John Edwards, Ph.D.

Contact Information	Department of Computer Science Utah State University MAIN 401D Logan, UT 84322	(435) 797-0246 john.edwards@usu.edu edwardsjohnmartin.github.io

Research Data visualization, data science, simulation, computing education

Education
Ph.D. Computer Science, The University of Texas, 2013
M.S. Computer Science, Brigham Young University, 2004
B.S. Computer Science, Utah State University, 1998

Professional experience
Assistant professor, Utah State University, 2018-current
Assistant professor, Idaho State University, 2015-2018
Post-doctoral fellow, Scientific Computing and Imaging Institute, University of Utah, 2013-2015
Visiting scholar, University of Hong Kong, 2012
Assistant instructor (during PhD studies), The University of Texas, 2010-2013
Robotics and visualization research engineer, Autonomous Solutions, Inc., 2008-2009
Research and development engineer, ProLogic, Inc., 2005-2008
Software engineer, Rigaku, Inc., 1999-2005

Refereed journal publications

[18] John Edwards, Kaden Hart*, and Raj Shrestha*. Review of CSEDM Data and Introduction of Two Public CS1 Keystroke Datasets. *Journal of Educational Data Mining.* 2023. Impact factor: 2.15.

[17] Boyd F Edwards, Cade Pankey, and John M Edwards. Inertial motion on the earth's spheroidal surface. *Chaos: An Interdisciplinary Journal of Nonlinear Science.* 2022. Impact factor: 2.643. H5-index: 55.

[16] Bishal Sainju*, Christopher Hartwell, and John Edwards. Job satisfaction and employee turnover determinants in Fortune 50 companies: Insights from employee reviews from Indeed.com. *Decision Support Systems.* 2021. Impact factor: 5.795. H5-index: 65.

[15] Boyd F Edwards and John M Edwards. Geodetic Model for Teaching Motion on the Earths Spheroidal Surface. *European Journal of Physics.* 2021. Impact factor: 0.756. H5-index: 25.

[14] John Edwards, Cameron Krome, and Tracy Payne. Computation of Positively Graded Filiform Nilpotent Lie Algebras in Low Dimensions. *Symbolic Computation.* 2021. Impact factor: 0.847. H5-index: 25.

[13] Boyd Edwards and John Edwards. Forces and Conservation Laws for Motion on our Ellipsoidal Earth. *American Journal of Physics.* 2021. Impact factor: 0.874. H5-index: 20. *Editor's pick.*

[12] Boyd Edwards, Bo Johnson*, and John Edwards. Periodic bouncing modes for two uniformly magnetized spheres I: Trajectories. *Chaos: An Interdisciplinary Journal of Nonlinear Science.* 30(1):013146, 2020. Impact factor: 2.643. H5-index: 55. *Featured article.*

[11] Boyd Edwards, Bo Johnson*, and John Edwards. Periodic bouncing modes for two uniformly magnetized spheres II: Scaling. *Chaos: An Interdisciplinary Journal of Nonlinear Science.* 30(1):013131, 2020. Impact factor: 2.643. H5-index: 55.

[10] Christopher Hartwell, Tyler Orr, and John Edwards. The Effect of Online Application Efficiency on Applicant Attrition. *International Journal of Selection and Assessment.* 28(2):200-208, 2020. Impact factor: 1.84. H5-index: 19.

[9] Lloyd Griffel*, Donna Delparte, and John Edwards. Using Support Vector Machines classification to differentiate spectral signatures of potato plants infected with Potato Virus Y. *Computers and electronics in agriculture*, 153:318-324. 2018. Impact factor: 5.565. H5-index: 76.

[8] DeWayne Derryberry, Ken Aho, John Edwards, and Teri Peterson. Model selection and regression t-statistics. *The American Statistician.* 72(4):379-381, 2018. Impact factor: 5.381. H5-index: 39.

[7] Nathan Morrical* and John Edwards. Parallel quadtree construction on collections of objects. *Computers and Graphics.* 66:162–168. 2017.

[6] Boyd Edwards and John Edwards. Periodic nonlinear sliding modes for two uniformly magnetized spheres. *Chaos: An Interdisciplinary Journal of Nonlinear Science.* 27(5):053107, 2017.

[5] Boyd Edwards and John Edwards. Dynamical interactions between two uniformly magnetized spheres. *European Journal of Physics.* 38(1):015205, 2016.

[4] Xin Tong, John Edwards, Chun-Ming Chen, Han-Wei Shen, Christopher Johnson, and Pak Chung Wong. View-dependent streamline deformation and exploration. *IEEE Transactions on Visualization and Computer Graphics.* 22(7):1788-1801, 2016.

[3] John Edwards, Eric Daniel, Valerio Pascucci, Chandrajit Bajaj. Approximating the Generalized Voronoi Diagram of Closely Spaced Objects. *Computer Graphics Forum.* 34(2):299-309, 2015.

[2] John Edwards, Eric Daniel, Justin Kinney, Terrence Sejnowski, Tom Bartol, Daniel Johnston, Kristen Harris, and Chandrajit Bajaj. VolRoverN: Enhancing surface and volumetric reconstruction for realistic dynamical simulation of cellular and subcellular function. *Neuroinformatics.* 12(2):277-289, 2014.

[1] John Edwards and Chandrajit Bajaj. Topologically correct reconstruction of tortuous contour forests. *Computer-Aided Design.* 43(10):1296-1306, 2011.

Refereed conference publications

[36] Joshua Urry* and John Edwards. A Framework that Explores the Cognitive Load of CS1 Assignments Using Pausing Behavior. *In ACM Technical Symposium on Computing Science Education (SIGCSE).* 2024. Qualis: A2.

[35] Muhammad Fawad Akbar Khan, John Edwards, Paul Bodily, and Hamid Karimi. Mining Student Behavior Patterns for Enhanced Performance Prediction in Introductory Programming: Keystroke Analysis and Ensemble Strategies. *In IEEE International Conference on Big Data (BigData).* 2023.

[34] Steven Scott*, Arto Hellas, Juho Leinonen, and John Edwards. Factors Affecting Compilable State at Each Keystroke in CS1. *In ACM International Conference on Software Engineering (ICSE), Software Engineering Education and Training (SEET) track.* 2023. Qualis: A1.

[33] Kaden Hart*, Christopher Warren, and John Edwards. Accurate Estimation of Time-on-Task While Programming. *In ACM Technical Symposium on Computing Science Education (SIGCSE).* 2023. Qualis: A2.

[32] Kaden Hart*, Chad Mano, and John Edwards. Plagiarism Deterrence in CS1 Through Keystroke Data. *In ACM Technical Symposium on Computing Science Education (SIGCSE).* 2023. Qualis: A2.

[31] Arto Hellas, Juho Leinonen, and John Edwards. Code Mimicking: The Impact of Program Output on Novice Programmers' Learning Gains. *In ACM conference on Innovation and Technology in Computer Science Education (ITiCSE).* 2023. Qualis: B1.

[30] Aashish Ghimire*, Raj Shrestha*, and John Edwards. Too Legal; Didn't Read (TLDR): Summarization of Court Opinions. *In IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* 2023.

[29] Aashish Ghimire*, Rita Ghimire, and John Edwards. Metadata in Tweets: Broadcasting a Lot More Than What You Tweet. *In IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* 2023.

[28] Stephanie Gonzales*, Hillary Swanson, and John Edwards. Activity During High-Repetition Practice of Syntax. *In IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* 2023.

[27] Jaxton Winder*, Erik Falor, and John Edwards. Early Submission of Project Analysis Milestones Correlates Positively With Student Project Performance; Incentives for This Early Project Analysis Positively Changes Student Behaviors. *In IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* 2023.

[26] Raj Shrestha*, Juho Leinonen, Albina Zavgorodniaia, Arto Hellas, and John Edwards. Pausing While Programming: Insights From Keystroke Analysis. *In ACM International Conference on Software Engineering (ICSE), Software Engineering Education and Training (SEET) track.* 2022. Qualis: A1.

[25] John Edwards, Kaden Hart*, Chris Warren. A practical model of student engagement while programming. *In ACM Technical Symposium on Computing Science Education (SIGCSE).* 2022. Qualis: A2.

[24] Raj Shrestha*, Juho Leinonen, Arto Hellas, Petri Ihantola, and John Edwards. CodeProcess Charts: Visualizing the Process of Writing Code. *Twenty-Fourth Australasian Computing Education Conference (ACE).* 2022. Qualis: B2.

[23] Eric Bagley*, Jessica Shumway, and John Edwards. Second-grade Students' Use of Visual Programming to Learn Multiplication: Leveraging the Concept of Iteration. *Twenty-Fourth Australasian Computing Education Conference (ACE).* 2022. Qualis: B2.

[22] Gordon Fjeldsted* and John Edwards. Quantifying Student Struggles Using Heatmaps and Keystroke Data. *IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* 2022.

[21] Aashish Ghimire* and John Edwards. Introspection with Data: Using Personality Traits for Academic Major Selection. *IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* 2022.

[20] Marina Johnson*, Hillary Swanson, and John Edwards. Syntax Exercises and Their Effect on Computational Thinking. *IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* 2022.

[19] Delaney Moore, John Edwards, Hamid Karimi, Rajiv Khadka, and Paul Bodily. Temporal Abstract Syntax Trees for Understanding Student Coding Thought Process. *IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* 2022.

[18] Shelsey Sullivan*, Hillary Swanson, and John Edwards. Student attitudes toward syntax exercises in CS1. *In ACM Technical Symposium on Computing Science Education (SIGCSE).* 2021. Acceptance rate: 34%. Qualis: A2.

[17] Joseph Ditton*, Hillary Swanson, and John Edwards. External imagery in computer programming. *In ACM Technical Symposium on Computing Science Education (SIGCSE).* 2021. Acceptance rate: 34%. Qualis: A2.

[16] Albina Zavgorodniaia, Raj Shrestha*, Juho Leinonen, Arto Hellas, and John Edwards. Morning or Evening? An Examination of Circadian Rhythms of CS1 Students. *In ACM International Conference on Software Engineering (ICSE), Joint Track on Software Engineering Education and Training (JSEET).* 2021. Acceptance rate: 33%. Qualis: A1.

[15] Anna Ly, John Edwards, Michael Liut, and Andrew Petersen. Revisiting Syntax Exercises in CS1. *ACM Conference on Information Technology Education (SIGITE).* 2021. Acceptance rate: 48%. Qualis: B3.

[14] John Edwards, Joseph Ditton*, Dragan Trninic, Shelsey Sullivan*, Hillary Swanson, and Chad Mano. Syntax exercises in CS1. *ACM International Computing Education Research (ICER) Conference.* Dunedin, New Zealand. August 2020. Acceptance rate: 23%. Qualis: B4.

[13] John Edwards, Juho Leinonen, Albina Zavgorodniaia, Chetan Birthare*, and Arto Hellas. Programming versus natural language: on the effect of context on typing in CS1. *ACM International Computing Education Research (ICER) Conference.* Dunedin, New Zealand. August 2020. Acceptance rate: 23%. Qualis: B4.

[12] Steven Scott*, Jaxon Willard*, and John Edwards. High Dimensional Event Exploration over Multiple Simulations. *IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* Orem, UT. September, 2020. Acceptance rate: 86%.

[11] John Edwards, Joseph Ditton*, Bishal Sainju*, and Joshua Dawson*. Different Assignments as Different Contexts: Predictors Across Assignments and Outcome Measures in CS1. *IEEE Intermountain Engineering, Technology, and Computing Conference (i-ETC).* Orem, UT. September, 2020. Acceptance rate: 86%.

[10] John Edwards, Juho Leinonen, and Arto Hellas. A Study of Keystroke Data in Two Contexts: Written Language and Programming Language Influence Predictability of Learning Outcomes. *ACM Technical Symposium on Computing Science Education (SIGCSE).* Portland, OR. March 2020. Acceptance rate: 31%. Qualis: A2.

[9] John Edwards, Erika Fulton, Jonathan Holmes, Joseph Valentin*, David Beard, and Kevin Parker. Separation of syntax and problem solving in Introductory Computer Programming. *IEEE Frontiers in Education.* San Jose, CA. October 2018. Acceptance rate: ∼50%. Qualis: B1.

[8] Sidharth Kumar, Duong Hoang, Steve Petruzza, Valerio Pascucci, and John Edwards. Reducing network congestion and synchronization overhead during data aggregation when writing hierarchical data. *IEEE International Conference on High Performance Computing, Networking, Storage, and Analysis.* Jaipur, India. December 2017. 23% acceptance rate. H5-index: 43.

[7] Nathan Morrical* and John Edwards. Parallel quadtree construction on collections of objects. *Shape Modeling International.* Berkeley, CA. June 2017. 37% acceptance rate. †

[6] John Edwards, Eric Daniel, Valerio Pascucci, Chandrajit Bajaj. Approximating the Generalized Voronoi Diagram of Closely Spaced Objects. *Eurographics.* Zurich, Switzerland. July 2015. 27% acceptance rate. H5-index: 10. †

[5] Sidharth Kumar, John Edwards, Peer-Timo Bremer, Aaron Knoll, Cameron Christensen, Venkatram Vishwanath, Philip Carns, John A. Schmidt, Valerio Pascucci. Efficient I/O and storage of adaptive resolution data. *High Performance Computing, Networking, Storage and Analysis (SC14)*. New Orleans, LA. November 2014. 21% acceptance rate. H5-index: 43.

[4] John Edwards, Wenping Wang, and Chandrajit Bajaj. Surface segmentation for improved remeshing. *Proceedings of the 21st International Meshing Roundtable*, pages 403-418. San Jose, CA. October 2012.

[3] John Edwards and Chandrajit Bajaj. Topologically correct reconstruction of tortuous contour forests. *Proceedings of the ACM Symposium on Solid and Physical Modeling*, pages 51-60. Haifa, Israel. September 2010. 29% acceptance rate.

[2] Joel Alberts, John Edwards, Josh Johnston, and Jeff Ferrin. 3D visualization for improved manipulation and mobility in EOD and combat engineering applications. *Proceedings of SPIE Defense, Security and Sensing*. April 2009.

[1] Josh Johnston, Joel Alberts, Matt Berkemeier, and John Edwards. Manipulator Autonomy for EOD Robots. *26th Army Science Conference*. December 2008.

* indicates student author

Publication quality metrics:

- Impact factor - Impact factor for year y calculated as $(c_{y-1} + c_{y-2})/(p_{y-1} + p_{y-2})$ where c_y is the number of citations and p_y is the number of publications for year y.
- H5-Index - The Google Scholar H5-Index is the largest number h such that h articles published in the last 5 years have at least h citations each.
- Qualis (conference) - Qualis ranks are obtained from www.conferenceranks.com and have possible values of A1, A2, B1, B2, B3, B4, and B5.

Book chapter

John Edwards, Sidharth Kumar, and Valerio Pascucci. Big data from scientific simulations. In L. Grandinetti, G.R. Joubert, M. Kunze, and V. Pascucci, editors, *Big Data and High Performance Computing*, pages 32–46. IOS Press, Amsterdam, Berlin, Tokyo, Washington, DC, 2015.

Funding

How novices write code: discovering best practices and how they can be adopted. PI: J. Edwards. National Science Foundation (NSF). Award #2315783. $238,468. 2023-2026.

DynamicsLab: Interactive Physics Simulations for Intermediate Classical Mechanics. PI: J. Edwards. co-PIs: H. Swanson, B. Edwards. National Science Foundation (NSF). Award #2235569. $299,649. 2023-2026.

Revolutionary Data Presentation and Manipulation. PI: M. Shields. co-PIs: J. Edwards, D. Heath. Missile Defense Agency (STTR). B18C-001-0097. $100,000. 2018.

Syntax before problem solving: an approach to introductory computer programming education. PI: J. Edwards. co-PIs: E. Fulton, J. Holmes, D. Beard, K. Parker. Idaho State University Office of Research. $32,564. 2017.

Implementing Unmanned Aircraft Systems to detect crop viruses using hyperspectral remote sensing and machine learning. PI: D. Delparte. co-PI: J. Edwards. Idaho State Dept. of Agriculture. $161,175. 2017.

Improving STEM Education: Engaged Learning in an Introductory Computer Programming Course. PI: J. Edwards. co-PIs: J. Holmes, K. Parker. ISU Teaching Innovation Grant. $4820. 2017.

STEM Action Center: Computer Programming Workshops in Southeastern Idaho. C. Hill, et al. United Way. $8000. Role: Senior personnel. 2017.

igniteCS: CS education in Southeastern Idaho high schools. PI: J. Edwards co-PIs: J. Rose, J. Glines, et al. Google igniteCS gift. $5307. 2016.

Pending grants

How novices write code: discovering best practices and how they can be adopted. PI: J. Edwards. National Science Foundation (NSF). *Recommended for funding.* $238,468. 2023-2026.

DTI: Nurturing Family Support in Middle School Coding Programs. PI: Vicki Allan. co-PIs: J. Edwards, Deborah Sue Ivie, Rebecca Bayeck. National Science Foundation (NSF). *In review.* $1,299,999.62. 2024-2028.

Theses

(Ph.D.) Analysis-Ready Models of Tortuous, Tightly Packed Geometries, 2013
(M.S.) Live Mesh: An Interactive 3D Image Segmentation Tool, 2004

Licensed Software

CodeKeyz (originally named *Phanon*) - CS1 Education Software
`https://codekeyz.com`

Research Software and Datasets

KeystrokeExplorer - Keystroke log analysis software
`https://edwardsjohnmartin.github.io/KeystrokeExplorer/`

Two keystroke datasets - Keystroke log datasets (1,275 downloads as of July 27, 2023)
`https://doi.org/10.7910/DVN/BVOF7S`
`https://doi.org/10.7910/DVN/6BPCXN`

DynamicsLab - Physics education software
`https://edwardslabusu.github.io/DynamicsLab`

CorioVis - Coriolis simulation software
`https://edwardsjohnmartin.github.io/coriolis`

MagPhyx - Magnet simulation software
`http://edwardsjohnmartin.github.io/MagPhyx`

pgvd - Parallel Generalized Voronoi Diagram Approximation
`https://github.com/edwardsjohnmartin/pgvd.git`

VolRoverN - Neuronal reconstruction and geometric analysis
`http://www.cs.utexas.edu/$\sim$bajaj/cvcwp/?page\_id=2089`

Honors

Teacher of the Year, USU CS Department, 2021
Undergraduate Research Mentor of the Year, USU CS Department, 2020
Translational Neuroscience Symposium Best Poster Award, 2012
The University of Texas, Computer Science PhD Fellowship, 2009
Graduation *Magna Cum Laude*, Utah State University, 1998
Member *Phi Kappa Phi* Honor Society, 1998
Wendell Pope Scholarship, Utah State University, 1998
Superior Student Scholarship, Utah State University, 1996-1998

Professional service

Program committee

IEEE Intermountain Engineering, Technology, and Computing (i-ETC) 2020

International Conference on Geometric Modeling and Processing (GMP) 2015, 2016, 2017, 2018

Reviewer

National Goldwater Scholarship 2023

Reviewer

Journal of Educational Data Mining 2022

Computer Science Education 2022, 2023

ACM ITiCSE 2023

ACM SIGCSE 2019, 2020, 2021, 2022, 2023

Computer Animation and Virtual Worlds

IEEE FIE 2018

ACM Transactions on Mathematical Software, 2018

GMP 2015, 2016, 2017, 2018

Computing Surveys

Computer Aided Geometric Design

European Symposium on Algorithms 2014

International Meshing Roundtable 2015

SIGGRAPH Asia 2015

University service

Member of Computer Science Undergraduate Curriculum Committee 2018-2020
Member of Computer Science Faculty Search Committee 2019-2020
Chair of CS faculty search committee 2017-2018 (ISU)
University Research Council 2016-2018 (ISU)
Health Informatics search committee 2016 (ISU)
Author of CS Masters Degree proposal submitted 2018 (ISU)

Expert witness

State of Idaho v. Gabriel L. Moreno and Anthony C. Moreno, 2018
Case Nos. CR-2017-8408-FE and CR-2017-8409-FE, District Court, County of Bannock, Idaho
Nature of Case: Second degree murder.

Plaintiff alleged malice aforethought in a fistfight resulting in a death. The defendant claimed self-defense. The event was captured on video and posted to Snapchat, which became the primary exhibit. I testified regarding the source and analysis of the video.

Employment-based immigration petition opinion letters, 2018-current
Maystar, LLC

Review immigration petitions of foreign employees in software engineering positions and provide opinion letters as to the educational requirements for their positions.

Other

Interviewed in Deseret News article, 2023
Title: *How these Utah professors are addressing ChatGPT in the classroom*
https://www.deseret.com/2023/6/5/23688236/chatgpt-ai-college-classes-utah-professors-universities