

# Christopher J. MacLellan

Research Scientist, Soar Technology, Inc.  
3600 Green Ct #600, Ann Arbor, MI 48105  
Homepage: <http://www.soartech.com/>  
Fax: (734) 913-8537

Email: [chris.maclellan@soartech.com](mailto:chris.maclellan@soartech.com)  
Personal Page: <http://www.christopia.net/>  
Phone: (307) 220-2425  
Citizenship: United States

## Education

**Carnegie Mellon University**, M.S./Ph.D. in Human-Computer Interaction, 2017.

*Advisor:* Ken Koedinger

**Arizona State University**, Ph.D. Student in Computer Science, 2010-2012.

*Concentration:* Artificial Intelligence, *Advisor:* Pat Langley

*(Transferred to Carnegie Mellon University August 2012)*

**University of Wyoming**, B.S. in Computer Science and Mathematics, 2010.

*Honors:* Most Outstanding 2010 Graduate, Cum Laude.

## Grants

National Science Foundation, Conference: A Proposal to the National Science Foundation for Support of the Seventh Annual Inter-Science of Learning Centers (iSLC) Student / Postdoctoral Scholar Conference. Award Number SMA-1430662. March 24, 2014.

## Honors and Awards

Post Doctoral Research Fellowship (declined), National Research Council, 2017.

Exemplary Paper Award, Educational Data Mining, 2016.

Program for Interdisciplinary Education Research Fellowship, Carnegie Mellon University, 2012-2015.

Conference Travel Grants, ACS 2016, NSF 2015, ACM 2015, AAAI 2011.

Fulton Fellowship, Arizona State University, 2010-2011.

Deans Fellowship Award, Arizona State University, 2010-2014.

Space Grant Fellowship, University of Wyoming, 2010.

Most Outstanding 2010 Graduate Award, University of Wyoming, 2010.

College of Engineering Excellent Academic Achievement Award, University of Wyoming, 2007-2009.

Invited Speaker, Keith and Thyra Thomson Honors Convocation, 2009.

NASA Space Grant, NASA Jet Propulsion Laboratory, 2009.

Arts and Sciences Board of Visitors Student Service Award, University of Wyoming, 2008.

Arts and Sciences Catherine Gibbs Shaw Award, University of Wyoming, 2008.

Summer EPSCoR Research Fellowship, University of Wyoming, 2008.

Spring EPSCoR Research Fellowship, University of Wyoming, 2008.

Undergraduate Research Fellowship, National Science Foundation, 2007-2008.

## Journal Publications

J4 **MacLellan, C.J.**, Harpstead, E., Alevan, V. Koedinger, K.R. (2016). TRESTLE: A Model of Concept Formation in Structured Domains. *Advances in Cognitive Systems*, 4, 131-150.

J3 Unger, L., Fisher, A. V., Nugent, R., Ventura, S. L., **MacLellan, C.J.** (2016). Developmental Changes in the Semantic Organization. *Journal of Experimental Child Psychology*, 146. doi:

10.1016/j.jecp.2016.01.005

- J2 Dinar, M., Danielescu, A., **MacLellan, C.J.**, Shah, J., Langley, P. (2015). Problem Map: An ontological framework for a computational study of problem formulation in engineering design. *Journal of Computing and Information Science in Engineering*, 15(3). doi: 10.1115/1.4030076
- J1 **MacLellan, C.J.**, Langley, P., Shah, J., Dinar, M. (2013). A Computational Aid for Problem Formulation in Early Conceptual Design. *Journal of Computing and Information Science in Engineering*, 13(3). doi: 10.1115/1.4024714

## Peer-Reviewed Conference Publications

- C12 **MacLellan, C.J.**, Harpstead, E., Patel, R., Koedinger, K.R. (2016). The Apprentice Learner Architecture: Closing the loop between learning theory and educational data. In *Proceedings of the 9th International Conference on Educational Data Mining*. (Winner of Exemplary Paper Award).
- C11 **MacLellan, C.J.**, Koedinger, K.R., Dow, S.P. (2015). Assessing the Creativity of Designs at Scale. In E. Y. Do (Ed.), *Proceedings of the 2015 ACM SIGCHI Conference on Creativity and Cognition* (pp. 339-340). New York: ACM Press. doi: 10.1145/2757226.2764770
- C10 **MacLellan, C.J.**, Harpstead, E., Alevan, V., Koedinger, K.R. (2015). TRESTLE: Incremental Learning in Structured Domains using Partial Matching and Categorization. In *Proceedings of the Third Annual Conference on Advances in Cognitive Systems*. Atlanta, GA: Cognitive Systems Foundation.
- C9 **MacLellan, C.J.**, Liu, R., Koedinger, K.R. (2015). Accounting for Slipping and Other False Negatives in Logistic Models of Student Learning. In O.C. Santos et al. (Eds.), *Proceedings of the 8th International Conference on Educational Data Mining*. Madrid, Spain: International Educational Data Mining Society.
- C8 **MacLellan, C.J.**, Koedinger, K.R., Matsuda, N. (2014). Authoring Tutors with SimStudent: An Evaluation of Efficiency and Model Quality. In S. Trausan-Matu, K. E. Boyer, M. Crosby, K. Panourgia (Eds.), *Proceedings of the 12th International Conference on Intelligent Tutoring Systems* (pp. 551-560). Switzerland: Springer International. doi: 10.1007/978-3-319-07221-0
- C7 Harpstead, E., **MacLellan, C.J.**, Alevan, V., Myers, B.A. (2014) Using Extracted Features to Inform Alignment-Driven Design Ideas in an Educational Game. In A. Schmidt, T. Grossman (Eds.), *Proceedings of the 32nd Annual SIGCHI Conference on Human Factors in Computing Systems - CHI '14* (pp. 3329-3338). New York: ACM Press. doi: 10.1145/2556288.2557393
- C6 Tenison, C., **MacLellan, C.J.** (2014). Modeling Strategy Use in an Intelligent Tutoring System: Implications for Strategic Flexibility. In S. Trausan-Matu, K. E. Boyer, M. Crosby, K. Panourgia (Eds.), *Proceedings of the 12th International Conference on Intelligent Tutoring Systems* (pp. 466-475). Switzerland: Springer International. doi: 10.1007/978-3-319-07221-0
- C5 Unger, L., Fisher, A. V., **MacLellan, C.J.** (2014). Developmental Changes in the Semantic Organization of Living Kinds. In P. Bello, M. Guarini, M. McShane, B. Scassellati (Eds.), *Proceedings of the 36th Annual Meeting of the Cognitive Science Society* (pp. 1646-1651). Quebec City: Cognitive Science Society.
- C4 Harpstead, E., **MacLellan, C.J.**, Koedinger, K.R., Alevan, V., Dow, S.P., Myers, B.A. (2013). Investigating the Solution Space of an Open-Ended Educational Game Using Conceptual Feature Extraction. In S.K. D'Mello, R.A. Calvo, A. Olney (Eds.), *Proceedings of the 6th International Conference on Educational Data Mining* (pp. 51-58). Memphis, TN: International Educational Data Mining Society

- C3 Danielescu, A., Dinar, M., **MacLellan, C.J.**, Shah, J., Langley, P. (2012). The structure of creative design: what problem maps can tell us about problem formulation and creative designers. *Proceedings of the ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference* (pp. 437-446). Chicago, Illinois: ASME.  
doi: 10.1115/DETC2012-70325
- C2 Dinar, M., **MacLellan, C.J.**, Danielescu, A., Shah, J. (2012). Beyond Function-Behavior-Structure. In J. Gero (Ed.), *Design Computing and Cognition '12* (pp. 511-527). Netherlands: Springer.  
doi: 10.1007/978-94-017-9112-0
- C1 Wiederrecht, M., **MacLellan, C.J.**, Gamboa, R. (2010). Reasoning about DrScheme Programs in ACL2. In R. Page, Z. Horvath, V. Zsk (Eds.), *Trends in Functional Programming* (pp. 276-283). Berlin: Springer-Verlag. doi: 10.1007/978-3-642-22941-1

## Book Chapters

- B1 Harpstead, E. , **MacLellan, C.J.**, Aleven, V., Myers, B. A. (2015). Replay analysis in open-ended educational games. In C. S. Loh, Y. Sheng, and D. Ifenthaler (Eds.), *Serious Game Analytics: Methodologies for Performance Measurement, Assessment, and Improvement*, 381-399. Switzerland: Springer International. doi: 10.1007/978-3-319-05834-4\_17

## Workshop Publications

- W12 Harpstead, E., **MacLellan, C.J.**, Koedinger K.R. (2018). Towards Natural Cognitive System Training Interactions: A Preliminary Framework. In *Proceedings of the AAAI 2018 Spring Symposium on the User Experience of Artificial Intelligence*.
- W11 **MacLellan, C.J.**, (2016). Apprentice Learner Architecture: A framework for modeling human learning from demonstrations and feedback in digital environments. *Proceedings of the Students of Cognitive Systems Workshop at the Fourth Annual Conference on Advances in Cognitive Systems*. Evanston, IL: Advances in Cognitive Systems.
- W10 **MacLellan, C.J.**, (2016). Investigating the Impact of Slipping Parameters on Additive Factors Model Parameter Estimates. *Proceedings of the 9th International Conference on Educational Data Mining*. Raleigh, NC: International Educational Data Mining Society.
- W9 **MacLellan, C.J.**, Harpstead, E., Wiese, E.S., Zou, M., Matsuda, N., Aleven, V., Koedinger, K.R. (2015). Authoring Tutors with Complex Solutions: A Comparative Analysis of Example Tracing and SimStudent. In J. Boticario K. Muldner (Eds.), *Proceedings of the Workshops at the 17th International Conference on Artificial Intelligence in Education AIED 2015* (Vol. 5, pp. 35-44). Aachen: CEUR-WS.org.
- W8 Harpstead, E., **MacLellan, C.J.**, Aleven, V. (2015). Discovering Knowledge Models in an Open-Ended Educational Game using Concept Formation. In J. Boticario, K. Muldner (Eds.), *Proceedings of the Workshops at the 17th International Conference on Artificial Intelligence in Education AIED 2015* (Vol. 2, pp. 9-16). Aachen: CEUR-WS.org.
- W7 Koedinger, K.R., Matsuda, N., **MacLellan, C.J.**, McLaughlin, E.A. (2015). Methods for Evaluating Simulated Learners: Examples from SimStudent. In J. Boticario, K. Muldner (Eds.), *Proceedings of the Workshops at the 17th International Conference on Artificial Intelligence in Education AIED 2015* (Vol. 5, pp. 45-54). Aachen: CEUR-WS.org.
- W6 **MacLellan, C.J.**, Wiese, E.S., Matsuda, N., Koedinger, K.R. (2014). SimStudent: Authoring Expert Models by Tutoring. In R. Sottolare (Ed.), *Proceedings of the Second Annual GIFT Users Symposium* (pp. 25-32). Orlando, FL: US Army Research Laboratory.

- W5 **MacLellan, C.J.**, Wiese, E.S., Matsuda, N., Koedinger, K.R. (2014). SimStudent: Improving Tutor Quality and Reducing Authoring Costs. In *Workshop Proceedings of the 12th International Conference on Intelligent Tutoring Systems*.
- W4 Harpstead, E., **MacLellan, C.J.**, Alevan, V., Koedinger, K.R. (2014). Using Data to Explore the Differences between Instructional Vision and Student Performance. In *Learning Innovations at Scale CHI 2014 Workshop*.
- W3 **MacLellan, C.J.**, Matsuda, N., Koedinger, K. R. (2013). Toward a reflective SimStudent: Using experience to avoid generalization errors. In E. Walker, C. Looi (Eds.), *Proceedings of the Workshops at the 16th International Conference on Artificial Intelligence in Education AIED 2013* (Vol. 4). Aachen: CEUR-WS.org.
- W2 Langley, P., Emery, M., Barley, M., **MacLellan, C.J.** (2013). An Architecture for Flexible Problem Solving. In *Annual Conference on Advances in Cognitive Systems: Workshop on Metacognition in Situated Agents*.
- W1 Langley, P., Emery, M., Barley, M., **MacLellan, C.J.** (2013). An Architecture for Flexible Problem Solving. In *Proceedings of the Annual Conference on Advances in Cognitive Systems: Workshop on Metacognition in Situated Agents*.

## Poster Publications

- P3 Tenison, C., **MacLellan, C.J.** (2015). The Impact of Instructional Intervention and Practice on Help-Seeking Strategies within an ITS. In O.C. Santos et al. (Eds.), *Proceedings of the 8th International Conference on Educational Data Mining*. International Educational Data Mining Society.
- P2 **MacLellan, C.J.**, Langley, P., Walker, C. (2012). A Generative Theory of Problem Solving. In *Proceedings of the First Conference on Advances in Cognitive Systems: Poster Collection*. Cognitive Systems Foundation.
- P1 **MacLellan, C.J.** (2011). An elaboration account of insight. In *Proceedings of the 2011 AAI Fall Symposium on Advances in Cognitive Systems* (pp. 194-201). Arlington, VA: AAI Press.

## Students Supervised

- Amrith Deepak**, Independent Study, September 2016 – December 2016  
Modeled human behavior in Stoichiometry Tutor.
- Anant Dadu**, Independent Study, May 2016 – August 2016  
Created interface between Scikit-learn toolkit and Apprentice Learner Architecture.
- Zach Halle**, Independent Study, May 2015 – August 2015  
Created a framework to train and test simulated agents using existing cognitive models.
- Aohan Lin**, Independent Study, May 2014 – August 2014  
Developed a web-based, drag-and-drop tool for interface design.
- Mengfan Zou**, Independent Study, May 2014 – August 2014  
Developed a computational model of Experimental Design using SimStudent.
- Aditya Kothari**, Independent Study, May 2014 – August 2014  
Conducted a reliability analysis of a new crowd-based creativity assessment tool.
- Steven Dang**, Independent Study, August 2013 – May 2014  
Developed and launched online creativity study.
- Chiddu Bhat**, Independent Study, May 2013 – August 2013  
Conducted pilots for creativity study and developed prompt and instructional materials.

**Collin Walker**, Independent Study, May 2012 – August 2012  
Developed GTPS (generative theory of problem solving) architecture.

## Teaching Experience

### **Carnegie Mellon University, Human-Computer Interaction Institute**

Teaching Assistant, Software Structures for User Interfaces, Jen Mankoff, Fall 2016.  
Teaching Assistant, User-Centered Research and Evaluation, Amy Ogan & Jim Morris, Fall 2015.

### **Arizona State University, Computer Science and Informatics**

Teaching Assistant, Decision Making and Problem Solving, Pat Langley, Spring 2012.

### **University of Wyoming, Department of Mathematics**

Teaching Assistant, Business Calculus, Cynthia Vadnais, Spring 2007 - Spring 2010.  
Program Instructor, Acing Algebra, Cynthia Vadnais, Summer 2008.

## Invited Talks

Towards a Computational Model of Human Learning from Interactive Training, University of Pittsburgh, 2016.  
Computational Models of Learning: Applications for Tutor Development and Theory Testing, Air Force Research Laboratory, 2016.

## Service

Reviewer, Cognitive Science, EDM, L@S, ACM CHI, AIED, IEEE TLT, 2012–Present.  
Organizer, Students of Cognitive Systems Workshop at Advances in Cognitive Systems, 2016.  
Organizer, Program for Interdisciplinary Education Research EdBag Lunch Seminar, 2015.  
Student Host, Carnegie Mellon University Fusion Forum, 2015.  
Chair, Seventh Annual Inter-Science of Learning Center Student / Postdoc Conference, 2014.  
Member, Pittsburgh Science of Learning Executive Committee, 2013.  
Language Editor, Central European Journal of Computer Science, 2011–2014.  
Member, Graduate Student Professional Society, Arizona State University, 2011–2012.  
Chapter Councilor, Sigma Phi Epsilon, Arizona State University, 2011–2012.  
Member, College of Arts and Sciences Grade Appeal Committee, University of Wyoming, 2010.  
President, Sigma Phi Epsilon Fraternity, University of Wyoming, 2008–2009.  
Student Senator, Associated Students of the University of Wyoming, 2008–2009.  
Vice President, Association for Computing Machinery, University of Wyoming, 2008.  
Vice President of Recruitment, Sigma Phi Epsilon Fraternity, University of Wyoming, 2007–2008.  
President of the Student Math Association of Wyoming, University of Wyoming, 2006–2007.