, Alexander Mordvintsev

*Distill* 3(3), March 2018**2017 Vega-Lite: A Grammar of Interactive Graphics**

Arvind Satyanarayan, Dominik Moritz, Kanit Wongsuphasawat, Jeffrey Heer

*IEEE Trans. Visualization & Computer Graphics (Proc. InfoVis '16)*, January 2017[22% Acceptance Rate, **Best Paper Award (Top 1)**]**2016 Visual Debugging Techniques for Reactive Data Visualization**

Jane Hoffswell, Arvind Satyanarayan, Jeffrey Heer

*Computer Graphics Forum (Proc. EuroVis)*, June 2016

[27% Acceptance Rate]

**Reactive Vega: A Streaming Dataflow Architecture for Declarative Interactive Visualization**

Arvind Satyanarayan, Ryan Russell, Jane Hoffswell, Jeffrey Heer

*IEEE Trans. Visualization & Computer Graphics (Proc. InfoVis '15)*, January 2016

[22% Acceptance Rate]

**2014 Declarative Interaction Design for Data Visualization**

Arvind Satyanarayan, Kanit Wongsuphasawat, Jeffrey Heer

*Proc. ACM User Interface Software and Technology (UIST)*, October 2014

[22% Acceptance Rate]

**Lyra: An Interactive Visualization Design Environment**

Arvind Satyanarayan, Jeffrey Heer

*Computer Graphics Forum (Proc. EuroVis)*, June 2014

[25% Acceptance Rate]

**Authoring Narrative Visualizations with Ellipsis**

Arvind Satyanarayan, Jeffrey Heer

*Computer Graphics Forum (Proc. EuroVis)*, June 2014

[25% Acceptance Rate]

**2013 Webzeitgeist: Design Mining the Web**

Ranjitha Kumar, Arvind Satyanarayan, Cesar Torres, Maxine Lim, Salman Ahmad, Scott R. Klemmer, Jerry O. Talton

*Proc. ACM Human Factors in Computing Systems (CHI)*, May 2013[20% Acceptance Rate, **Best Paper Award (Top 1%)**]**2012 Using Overlays to Support Collaborative Interaction with Display Walls**

Arvind Satyanarayan, Nadir Weibel, James D. Hollan

*Proc. ACM Intelligent User Interfaces (IUI)*, February 2012

[19% Acceptance Rate]

## POSITION PAPERS, POSTERS & REPORTS

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- 2020 **Towards a Dynamic Multiscale Personalized Information Space**  
James Hollan, Amy Fox, Philip Guo, Clemens Klokmoose, [Arvind Satyanarayan](#), Haijun Xia  
*Convivial Computing Salon, <Programming>, May 2020*
- Self-Interfaces: Utilizing Real-Time Biofeedback in the Wild to Elicit Subconscious Behavior Change**  
Nava Haghighi, [Arvind Satyanarayan](#)  
*Work-in-Progress of ACM Tangible and Embodied Interaction (TEI), February 2020*
- 2019 **Visualive: Representing Synchronized Visualization Interactions**  
Rupayan Neogy, Emily Hu, [Arvind Satyanarayan](#)  
*Posters of IEEE Visualization (VIS), October 2019*
- 2018 **Designing Cognitively Convivial Physics for Dynamic Visual Information Substrates**  
James D. Hollan, [Arvind Satyanarayan](#)  
*Rethinking Interaction Workshop, ACM Human Factors in Computing Systems (CHI), May 2013*
- 2013 **The CHI 2013 Interactive Schedule**  
[Arvind Satyanarayan](#), Daniel Strazzulla, Clemens Klokmoose, Michel Beaudouin-Lafon, Wendy Mackay  
*Extended Abstracts, ACM Human Factors in Computing Systems (CHI), May 2013*
- 2012 **Learning Structural Semantics for the Web**  
Maxine Lim, Ranjitha Kumar, [Arvind Satyanarayan](#), Cesar Torres, Jerry O. Talton, Scott R. Klemmer  
*Stanford CSTR 2012-03, December 2012*
- A Platform for Large-Scale Machine Learning on Web Design**  
[Arvind Satyanarayan](#), Maxine Lim, Scott R. Klemmer  
*Extended Abstracts, ACM Human Factors in Computing Systems (CHI), May 2012*

## INVITED TALKS & DEMOS

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- Towards Effective Interaction with Data Visualization**  
Jun 2020 Invited Talk, Symposium on Data Science & Statistics, *American Statistics Association*  
Jun 2020 Keynote Talk, Workshop on Human-In-the-Loop Data Analytics, *ACM SIGMOD*
- Visualization: A Petri Dish for Intelligence Augmentation**  
Apr 2019 Radcliffe Institute for Advanced Study, Harvard University, *Cambridge, MA*  
Oct 2018 MIT CSAIL, *Cambridge, MA*  
Sep 2018 Northeastern University, *Boston, MA*
- The Building Blocks of Interpretability**  
May 2018 emlyon business school, *Lyon, France*
- Vega-Lite: A Grammar of Interactive Graphics**  
Apr 2017 OpenVis Conf, *Boston, MA*
- Declarative Interaction Design for Data Visualization**  
Apr 2017 Massachusetts Institute of Technology, *Cambridge, MA*  
Apr 2017 New York University, *Tandon Computer Science & Center of Data Science, New York City, NY*  
Apr 2017 University of California, San Diego, *San Diego, CA*  
Apr 2017 Northwestern University, *Evanston, IL*

Mar 2017 University of British Columbia, *Vancouver, Canada*  
 Mar 2017 University of Toronto, *Toronto, Canada*  
 Mar 2017 University of Michigan, *Ann Arbor, MI*  
 Feb 2017 University of California, Berkeley, *Berkeley, CA*  
 Feb 2017 University of Illinois Urbana-Champaign, *Urbana, IL*  
 Feb 2017 Cornell University, *Computer Science & Information Science, Ithaca, NY*  
 Feb 2017 University of Wisconsin-Madison, *Madison, WI*

### **The Vega Ecosystem**

Oct 2016 Keynote Talk, Visualization In Practice Workshop, *IEEE VIS, Baltimore, MD*

### **Reactive Building Blocks: Interactive Visualizations with Vega**

Jul 2016 Keynote Talk, DataViz Camp, *United Nations*  
 Apr 2016 OpenVis Conf, *Boston, MA*

### **Higher-Level Tools for Interactive Data Visualization**

May 2016 INRIA Saclay, *Saclay, France*  
 Sep 2015 BiD Seminar, *UC Berkeley, Berkeley, CA*

### **Lowering the Threshold of Visualization Design**

Apr 2015 Linfield College, *Science Colloquium, McMinnville, OR*  
 Dec 2014 Tata Innovation Labs, *Tata Consultancy Services, Delhi, India*

### **Designing Visualizations with Lyra Tutorial**

Apr 2015 I247: Information Visualization & Presentation, *UC Berkeley Information School, Berkeley, CA*  
 Dec 2014 Tata Innovation Labs, *Tata Consultancy Services, Delhi, India*  
 Dec 2014 J221: Introduction to Data Visualization, *UC Berkeley Journalism School, Berkeley, CA*  
 Nov 2014 HCDE 511: Information Visualization, *University of Washington, Seattle, WA*

### **Lyra: An Interactive Visualization Design Environment**

Apr 2014 OpenVis Conf, *Boston, MA*  
 Mar 2014 CAR, *Baltimore, MD*  
 Feb 2014 Tapestry, *Annapolis, MD*

### **NewsCamp :: Introduction to D3**

Mar 2014 CAR, *Baltimore, MD*

## **TEACHING**

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2019 – **6.894: Interactive Data Visualization**, *MIT EECS*  
 2018 – **6.170: Software Studio**, *MIT EECS*  
 Co-Instructor with Prof. Daniel Jackson  
 Winter 2016 **HCID 520: User Interface Software & Technology**, *University of Washington*  
 Co-Instructor with Prof. Jeffrey Heer  
 Winter 2013 **CS 247: Human-Computer Interaction Design Studio**, *Stanford University*  
 Graduate Teaching Assistant for Profs. Jeffrey Heer and Michael Bernstein  
 Fall 2012 **CS 147: Introduction to Human-Computer Interaction**, *Stanford University*  
 Graduate Teaching Assistant for Prof. Scott Klemmer  
 Winter 2012 **HCI Online #001**, *Stanford University and Coursera*  
 Graduate Teaching Assistant for Prof. Scott Klemmer

## STUDENT ADVISEES

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PhD	Angie Boggust ( <i>MIT EECS</i> ), Aspen Hopkins ( <i>MIT EECS</i> ), Crystal Lee ( <i>MIT STS</i> ), Alan Lundgard ( <i>MIT EECS</i> ), Jonathan Zong ( <i>MIT EECS</i> )
Master's	Nava Haghighi ( <i>MIT ID&amp;M</i> ), Houssam Kherraz ( <i>MIT EECS</i> ), Rupayan Neogy ( <i>MIT EECS</i> ), Wonyoung So ( <i>MIT DUSP</i> )
Undergraduate	Allen Lee ( <i>MIT EECS</i> ), Tanya Yang ( <i>MIT EECS</i> )

### Mentoring as a PhD Student

Tianyi "Tina" Lin (*UW CSE '17*), Matthew Chun (*UW CSE '18*), Yiyang "Amy" Xu (*UW CSE '18*), Anjir Hossain (*UW CSE '18*), Nikhil Khanna (*UW CSE '18*), Emily Gu (*UW CSE '16*), Ruijia "Iris" Wang (*UW CSE '17*), Ryan Russell (*UW CSE '16*)

## SERVICE

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Reviewing	IEEE VIS 2014–2020, EuroVis 2014–2020, IEEE TVCG 2015–2020, ACM UIST 2014–2018, ACM CHI 2013–2020, ACM IUI 2012–2020, IEEE PacificVis 2016. <b>Recognition for exceptional reviews:</b> CHI 2019, CHI 2017, VIS 2017 (x2).
Committees	<b>Diversity &amp; Inclusivity.</b> IEEE VIS 2018, Information+ 2018. <b>Program Committees.</b> ACM IUI 2019–2020, IEEE VIS 2018–2020, OpenVis Conf 2016–2018, ACM CHI 2016 Late-Breaking Work, Information+ 2018.
Editor	Distill ( <a href="http://distill.pub">http://distill.pub</a> )
2019, 2020	Diversity & Inclusion Co-Chair, <i>IEEE VIS 2019, 2020</i>
2018	Program Co-Chair, <i>OpenVis Conf</i>
2013	Interactive Schedule Chair, <i>CHI 2013 Organizing Committee</i>
2009 – 2011	Resident Advisor, <i>Revelle College, UC San Diego</i>
2010 – 2011	Student Conduct Code Re-write Workgroup Student Representative, <i>UC San Diego</i>
2010 – 2011	Housing, Dining, Hospitality Advisory Committee Student Representative, <i>UC San Diego</i>
Summer 2010	Parent Orientation Leader, <i>Revelle College, UC San Diego</i>
2009 – 2010	Revelle College Senator, <i>Associated Students, UC San Diego</i>
2008 – 2009	Director of Communications, <i>Revelle College Council, UC San Diego</i>

## PRESS

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2018	Google Researchers Are Learning How Machines Learn <i>Cade Metz, The New York Times</i> , March 2018 <a href="https://www.nytimes.com/2018/03/06/technology/google-artificial-intelligence.html">https://www.nytimes.com/2018/03/06/technology/google-artificial-intelligence.html</a>
2018	Google Researchers Are Learning How Machines Learn <i>Cade Metz, The New York Times</i> , March 2018 <a href="https://www.nytimes.com/2018/03/06/technology/google-artificial-intelligence.html">https://www.nytimes.com/2018/03/06/technology/google-artificial-intelligence.html</a>
2015	Information is Beautiful Award Shortlist Nomination <i>Kantar</i> , November 2015 <a href="http://www.informationisbeautifulawards.com/showcase?acategory=free-tool&amp;action=index&amp;award=2015&amp;controller=showcase&amp;page=1&amp;pcategory=long-list&amp;type=awards">http://www.informationisbeautifulawards.com/showcase?acategory=free-tool&amp;action=index&amp;award=2015&amp;controller=showcase&amp;page=1&amp;pcategory=long-list&amp;type=awards</a>

- 2014    Apropose Closes \$1.875M Funding Round Led by NEA and Andreessen Horowitz  
      *PR Newswire*, September 2014  
      <http://www.prnewswire.com/news-releases/apropose-closes-1875m-funding-round-led-by-nea-and-andreessen-horowitz-274728751.html>
- 10 Significant Visualization Developments: January to June 2014.  
      *Visualizing Data*, August 2014  
      <http://www.visualisingdata.com/index.php/2014/08/10-significant-visualisation-developments-january-to-june-2014/>
- 2008    Movable Type Experts Team Up on Melody, an Open Source Publishing Platform  
      *Techcrunch*, June 2009  
      <http://techcrunch.com/2009/06/25/movable-type-experts-team-up-on-melody-an-open-source-publishing-platform/>
- 2007    Why We Call it a “Community”  
      *Six Apart/Movable Type*, August 2007  
      <http://www.movabletype.com/blog/2007/02/why-we-call-it-a-community.html>