

**EMMET J. WHITEHEAD, JR., Ph.D.**

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**RESEARCH INTERESTS**

Generative methods, including procedural content generation for games, generative design, augmenting human design capabilities, mixed-initiative design systems, and generative art.

Serious games (or, games with a purpose), especially citizen science games focused on software engineering.

Software evolution, including generative models of software evolution, and software repository mining.

Software bug prediction using machine learning models.

**TEACHING INTERESTS**

Teaching large game/software project classes, including issues of scalability in numbers of students and teams, processes for improving aggregate creativity of large groups, and motivation and reward structures for effective team work. Evaluation rubrics for student game projects that provide feedback on the many facets of each game, tailored to each game.

Approaches for teaching generative methods, especially tailoring this content for professional masters and research PhD student audiences.

**EMPLOYMENT HISTORY**

July 2011- present	Professor	University of California, Santa Cruz Dept. of Computer Science, 2000-2014 (Computer Science Department Chair 2010-2014), Dept. of Computational Media 2014-present (Computational Media Department Chair, 2017-now)
July 2006- June 2011	Associate Professor	University of California, Santa Cruz
July 2000- June 2006	Assistant Professor	University of California, Santa Cruz
Summer 1994	Software Engineer	Continuus Software
1993-2000	Research Assistant	University of California, Irvine
1992-1993	Teaching Assistant	University of California, Irvine
1989-1992	Engineer	Raytheon, Equipment Division

**EDUCATION**

September, 2000	Ph.D, Information and Computer Science	University of California, Irvine
December, 1994	MS, Information and Computer Science	University of California, Irvine
May, 1989	BS, Electrical Engineering	Rensselaer Polytechnic Institute

**PUBLISHED WRITINGS AND CREATIVE ACTIVITIES****Journal Articles**

11. Xiaoyan Zhu, E. James Whitehead, Jr., Caitlin Sadowski, Qinbao Song, "An analysis of programming language statement frequency in C, C++, and Java source code." *Software: Practice and Experience*, vol. 45, no. 11, November 2015, pp. 1479-1495.

- J2. Zhongpeng Lin, Chris Lewis, Sri Kurniawan, Jim Whitehead, "Why Players Start and Stop Playing a Chinese Social Network Game." *Journal of Gaming and Virtual Worlds*, vol. 5, no. 3, September 2013, pp. 307-328.
- J3. Shivkumar Shivaji, E. James Whitehead, Jr., Ram Akella, Sunghun Kim, "Reducing Features to Improve Code Change-Based Bug Prediction." *IEEE Transactions on Software Engineering*, vol. 39, no. 4, April 2013, pp. 552-569.
- J4. Gillian Smith, Jim Whitehead, Michael Mateas, "Tanagra: Reactive Planning and Constraint Solving for Mixed-Initiative Level Design." *IEEE Transactions on Computational Intelligence and Artificial Intelligence in Games (TCIAIG)*, vol. 3, no. 3, September, 2011, pp. 201-215.
- J5. Chris Lewis, Jim Whitehead, "Repairing Games at Runtime or, How We Learned to Stop Worrying and Love Emergence." *IEEE Software*, Vol. 28, No. 5, September/October 2011, pp. 53-59.
- J6. Gillian Smith, Jim Whitehead, Michael Mateas, Mike Treanor, Jameka March, Mee Cha, "Launchpad: A Rhythm-Based Level Generator for 2-D Platformers." *IEEE Transactions on Computational Intelligence and AI in Games (TCIAIG)*, Vol. 3, No. 1, March 2011.
- J7. Kai Pan, Sunghun Kim, E. James Whitehead, Jr., "Toward an Understanding of Bug Fix Patterns" *Empirical Software Engineering*, Vol. 14, No. 3, June 2009.
- J8. Sunghun Kim, E. James Whitehead, Jr., Yi Zhang, "Classifying Software Changes: Clean or Buggy?" *IEEE Transactions on Software Engineering*, vol. 34, no. 2, March/April 2008, pp. 181-196.
- J9. E. James Whitehead, Jr., Yaron Y. Golan, "The WebDAV Property Design." *Software, Practice and Experience*, vol 34, 2004, pp. 135-161.
- J10. E. James Whitehead, Jr. "A Proposed Curriculum for a Masters in Web Engineering." *Journal of Web Engineering*, Vol. 1, No. 1, October, 2002, pp. 18-22.
- J11. Kenneth M. Anderson, Richard N. Taylor, E. James Whitehead, Jr. "Chimera: Hypermedia for Heterogeneous Software Development Environments." *ACM Transactions on Information Systems*, Vol. 18, No. 3, July 2000, pages 211-245.
- J12. Roy T. Fielding, E. James Whitehead, Jr., Kenneth M. Anderson, Gregory A. Bolcer, Peyman Oreizy, Richard N. Taylor "Web-Based Development of Complex Information Products." *Communications of the ACM*, Vol. 41, No. 8, August, 1998, pages 84-92.
- J13. Kenneth M. Anderson, Richard N. Taylor, E. James Whitehead, Jr. "A Critique of the Open Hypermedia Protocol." *Journal of Digital Information*, Vol. 1, No. 2, December, 1997.
- J14. Richard N. Taylor, Nenad Medvidovic, Kenneth M. Anderson, E. James Whitehead, Jr., Jason E. Robbins, Kari A. Nies, Peyman Oreizy, and Deborah L. Dubrow "A Component and Message-Based Architectural Style for GUI Software." *IEEE Transactions on Software Engineering*, Vol. 22, No. 6, June, 1996, pages 390-406.

#### **Edited Books**

- B1. Ivan Mistrík, John Grundy, André van der Hoek, Jim Whitehead (editors), *Collaborative Software Engineering*, Springer, 2010. ISBN 978-3642102936.

#### **Contributions to Books**

- BC1. Jim Whitehead, "From Software Data to Software Theory: The Path Less Traveled." In *Perspectives on Data Science for Software Engineering*, ed. By Tim Menzies, Laurie Williams, Thomas Zimmermann, Morgan Kaufmann, 2016, pp. 25-28.
- BC2. Jim Whitehead, Ivan Mistrík, John Grundy, André van der Hoek, "Collaborative Software Engineering: Concepts and Techniques." In *Collaborative Software Engineering*, Springer, 2010, pp. 1-34.
- BC3. Ivan Mistrík, John Grundy, André van der Hoek, Jim Whitehead, "Collaborative Software Engineering: Challenges and Prospects." In *Collaborative Software Engineering*, Springer, 2010, pp. 389-404.

#### **Conference and Workshop Publications (All Peer Reviewed)**

*Acceptance rates, where known, shown in parenthesis.*

- C1. Batu Aytemiz, Isaac Karth, J. Harder, Adam M. Smith, Jim Whitehead, "Talin: A Framework for Dynamic Tutorials Based on the Skill Atoms Theory." *Proc. 14th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE'18)*.
- C2. Afshin Mobramaein, Morteza Behrooz, Jim Whitehead, "CADI—A Conversational Assistive Design Interface for Discovering Pong Variants." *Proc. 14th AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE'18) (poster paper)*.
- C3. Afshin Mobramaein, Jim Whitehead, Chandranil Chakrabortii, "Talk to Me About Pong: On Using Conversational Interfaces for Mixed-Initiative Game Design." *Proc. 2018 AAAI Spring Symposium Series, The Design of the User Experience for Artificial Intelligence (the UX of AI)*, 2018.
- C4. Jo Mazeika, Jim Whitehead, "Solving for Bespoke Game Assets: Applying Style to 3D Generative Artifacts." *Proceedings of the 13<sup>th</sup> AAAI Conference on Artificial Intelligence and Interactive Digital Entertainment (AIIDE 2017)*, Snowbird, Utah, October 5-9, 2017, pp. 73-79 (*short paper*)
- C5. Jo Mazeika, Jim Whitehead, "Solusforge: Controlling the Generation of the 3D models with Spatial Relation Graphs." *Proceedings of the 2017 International Conference on the Foundations of Digital Games (FDG 2017)*, Hyannis, MA, August 14-17, 2017 (*poster presentation*)
- C6. Jim Whitehead, "Art and Science of Engineered Design: What Kind of Discipline is PCG?" *Proceedings of the Eighth Workshop on Procedural Content Generation (PCG 2017)*, Hyannis, MA, August 14, 2017. (*short paper*)
- C7. Chandranil Chakrabortii, Lucas Ferreira and Jim Whitehead, "Towards Generative Emotions in Games based on Cognitive Modeling." *Proceedings of the Eighth Workshop on Procedural Content Generation (PCG 2017)*, Hyannis, MA, August 14, 2017. (*short paper*)
- C8. Johnathan Pagnutti, Jim Whitehead, "Cooking on the Margins: Probabilistic Soft Logics for Recommending and Adapting Recipes." *Computer Cooking Contest held with 25<sup>th</sup> Int'l Conference on Case Based Reasoning (ICCBR 2017)*, Trondheim, Norway, June 26-28, pp. 269-276.
- C9. Kate Compton, Heather Logas, Joseph C. Osborn, Chandranil Chakrabortii, Kelsey Coffman, Daniel Fava, Dylan Lederle-Ensign, Zhongpeng Lin, Jo Mazeika, Afshin Mobramaein, Johnathan Pagnutti, Huascar Sanchez, Jim Whitehead, John Murray, Brenda Laurel, "Design Lessons From Binary Fission: A Crowd Sourced Game for Precondition Discovery." *Proceedings of the First International Joint Conference of the Digital Games Research Association (DIGRA) and the Foundations of Digital Games (FDG) 2016*, Dundee, Scotland, UK, August 1-5, 2016.
- C10. Johnathan Pagnutti, Kate Compton, Jim Whitehead, "Do You Like This Art I Made You: Introducing Techne, A Creative Art Bot Commune." *Proceedings of the 7<sup>th</sup> Procedural Content Generation Workshop (PCG 2016)*, Dundee, Scotland, UK, August 1-5, 2016.
- C11. Huascar Sanchez, Jim Whitehead, and Martin Schaef, "Multistaging to Understand: Distilling the Essence of Java Code Examples." *Proceedings of the 24th IEEE International Conference on Program Comprehension (ICPC 2016)*, Austin, TX, May 16-17, 2016. (*30% accept rate*)
- C12. Daniel Fava, Dan Shapiro, Joseph C. Osborn, Martin Schaef, E. James Whitehead Jr., "Crowdsourcing program preconditions via a classification game." *Proceedings of the 38th International Conference on Software Engineering (ICSE 2016)*, Austin, TX, May 14-22, 2016. (*19% accept rate*)
- C13. Johnathan Pagnutti, Jim Whitehead, "Generative Mixology: An Engine for Creating Cocktails." *Proceedings of the Sixth International Conference on Computational Creativity (ICCC 2015)*, Park City, Utah, USA, June 29-July 2, 2015.
- C14. Kate Compton, Dylan Lederle-Ensign, Zhongpeng Lin, Joe Mazeika, Afshin Mobramaein, Johnathan Pagnutti, Huascar Sanchez, Jim Whitehead, "BotPrint: Casual Robotic Evolution." *Proceedings of the Computational Creativity and Games Workshop*, held in conjunction with ICCC 2015, June 28, 2015 (*demonstration paper*).
- C15. Heather Logas, Richard Vallejos, Joseph Osborn, Kate Compton, Jim Whitehead, "Visualizing Loops and Data Structures in Xylem: The Code of Plants." *Proceedings of the 2015 Games and Software Engineering Workshop (GAS 2015)*, held with ICSE 2015, Firenze, Italy, May 18, 2015.
- C16. Huascar Sanchez, Jim Whitehead, "Source Code Curation on Stack Overflow: The Vesperin System." Tool demonstration paper, *International Conference on Software Engineering*, Firenze, Italy, May 16-24, 2015. (*61% accept rate for tool demos*)

- C17. Zhongpeng Lin, Jim Whitehead, "Why Power Laws? An Explanation from Fine-Grained Code Changes." *Proceedings of the 12th Working Conference on Mining Software Repositories, MSR 2015*, Firenze, Italy, May 16-17, 2015. (30% full paper accept rate)
- C18. Carlos Maltzahn, Arnav Jhala, Michael Mateas, Jim Whitehead, "Gamification of private digital data archive management." *Proceedings of the First International Workshop on Gamification for Information Retrieval (GamifIR'14)*, held in conjunction with ECIR'14, Amsterdam, Netherlands, July 21, 2014.
- C19. Zhongpeng Lin, Jim Whitehead "Using Fine-Grained Code Change Metrics to Simulate Software Evolution." *Proceedings of the 5<sup>th</sup> International Workshop on Emerging Trends in Software Metrics (WETSoM 2014)*, Hyderabad, India, June 3, 2014, pp. 15-18.
- C20. Heather Logas, Jim Whitehead, Michael Mateas, Richard Vallejos, Lauren Scott, Dan Shapiro, John Murray, Kate Compton, Joseph Osborn, Orlando Salvatore, Zhongpeng Lin, Huascar Sanchez, Michael Shavlovsky, Daniel Cetina, Shayne Clementi, and Chris Lewis, "Software Verification Games: Designing Xylem, The Code of Plants." *Proceedings of the 9th International Conference on the Foundations of Digital Games (FDG 2014)*, Ft. Lauderdale, FL, USA, April 3-7, 2014.
- C21. Chris Lewis, Zhongpeng Lin, Caitlin Sadowski, Xiaoyan Zhu, Rong Ou, E. James Whitehead Jr., "Does Bug Prediction Support Human Developers? Findings from a Google Case Study." *Proceedings of the 2013 International Conference on Software Engineering (ICSE 2013)*, San Francisco, CA, May 18-26, 2013, pp. 372-381. (18.5% accept rate)
- C22. Gillian Smith, Alexei Othenin-Girard, Jim Whitehead, Noah Wardrip-Fruin. "PCG-Based Game Design: Creating Endless Web." *Proceedings of the 2012 Foundations of Digital Games Conference (FDG 2012)*, Raleigh, NC, USA, May 30-June 1, 2012.
- C23. Chris Lewis, Noah Wardrip-Fruin, Jim Whitehead. "Motivational Game Design Patterns of 'Ville Games.'" In *Proceedings of the 2012 Foundations of Digital Games Conference (FDG 2012)*, Raleigh, NC, USA, May 30 - June 1, 2012.
- C24. Gabriel Rivera, Kenneth Hullett, Jim Whitehead, "Enemy NPC Design Patterns in Shooter Games." *Proceedings of the Workshop on Design Patterns in Games (DPG 2012)*, held with FDG 2012, Raleigh, NC, USA, May 30 - June 1, 2012.
- C25. Robert Giusti, Kenneth Hullett, Jim Whitehead, "Weapon Design Patterns in Shooter Games." *Proceedings of the Workshop on Design Patterns in Games (DPG 2012)*, held with FDG 2012, Raleigh, NC, USA, May 30 - June 1, 2012.
- C26. Gillian Smith, Ryan Anderson, Brian Kopleck, Zach Lindblad, Lauren Scott, Adam Wardell, Jim Whitehead, Michael Mateas, "Situating Quests: Design Patterns for Quest and Level Design in Role-Playing Games." *Fourth International Conference on Interactive Digital Storytelling (ICIDS 2011)*, Vancouver, Canada, November 28-December 1, 2011. Lecture Notes in Computer Science 7069 Springer, pp. 326-329.
- C27. Chris Lewis, Jim Whitehead, "The Whats and Whys of Games and Software Engineering." *Proceedings of the Games and Software Engineering workshop (GAS 2011)*, co-located with the 2011 Int'l Conference on Software Engineering (ICSE 2011), Honolulu, Hawaii, USA, May 21, 2011.
- C28. Gillian Smith, Elaine Gan, Alexei Othenin-Girard, Jim Whitehead, "PCG-Based Game Design: Enabling New Play Experiences through Procedural Content Generation." *Proceedings of the Second Int'l Workshop on Procedural Content Generation in Games (PCGames 2011)*, co-located with the 2011 Foundations of Digital Games (FDG 2011) conference, Bordeaux, France, June 28, 2011.
- C29. Caitlin Sadowski, Chris Lewis, Zhongpeng Lin, Xiaoyan Zhu, E. James Whitehead, Jr., "An Empirical Analysis of the FixCache Algorithm." *Proceedings of the 8th Working Conference on Mining Software Repositories (MSR 2011)*, Honolulu, Hawaii, USA, May 21-22, 2011. (Short paper, 35%)
- C30. Gillian Smith, Jim Whitehead, Michael Mateas, "Tanagra: A Mixed-Initiative Level Design Tool." *Proceedings of the 5th International Conference on the Foundations of Digital Games (FDG 2010)*, Monterey, California, USA, June 19-21, 2010. (34%)
- C31. Chris Lewis, Jim Whitehead, Noah Wardrip-Fruin, "What Went Wrong: A Taxonomy of Video Game Bugs." *Proceedings of the 5th International Conference on the Foundations of Digital Games (FDG 2010)*, Monterey, California, USA, June 19-21, 2010. (34%)

- C32. Kenneth Hullett, Jim Whitehead, "Design Patterns in FPS Levels." *Proceedings of the 5th International Conference on the Foundations of Digital Games (FDG 2010)*, Monterey, California, USA, June 19-21, 2010. (34%)
- C33. Gillian Smith, Jim Whitehead, "Analyzing the Expressive Range of a Level Generator." *Proceedings of the Workshop on Procedural Content Generation in Games (Co-located with FDG 2010)*, Monterey, California, USA, June 18, 2010.
- C34. Jim Whitehead, "Toward Procedural Decorative Ornamentation in Games." *Proceedings of the Workshop on Procedural Content Generation in Games (Co-located with FDG 2010)*, Monterey, California, USA, June 18, 2010 (short paper).
- C35. Chris Lewis, Jim Whitehead, "Runtime Repair of Software Faults Using Event-Driven Monitoring." *Proceedings of the 2010 International Conference on Software Engineering (ICSE 2010)*, Cape Town, South Africa, May 2-10, 2010 (formal research demonstration paper).
- C36. Shivkumar Shivaji, E. James Whitehead, Jr., Ram Akella, Sunghun Kim, "Reducing Features to Improve Bug Prediction." *Proceedings of the 24th IEEE/ACM International Conference on Automated Software Engineering (ASE 2009)*, Auckland, New Zealand, Nov. 16-20, 2009. (short paper)
- C37. Sunghun Kim, Shivkumar Shivaji, E. James Whitehead, Jr., "Kenyon-Web: Reconfigurable Web-based Feature Extractor." *Proceedings of the 17th IEEE International Conference on Program Comprehension (ICPC '09)*, Vancouver, BC, Canada, May 17-19, 2009. (Tool demonstration paper.)
- C38. Gillian Smith, Mike Treanor, Jim Whitehead, Michael Mateas, "Rhythm-Based Level Generation for 2D Platformers." *Proceedings of the 2009 Int'l Conference on the Foundations of Digital Games (FDG 2009)*, Orlando, FL, April 26-30, 2009.
- C39. Gillian Smith, Mee Cha, Jim Whitehead, "A Framework for Analysis of 2D Platformer Levels." *Proceedings of ACM SIGGRAPH Sandbox Symposium 2008*, Los Angeles, CA, August 9-10, 2008.
- C40. Guozheng Ge, E. James Whitehead, Jr., "Rhizome: A Feature Modeling and Generation Platform." *Proceedings of the 23rd IEEE/ACM International Conference on Automated Software Engineering (ASE 2008)*, L'Aquila, Italy, September 15-19, 2008. (short paper)
- C41. Sangeetha Sudhakarishnan, Janaki T. Madhavan, E. James Whitehead, Jr., Jose Renau, "Understanding Bug Fix Patterns in Verilog." *Proceedings of the 5th Working Conference on Mining Software Repositories (MSR 2008)*, Leipzig, Germany, May 10-11, 2008. (short paper)
- C42. Jim Whitehead, "Introduction to Game Design in the Large Classroom." *Proceedings of the Third Annual Microsoft Academic Days Conference on Game Development in Computer Science Education (GDCSE 2008)*, Miami, Florida, February 27-March 3, 2008. (25%)
- C43. Janaki T. Madhavan, E. James Whitehead, Jr., "Predicting Buggy Changes Inside an Integrated Development Environment." *Proceedings of the Eclipse Technology Exchange Workshop at OOPSLA 2007 (ETX 2007)*, Montréal, Québec, Canada, October 21, 2007.
- C44. Sunghun Kim, Thomas Zimmermann, E. James Whitehead, Jr., Andreas Zeller, "Predicting Faults from Cached History." *Proceedings of the 29th International Conference on Software Engineering (ICSE 2007)*, Minneapolis, Minnesota, USA, May 20-26, 2007. (15%) *ACM SIGSOFT Distinguished Paper Award winner.*
- C45. Peter Bergstrom, E. James Whitehead, Jr., "CircleView: Scalable Visualization and Navigation of Citation Networks." *Proceedings of the 2006 Symposium on Interactive Visual Information Collections and Activity (IVICA 2006)*, College Station, Texas, October 20-22, 2006.
- C46. Sunghun Kim, Kai Pan, E. James Whitehead, Jr., "Memories of Bug Fixes." *Proceedings of the Fourteenth ACM SIGSOFT Symposium on Foundations of Software Engineering (FSE 2006)*, Portland, Oregon, November 5-11, 2006. (20%)
- C47. Sunghun Kim, E. James Whitehead, Jr., Jennifer Bevan, "Properties of Signature Change Patterns." *Proceedings of ICSM 2006, the 22nd IEEE International Conference on Software Maintenance*, Philadelphia, PA, September 24-27, 2006. (30%)
- C48. Kai Pan, Sunghun Kim, E. James Whitehead, Jr., "Bug Classification Using Program Slicing Metrics." *Proceedings of the Sixth IEEE International Workshop on Source Code Analysis and Manipulation (SCAM 2006)*, Philadelphia, PA, September 27-29, 2006. (41%)

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