# Curriculum Vitae

**Patrick E. Carlson**
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## Education

**Iowa State University** **Ames, Iowa**
PhD, Cumulative GPA: 3.68/4.0 2008 - 2015
Major: Human-Computer Interaction (HCI)

**Simpson College** **Indianola, Iowa**
Bachelor of Arts, cum laude, Cumulative GPA: 3.715/4.0 2003 - 2008
Majors: Computer Science and Psychology

## Experience

**Sandia National Labs** **Albuquerque, New Mexico**
Data Scientist (promoted to Principal level - May 2021) 2017 - present

Data analysis, R and Python programming, data virtualization, Tableau and Shiny visualizations, analytics team co-lead, SQL and Mongo querying, architecture and data engineering research, project planning, writeups, design mockups, and UX reviews.

**Renaissance Learning** **Wisconsin Rapids, Wisconsin**
User Experience Analyst 2016 - 2017

Perform remote usability testing on software prototypes, help with UI design, and develop and analyze survey data.

**Iowa State University** **Ames, Iowa**
Improving Open Source Software Development (Dissertation Topic) 2010 - 2015

Apply data mining in the development of algorithms and tools to improve developer understanding of technical and social structure in large Open Source communities. Under direction of Dr. Judy Vance.

Bimanual Haptics for Virtual Assembly Tasks (Research Assistant) 2009 - 2015

Designed and analyzed studies examining various bimanual haptic device configurations and learning transfer for virtual assembly tasks. Under direction of Dr. Judy Vance.

Mentor/Support Research Experience for Undergraduate (REU) Students Summer 2010

Helped coordinate three undergraduate REU students whose project entailed creating a physical mockup of a shopping cart which was then used in a virtual reality user study. Under direction of Dr. Judy Vance.

**University of New Mexico** **Albuquerque, New Mexico**
Research Experience for Undergraduates (REU) Spring 2006 - Fall 2007

Learned the basics of machine learning and worked on applying this to improving the routing of packets in a dynamic network. Under direction of Dr. Terran Lane.

**Simpson College** **Indianola, Iowa**

Usability and Appeal of the Linux Desktop (Psychology Capstone) Spring 2007 - Fall 2008

Constructed and performed an experiment empirically contrasting usability and appeal of a 2D versus 3D Linux desktop.

Origins of Human Cooperation and Altruism Fall 2005 - Fall 2006

Simulated the evolution of cooperation/altruism using game theory techniques and genetic algorithms. Presented work at Argonne National Laboratory.

Student Technician Nov 2005 - May 2006

Helped students and faculty connect to the Internet and troubleshoot network issues.

**Mounds Park Academy** **St. Paul, Minnesota**

Computer Technician Summers 2002 - 2005, and 2008

Conducted laptop repair and software setup for 60 freshman students. Imaged and configured multiple computer labs.

## Teaching and Other

Engineering/LAS Online Learning (Graduate Assistant) Fall 2014

Recorded class videos, advised undergraduate producers, and scripted automated startups for recordings

ME/WLC 484/584: Technology, Globalization, and Culture (Teaching Assistant) Fall 2013

Graded homework, facilitated online class discussions

HCI/Psych 522: Scientific Methods in HCI (Teaching Assistant) Spring 2013

Graded homework and managed content for online website

CS 309: Software Development Practices (Teaching Assistant) Spring 2009

Graded homework, helped students with documenting project development

CS 207: Programming I (Teaching Assistant) Fall 2008

Assisted and tutored students with homework and basic programming concepts

## Groups and Activities

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|---|---|
| Sandia Data Sciences - Community of Practice Organizer | 2018 - Present |
| Iowa State University Badminton Club | 2009 - 2015 |
| ISU Badminton Club Webmaster | 2009 - 2012 |
| Computational Design Synthesis: Summer Camp (Munich, Germany) | August 1-5, 2011 |
| ISU Human-Computer Interaction Student Group Vice President | 2010 - 2011 |
| Simpson College Math Club | 2006 - 2008 |
| Simpson College Computer Club | 2003 - 2008 |

## Honors

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|---|---|
| Awarded Employee Retention Compensation for Select Employees | June 2023 |
| Nominated for 'Most Inspiring Up & Comer' for FedScoop 50 | September 2022 |
| Iowa State University Research Excellence Award | Spring 2015 |
| Outstanding Senior in Computer Science (Simpson College) | May 2008 |
| Honorable Mention in the Mathematical Contest in Modeling (MCM) | 2006, 2007, 2008 |
| Psi Chi National Honor Society in Psychology | March 2007 |
| Simpson College Dean's List | Spring 2005, Fall 2006, Fall 2007 |

Simpson College Academic Honor Scholarship Fall 2003 - Spring 2008
Certificate of Achievement from MPA Technology Department December 2000

## Poster Presentations

Carlson, Patrick & Vance, Judy M. (2013, April). Who Should I Contact?: Helping New Developers Find Experts. Poster presented at the Emerging Technologies Conference, Ames, IA. **Awarded most interesting research project**.

Peters, Anicia & Carlson, Patrick & Gilbert, Stephen & Vance, Judy M. (2012, April). A Hybrid Method to Support Natural Interaction of Parts in a Virtual Environment. Poster presented at the Emerging Technologies Conference, Ames, IA. **Awarded most interesting research project**.

Vance, Judy M. & Gilbert, Stephen & Oren, Michael & Pavlik, Ryan & Carlson, Patrick (2012, July). GOALI: A Hybrid Method to Support Natural Interaction of Parts in a Virtual Environment. Poster presented at the NSF Engineering Research and Innovation Conference, Atlanta, Georgia.

Carlson, Patrick & Vance, Judy M. & Nguyen, Tien & Blankenship, Kevin (2011, April). Social Technical Congruence: The Link Between Social Science and Technology. Poster presented at the Emerging Technologies Conference, Ames, IA.

Carlson, Patrick & Vance, Judy M. (2010, May). An Evaluation of Asymmetric Interfaces for Bimanual Virtual Assembly With Haptics. Poster presented at the ASME World Conference on Innovative Virtual Reality, Ames, IA.

Carlson, Patrick (2008, May). Usability and Appeal of a 2D versus 3D Linux Operating System. Poster presented at the Midwestern Psychological Association, Chicago, IL.

## Publications

Bruno, Sean & Carlson, Patrick (2023). Podman vs Docker comparison via R Shiny project deployment. In Proceedings of the 2023 Improving Scientific Software Conference, pages 10-14. **(Peer-Reviewed Conference Paper)**

Carlson, Patrick & Vance, Judy M. & Berg, Meisha (2016). An evaluation of asymmetric interfaces for bimanual virtual assembly with haptics. In Virtual Reality, pages 1-9. **(Peer-Reviewed Journal Article)**

Carlson, Patrick & Peters, Anicia & Gilbert, Stephen & Vance, Judy M. & Luse, Andy (2015). Virtual Training: Learning Transfer of Assembly Tasks. In IEEE Transactions on Visualization and Computer Graphics, pages 770-782. **(Peer-Reviewed Journal Article)**

Carlson, Patrick (2015). Engaging developers in open source software projects: harnessing social and technical data mining to improve software development. In Graduate Theses and Dissertations, pages 1-192, Ames, IA. **(PhD Dissertation)**

Carlson, Patrick & Xiao, Nan (2012). Experience and Recommendations for Distributed Software Development. In Proceedings of the international conference on software engineering (ICSE) workshop on collaborative teaching of globally distributed software development, pages 1-4, Zurich, Switzerland. **(Workshop Paper)**

Oren, Mike & Carlson, Patrick & Gilbert, Stephen & Vance, Judy M. (2012). Puzzle Assembly Training: Real World vs. Virtual Environment. In Proceedings of the IEEE 2012 virtual reality conference, pages 1-4, Orange County, California. **(Conference Paper)**

Vance, Judy M. & Gilbert, Stephen B. & Oren, Michael & Pavlik, Ryan & Carlson, Patrick (2011). GOALI: A Hybrid Method to Support Natural Interaction of Parts in a Virtual Environment. In NSF engineering research and innovation conference proceedings, pages 1-4, Atlanta, Georgia. **(Workshop Paper)**

Carlson, Patrick & Kirpes, Carl & Pavlik, Ryan A. & Vance, Judy M. & Yin, Livien & Scott-Cooper, Terrence & Lambert, Troy (2011). Comparison of Single-Wall Versus Multi-Wall Immersive Environments to Support a Virtual Shopping Experience. In Proceedings of the ASME 2011 world conference on innovative virtual reality (WINVR2011), pages 1-5, Milan, Italy. **(Conference Paper)**

## Invited Presentations

Got Data? Discovery is the Key - National Laboratories Information Technology Summit - April 11, 2024

Sandia Insights - A Data Sciences Architecture and Framework - National Laboratories Information Technology Summit - Oct 17, 2022

Sandia Insights - A Data Sciences Architecture and Framework - National Laboratories Information Technology Summit - May 30, 2019

Viz Wars: Tableau vs. Shiny - National Laboratories Information Technology Summit - May 29, 2019

IEEE VR 2015 (presented by Dr. Judy Vance), invited by Dr. Ed Swan, talk title: Virtual Training: Learning Transfer of Assembly Tasks - March 23-27, 2015

IE 681 Cognitive Engineering, invited by Dr. Stephen Gilbert, talk on Open Source communities - December 4, 2014

HCI 591 Seminar, talk on Open Source socialization - November 16, 2012

## Outreach

Road Less Traveled Spring 2010, 2011, 2012, 2013

Demo of virtual reality system for over 50 middle school and high school girls from across Iowa.

ISU Badminton Club online tournament support 2010, 2011, 2012, 2014, 2015

Created online tournament registration and administration system.

## Professional Organizations

Special Interest Group on Human-Computer Interaction (Past Student Member)

Association for Computing Machinery (Past Student Member)

## Conference Attendance

National Laboratories Information Technology Summit April 8-11, 2024

Seattle, Washington - USA

National Laboratories Information Technology Summit June 27-30, 2023

Milwaukee, Wisconsin - USA

National Laboratories Information Technology Summit Oct 17-19, 2022

Albuquerque, New Mexico - USA

National Laboratories Information Technology Summit May 28-31, 2019

Boise, Idaho - USA

RStudio Conference Jan 15-18, 2019

Austin, Texas - USA

Tableau Conference Oct 9-12, 2017

Las Vegas, Nevada - USA

International Conference on Software Engineering (ICSE) June 2-9, 2012

Zurich - Switzerland

IEEE Virtual Reality Conference March 4-8, 2012

Costa Mesa, California - USA

The Association for the Advancement of Artificial Intelligence July 22-26, 2007

Vancouver, British Columbia - Canada

The Association for the Advancement of Artificial Intelligence July 16-20, 2006

Boston, Massachusetts - USA

## Training

Cloudera Data Governance Training Sept 18-19, 2023

This course covered the Atlas data catalog and Ranger security and access control services in Cloudera.

Cloudera Spark Developer Training Sept 11-14, 2023

This course covered Spark, Hive, HDFS, Cloudera Machine Learning, and more.

Cloudera Streaming Analytics Training Aug 21-23, 2023

This course covered Flink and Kafka streaming technologies.

Cloudera Data Science Training Feb 14-17, 2022

This course covered Spark, Cloudera Data Science workbench, supervised and unsupervised learning, and more.

Scaled Agile Framework (SAFe) Product Owner / Product Manager Training Jan 11-13, 2022

This training covered the Scaled Agile Framework for project management, requirements gathering, estimating work, and so on.

Coursera: Machine Learning August 14, 2020

Online course on Machine Learning taught by Stanford professor Andrew Ng.

Apache Spark Programming (DB 105) Sept 24-26, 2019

This course covered the fundamentals of Apache Spark including Spark's architecture and internals, the core APIs for using Spark, SQL and other high-level data access tools, as well as Spark's streaming capabilities and machine learning APIs.

Intermediate Shiny (RStudio Conference 2019) Jan 15-16, 2019

This covered the basics of Shiny, reactivity, modules, and best-practices.

Intro to Deep Learning August 2018 - 8 hours

This was an internal course offered at Sandia National Lab that covered deep learning methods.

Docker Fundamentals and Docker for Enterprise Developers Feb 19-22, 2018

This course covered Docker fundamentals, Docker swarm, Docker compose files, YAML format, and more.

R and Shiny Training April 9-12, 2018

Taught by Matt Pickard this covered the basics of R, dplyr, Shiny, and reactivity.

## Technical Skills

Programming Languages: Python, Lua, Java, R, C#, HTML, Javascript, SQL, PHP, LaTeX, Cypher (Neo4j)

Tools: Git, Subversion, Windows, Linux, CMake, Eclipse, Jupyter, Docker, Travis-CI, Github Actions, Gitlab Runners, Ansible, Terraform, Bicep

Programs: Inkscape, Lyx, Gimp, JustInMind, Balsamiq, UserZoom, Mendeley, Pencil, Tableau, RStudio, Axure, Morae, Tibco Data Virtualization, Collibra, yEd, Denodo Data Virtualization

Libraries: Pandas, SciPy, scikit-learn, jQuery, D3.js, Django, Bootstrap, NodeJS, Shiny, Jekyll, Spark, Tidyverse