

# **2016 IEEE Symposium on Visual Languages and Human-Centric Computing (VL/HCC 2016)**

**Cambridge, United Kingdom  
4 – 8 September 2016**



**IEEE Catalog Number: CFP16060-POD  
ISBN: 978-1-5090-0253-5**

**Copyright © 2016 by the Institute of Electrical and Electronics Engineers, Inc  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\*This publication is a representation of what appears in the IEEE Digital Libraries. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP16060-POD
ISBN (Print-On-Demand):	978-1-5090-0253-5
ISBN (Online):	978-1-5090-0252-8
ISSN:	1943-6092

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

# 2016 IEEE Symposium on Visual Languages and Human-Centric Computing Table of Contents

4-8 September 2016

Foreword	
Organizing Committee	
Keynote abstract: Drawing and the Primacy of Expression, <i>David Dernie</i>	1
Keynote abstract: Beyond Text: The Future of IDEs, <i>Michael Kölling</i>	2
<b>Visual Interaction</b>	
Label Management: Keeping Complex Diagrams Usable, <i>Christoph Daniel Schulze, Yella Lasch and Reinhard von Hanxleden</i>	3
Who Changed My Annotation? An Investigation into Refitting Freeform Ink Annotations, <i>Craig Sutherland, Andrew Luxton-Reilly and Beryl Plimmer</i>	12
Operating Diagram Editors through Unistroke Gestures, <i>Christian Schenk, Sonja Schimmler and Mark Minas</i>	21
An Evolutionary Approach to Determining Hidden Lines from a Natural Sketch, <i>Alexandra Bonnici and Kenneth Camilleri</i>	26
<b>Visual Modeling</b>	
Measuring Perceived Clutter in Concept Diagrams, <i>Tie Hou, Peter Chapman and Ian Oliver</i>	31
Evaluation of a Modelling Language for Customer Journeys, <i>Ragnhild Halvorsrud, Ida Maria Haugstveit and Antoine Pultier</i>	40
An Empirical Study of User Perceived Usefulness and Preference of Open Learner Model Visualisations, <i>Check-Yee Law, John Grundy, Rajesh Vasa and Andrew Cain</i>	49
Visual Analysis of Compound Graphs, <i>Michael Burch</i>	54
<b>Visual Learning</b>	
Learning Programming from Tutorials and Code Puzzles: Children's Perceptions of Value, <i>Kyle J. Harms, Evan Balzuweit, Jason Chen and Caitlin Kelleher</i>	59
Smells in Block-Based Programming Languages, <i>Felienne Hermans, Kathryn T. Stolee and David Hoepelman</i>	68
Coding, Reading, and Writing: Integrated Instruction in Written Language, <i>Robert H. Thompson, Steven L. Tanimoto, Virginia W. Berninger and William Nagy</i>	73
<b>Visual Intelligence</b>	
Visual Discovery and Model-Driven Explanation of Time Series Patterns, <i>Advait Sarkar, Martin Spott, Alan F. Blackwell and Mateja Jamnik</i>	78
Diagnostic Visualization for Non-expert Machine Learning Practitioners: A Design Study, <i>Dong Chen, Rachel K. E. Bellamy, Peter K. Malkin and Thomas Erickson</i>	87
Supporting End-Users in Defining Complex Queries on Evolving and Domain-Specific Data Models, <i>Thomas Reschenhofer and Florian Matthes</i>	96
Developing Usable APIs with XP and Cognitive Dimensions, <i>Rahul Kamal Bhaskar, Craig Anslow, John Brosz and Frank Maurer</i>	101

## Data and Repositories

- Yestercodex: Improving Code-Change Support in Visual Dataflow Programming Environments, 106  
*Austin Z. Henley and Scott D. Fleming*
- Declarative Setup-free Web Application Prototyping Combining Local and Cloud Datastores, 115  
*Filip Kis and Cristian Bogdan*
- Reuse of Variants in Online Repositories: Foraging for the Fittest, 124  
*Carlos Martos, Se Yeon Kim and Sandeep Kaur Kuttal*
- Putting Information Foraging Theory to Work: Community-based Design Patterns for Programming Tools, 129  
*Tahmid Nabi, Kyle M.D. Sweeney, Sam Lichlyter, David Piorkowski, Chris Scaffidi, Margaret Burnett and Scott D. Fleming*

## User Strategies

- A Perspective on Blending Programming Environments and Games: 134  
*Titus Barik, Emerson Murphy-Hill and Thomas Zimmermann*
- Beyond Points, Badges, and Leaderboards, 143  
*Jian Liu, John Grundy, Iman Avazpour and Mohamed Abdelrazek*
- Examining Active Error in Software Development, 152  
*Tamara Lopez, Marian Petre and Bashar Nuseibeh*
- Finding Errors in the Enron Spreadsheet Corpus, 157  
*Thomas Schmitz and Dietmar Jannach*

## Professional Skill

- Trials and Tribulations of Developers of Intelligent Systems: A Field Study, 162  
*Charles Hill, Rachel Bellamy, Thomas Erickson and Margaret Burnett*
- Veteran Developers' Contributions and Motivations: An Open Source Perspective, 171  
*Patrick Morrison, Rahul Pandita, Emerson Murphy-Hill and Anne McLaughlin*
- Potential Financial Motivations for End-User Programming, 180  
*Chris Scaffidi*
- Labeling Relevant Skills in Tasks: Can the Crowd Help?, 185  
*Rafael Leano, Zhendong Wang and Anita Sarma*

## Diversity in Development

- The Practices of Programming, 190  
*Ilias Bergström and Alan F. Blackwell*
- GenderMag Experiences in the Field: The Whole, the Parts, and the Workload, 199  
*Charles Hill, Shannon Ernst, Alannah Oleson, Amber Horvath and Margaret Burnett*
- End-User Development and Learning in Second Life: The "Box" as Multipurpose Building Block, 208  
*Anders I. Mørch*

## Education and Cognition

- Skill Progression in MIT App Inventor, 213  
*Benjamin Xie and Hal Abelson*
- Computational Thinking Tools, 218  
*Alexander Repenning, Ashok Basawapatna and Nora Escherle*
- Perceived Obstacles by Novice Developers Adopting User Interface APIs and Tools, 223  
*Irum Rauf, Pekka Perälä, Jouni Huotari and Ivan Porres*

## Showpieces

Polaris: Providing Context Aware Navigation in Spreadsheets, <i>Bas Jansen</i>	228
Suggesting Examples to Novice Programmers in an Open-Ended Context with the Example Guru, <i>Michelle Ichinco, Wint Hnin and Caitlin Kelleher</i>	230
Fostering Computational Thinking skills with a Tangible Blocks Programming Environment, <i>Tommaso Turchi and Alessio Malizia</i>	232
Opportunistic Visualization with iVoLVER, <i>Gonzalo Gabriel Méndez and Miguel A. Nacenta</i>	234
Transforming Spreadsheets with Data Noodles, <i>Maria I. Gorinova, Advait Sarkar, Alan F. Blackwell and Karl Prince</i>	236
Ninja Code Village for Scratch: Function Samples/Function Analyser and Automatic Assessment of Computational Thinking Concepts, <i>Go Ota, Yosuke Morimoto and Hiroshi Kato</i>	238
Gradual Structuring in the Spreadsheet Paradigm, <i>Gary Miller and Felienne Hermans</i>	240
Sonic Pi - Reliable Randomisation for Performances, <i>Samuel Aaron</i>	242
Tool Demo: Operating Diagram Editors through Unistroke Gestures, <i>Christian Schenk, Sonja Schimmler and Mark Minas</i>	244

## Graduate Consortium

An Approach to Gesture-based Editing of Diagrams, <i>Christian Schenk</i>	246
End User Programming of Visualisations, <i>Mariana Marasoiu</i>	248
Tools for Opportunistic Information Visualization: Visual Analysis with Non-traditional Data Sources, <i>Gonzalo Méndez</i>	250
Resolving Input Validation Vulnerabilities by Retracing Taint Flow Through Source Code, <i>Justin Smith</i>	252
Designing Affordances for Navigating Information Spaces in Code Editors, <i>Austin Henley</i>	254
X marks the task: Helping developers navigate to the right task, <i>Rafael Leano</i>	256
Teaching Coding to Learning-Disabled Children with Kokopelli's World, <i>Rob Thompson</i>	258
Suggesting and supporting examples for novice programmers, <i>Michelle Ichinco</i>	260
Embodied Programming: Supporting the Move from Concrete to Abstract, <i>Anthony Trory</i>	262
Recognizing Gender Differences in Stack Overflow Usage: Applying the Bechdel Test, <i>Denae Ford</i>	264
Socio-Economic Status and Computer Use: Designing Software that Supports Low-Income Users, <i>Charles Hill</i>	266
Supporting Collaborative Information Analysis with Interactive Visualization, <i>Dong Chen</i>	268