Heather M. Conboy

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TEACHING AND RESEARCH INTERESTS

Software engineering, program analysis, runtime environments, ethical and responsible computing

EDUCATION

Ph.D. in Computer Science, UMass Amherst, May 2017
- "Automatic Derivation of Requirements for Components Used in Human-Intensive Systems"
- Co-Advisors: Lori A. Clarke and George S. Avrunin

M.S. in Computer Science, UMass Amherst, Sept. 2007
B.S., Major in **Computer Science**, Minor in Chemistry, UMass Amherst, May 1997

EXPERIENCE

Lecturer, Jan. 2020 - present
- College of Information and Computer Sciences, UMass Amherst

Senior Research Fellow, June 2023 - present
- Laboratory for Advanced Software Engineering Research, UMass Amherst

Postdoctoral Researcher, June 2017 - June 2023
- Laboratory for Advanced Software Engineering Research, UMass Amherst

Research Assistant, Sept. 2007 – May 2017
- Laboratory for Advanced Software Engineering Research, UMass Amherst

Teaching Assistant, Fall 2007, 2008, 2009
- College of Information and Computer Sciences, UMass Amherst

Software Engineer, July 1997 – Aug. 2007
- Laboratory for Advanced Software Engineering Research, UMass Amherst

PEER REVIEWED PUBLICATIONS

- "Embedding Ethical Awareness in Computer Science and AI Education: The PEaRCE Approach to Responsible Computing", Mohammad Hadi Nezhad, Francisco Enrique Vicente Castro, Eugene Mak, Peter J. Haas, Danielle Allessio, Leon Osterweil, Injila Rasul, **Heather Conboy**, and Ivon Arroyo. In Proceedings, Part I, of the 26th International Conference in Artificial Intelligence in Education (AIED 2025), 2025.
- "A Novel, Multi-Modal, Intraoperative Cognitive Workload Assessment of Cardiac Surgery Team Members", Lauren R. Kennedy-Metz, **Heather M. Conboy**, Anna Liu, Roger D. Dias, Rayan E. Harari, Ajami Gikandi, Alexander Shapeton, Lori A. Clarke, Leon J. Osterweil, George S. Avrunin, Theodora Chaspari, Steven Yule, and Marco A. Zentai, The Journal of Thoracic and Cardiovascular Surgery, 2024.

- “Piloting an Interactive Ethics and Responsible Computing Learning Environment in Undergraduate CS Courses”, Francisco Castro, Sahitya Raipura, **Heather Conboy,** Peter Haas, Leon Osterweil, Ivan Arroyo, In Proceedings of the 54th ACM Technical Symposium on Computer Science Education (SIGCSE 2023), 2023, pp. 659-665.
- “A Coding Framework for Usability Evaluation of Digital Health Technologies”, Mahdi Ebnali, Lauren Kennedy-Metz, **Heather Conboy**, Lori Clarke, Leon Osterweil, George Avrunin, Christian Miccile, Maria Arshanskiy, Annette Phillips, Marco Zenati, Roger Dias, In Proceedings of the 2022 International Conference on Human-Computer Interaction (HCI International 2022), 2022, pp. 185-196.
- "Dissecting Cardiac Surgery: A Video-based Recall Protocol to Elucidate Team Cognitive Processes in the Operating Room", Roger D. Dias, Marco A. Zenati, **Heather M. Conboy**, Lori A. Clarke, Leon J. Osterweil, George S. Avrunin, and Steven J. Yule, Annals of Surgery, Vol. 274 (2), 2021, pp. e181-e186.
- "Analysis of Dynamic Changes in Cognitive Workload During Cardiac Surgery Perfusionists' Interactions With the Cardiopulmonary Bypass Pump", Lauren R. Kennedy-Metz, Roger D. Dias, Rithy Srey, Geoffrey C. Rance, **Heather M. Conboy**, Miguel E. Haime, Jacquelyn A. Quin, Steven J. Yule, and Marco A. Zenati, Human Factors, Vol. 63 (5), 2021, pp. 757-771.
- "Digital Cognitive Aids to Support Adaptation of Surgical Processes to COVID-19 Protective Policies", **Heather M. Conboy**, Lauren R. Kennedy-Metz, George S. Avrunin, Lori A. Clarke, Leon J. Osterweil, Roger D. Dias, Marco A. Zenati, In Proceedings of the 2020 IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA’20), Victoria, BC, Canada, 2020, pp. 205-210.
- "Process-Model-Driven Guidance to Reduce Surgical Procedure Errors: An Expert Opinion", Leon J. Osterweil, **Heather M. Conboy**, Lori A. Clarke, and George S. Avrunin, Seminars in Thoracic Cardiovascular Surgery, Vol. 31 (3), 2019, pp. 453-457.
- "Intelligent Interruption Management System to Enhance Safety and Performance in Complex Surgical and Robotic Procedures.", Roger D. Dias, **Heather M. Conboy**, Jennifer M. Gabany, Lori A. Clarke, Leon J. Osterweil, David Arney, Julian M. Goldman, Giuseppe Riccardi, George S. Avrunin, Steven J. Yule, and Marco A. Zenati, OR 2.0 Context-aware Operating Theaters, Computer Assisted Robotic Endoscopy, Clinical Image-based Procedures, and Skin Image Analysis, Vol. 11041, 2018, pp. 62-68.
- “Process Driven Guidance for Complex Surgical Procedures”, George S. Avrunin, Stefan C. Christov, **Heather M. Conboy**, Lori A. Clarke, Leon J. Osterweil, and Marco A. Zenati, American Medical Informatics Association Annual Symposium Proceedings (AMIA’18), 2018, pp. 175-184.
- "Toward Improving Surgical Outcomes by Incorporating Cognitive Load Measurement into Process-Driven Guidance", George S. Avrunin, Lori A. Clarke, **Heather M. Conboy**, Leon J. Osterweil, Roger D. Dias, Steven J. Yule, Julian M. Goldman, and Marco A. Zenati, In Proceedings of the 2018 IEEE/ACM International Workshop on Software Engineering in Healthcare Systems (SEHS’18), 2018, pp. 2 - 9.
- "Development of an Interactive Dashboard to Analyze Cognitive Workload of Surgical Teams During Complex Procedural Care", Roger D. Dias, **Heather M. Conboy**, Jennifer M. Gabany, Lori A. Clarke, Leon J. Osterweil, George S. Avrunin, David Arney, Julian M. Goldman, Giuseppe Riccardi, Steven J. Yule, and Marco A. Zenati, In Proceedings of the 2018 IEEE International Conference on Cognitive Methods in Situation Awareness and Decision Support, Vol. 2018, 2018, pp. 77-82.

- "A Comprehensive Framework for Using Iterative Analysis to Improve Human-Intensive Process Security: An Election Example", Leon J. Osterweil, Matt Bishop, **Heather M. Conboy**, Huong Phan, Borislava I. Simidchieva, George S. Avrunin, Lori A. Clarke, and Sean Peissart, In ACM Transactions on Privacy and Security (TOPS), 2017, pp. 5:1 – 5:31.
- "Cognitive Support During High-Consequence Episodes of Care in Cardiovascular Surgery", **Heather M. Conboy**, George S. Avrunin, Lori A. Clarke, Leon J. Osterweil, Stefan C. Christov, Julian M. Goldman, Steven J. Yule, and Marco A. Zenati, In Proceedings of the 2017 IEEE Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA'17), 2017.
- "Smart Checklists to Improve Healthcare Outcomes", Stefan C. Christov, **Heather M. Conboy**, Nancy Famigletti, George S. Avrunin, Lori A. Clarke, and Leon J. Osterweil, In Proceedings of the International Conference on Software Engineering (ICSE) 2016 Workshop on Software Engineering in Healthcare Systems (SEHS'16), 2016, pp. 54 - 57.
- "Process Modelling of Aortic Cannulation in Cardiac Surgery: Toward a Smart Checklist to Mitigate the Risk of Stroke", **Heather M. Conboy**, Jason K. Maron, Stefan C. Christov, George S. Avrunin, Lori A. Clarke, Leon J. Osterweil, and Marco A. Zenati, In Proceedings of the 5th Workshop on Modeling and Monitoring of Computer Assisted Interventions (M2CAI'14), 2014.
- "Insider Threat Identification by Process Analysis", Matt Bishop, **Heather M. Conboy**, Huong Phan, Borislava I. Simidchieva, George S. Avrunin, Lori A. Clarke, Leon J. Osterweil, and Sean Peisert, In Proceedings of the 1st Workshop on Research for Insider Threat (WRIT'14), 2014, pp. 251 - 264.
- "Modal Abstraction View of Requirements for Medical Devices Used in Healthcare Processes", **Heather M. Conboy**, George S. Avrunin, and Lori A. Clarke, In Proceedings of the ICSE 2013 Workshop on Software Engineering in Health Care (SEHC'13), 2013, pp. 24 - 27.
- "Process-Based Derivation of Requirements for Medical Devices", **Heather M. Conboy**, George S. Avrunin, and Lori A. Clarke, In Proceedings of the 1st ACM International Health Informatics Symposium (IHI '10), 2010, pp. 656 - 665.

TEACHING

Instructor:

Fall 2025
- COMPSCI 320 Introduction to Software Engineering, 29 ugrad
- COMPSCI 429 Software Engineering Project Management, 5 ugrad
- COMPSCI 520 Theory and Practice of Software Engineering, 49 ugrad + grad

Spring 2025
- COMPSCI 520 Theory and Practice of Software Engineering, 150 ugrad + grad

Fall 2024
- COMPSCI 320 Introduction to Software Engineering, 18 ugrad
- COMPSCI 429 Software Engineering Project Management, 3 ugrad

Spring 2024
- COMPSCI 320 Introduction to Software Engineering, 48 ugrad
- COMPSCI 429 Software Engineering Project Management, 6 ugrad

Fall 2023
- COMPSCI 520 Theory and Practice of Software Engineering, 149 ugrad + grad

Spring 2023
- COMPSCI 320 Introduction to Software Engineering, 37 ugrad
- COMPSCI 429 Software Engineering Project Management, 4 ugrad
- COMPSCI 520 Theory and Practice of Software Engineering, 137 ugrad + grad

Fall 2022
- COMPSCI 520 Theory and Practice of Software Engineering, 108 ugrad + grad

Spring 2022
- COMPSCI 520 Theory and Practice of Software Engineering, 57 ugrad + grad

Fall 2021
- COMPSCI 520 Theory and Practice of Software Engineering, 98 ugrad + grad

Spring 2021
- COMPSCI 520 Theory and Practice of Software Engineering, 53 ugrad + grad

Fall 2020
- COMPSCI 520 Theory and Practice of Software Engineering, 76 ugrad + grad

Spring 2020
- COMPSCI 520 Theory and Practice of Software Engineering, 50 ugrad + grad

Recent Student Research Projects:

Fall 2025
- Co-Advisor for Honors Project with Leon J. Osterweil, Atharva Shahane, "Designing a Large Language Model (LLM) Agent to Support the Development of the Platform for Ethicical and Responsible Computing Education (PEaRCE)"

Spring 2023
- Mentor for Honors Project, Enoch Hsaio, "Development of a User Role Management through a Role-Based Access Control (RBAC) System within an Interactive CS Ethics Learning Environment (PEaRCE)"

Spring 2022
- Mentor for Honors Project, Sahitya Raipura, "Initial Evaluation of an Interactive Online System for Computer Science Ethics Education"

Spring 2021
- Co-Advisor for Honors Project with Lori A. Clarke, Henry Cheung, "Automatically Generating Post-Procedure Documentation as Part of the UMass Medical Safety Project"
- Co-Advisor for Honors Project with Leon J. Osterweil, Jack Joseph McDonough, "Enhancing Annotations of Audiovisual Recordings of Surgical Processes"

Fall 2020
- Co-Advisor for Masters Project with Leon J. Osterweil, Gregory Fleming, "Using Voice to Guide Medical Processes"

Teaching Assistant:

Fall 2007, 2008, 2009
- CS 521/621 Advanced Software Engineering: Analysis, About 20 ugrad and grad

PAPER PRESENTATIONS AND INVITED TALKS

- Invited speaker, “A Model-based Approach to Iteratively Improve Human Intensive Processes”, The Parker Lab, Virginia Tech, Blacksburg, VA, March 2022. (Virtual)
- Invited speaker, “The Use of Process Modeling and Smart Checklists in Healthcare”, Research Seminars, STRATUS Center for Medical Simulation, Boston, MA, August 2020. (Virtual)
- Presenter, "Digital Cognitive Aids to Support Adaptation of Surgical Processes to COVID-19 Protective Policies”, 2020 Conference on Cognitive and Computational Aspects of Situation Management (CogSIMA’20), Victoria, BC, Canada. (Virtual)
- Presenter, “Process Driven Guidance for Complex Surgical Procedures”, 2018 American Medical Informatics Association Annual Symposium (AMIA’18), San Francisco, CA.
- Presenter, “Toward Improving Surgical Outcomes by Incorporating Cognitive Load Measurement into Process-Driven Guidance”, 2018 IEEE/ACM International Workshop on Software Engineering in Healthcare Systems (SEHS’18), Gothenburg, Sweden.
- Presenter, “Smart Checklists to Improve Healthcare Outcomes”, 2016 Workshop on Software Engineering in Healthcare Systems (SEHS’16), San Francisco, CA.
- Invited speaker, “MAC (Memory and Aging Center) Process Modeling Project”, **Heather M. Conboy** and Kate Rankin, MAC, University of California San Francisco, San Francisco, CA, March 2014.
- Presenter, “Process-Based Derivation of Requirements for Medical Devices”, 1st ACM International Health Informatics Symposium (IHI '10), Washington, DC, 2010.
- Invited Speaker, “Building Finite State Verifier (FSV) Models from the Bandera Intermediate Representation (BIR)”, **Heather M. Conboy**, George S. Avrunin, Lori A. Clarke, and Stephen F. Siegel, SANTOS Laboratory, Kansas State University Manhattan, KS, February 2002.

TEACHING ACTIVITIES

- Educational Software Researcher and Developer, Platform for Ethical and Responsible Computing Education (PEARCE)
- Course development with Mahbuba Tasmin, COMPSCI 520 Theory and Practice of Software Engineering, Summer 2023
- Closely collaborated with the CICS Ethics Education Committee, Fall 2019 - present
- Advisor for Nathaniel Grebelsky, UMass 298 Internship Practicum, Summer 2022
- Customer for David Fisher, COMPSCI 320 Introduction to Software Engineering and COMPSCI 429 Software Engineering Project Management, Early version of the Platform for Ethical and Responsible Computing Education (PEaRCE), Fall 2020 - Spring 2021
- Judge, HackUMass, Fall 2020, Fall 2021, Fall 2022
- Mentor for female undergraduate students, Research Experience for Undergraduates, Summer 2001, 2002, 2008, 2011, 2013, 2015, 2016, 2017
- Graduate Student Senator, University of Massachusetts Amherst, Feb. 2011 - Aug. 2011
- CS Women’s Group Co-Chair, University of Massachusetts Amherst, June 2009 - Aug 2010

RESEARCH ACTIVITIES

- Reviewer, American Medical Informatics Association, Spring 2019, 2020, 2021, 2022, 2023
- Member, ICSE 2019 Demonstrations Track Program Committee, Fall 2018
- Member, ICSE 2018 Posters Track Program Committee, Spring 2018
- Visual-JIL a Little-JIL process programming editor tutorial
- Yolo County Election Process Model and Fault Tree Analysis benchmark
- FLAVERS (FLow Analysis for the VERification of Systems) for Ada, Java, and Little-JIL
- Finite-state verification tools for Ada benchmark