

Hughes, Charles E.

June 2021

Pegasus Professor: Department of Computer Science
Secondary Appointments in the School of Modeling, Simulation & Training Graduate Program,
College of Community Innovation & Education, and Department of Games & Interactive Media

Interim Director: School of Modeling Simulation & Training Graduate Programs

Co-Director: Synthetic Reality Laboratory: <http://sreal.ucf.edu/>

Co-Lead: Learning Sciences Cluster

Member: Disabilities, Aging and Technology Cluster

Co-Lead: Center for Research in Education Simulation Technology

Contributing Faculty: Institute for Simulation & Training

University of Central Florida (<http://www.ucf.edu>)

Orlando, FL 32816-2362

e-mail: ceh@cs.ucf.edu

Home Page: <http://www.cs.ucf.edu/~ceh/>

TeachLive Project: <http://teachlive.org>

Member of Computational Imaging Lab: <http://cil.cs.ucf.edu>

BIOGRAPHICAL DATA

Education:

Ph.D. December 1970, Computer Science; Penn State Univ., University Park, PA

M. S. December 1968, Computer Science; Penn State Univ., University Park, PA

B.A. June 1966, Mathematics; Northeastern Univ., *Boston*, MA

Academic Experience:

1980-Present: Professor, Computer Science, University of Central Florida

2020-Present: Interim Director, School of Modeling Simulation & Training Graduate Programs

2019-Present: Professor, College of Community Innovation and Education

2019-Present: Professor, School of Modeling, Simulation and Training

2018-Present: Co-Director, Center for Research in Education Simulation technology (CREST)

2017-Present: Co-Lead of Learning Sciences Faculty Cluster

2010-Present: Founding Director and Current Co-Director, Synthetic Reality Laboratory

2007-Present: UCF Pegasus Professor

2005-Present: Professor, Games and Interactive Media

1982-Present: Contributing Faculty, Institute for Simulation & Training

2006-2010: Director, Media Convergence Laboratory

2007-2008: Associate Director, School of EECS

2007-2009: Cognitive Sciences Faculty

2001-2009: Affiliate Faculty, Text & Technology PhD Program

1974-1980: Assoc. Prof. (74-78); Prof. and Assoc. Chair (78-80), Computer Science, Univ. of Tennessee

1972-1974: Assistant Professor of Computer Science, Pennsylvania State Univ.

1971-1972: Postdoctoral Research Associate – National Research Council/NIST, Washington, D.C.

1968-1971: Instructor of Computer Science, Pennsylvania State Univ.

1967-1968: Research Assistant, Computer Science, Pennsylvania State Univ.

Industrial Experience:

1966-1968: Computer Programmer – Applied Research Lab., State College, PA

1962-1966: Computer Programmer – Radio Corp. of America, Burlington, MA

TEACHING**Teaching Interests:**

Theory of Computation, Design & Analysis of Algorithms, Systems Programming

Teaching Recognitions at UCF:

Teaching Incentive Awards: 2015, 2009, 2002, 1995

College Award for Excellence in Undergraduate Teaching: 2001, 1992

University Award for Excellence in Undergraduate Teaching: 2001

Ph.D. Direction (Completed):

1. Anthony Wehrer, *Multi-Modal Interface for Sensemaking of Graph-Connected Datasets*, December 2019, Simeetri, Inc., Winter Park, FL.
2. Thomas Carbone, *Psychomotor Skill Measurement of Video Game Players*, December 2018, Florida Interactive Entertainment Academy, University of Central Florida, and Iron Galaxy Studios, Orlando, FL.
3. Sungchul Jung, *Personalized Digital Body: Enhancing Body Ownership and Spatial Presence in Virtual Reality*, May 2018, HIT Lab NZ, University of Canterbury, Christ Church, NZ.
4. Ahmad Abualsamid, *Applied Software Tools for Supporting Children with Intellectual Disabilities*, May 2018, Reach Beyond Academy, Winter Springs, FL.
5. Behnaz Nojavanasghari, *Complex Affect Recognition in the Wild*, December 2017 (co-director: L. P. Morency, Carnegie Mellon University), Cognitiv, Bellevue, WA.
6. Antoniya Petkova, *Network Partitioning in Distributed Agent-Based Models*, December 2017 (co-director: Narsingh Deo), Intel Corporation, Phoenix, AZ.
7. Roghayeh Barmaki, *Gesture Assessment of Teachers in an Immersive Rehearsal Environment*, August 2016, Assistant Professor, University of Delaware, Newark, DE.
8. Alyssa Tanaka, *The Effect of Videogame Play on Robotics Surgery Skill Acquisition*, December 2015, Research Scientist, Soartech, Orlando, FL.
9. Aleshia Hayes, *The Experience of Presence and Social Presence in a Virtual Learning Environment as Impacted by the Affordance of Movement Enabled Motion Tracking*, August 2015, Assistant Professor University of North Texas, Denton, TX.
10. Yiyang Xiong, *Automatic 3D Human Modeling: An Initial Stage towards 2-Way Inside Interaction in Mixed Reality*, May 2014. Member of Technical Staff, Advanced Micro Devices, Orlando, FL.
11. Emiko Charbonneau, *Bridging the Gap between Fun and Fitness: Instructional Techniques and Real-World Applications for Full-Body Dance Game*, August 2013 (co-director: Joseph LaViola). Microsoft, Redmond, WA.
12. Nicholas Beato, *Towards Real-Time Mixed Reality Matting in Natural Scenes*, December 2012. Software Engineer III, Google, Mountain View, CA.
13. Jared Johnson, *Algorithms for Rendering Optimization*, University of Central Florida, May 2012. Software Engineer III, Google, Mountain View, CA.
14. Glenn Martin, *Automatic Scenario Generation Using Procedural Modeling Techniques*, University of Central Florida, May 2012. Director, Interactive Realities Lab, Institute for Simulation & Training, University of Central Florida, Orlando, FL.
15. Paul Varcholik, *Multitouch for General Purpose Computing: An Examination of Text Entry*, University of Central Florida, May 2011 (co-director: Joseph LaViola). Programming Faculty, Florida Interactive Entertainment Academy, University of Central Florida, Orlando, FL.
16. Sameer Joshi, *Automation of Concept Acquisition*, University of Central Florida, December 2008. CEO, Datanova Scientific LLC, Washington, DC.
17. Mark Colbert, *Appearance-Driven Material Design*, University of Central Florida, August 2008 (co-director: Erik Reinhard). Google Search Front-End Experience Lead Manager, Google, Mountain View, CA.
18. Yunjun Zhang, *Augmentation in Visual Reality*, University of Central Florida, August 2007. Member of Technical Staff, Advanced Micro Devices, Orlando, FL.

19. Keith Garfield, *A Sparse Program Dependence Graph for Object-Oriented Programming Languages*, University of Central Florida, December 2006 (co-director: Rebecca Parsons). Assistant Professor, Electrical, Computer, Software & Sys. Eng., Embry-Riddle Aeronautical University, Daytona Beach, FL.
20. Felix Hamza-Lup, *Dynamic Shared State Maintenance in Distributed Virtual and Mixed Reality Environments*, University of Central Florida, July 2004 (co-director: Jannick Rolland). Professor, Computer Science, Georgia Southern University, Savannah, GA.
21. Marc Smith, *View-centric Reasoning about Parallel and Distributed Computation*, Univ. of Central Florida, December 2000 (co-director: Rebecca J. Parsons). Associate Professor, Computer Science, Vassar College, Poughkeepsie, NY.
22. Jennifer Burg, *Parallel Execution Models and Algorithms for Constraint Logic Programming over a Real-Number Domain*, Univ. of Central Florida, May 1992 (co-director: Sheau-Dong Lang). Professor, Computer Science, Wake Forest University, Winston-Salem, NC.
23. Farah Arefi, *Automatically Generating Syntax-Directed Editors for Graphical Languages*, Univ. of Central Florida, August 1988 (co-director: David A. Workman). Unknown.
24. Kathryn Kinsley, *An Analytical Model for Evaluating Database Update Schemes*, Univ. of Central Florida, May 1983. President, Datawise Inc., Orlando, FL.
25. Vida Ghodssi, *Incremental Data Flow Analysis*, Univ. of Central Florida, December 1983. Director of Software Development, Oracle, Sunnyvale, CA.
26. John R. Mashey, *Semantic Error Detection in Programming Languages*, Penn State University, May 1974. Venture Capitalist and Consultant to VC Firms; Trustee, Computer History Museum; Former Chief Scientist at Silicon Graphics, Mountain View, CA.

Ph.D. Direction (Active):

Post-Candidacy:

Kamran Ali (CpE Program)
Julie Kent (M&S Program)

Pre-Candidacy:

Erik Sands (M&S Program)

Other Student Research Mentoring:

Current Undergraduates

Itzik Efraim
Will English
Ronit Luthra
John Murphy
Sachin Shah

Current & Recent High School Students

Neel Patel (2009-12); Harvard Class of 2016; Placed 6th in Intel Science Talent Search Competition (ISEF); published several papers while in high school, including one in *ACM Interactions*, January 2012.

Nikhil Patel (2013-17); Yale Class of 2021; 2015 Regional Grand Prize Science & Engineering Fair Winner; 4th Award 2015 ISEF; 2nd Award 2016 ISEF, 1st place award from the International Honor Society in Psychology, Psi Chi, 3rd place from the American Psychological Association, and 1st place from the US Patent and Trademark Office Society; Awarded Congress-Bundestag Youth Exchange Scholarship for 2016-17; published several papers while in high school, including one at the *Interservice/Industry Training, Simulation and Education Conference*, November 2016.

Sapna Patel (2014-2018); Columbia Class of 2022, awarded Rabi Scholar award (one of only ten per year); 2015 Florida Engineering Science Fair recognition -- Intel Excellence in Computer Science and Florida Department of Agriculture and Consumer Services Awards; 3rd Award 2015, 4th Award 2016 and 3rd Award 2017 ISEF; 1st place 2016 and 3rd place 2017 American Psychological Association; 2018 Semi-Finalist in Regeneron Science Talent Search; published several papers while in high school, including one in the *Workshop on Child Computer Interaction*, September 2016.

Donald Lisle (2015-16); UCF Class of 2021; Member of UCF Honor College.

Ronald Xu (2016-); Rising Sophomore, MIT Class of 2024; 2nd Place 2018 Florida Engineering Science Fair; 1st Place 2019 Florida Engineering Science Fair; 4th Place Award 2019 ISEF and 3rd place 2019 American Psychological Association; 2020 Regeneron STS Top 300 Scholar.

Text and Educational Books:

Hughes C. E., & Moshell J. M. (1985). *Visible Pascal*, John Wiley & Sons, Inc., New York.

Hughes, C. E., & Moshell J. M. (1984). *Imagination: Picture Programming*, John Wiley & Sons, Inc., New York.

Moshell J. M., & **Hughes, C. E.** (1984). *Imagination: Quilt*, John Wiley & Sons, Inc., New York.

Moshell, J. M., **Hughes C. E.** et al. (1982). *Computer Power: A First Course in Using the Computer*, McGraw-Hill, New York, Teacher's Text – 340 pages, Student's Text – 193 pages, plus software.

Hughes, C. E., Pfleeger C. P., & Rose, L. (1978). *Advanced Programming Techniques: A Second Course in Programming Using FORTRAN*, John Wiley & Sons, Inc., New York, 287 pages. Russian Translation, 1981.

Forsythe, A. I., **Hughes, C. E.**, Aiken R. M., & Organick, E. I. (1976). *Computer Science: Programming in BASIC*, John Wiley & Sons, Inc., New York, 148 pages. Japanese Translation, 1981.

Forsythe, A. I., Aiken R. M., **Hughes, C. E.**, & Organick, E. I. (1975). *Computer Science: Programming in FORTRAN with WATFOR/WATFIV*, John Wiley & Sons, Inc., New York, 200 pages. Japanese Translation, 1980.

RESEARCH

Current Research Interests (Keywords):

Affective Computing, Human-Centered Computing, Mixed/Virtual Reality, Theory of Computation, Tree of Life, Virtual Learning Environments

Recent Research Recognitions

2020 NCS Modeling and Simulation Hall of Fame Inductee

2018 Best Paper Award, *ACM Symposium on Spatial User Interaction (SUI 2018)*

2016 Best Paper Award, *IEEE International Conference on Serious Games and Applications for Health*

2015 Grand Challenge People's Choice Award, *International Conference on Multimodal Interaction*

2015 Publication Award from the *Teacher Education Division of the Council for Exceptional Children*

2014 Keynote speaker at ACM Multimedia 2014 EMASC-2014 Workshop

2014 TeachLivE selected for *2014 Learning to Teach Impact Award*

2013 TeachLivE selected for NTSA *Governor's Award for Outstanding Achievement in Modeling & Simulation*

2013-14 CECS Excellence in Research

2013, 2007 Research Incentive Award, 1995 Professional Excellence Program Award

2013 CECS Advisory Board Award for Faculty Excellence

2013 Dean's Research Professorship Award

2013 Invited Participant Dagstuhl Seminars – Virtual Reality

2012 UCF Fellow of the Academy for Teaching, Learning and Leadership

2012 TeachLivE Selected for AACTE *2012 Best Practice Award for Innovations in Technology*

2009 Best Paper Award, *Genetic and Evolutionary Computation Conference (GECCO 2009)*

Publications: (* reflects current or former student co-authors)

Preprints (arXiv):

1. Ali, K.*, & Hughes, C. E. (2020). An Efficient Integration of Disentangled Attended Expression and Identity Features for Facial Expression Transfer and Synthesis. *arXiv:2005.00499v1 [cs.CV]*.
2. Ali, K.*, & **Hughes, C. E.** (2019). Facial Expression Representation Learning by Synthesizing Expression Images. *arXiv:1912.01456v1 [cs.CV]*.
3. Ali, K.*, & **Hughes, C. E.** (2019). All-In-One: Facial Expression Transfer, Editing and Recognition Using A Single Network. *arXiv:1911.07050v1 [cs.CV]*.

4. Ali, K.*, Isler, I.*, & **Hughes, C. E.** (2019). Facial Expression Recognition Using Human to Animated-Character Expression Translation. *arXiv*: 1910.05595v1 [cs.CV].
5. Ali, K.*, & **Hughes, C. E.** (2019). Facial Expression Recognition Using Disentangled Adversarial Learning. *arXiv*: 1909.13135v1 [cs.CV].
6. Hamza-Lup*, F. G., Rolland, J. P., & **Hughes, C. E.** (2018). A Distributed Augmented Reality System for Medical Training and Simulation. *arXiv*:1811.12815 [cs.DC].
7. Hamza-Lup*, F. G., **Hughes, C. E.** & Rolland, J. P. (2018). Sensors in Distributed Mixed Reality. *arXiv*:1811.11955 [cs.DC].

Journals:

1. Dieker, L. A., Straub, C., Hynes, M., **Hughes, C. E.**, Bukaty*, C., Bousfield, T.*, & Mrstik, S.* (2019). Using Virtual Rehearsal in a Simulator to Impact Performance of Science Teachers. *International Journal of Gaming and Computer-Mediated Simulations (IJGCMS)*, 11(4), 1-20.
2. Barmaki, R.*, & **Hughes, C. E.** (2018). Embodiment Analytics of Practicing Teachers in a Virtual Rehearsal Environment. *Journal of Computer Assisted Learning*, 34(4), 387-396.
3. Abualsamid A.*, & **Hughes C.E.** (2018). Using a Mobile App to Reduce Off-Task Behaviors in Classrooms: A Pilot Study. *Journal on Technology and Persons with Disabilities*, Vol. 6, 378-384.
4. Dieker, L. A., **Hughes, C. E.**, Hynes, M. C., & Straub, C. (2017). Using simulated virtual environments to improve teacher performance. *School University Partnerships (Journal of the National Association for Professional Development Schools): Special Issue: Technology to Enhance PDS*, 10(3), 62-81.
5. Taylor, M.*, Tucker, J., Donehower, C.*, Pabian, P., Dieker, L. A., Hynes, M. C., & **Hughes, C.** (2017). Impact of virtual simulation on the interprofessional communication skills of physical therapy students. *Journal of Physical Therapy Education*, 31(3), 83-90.
6. Wehrer, A.*, Yee, A.*, Lisle, C., & **Hughes, C. E.** (2015). PhyloPen: Phylogenetic tree browsing using a pen and touch interface. *PLOS Currents: Tree of Life*. 2015 Nov 23, Edition 1.
7. Dieker, L. A., Hynes, M. C., **Hughes, C. E.**, Hardin, S. *, & Becht, K.* (2015). TLE TeachLivE (TM): Using Technology to Provide Quality Professional Development in Rural Schools. *Rural Special Education Quarterly* 34(3), 11-16.
8. Nagendran, A., Pillat, R.*, Kavanaugh, A.*, Welch, G., & **Hughes, C. E.** (2014). A Unified Framework for Individualized Avatar-Based Interactions. *Presence: Teleoperators and Virtual Environments*, 23(2), 109-132.
9. Dieker, L. A., Straub, C., **Hughes, C. E.**, Hynes M. C., & Hardin, S. E.* (2014). Virtual environments can take us virtually anywhere. *Educational Leadership*, 71(8), 54-58.
10. Dieker, L. A., Rodriguez, J.*, Lingnugaris-Kraft, B., Hynes, M., & **Hughes C. E.** (2014). The Future of Simulated Environments in Teacher Education: Current Potential and Future Possibilities. *Teacher Education and Special Education*, 37(1), 21-33. **(2015 Publication Award from the Teacher Education Division of the Council for Exceptional Children)**.
11. Hayes, A. T.*, Straub, C. L., Dieker, L. A., **Hughes, C. E.**, & Hynes, M. C. (2013). Ludic Learning: Exploration of TLE TeachLivE™ and Effective Teacher Training. *International Journal of Gaming and Computer-Mediated Simulations*, 5(2), 2013, 23-36.
12. Harmon, L. J., Baumes, J., **Hughes, C.**, Soberon, J., Specht, C. D., Turner, W., Lisle C., & Thacker, R. W. (2013). Arbor: Comparative Analysis Workflows for the Tree of Life. *PLOS Currents: Tree of Life*, 2013 Jun 21 [last modified: 2013 Jun 21]. Edition 1.
13. Norris, A. E., **Hughes, C.**, Hecht, M. L., Peragallo N. P., & Nickerson, D. (2013). Randomized trial of a peer resistance skill-building game for Hispanic early adolescent girls. *Nursing Research*, 62(1), 25-35.
14. Varcholik, P.*, LaViola, J. J., & **Hughes, C. E.** (2011). Establishing a baseline for text entry for a multi-touch virtual keyboard. *International Journal of Human-Computer Studies*, 70(10), October 2012, 657-672.
15. Walters, L. C., Hughes D. E., & **Hughes, C. E.** (2011). Interconnections: Revisiting the Future. *Game and Culture*, 6(6), 538-559.
16. Risi, S. *, **Hughes, C. E.**, & Stanley, K. O. (2010). Evolving plastic neural networks with novelty search. *Adaptive Behavior*, 18(6), 470-491.

17. Beato, N.*, Colbert, M.*, Zhang, Y.*, Yamazawa, K., & **Hughes, C. E.** (2009). Interactive Chroma-keying for Mixed Reality. *Computer Animation and Virtual Worlds*, 20(2-3), 405-415. (US Patent No. 8,477,149 B2).
18. Fiore, S. M., Harrison, G. W., **Hughes, C. E.**, & Rutström, E. (2009). Virtual Experiments and Environmental Policy. *Journal of Environmental Economics and Management* 57(1), 65-86.
19. Dieker, L., Hynes, M., **Hughes, C. E.**, & Smith E. (2008). Implications of Mixed Reality and Simulation Technologies on Special Education and Teacher Preparation. *Focus on Exceptional Children*, 40(6), 1-20.
20. Colbert, M.*, Reinhard E., & **Hughes, C. E.** (2007). Painting in High Dynamic Range. *Journal of Visual Communication and Image Representation*, 18(5), 387-396.
21. Micikevicius, P., & **C. E. Hughes** (2007). Visibility-based Forest Walk-through Using Inertial Level of Detail Model. *Journal of Defense Modeling and Simulation*, 4(2), April 2007, 80-96.
22. Fidopiastis, C. M., Stapleton, C. B., Whiteside, J. D., **Hughes, C. E.**, Fiore, S. M., Martin, G. A.*, Rolland J. P., & Smith, E. M. (2006). Human Experience Modeler: Context Driven Cognitive Retraining to Facilitate Transfer of Training. *CyberPsychology and Behavior*, 9(2), 183-187.
23. Stapleton, C. B., & **Hughes, C. E.** (2006). Believing is Seeing. *IEEE Computer Graphics and Applications* 27(1), January/February 2006, 80-85.
24. Xu, R.*, Pattanaik S. N., & **Hughes, C. E.** (2005). HDR Still Image Encoding in JPEG 2000. *IEEE Computer Graphics and Applications*, 26(6), 69-76.
25. **Hughes, C. E.**, Stapleton, C. B., Hughes, D. E., & Smith, E. (2005). Mixed Reality in Education, Entertainment and Training: An Interdisciplinary Approach. *IEEE Computer Graphics and Applications*, 26(6), 24-30.
26. Kontinen*, J., **Hughes, C. E.**, & Pattanaik, S. N. (2005). The Future of Mixed Reality: Issues in Illumination and Shadows. *Journal of Defense Modeling and Simulation* 2(1), January 2005, 51-59.
27. Stapleton, C. B., & **Hughes, C. E.** (2003). Interactive Imagination: Tapping the Emotions through Interactive Story for Compelling Simulations. *IEEE Computer Graphics and Applications* 24(5), September/October 2003, 11-15.
28. Smith, M. L.*, Parsons R. J., & **Hughes C. E.** (2003). View-centric Reasoning for Linda and Tuple Space Computation. *IEE Proceedings-Software* 150(2), April 2003, 71-84.
29. Stapleton C. B., **Hughes, C. E.**, Moshell, J. M., Micikevicius P., & Altman, M.* (2002). Applying Mixed Reality to Entertainment. *IEEE Computer* 35(12), December 2002, 122-124.
30. **Hughes, C. E.**, Moshell, J. M., Reed, D.*, Chase, D. Z., & Chase, A. F. (2001). The Caracol Time Travel Project. *The Journal of Visualization and Computer Animation* 12(4), September, 2001, 203-214.
31. Chen, J. X.*, Lobo, N., **Hughes, C. E.**, & Moshell, J. M. (1997). Real-time Fluid Simulation in a Networked Virtual Environment. *IEEE Computer Graphics and Applications* 17(3), 52-61.
32. **Hughes, C. E.**, & Moshell, J. M. (1997). Shared Virtual Worlds for Education: The ExploreNet Experiment. *Multimedia Systems*, 5(2), 145-154.
33. Burg, J.*, Lang, S. D., & **Hughes, C. E.** (1996). Intelligent Backtracking in CLP(R). *Annals of Artificial Intelligence and Mathematics* 17(3-4), 1996, 189-212.
34. Moshell, J. M., & **Hughes, C. E.** (1996). The Virtual Academy: A Simulated Environment for Constructionist Learning. *International Journal of Human-Computer Interaction* 8(1), 1996, 95-110.
35. Chen, J. X.*, Moshell, J. M., **Hughes, C. E.**, Blau, B.*, & Li, X.* (1994). Distributed Virtual Environment Real-Time Simulation Network. *Advances in Modeling and Analysis B*, 31(1), 1994, 1-7.
36. Kinsley, K.*, & **Hughes, C. E.** (1992). Analysis of a Virtual Memory Model for Maintaining Database Views. *IEEE Transactions on Software Engineering*, May 1992, 402-409.
37. Arefi, F.*, Workman, D., & **Hughes, C. E.** (1990). Automatically Generating Visual Syntax-Directed Editors. *Communications of the ACM*, 1990, 349-360.
38. Kinsley, K.*, & **Hughes, C. E.** (1988). Evaluating Database Update Schemes: A Methodology and its Applications to Distributive Systems. *IEEE Transactions on Software Engineering*, 1081-1089.
39. Petty, M. D.*, Moshell, J. M., & **Hughes, C. E.** (1988). Tactical Simulation in an Object-Oriented Animated Graphics Environment. *ACM SIGSIM Simulation Digest* 19(2), June 1988, 31-46.

40. **Hughes, C. E.**, Moshell, J. M., Lacy, L. W.*, & Lewis, R. L.* (1988). Action Graphics: An Interactive Spreadsheet-Based Animation System for Simulation and Training. *Simulators V*, The Society for Computer Simulation International, Simulation Series, 19, 4, 1988, 474-478.
41. Petty, M.*, Moshell, J. M., & **Hughes, C. E.** (1988). Tactical Simulation in an Object-Oriented Animated Graphics Environment. *ACM SIGSIM Simulation Digest* 19(2, June 1988), 31-46.
42. **Hughes, C. E.**, & Selkow, S. M. (1981). The Finite Power Property for Context-Free Languages. *Journal of Theoretical Computer Science*, 15, 111-114.
43. **Hughes, C. E.**, & Straight, D. W. (1980). Word Problems for Bidirectional, Single Premise Post Systems. *Notre Dame Journal of Formal Logic*, 21, 1980, 501-508.
44. **Hughes, C. E.** (1980). Derivatives and Quotients of Prefix-Free Context-Free Languages. *Information and Control*, 45, 1980, 229-235.
45. **Hughes, C. E.**, & Pfleeger, C. P. (1978). ASSIST-V: An Environment Simulator for Systems Software Development. *IEEE Transactions on Software Engineering*, 4, 526-530.
46. **Hughes, C. E.** (1978). The Equivalence of Vector Addition Systems to a Subclass of Post Canonical Forms. *Information Processing Letters*, 7, 1978, 201-204.
47. **Hughes, C. E.**, & Singletary, W. E. (1977). The One-One Equivalence of Some General Decision Problems. *Notre Dame Journal of Formal Logic*, 18, 1977, 305-309.
48. **Hughes, C. E.** (1976). Two Variable Implicational Calculi of Prescribed Many-One Degrees of Unsolvability. *Journal of Symbolic Logic*, 41, 1976, 35-44.
49. **Hughes, C. E.** (1976). A Reduction Class Containing Formulas with One Monadic Predicate and One Binary Function Symbol. *Journal of Symbolic Logic*, 4, 1976, 45-49.
50. **Hughes, C. E.** (1975). The General Decision Problem for Markov Algorithms with Axiom. *Notre Dame Journal of Formal Logic*, 16, 1975, 208-216.
51. **Hughes, C. E.**, & Singletary, W. E. (1975). Triadic Partial Implicational Propositional Calculi. *Z. Math Logik und Grundlagen*, 21, 1975, 21-28.
52. **Hughes, C. E.** (1975). Sets Derived by Deterministic Systems with Axiom. *Z. Math Logik und Grundlagen*, 21, pp. 71-80, 1975.
53. **Hughes, C. E.**, & Singletary, W. E. (1975). Combinatorial Systems Defined Over One- and Two-Letter Alphabets. *Archiv Math. Logik und Grundlagenforschung*, 17, 1975, 25-33.
54. **Hughes, C. E.** (1974). Single Premise Post Canonical Forms Defined Over One-Letter Alphabets. *Journal of Symbolic Logic*, 39, 1974, 489-495.
55. **Hughes, C. E.** (1973). Many-One Degrees Associated with Problems of Tag. *Journal of Symbolic Logic*, 38, pp. 1-17, 1973.
56. **Hughes, C. E.**, & Singletary, W. E. (1973). Combinatorial Systems with Axiom. *Notre Dame Journal of Formal Logic*, 14, 1973, 354-260.
57. **Hughes, C. E.** (1973). Many-One Degrees Associated with Semi-Thue Systems. *Journal of Computer and Systems Sciences*, 7, 1973, 497-505.
58. **Hughes, C. E.** (1972). Degrees of Unsolvability Associated with Markov Algorithms. *International Journal of Computer and Information Sciences*, 1, 1972, 355-365.
59. **Hughes, C. E.**, Overbeek, R., & Singletary, W. E. (1971). The Many-One Equivalence of Some General Combinatorial Decision Problems. *Bulletin of the American Mathematical Society* 77, 467-472.

Refereed Book Chapters:

1. Ingraham, K. M., Romualdo, A., Fulchini Scruggs, A., Imperiale, E., Dieker, L. A., & **Hughes, C. E.** (2021). Developing an Immersive Virtual Classroom: TeachLive – A Case Study. In Choi, D. H., Dailey-Hebert, A., & Estes, J. S. (Ed.), *Current and Prospective Applications of Virtual Reality in Higher Education* (pp. 118-144). IGI Global. <http://doi:10.4018/978-1-7998-4960-5.ch006>
2. Ingraham, K., **Hughes, C. E.**, Taliaferro, L., Westers, N., Dieker, L., & Hynes, M. (2019). Using Digital Puppetry to Prepare Physicians to Address Non-Suicidal Self-Injury Among Teens. In: Antona M., Stephanidis C. (eds) *Universal Access in Human-Computer Interaction. Theory, Methods and Tools. HCII 2019. Lecture Notes in Computer Science*, vol 11572. Springer, Cham., 555-568.
3. Abualsamid, A.*, & **Hughes, C. E.** (2018). Modeling Augmentative Communication with Amazon Lex and Polly. In: Ahram T., Falcão C. (eds) *Advances in Usability, User Experience and Assistive Technology. AHFE 2018. Advances in Intelligent Systems and Computing*, vol 794. Springer, Cham., 871-879.

4. Abualsamid A.*, **Hughes C.E.** (2017). Why Is Video Modeling Not Used in Special Needs Classrooms? In: Andre T. (eds.) *Advances in Human Factors in Training, Education, and Learning Sciences. AHFE 2017. Advances in Intelligent Systems and Computing*, vol 596. Springer, Cham., 123-130.
5. Abualsamid A.*, & **Hughes C.E.** (2017). Language Sample Analysis Framework Utilizing the Natural Language Toolkit and Social Media. In: Duffy V., Lightner N. (eds) *Advances in Human Factors and Ergonomics in Healthcare. Advances in Intelligent Systems and Computing*, vol 482. Springer, Cham., 445-456.
6. Dieker, L. A., Lignugaris-Kraft, B., Hynes, M., & **Hughes, C. E.** (2016). Mixed reality environments in teacher education: Development and future applications. *Online in Real Time: Using WEB 2.0 for Distance Education in Rural Special Education*, Eds. B. Collins & B. Ludlow, American Council for Rural Special Educators, Chapter 12, 122-131.
7. **Hughes, C. E.**, Nagendran, A., Dieker, L., Hynes M., & Welch, G. (2015). Applications of Avatar-Mediated Interaction to Teaching, Training, Job Skills and Wellness. *Virtual Realities – Dagstuhl Seminar 2013*, Eds. G. Burnett, S. Coquillard, R VanLiere & G. Welch, Springer LNCS, 8844. 133-146.
8. Nagendran, A., Welch, G., **Hughes, C. E.**, & Pillat, R.* (2015). Exploring human surrogate characteristics. *Virtual Realities: Lecture Notes in Computer Science*, 8844, Eds. G. Burnett, S. Coquillard, R VanLiere & G. Welch, Springer LNCS, 215-238.
9. Jung, S.*, & **Hughes, C. E.** (2015). Pilot Study for Telepresence with 3D-model in Mixed Reality. *HCI International 2015 (HCII2015)*, Las Vegas, NV, July 21-26. In *Lecture Notes in Computer Science*, Volume 9179, *Virtual, Augmented and Mixed Reality*. Chapter 3, 22-29. DOI: 10.1007/978-3-319-21067-4_3.
10. Lindgren, R., Moshell J. M., & **Hughes, C. E.** (2014). Virtual environments as a tool for conceptual learning. In *Handbook of virtual environments: Design, implementation, and applications (2nd Edition)*, Eds. K. Hale & K. M. Stanney, Chapter 40, 1043-1055.
11. Erbiceanu, E.*, Mapes, D., & Hughes, C. E. (2014). Modeling Attention and Interaction in Small Groups of Virtual Characters. In *Non-Verbal Communication in Virtual Worlds: Understanding and Designing Expressive Characters*, Eds. J. Tanenbaum, M. Nixon & M. Seif el-Nasr, ETC Press, Carnegie-Mellon, Chapter 16, 269-287.
12. Abich IV, J., Matthews, G., Reinerman-Jones, L., Welch, G., Lackey, S., **Hughes, C. E.**, & Nagendran, A. (2014). Good Enough Yet? A Preliminary Evaluation of Human Surrogate Interaction. *HCI International 2014 (HCII2014)*, Crete, Greece, July 22-27. In *Lecture Notes in Computer Science*, Volume 8525, Springer-Verlag, Heidelberg, 239-250.
13. Hayes, A., Hardin, S.*, & **Hughes, C. E.** (2013). Perceived presence's role on learning outcomes in a mixed reality classroom of simulated students. *HCI International 2013 (HCII2013)*, Las Vegas, NV, July 21-26. In *Lecture Notes in Computer Science*, Volume 8022, Springer-Verlag, Heidelberg, 142-151. DOI:10.1007/978-3-642-39420-1_16
14. Hughes, D. E., Sabbagh*, S., Lindgren, R., Moshell, J. M., & **C. E. Hughes** (2013). Mixed Reality Space Travel for Physics Learning. *HCI International 2013 (HCII2013)*, Las Vegas, NV, July 21-26. In *Lecture Notes in Computer Science*, Volume 8022, Springer-Verlag, Heidelberg, 162-169. DOI:10.1007/978-3-642-39420-1_18
15. Walters, L. C., Hughes, D. E., Gertrudix Barrio, M., & **C. E. Hughes** (2013). ChronoLeap: The Great World's Fair Adventure. *HCI International 2013 (HCII2013)*, Las Vegas, NV, July 21-26. In *Lecture Notes in Computer Science*, Volume 8022, Springer-Verlag, Heidelberg, 426-435. DOI: 10.1007/978-3-642-39420-1_45
16. Lopez, A. L.*, **Hughes, C. E.**, Mapes, D. P., & Dieker, L. A. (2012). Cross Cultural Training through Digital Puppetry. *Advances in Design for Cross-Cultural Activities Part I*, Chapter 25, Edited by Denise M. Nicholson, CRC Press, 247-256.
17. Martin, G. A.*, **Hughes, C. E.**, & Moshell, J. M. (2012). Analysis of a Procedural System for Automatic Scenario Generation. *Advances in Applied Human Modeling and Simulation*, Chapter 54, Edited by Vincent G. Duffy, CRC Press, 536-544.
18. Zhu, E J., Moshell, J. M., Ontañón, S., Erbiceanu, E., & Hughes, C. E. (2011). Why can't a virtual character be more like a human: A mixed initiative approach to believable agents. *HCI*

- International 2011 (HCII2011)*, Orlando, FL. In *Lecture Notes in Computer Science*, Volume 6774, Springer-Verlag, Heidelberg, 2011, 289-296.
19. Schutz, L. E., Rivers, K. O., McNamara E. A., & **Hughes, C. E.** (2010). The Rehabilitation of Shaken Soldier Syndrome: A Coordinated System of Community-Situated Postacute Treatment for Blast-Injured Veterans. *Military Psychiatry: New Developments*, Eds.: D. G. Stanton & L. R. Castenada, Nova Science Publishers, Chapter 3, 71-106.
 20. Martin, G., Schatz, S., **Hughes, C. E.**, & Nicholson, D. (2010). What is a Scenario? Operationalizing Training Scenarios for Automatic Generation. *Applied Human factors and Ergonomics 2010 (AHFE2010)*, July 17-29, 2010 Miami, FL, 746-753.
 21. Mapes, D. P., Tonner, P., & **Hughes, C. E.** (2010). Geppetto: An environment for the efficient control and transmission of digital puppetry. *HCI International 2011 (HCII2011)*, Orlando, FL, July 9-14. In *Lecture Notes in Computer Science*, Volume 6774, Springer-Verlag, Heidelberg, 2011, 270-278.
 22. Hughes, D., Smith, E., Shumaker R., & **Hughes, C. E.** (2009). Virtual Reality for Accessibility. *Universal Access Handbook*, CRC Press, Chapter 12, 12-1 – 12-10.
 23. Beato*, N., Mapes, D., **Hughes, C. E.**, Fidopiastis, C., & Smith, E. (2009). "Evaluating the Potential of Cognitive Rehabilitation with Mixed Reality," *HCI International 2009 (HCII2009)*, San Diego, CA, July 19-24, 2009, Springer-Verlag Lecture Notes in Computer Science, Volume 5622/2009, 522-531.
 24. Hughes, D., Jerome, C., **Hughes C. E.**, & Smith, E. (2008). The Application and Evaluation of Mixed Reality Simulation, In *The PSI Handbook of Virtual Environments for Training and Education: Developments for the Military and Beyond*, Volume 3, Praeger Security International, Westport, CT, 254-277.
 25. Walters, L., Smith, E., & **Hughes C. E.** (2008). The Future of Museum Experiences. *The PSI Handbook of Virtual Environments for Training and Education: Developments for the Military and Beyond*, Praeger Security International, Westport, CT, 444-452.
 26. **Hughes, C. E.**, Stapleton, C. B., & O'Connor, M.* (2006). The Evolution of a Framework for Mixed Reality Experiences. *Emerging Technologies of Augmented Reality: Interfaces and Design*, Idea Group, Inc., Hershey, PA, 198-216.
 27. Stapleton, C. B., & **Hughes, C. E.** (2006). Making Memories for a Lifetime. *Emerging Technologies of Augmented Reality: Interfaces and Design*, Idea Group, Inc., Hershey, PA, 329-351.
 28. Adabala, N.*, & **Hughes, C. E.** (2005). Gridless Controllable Fire. *Game Programming Gems 5* (K. Pallister, Ed.), Charles River Media, 539-549.
 29. Hamza-Lup, F. G.*, **Hughes, C. E.**, & Rolland, J. P. (2004). A Distributed Augmented Reality System for Medical Training and Simulation. *Energy, Simulation-Training, Ocean Engineering and Instrumentation: Research Papers of the Link Foundation Fellows, Vol. 4*, Rochester Press.
 30. Smith, M.*, **Hughes, C. E.**, & Burke, K. W. (2003). The Denotational Semantics of View-Centric Reasoning. *Concurrent Systems Engineering Series*, Volume 61, (J.F. Broenink and G.H. Hilderink, Eds.), IOS Press, Amsterdam, 91-96. (Presented at *Communicating Process Architectures 2003*, University of Twente (Enschede, Netherlands), September 7-10, 2003.)
 31. Smith, M.*, Parsons, R., & **Hughes, C. E.** (2002). View-Centric Reasoning for Linda and Tuple Space Computation. *Concurrent Systems Engineering Series*, Volume 60, (J. S. Pascoe, R. J. Loader, and V. S. Sunderam, Eds.), IOS Press, Amsterdam, 223-254. (Presented at *Communicating Process Architectures 2002*, The University of Reading (England), September 15-18, 2002.)
 32. **Hughes, C. E.**, Moshell, J. M., & Reed, D.* (2001). Internet-Based Virtual Environments. *Handbook of Virtual Environments: Design, Implementation, and Applications* (K. M. Stanney, Ed.), Lawrence Erlbaum Associates, 333-352.
 33. Moshell, J. M., & **Hughes, C. E.** (2001). Virtual Environments as a Tool for Academic Learning. *Handbook of Virtual Environments: Design, Implementation, and Applications* (K. M. Stanney, Ed.), Lawrence Erlbaum Associates, 893-910.
 34. **Hughes, C. E.**, & Moshell, J. M. (1994). ExploreNet. *The Virtual Reality Casebook*. (C. E. Loeffler and Tim Anderson, ed.), Van Nostrand Reinhold, New York, 118-122.
 35. **Hughes, C. E.**, & Moshell, J. M. (1993). ExploreNet. *Virtual Reality: Anthology of Industry and Culture* (C. E. Loeffler, ed.), Gijutsu Hyoron Sha, Tokyo.

36. **Hughes, C. E.**, & Moshell, J. M. (1990). Action Graphics: A Spreadsheet-based Language for Animated Simulation. *Visual Languages and Applications*, (Robert Korfhage, ed.), Plenum Press, 203-235.
37. Mears, J. E.* , **Hughes, C. E.**, Moshell, J. M., & Braby, R. (1990). Rehearsal-Based Authoring Environment for Visual Programming of Procedural Simulations. *Visual Languages and Visual Programming*, (S.K. Chang, ed.) Plenum Press, 159-184.

Refereed Proceedings:

1. Wang, D.* , Wang, P.* , Liu, K.* , Zhou, Y., Hughes, C. E., & Fu, Y. (2021). Integrating Representation and Imitation in Reinforcement Learning for Mobile User Profiling: An Adversarial Training Perspective. *Proceedings of Thirty-Fifth AAAI Conference on Artificial Intelligence (AAAI-21)*. February 2-9, 2021. In press.
2. Ali, K.* , & **Hughes, C. E.** (2021). Facial Expression Recognition by Using a Disentangled Identity-Invariant Expression Representation. *25th International Conference on Pattern Recognition (ICPR 2020)*, 9460-9467. <https://doi.org/10.1109/ICPR48806.2021.9412172>
3. Ali, K.* , & **Hughes, C.E.** (2020). Face Reenactment Based Facial Expression Recognition. In: Bebis G. et al. (eds) *Advances in Visual Computing. ISVC 2020. Lecture Notes in Computer Science*, vol 12509. Springer, Cham., 501-513.
4. Ghosh, A. K.* , **Hughes, C. E.**, & Wisniewski, P. J. (2020), Circle of Trust: A New Approach to Mobile Online Safety for Families. *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI 2020)*. Honolulu, Hawaii, April 25-30, 1-14.
5. Jung, S.* , Bruder, G., Wisniewski, P. J., Sandor, C., & **Hughes, C. E.** (2018). Over My Hand: Using a Personalized Hand in VR to Improve Object Size Estimation, Body Ownership, and Presence. *Proceedings of the 6th ACM Symposium on Spatial User Interaction (SUI 2018)*, Berlin, Germany, October 13-14, 2018, 60-68. **Best Paper Award.**
6. Jung, S.* , Wisniewski, P., & **Hughes, C. E.** (2018). In Limbo: The Effect of Gradual Visual Transition between Real and Virtual on Virtual Body Ownership Illusion and Presence. *Proceedings of IEEE Virtual Reality Conference 2018 (IEEE VR 2018)*, Reutlingen, Germany, March 18-22, 267-272.
7. Barmaki, R.* , & **Hughes, C. E.** (2018). Gesturing and Embodiment in Teaching: Investigating the Nonverbal Behavior of Teachers in a Virtual Rehearsal Environment. *Proceedings of The Eighth Symposium on Educational Advances in Artificial Intelligence 2018 (EAAI-18)*, New Orleans, February 3-4, 7893-7899.
8. Nojavanasghari, B.* , **Hughes, C. E.**, Baltrusaitis, T., & Morency, L-P (2017). Hand2Face: Automatic Synthesis and Recognition of Hand Over Face Occlusions. *Proceedings of Affective Computing and Intelligent Interaction (ACII 2017)*, San Antonio, TX, Oct. 23-26, 209-215.
9. Jung, S.* , Sandor, C., Wisniewski, P., & Hughes, C. E. (2017). RealME: The Influence of Body and Hand Representations on Body Ownership and Presence. *Proceedings of the 5th ACM Symposium on Spatial User Interaction (SUI 2017)*, Brighton, UK, October 16-17, 2017, 3-11.
10. Jung, S.* , Sandor, C., & **Hughes, C. E.** (2017). Pilot Study: The Effect of Real User Body Cues to The Perception on Virtual Body. *Proceedings of the 30th Conference on Computer Animation and Social Agents (CASA 2017)*, Seoul, Korea, May 22-24, 2017, 47-50.
11. Nojavanasghari, B.* , Morency, L-P & **Hughes, C. E.** (2017). Exceptionally Social: Design of an Avatar-Mediated Interactive System for Promoting Social Skills in Children with Autism. *Proceedings of CHI 2017*. Denver, CO, May 6-11, 1932-1939.
12. Nojavanasghari, B.* , Morency, L-P & **Hughes, C. E.** (2017). Hands-on: Context-Driven Hand Gesture Recognition for Automatic Recognition of Curiosity. *Proceedings of CHI 2017 Workshop: Designing for Curiosity*. Denver, CO, May 7. Poster and Short Paper.
13. Jung, S.* , & **Hughes, C. E.** (2016). The Effects of indirect real body cues of irrelevant parts on virtual body ownership and presence. *International Conference on Artificial Reality and Telexistence Eurographics Symposium on Virtual Environments (ICAT-EGVE)*, Little Rock, AK, December 7-9, 2016, 107-112.
14. Jung, S.* , & **Hughes, C. E.** (2016). The effects of indirectly implied real body cues to virtual body ownership and presence in a virtual reality environment. *ACM Symposium on Virtual Reality Software and Technology (VRST)*, Munich Germany, November 2-14, 2016 (Poster and short paper), 363-364.

15. Nojavanasghari, B.*, Baltrusaitis, T., **Hughes, C. E.**, & Morency, L-P. (2016). EmoReact: A multimodal approach and dataset for recognizing emotional responses in children. *International Conference on Multimodal Interaction (ICMI 2016)*, Tokyo, Japan, November 12-16, 2016, 137-144.
16. Petkova, A.*, Dimitrov, M., **Hughes, C. E.**, & Deo, N. (2016). Accelerating the distributed simulations of agent-based models using community detection. *12th Annual IEEE RIVF International Conference on Computing and Communication Technologies*, Hanoi, Vietnam, November 7-9, 2016.
17. Nojavanasghari, B.*, Baltrusaitis, T., **Hughes, C. E.**, & Morency, L-P. (2016). The future belongs to the curious: Towards automatic understanding and recognition of curiosity in children. *Workshop on Child Computer Interaction (WOCCI 2016)*, San Francisco, CA, September 6-7, 2016, 16-22.
18. Patel, S.*, Hughes, D. E., & **Hughes, C. E.** (2016). MeEmo - Using an avatar to improve social skills in children with ASD. *Workshop on Child Computer Interaction (WOCCI 2016)*, San Francisco, CA, September 6-7, 2016, 45-50.
19. Barmaki, R.*, & **Hughes, C. E.** (2016). Towards the Understanding of Gestures and Vocalization Coordination in Teaching Context, *Educational Data Mining 2016 (EDM2016)*, June 29-July 2, Raleigh, NC, 663-665.
20. **Hughes, C. E.**, Epstein, J. A., Hall, T., Ingraham, K. M., & Hughes, D. E. (2016). Enhancing Protective Role-Playing Behaviors through Avatar-Based Scenarios. *4th International Conference on Serious Games and Applications for Health (IEEE SeGAH 2016)*, May 11-13, Orlando, FL, 1-7. **Best Paper Award**
21. Tanaka, A.*, Smith, R., & **Hughes, C. E.** (2016). Video Game Experience and Basic Robotic Skills. *4th International Conference on Serious Games and Applications for Health (IEEE SeGAH 2016)*, May 11-13, Orlando, FL.
22. Carbone, T.*, McDaniel, R., & **Hughes, C. E.** (2016). Psychomotor Skills Measurement for Surgery Training using Game-based Methods, *4th International Conference on Serious Games and Applications for Health (IEEE SeGAH 2016)*, May 11-13, Orlando, FL.
23. **Hughes, C. E.**, & Ingraham, K. M. (2016). De-escalation Training in an Augmented Virtuality Space. *IEEE Virtual Reality (IEEE VR 2016)*, March 19-23, Greenville, SC. (Poster and Short Paper), 181-182.
24. Barmaki, R.*, & **Hughes, C. E.** (2015). Providing Real-time Feedback for Student Teachers in a Virtual Rehearsal Environment. *Proceedings of 17th International Conference on Multimodal Interaction (ICMI'15)*, November 9-13, 2015, 531-537. **(Grand Challenge People's Choice Award)**
25. Barmaki, R.*, & **Hughes, C. E.** (2015). A case study to track teacher's gestures in virtual learning environments. *Learning, Analytics and Knowledge Conference 2015 (LAK 2015)*, Poughkeepsie, NY, March 16-20, 2015, 420-421.
26. **Hughes, C. E.** (2014). Human Surrogates: Remote Presence for Collaboration and Education in Smart Cities. *Proceedings of the 1st International Workshop on Emerging Multimedia Applications and Services for Smart Cities (EMASC '14)*, Nov. 7, Orlando, FL. 1-2.
27. Nagendran, A., Pillat, R.*, Kavanaugh, A.*, Welch, G., & **Hughes C. E.** (2013). AMITIES: Avatar-Mediated Interactive Training and Individualized Experiences System. *Proceeding of Virtual Reality Software & Technology (VRST) 2013*, Singapore, October 6-8, 2013, 143-152. DOI:10.1145/2503713.2503731
28. Nagendran, A., Pillat, R.*, **Hughes, C. E.**, & Welch, G. (2012). Continuum of virtual-human space: Towards improved interaction strategies for physical-virtual avatars. *ACM SIGGRAPH VRCAI 2012*, Dec. 2-4, Singapore, 135-142.
29. **Hughes C. E.**, & Mapes, D. P. (2012). Mediated Dialogues through Multiple Networked Avatars. *Proceedings of Immersive Education 2012 (iED 2012)*, Boston, Ma, June 14-16), 10-18.
30. Martin, G. A.*, **Hughes C. E.**, & Moshell, J. M. (2012). Analysis of a Procedural System for Automatic Scenario Generation. *Advances in Applied Human Modeling and Simulation*, Section IX, Edited by Vincent G. Duffy, CRC Press 2012.

31. Pillat, R.*, Nagendran A., & **Hughes, C. E.** (2012). A Control Paradigm for Decoupled Operation of Mobile Robots in Remote Environment. *Simulation and Interaction in Intelligent Environments (SIMIE 2012)*, Rome, Italy, February 24-26, 2012, 553-561.
32. Beato, N.*, Pillat, R.*, & **Hughes, C. E.** (2012). Real-Time Video Matting for Mixed Reality Using Depth Generated Trimaps. *International Conference on Computer Graphics Theory & Applications (GRAPP 2012)*, Rome, Italy, February 24-26, 2012, 280-288.
33. Charbonneau, E.*, **Hughes C. E.**, & LaViola, J. J. (2010). Vibraudio Pose: An Investigation of Non-Visual Feedback Roles for Body Controlled Video Games. *Sandbox 2010: ACM SIGGRAPH Video Game Proceedings*, July 25-29, 2010, Los Angeles, 79-84.
34. Martin, G.*, **Hughes, C. E.**, Schatz, S., & Nicholson, D. (2010). The Use of Functional L-Systems for Scenario Generation in Serious Game. *Proceedings of the 2010 Workshop on Procedural Content Generation in Games*, Monterey, CA, June 18, 2010, Article#6, 5 pages.
35. Martin, G.*, & **Hughes, C. E.** (2010). A Scenario Generation Framework for Automating Instructional Support in Scenario-based Training. *Military Modeling and Simulation 2010*, April 11-15, Orlando, FL. Article#35, 6 pages.
36. Martin, G. *, Schatz, S., Bowers, C., **Hughes, C. E.**, Fowlkes, J., & Nicholson, D. (2009). Automatic Scenario Generation through Procedural Modeling for Scenario-Based Training. *Human Factors and Ergonomics Society Annual Meeting Proceedings 2009 (AHFE2009)*, 53(26), 2009, 1949-1953.
37. Varcholik, P.*, LaViola J., & **Hughes, C. E.** (2009). The Bespoke 3DUI XNA Framework: A Low-Cost Platform for Prototyping 3D Spatial Interfaces in Video Games. *Proceedings of ACM SIGGRAPH 2009 Video Games Symposium*, New Orleans, August 3-7, 2009, 55-61.
38. Risi, S.*, Vanderbleek, S.*, **Hughes, C. E.** & Stanley, K. O. (2009). How Novelty Search Escapes the Deceptive Trap of Learning to Learn. *Proceedings of 2009 Genetic and Evolutionary Computation Conference (GECCO 2009)*, Montreal, July 8-12, 2009, 153-160. [**Best Paper Award**]
39. Fidopiastis, C., **Hughes, C. E.**, & Smith, E. (2009). Mixed Reality for PTSD/TBI Assessment. *Annual Review of Cybertherapy and Telemedicine 2009: Advanced Technologies in the Behavioral, Social and Neurosciences*, IOS Press BV, Amsterdam, 216-240.
40. Salva, M., Wiederhold, B. K., Alban, A. J., **Hughes, C. E.**, Smith, E., Fidopiastis, C., & Wiederhold, M. D. (2009). Cognitive Therapy using Mixed Reality for those impaired by a Cerebrovascular Accident (CVA). *Annual Review of Cybertherapy and Telemedicine 2009: Advanced Technologies in the Behavioral, Social and Neuroscience*, IOS Press BV, Amsterdam, 2009, 253-256.
41. Walters, L. C., **Hughes, C. E.**, & Smith, E. (2009). Shadows of Canaveral: The Application of VR to a Post-World War II Subject. *Computer Applications and Quantitative Methods in Archaeology 2009 (CAA2009)*, Williamsburg, VA, March 22-26, 2009. On-Line at [http://www.caa2009.org/articles/Walters_Contribution313_c%20\(2\).pdf](http://www.caa2009.org/articles/Walters_Contribution313_c%20(2).pdf).
42. Walters, L. C., **Hughes, C. E.**, & Smith, E. (2008). Come Back to the Fair. *14th International Conference on Virtual Systems and Multimedia (VSMM) '08*, Limassol, Cyprus, October 20-26, 2008, 289-293.
43. Zhang, Y.*, & **Hughes, C. E.** (2007). Model-Guided Luminance Range Enhancement in Mixed Reality. *International Conference on Image Analysis and Recognition (ICIAR) 2007*, Montreal, August 22-24, 2007, 1160-1171.
44. Konttinen, J.*, Pattanaik, S., & **Hughes, C. E.** (2007). Image-Space Particle Emission. *SIGGRAPH 2007*, San Diego, August 6-9, 2007, Poster.
45. Fiore, S. M., Harrison, G. W., **Hughes, C. E.**, & Rutström, E. E. (2007). Virtual Experiments and Environmental Policy. *Frontiers of Environmental Economics*, Washington, February 2007.
46. Dieker, L., Hynes, M., Stapleton, C. B., & **Hughes, C. E.** (2007). Virtual Classrooms: STAR Simulator. *New Learning Technologies 2007*, Orlando, FL, February 2007, 1-22.
47. Szumlanski, S.*, Wu, A. S., & **Hughes, C. E.** (2006). Conflict Resolution and a Framework for Collaborative Interactive Evolution. *Twenty-First National Conference on Artificial Intelligence (AAAI-06)*, Boston, MA, July 16-20, 2006, 512-517.
48. Stapleton, C. B., Smith, E., & **Hughes, C. E.** (2005). The Art of Nurturing Citizen Scientists through Mixed Reality. *ISMAR 2005*, Vienna, Austria, October 5-8, 2005, 2-11. (Invited)
49. Fidopiastis, C. M., Stapleton, C. B., Whiteside, J. D., **Hughes, C. E.**, Fiore, S. M., Martin, G. A. *, Rolland, J. P., & Smith, E. M. (2005). Human Experience Modeler: Context Driven Cognitive

- Retraining and Narrative Threads. *4th International Workshop on Virtual Rehabilitation (IWVR2005)*, Catalina Island, CA, September 19-21, 2005, 120-134.
50. **Hughes, C. E.**, & Stapleton, C. B. (2005). The Shared Imagination: Creative Collaboration in Augmented Virtuality. *HCI International 2005*, Las Vegas, NV, July 22-27, 2005.
 51. Szumlanski*, S. R., Wu, A. S., & **Hughes, C. E.** (2005). Collaborative Interactive Evolution. *Proceedings of the 2005 Conference on Genetic and Evolutionary Computation*, Washington DC, USA, June 25 - 29, 2005, H. Beyer, Ed. GECCO '05, ACM Press, New York, NY, 2199-2200. [Poster]
 52. Liu, D. Z.*, & **Hughes, C. E.** (2005). Deducing Behaviors from Primitive Movement Attributes. *SPIE Defense and Security Symposium*, Orlando, FL, March 28 - April 1, 2005, 180-189.
 53. O'Connor, M.*, & **Hughes, C. E.** (2005). Authoring and Delivering Mixed Reality Experiences. *Proceedings of 2005 International Conference on Human-Computer Interface Advances in Modeling and Simulation (SIMCHI'05)*, New Orleans, January 23-27, 2005, 33-39.
 54. Hughes, D. E., Vogelpohl, S.*, & **Hughes, C. E.** (2005). Designing a System for Effective Use of Immersive Audio in Mixed Reality. *Proceedings of 2005 International Conference on Human-Computer Interface Advances in Modeling and Simulation (SIMCHI'05)*, New Orleans, January 23-27, 2005, 51-57.
 55. Stapleton, C. B., & **Hughes, C. E.** (2005). Mixed Reality and Experiential Movie Trailers: Combining Emotions and Immersion to Innovate Entertainment Marketing. *Proceedings of 2005 International Conference on Human-Computer Interface Advances in Modeling and Simulation (SIMCHI'05)*, New Orleans, January 23-27, 2005, 40-48.
 56. **Hughes, C. E.**, Konttinen, J.*, & Pattanaik, S. N. (2004). The Future of Mixed Reality: Issues in Illumination and Shadows. *Proceedings of I/ITSEC 2004*, Orlando, December 6-9, 2004.
 57. Reinhard, E., Akyuz, A. O.*, Colbert, M.*, O'Connor, M.*, & **Hughes, C. E.** (2004). Real-Time Color Blending of Rendered and Captured Video. *Proceedings of I/ITSEC 2004*, Orlando, December 6-9, 2004.
 58. Malo, S., Stapleton, C. B., & **Hughes, C. E.** (2004). Going beyond Reality: Creating Extreme Multi-Modal Mixed Reality for Training Simulation. *Proceedings of I/ITSEC 2004*, Orlando, December 6-9, 2004.
 59. **Hughes, C. E.**, Reinhard, E., Konttinen, J.*, & Pattanaik, S. N. (2004). Achieving Interactive-Time Realistic Illumination in Mixed Reality. *Proceedings of Army Science Conference (ASC) 2004*, Orlando, FL, November 29-December 2, 2004.
 60. **Hughes, C. E.**, Harrison, G., Fiore, S., Rutstrom, E., Smith, E., & Stapleton, C. B. (2004). Cognition in Natural Environments: Using Simulated Scenarios in Complex Decision Making. *Proceedings of Army Science Conference (ASC) 2004*, Orlando, FL, November 29-December 2, 2004.
 61. **Hughes, C. E.**, Smith, E., Stapleton, C. B., & Hughes, D. E. (2004). Augmenting Museum Experiences with Mixed Reality. *Proceedings of KSCE 2004*, St. Thomas, V.I., November 22-24, 2004.
 62. Stapleton, C. B., **Hughes, C. E.**, & Malo, S. (2004). Extreme MR: Going Beyond Reality to Create Extreme Multi-Modal Mixed Reality for Entertainment, Training and Education. *Proceedings of ISMAR 2004*, p. 306, Washington, D.C., Oct. 31-Nov. 3, 2004.
 63. **Hughes, C. E.**, Stapleton, C. B., Pattanaik, S. N., Smith, E., & Malo, S. (2004). MR Sea Creatures – A Cretaceous Journey in Augmented Virtuality. *Proceedings of ISMAR 2004*, Washington, D.C., Oct. 31-Nov. 3, 2004.
 64. Schiavone, G. A., Wahid, P., Palaniappan, R., Tracy, J., Vandoorn, E., Micikevicius, P.*, & **Hughes, C. E.** (2004). Intruder Detection and Tracking using UWB Technology. *Proceedings of SPIE Int. Soc. Opt. Eng.* Volume 5431, August 2004, 106-116.
 65. Xu, R.*, Pattanaik, S. N., & **Hughes, C. E.** (2004). Real-time Rendering of Dynamic Objects in Dynamic, Low-Frequency Lighting Environments. *Computer Animation and Social Agents (CASA 2004)*, Geneva, Switzerland, July 7-9, 2004.
 66. Adabala, N.*, & **Hughes, C. E.** (2004). A Parametric Model for Real-Time Flickering Fire. *Computer Animation and Social Agents (CASA 2004)*, Geneva, Switzerland, July 7-9, 2004.
 67. **Hughes, C. E.**, Stapleton, C. B., Micikevicius, P.*, Hughes, D. E., Malo, S., & O'Connor, M.* (2004). Mixed Fantasy: An Integrated System for Delivering MR Experiences. *VR Usability Workshop: Designing and Evaluating VR Systems*, Nottingham, England, January 22-23, 2004.

68. Micikevicius, P.*, **Hughes, C. E.**, Moshell, J. M., Sims, V., & Smith, H. (2004). Perceptual Evaluation of an Interactive Forest Walk-through. *VR Usability Workshop: Designing and Evaluating VR Systems*, Nottingham, England, January 22-23, 2004.
69. Stapleton, C. B., **Hughes, C. E.**, & Moshell, J. M. (2003). Mixed Fantasy. *Proceedings of ISMAR 2003*, Tokyo. October 8-10, 2003, 354-355.
70. **Hughes, C. E.**, & Smith, M. L.* (2003). A Characterization of Lazy and Eager Semantic Solutions to the Linda Predicates Ambiguity Problem. *Proceedings of 2003 International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA'03)*, edited by Hamid R. Arabnia, CSREA Press, Las Vegas, 23-26 June 2003, 1623-1627.
71. Smith, M. L.*, & **Hughes, C. E.** (2003). "Teaching Java Concurrency to CS vs IT Students: A Matter of Emphasis," *Proceedings of 2003 International Conference on Parallel and Distributed Processing Techniques and Applications (PDPTA'03)*, edited by Hamid R. Arabnia, CSREA Press, Las Vegas, June 23-26, 2003, 1502-1510.
72. **Hughes, C. E.**, & Marin, G. A. (2003). A New Program in Information Technology. *International Conference on Information Technology (ITCC 2003)*, Las Vegas, April 28-30, 2003, 2-8.
73. **Hughes, C. E.**, Stapleton, C. B., Moshell, J. M., Micikevicius, P.*, Garrity, P., & Dumanoir, P. (2002). Challenges & Opportunities Simulating Future Combat Systems via Mixed Reality. *23rd Army Science Conference (ASC 2002)*, Orlando, FL, December 2-5, 2002.
74. Smith, M. L.*, Parsons, R., & **Hughes, C. E.** (2002). View-Centric Reasoning about Space-Based Middleware. *Information and Knowledge Sharing (IKS 2002)*, St. Thomas, Virgin Islands, November 18-20, 2002.
75. Hamza-Lup, F. G.*, Davis, L., **Hughes, C. E.**, & Rolland, J. (2002). Marker Mapping Techniques for Augmented Reality Visualization. *Seventeenth International Symposium on Computer and Information Sciences (ISCIS XVII)*, Orlando, FL, October 28-30, 2002, 152-158.
76. Williams, D. R. E. *, **Hughes, C. E.**, & Orooji, A. (2002). A Mathematical Formalism for Specifying Design Patterns. *Seventeenth International Symposium on Computer and Information Sciences (ISCIS XVII)*, Orlando, FL, October 28-30, 2002, 354-360.
77. Sims, V. K., Moshell, J. M., **Hughes, C. E.**, Cotton, J. E., & Xiao, J.* (2002). Recognition of Computer-Generated Trees. *Proceedings of the Human Factors and Ergonomics Society*, 46, Baltimore, MD, Sept. 30-Oct. 4, 2002, 2215-2218.
78. **Hughes, C. E.**, Burnett, J.*, Moshell, J. M., Stapleton, C. B., & Mauer, B. (2002). Space-based Middleware for Loosely Coupled Distributed Systems. *Proceedings of SPIE*, Vol 4862; presented at *ITCOM2002: Multimedia Networks and Management Systems*, Boston, 29 July-2 August 2002, 70-79.
79. Smith, M. L.*, Parsons, R., & **Hughes, C. E.** (2002). View-Centric Reasoning in Modern Computing Systems. *Proceedings of CIC2002: 3rd International Conference on Communications in Computing*, edited by B. J. d'Auriol and H. R. Arabnia, CSREA Press, Las Vegas, 24-27 June 2002, 253-258.
80. Williams, D. R. E. *, **Hughes, C. E.**, & Orooji, A. (2002). Enabling Adaptive Enterprise Services Oriented Architectures with Distributed Object-Oriented Middleware. *Proceedings of CIC2002: 3rd International Conference on Communications in Computing*, edited by B. J. d'Auriol and Hamid R. Arabnia, CSREA Press, Las Vegas, 24-27 June 2002, 242-249.
81. Sims, V. K., Moshell, J. M., **Hughes, C. E.**, Cotton, J. E., & Xiao, J.* (2001). Salient Characteristics of Virtual Trees. *Proceedings of the Human Factors and Ergonomics Society*, 45, Minneapolis, Minn., Oct. 8-12, 2001, 1935-1938.
82. **Hughes, C. E.**, Moshell, J. M., Reed, D.*, Chase, D., & Chase, A. (2000). The Caracol Time Travel Project. *Visual 2000: 3rd International Conference on Visual Computing*, Mexico City, 18-22 September 2000.
83. **Hughes, C. E.**, Moshell, J. M., Sims, V. K., & Yu, Q.* (2000). Dynamic Computation of Levels of Detail in Complex Outdoor Environments. *Visual 2000: 3rd International Conference on Visual Computing*, Mexico City, 18-22 September 2000.
84. Moshell, J. M., **Hughes, C. E.**, Reed, D.*, Chase, D., & Chase, A. (2000). Virtual Drama as a Learning Medium. *IEEE VR 2000*, New Brunswick, NJ, March 2000, 282.

85. Morelos-Borja, H.*, Wang, A., Moshell, J. M., Parsons, R., & **Hughes, C. E.** (1998). Agents for the Matching of Peer Tutors with Distance Learners. *AACE-WebNet 98 Conference Proceedings*, Orlando, FL. November 1998.
86. **Hughes, C. E.**, Moshell, J. M., & Pullen, M. (1998). Two dimensional Shared Virtual Worlds in Middle and Elementary Schools: Lessons Learned. *Virtual Worlds and Simulation Conference* 30(2), January, 1998, 139-144.
87. Burg, J.*, Lang, S. D., & **Hughes, C. E.** (1994). Finding Conflict Sets and Backtrack Points in CLP(R). *Proceedings of the International Conference on Logic Programming (ICLP94)*, S. Margherita ligure, Italy, June 1994, 323-338.
88. Moshell, J. M., & **Hughes, C. E.** (1994). The Virtual Academy: Networked Simulation and the Future of Education. *Proceedings of the Imagina Conference*, Monte Carlo, February 1994.
89. Burg, J.*, **Hughes, C. E.**, & Lang, S. D. (1994). Intelligent Backtracking in CLP(R). *Proceedings of Third International Symposium on Artificial Intelligence and Mathematics*, Boca Raton, FL, January 1994.
90. Moshell, J. M., & **Hughes, C. E.** (1993). Shared Virtual Worlds for Education. *Proceeding of the 4th Annual Virtual Reality Conference & Exposition*, Meckler Publishing Co., San Jose, May, 1993, reprinted in *Virtual World Review* 1.2, Nov./Dec. 1993.
91. **Hughes, C. E.**, Moshell, J. M., Hughes, S. G., & Smith, M.* (1992). Cooperative Problem Solving Among K-12 Students: The ExploreNet Project. *Proceedings of Frontiers in Education '92*, November 1992, 522-526.
92. **Hughes, C. E.**, Guha, R. K., Frederick, T. J., & Deo, N. (1992). Parallel Processing in the Undergraduate Curriculum. *Proceedings of Frontiers in Education '92*, November 1992, 471-474.
93. Burg, J.*, **Hughes, C. E.**, & Lang, S. D. (1992). Parallel Execution of CLP-R Programs. *Proceedings of JICSLP'92 Joint Workshop on Distributed and Parallel Implementations of Logic Programming Systems*, November 1992.
94. Blau, B.*, Moshell, J. M., **Hughes, C. E.**, & Lisle, C. R.* (1992). Networked Virtual Environments. *Computer Graphics Special Issue: Proceedings of 1992 Workshop on Interactive 3D Graphics*, Boston, MA, March 1992, 157-160.
95. Moshell, J. M., Blau, B.*, **Hughes, C. E.**, & Lin, X.*, & Dunn-Roberts, R.* (1991). Networked Virtual Environments for Simulation and Training. *Proceedings of Simtec '91*, Orlando, FL, October 1991, 210-215.
96. Moshell, J. M., **Hughes, C. E.**, Blau, B.*, Dunn-Roberts, R.*, Lisle, C. R.*, & Li, X.* (1991). Networked Virtual Environments: Issues and Approaches. *Proceedings of the SRI Virtual Worlds Symposium*, Menlo Park, CA. June 17-19, 1991.
97. Burg, J.*, **Hughes, C. E.**, Lisle, C.*, Moshell, J. M., Carrington, J.*, & Li, X.* (1991). Behavioral Representation in Virtual Reality. *Proceedings of the 2nd Behavioral Representation and Computer Generated Forces Symposium*, Orlando, FL, May 1991, B.1-B.26.
98. Burg, J.*, **Hughes, C. E.**, & Moshell, J. M. (1990). Constraint-Based Modeling of Behaviors. *Proceedings of the Florida Artificial Intelligence Research Symposium 1990*, Cocoa Beach, FL, April 1990.
99. Moshell, J. M., Blau, B.*, **Hughes, C. E.**, Li, X.*, & Goldiez, B. (1990). Nap-of-Earth Flight and Realtime Simulation of Dynamic Terrain. *Proceedings of SPIE '90*, Orlando, FL, April 1990.
100. Arefi, F.*, Workman, D., & **Hughes, C. E.** (1989). The Object-Oriented Design of a Visual Syntax-Directed Editor Generator. *Proceedings of COMPSAC '89*, Orlando, FL, February 1989, 389-396.
101. Kinsley, K.*, & **Hughes, C. E.** (1989). An Analytical Model for Evaluating Database Update Schemes in a Centralized Environment. *Proceedings of 22nd Hawaiian International Conference on System Sciences* Vol. 2, IEEE Computer Society, Honolulu, January 1989, 630-635.
102. J. E. Mears*, **Hughes, C. E.**, & Moshell, J. M. (1988). Designing Training Scenarios by Rehearsal. *Proceedings of the 1988 IEEE Workshop on Visual Languages*, Pittsburgh, October 1988, 207-212.
103. Moshell, J. M., **Hughes, C. E.**, Lacy, L. W.*, Lewis, R. L.*, & Blower, D. (1987). A Spreadsheet-Based Visual Language for Freehand Sketching of Complex Motions. *Proceedings of the 1987 Workshop on Visual Languages*, Linköping, Sweden, August 1987, 94-104.
104. Moshell, J. M., & **Hughes, C. E.** (1987). Graphical Spreadsheet Environments for Problem Solving. *NCGA Computer Graphics '87 Conference Proceedings*, Philadelphia, 1987, 593-602.

105. Moshell, J. M., **Hughes, C. E.**, Lacy, L. W.*, Lewis, R. L.*, & Blower, D. (1987). An Educational Animation System Based on Class Inheritance. *NCGA Computer Graphics '87 Conference Proceedings*, Philadelphia, 1987, 618-627.
106. **Hughes, C. E.**, & Moshell, J. M. (1986). Visible Pascal: A Graphics-Based Learning Environment. *Proceedings of NCGA Computer Graphics '86 Conference*, Anaheim, CA, 1986, 401-411.
107. Kinsley, K.*, & **Hughes, C. E.** (1986). Evaluating Database Update Schemes: A Methodology and its Applications to Distributive Systems. *Proceedings of COMPSAC '86*, Chicago, 1986, 351-357.
108. **Hughes, C. E.**, & Moshell, J. M. (1985). Picture Programming: A Graphical Programming Environment. *Proceedings of NCGA Computer Graphics '85 Conference*, 26, Dallas, 1985, 290-299.
109. **Hughes, C. E.**, & Moshell, J. M. (1983). A Programming Environment for Pre-literate Children. *Proceedings of the 1983 National Education Computing Conference*, Baltimore, MD, 1983, 103-106.
110. **Hughes, C. E.**, Moshell, J. M., Gregory, C.*, & Wittenberg, L.* (1983). Hobby Robots as Teaching/Learning Tools. *Proceedings of the 1983 National Education Computing Conference*, Baltimore, MD, 1983, 68-74.
111. **Hughes, C. E.**, & Moshell, J. M. (1982). Computer Power: A Coordinated Series of High School Curricula. *Proceedings of the Association for Educational Data Systems Conference*, Orlando, FL, 1982, 350-355.
112. Moshell, J. M., **Hughes, C. E.**, & Amann, G. W.* (1982). INTERPAS and Rascal: A Playful Cartoon Programming System. *Proceedings of the 7th West Coast Computer Faire*, San Francisco, 1982, 157-161.
113. Aiken, R. M., Moshell, J. M., **Hughes, C. E.**, & Gregory, C. R.* (1981). Insights into Universal Computer Education. *ACM SIGCSE Bulletin*, 13, Eleventh Symposium on Computer Science Education, 1981, 8-11.
114. Aiken, R. M., **Hughes, C. E.**, & Moshell, J. M. (1982). Computer Science Curriculum for High School Students. *ACM SIGCSE Bulletin*, 12, Tenth Symposium on Computer Science Education, 1980, 172-177.
115. **Hughes, C. E.**, & Pfleeger, C. P. (1976). Pascal Program Development Aids. *Proceedings of the 17th Annual Southeast Regional ACM Conference*, 1979, 38-44.
116. Aiken, R. M., **Hughes, C. E.**, & Moshell, J. M. (1978). An Integrated Small Computer Laboratory Using a Central Disk Storage Facility. *ACM SIGCSE Bulletin*, 10, Eighth Symposium on Computer Science Education, 1978, 35-37.
117. Haynes*, W., **Hughes, C. E.**, & Pfleeger, C. P. (1977). Oracle: A Tool for Learning Compiler Writing. *ACM SIGCSE Bulletin*, 9, Seventh Symposium on Computer Science Education, 1977, 37-51.
118. **Hughes, C. E.**, & Pfleeger, C. P. (1976). ASSIST-V: A Tool for Studying the Implementation of Operating Systems. *ACM SIGCSE Bulletin*, 8, Sixth Symposium on Computer Science Education, 1976, 167-173.
119. **Hughes, C. E.**, & Walker, J. (1974). POPSS – A System for Modeling and Analyzing Operating System Resource Allocation Strategies. *Proceedings of the Third Texas Conference on Computing Systems*, 1974, 3.6.1-3.6.8.
120. **Hughes, C. E.**, & Walker, J. (1973). POPSS – A Parametric Operating System Simulator. *ACM SIGCSE Bulletin*, 5, Third Symposium on Computer Science Education, 1973, 166-169.

Posters:

1. Hayes, A.*, & **Hughes, C. E.** (2016). Using human in the loop simulation in virtual and mixed reality for medical training. 22nd Medicine Meets VR Conference (NextMED/MMVR), April 7-9, Los Angeles, CA.
2. Petkova, A.*, Jha, S., Deo, N., **Hughes, C. E.**, & Dimitrov, M. (2015). Accelerating the distributed simulations of agent-based models using community detection. *Proceedings of 18th Annual IEEE High Performance Extreme Computing Conference (HPEC'15)*, Waltham, MA, September 15-17. [Poster]
3. Ingraham, K., & **Hughes, C. E.** (2015). CollegeLiVE: Using avatar training to promote protective behaviors on college campuses. *Proceedings of Association for Educational Communications and Technology (AECT 2015)*, Indianapolis, IN, November 2-7.

4. Braeger, S. *, Xiong, Y. *, **Hughes, C. E.** (2013). Photometric display calibration for embedded MR environments. *IEEE Virtual Reality (IEEE VR 2013)*, Orlando, FL, March 18-20, Poster 41. 10.1109/VR.2013.6549399
5. Braeger, S. *, & **Hughes, C. E.** (2012). Linear Compression for Spatially-Varying BRDFs. *ACM SIGGRAPH Symposium on Interactive 3D Graphics and Games (I3D 2012)*, Costa Mesa, CA, March 9-11, 2012, 212. (Poster)
6. **Hughes, C. E.**, Fidopiastis, C., Hughes, D., Salva, A., & Shumaker, R. (2009). Using Mixed Reality to Assess and Improve Performance. *Medicine Meets Virtual Reality 2009*, Long Beach, CA, January 19-22, 2009.
7. Fidopiastis, C. M., & **Hughes, C. E.** (2007). Use of Psychophysiological Measures in Virtual Rehabilitation. *Virtual Rehabilitation 2008*, Vancouver, BC, August 25-27, 2008, xi. (Invited)
8. Fidopiastis, C. M., Nicholson, D. M., **Hughes, C. E.**, & Smith, E. M. (2007). Developing Baseline Assessments for Virtual Rehabilitation Environments. *4th INTUITION International Conference and Workshop 2007*, Athens, Greece, October 4-5, 2007 (Poster)
9. Fidopiastis, C. M., **Hughes, C. E.**, Smith, E. M., & Nicholson, D. M. (2007). Assessing Virtual Rehabilitation with Biophysical Metrics. *Virtual Rehabilitation 2007*, Venice, Italy, September 27-29, 2007. (Poster)
10. Riedel, T. M., Weishampel, J. F., Breedlove, J., Moshell, J. M., **Hughes C. E.**, Stapleton, C. B., & Smith, E. (2002). The Virtual Forest Canopy Orlando Science Center Exhibit. *International Canopy Conference*, Cairns, Australia, June 23-28, 2002. (Poster)

Magazines and Lightly-Refereed Proceeding or Conferences without Proceedings:

1. Abualsamid, A., & Hughes, C. E. (2018). Bot Assisted Communication Systems, *CSUN Assistive Technology Conference*, March 19-23, 2018, Northridge, CA.
2. Welch, G., Nagendran, A., Bailenson, G., **Hughes, C. E.**, Muller P., & Squire P. (2014). Mastering the Human Element of Immersive Training. *Naval Science & Technology Future Force*, Fall 2014, 10-13.
3. Vasquez, E., Straub, C., **Hughes, C. E.** et. al., (2014). A Comparison of Virtual Learning Environments on the Social Responses for Children with Autism. *Proceedings of the 2nd Annual TLE TeachLivE Conference: Ludic Convergence*, May 21-23, Orlando, FL, University of Central Florida, 2014, pp. 40-44.
4. Vasquez, E., Koch, A., Delisio, L., *Gallup, J., Schaffer, K., Nagendran, A., Russell, M., Straub, C., Welch, G., **Hughes, C.**, Paz, M., & Alias, A. (2013, April). An analysis of virtual learning environments for students with disabilities: A review of the empirical literature. Paper Presented at the *Council for Exceptional Children 2013 Convention and Expo*. San Antonio, TX.
5. Norris, A.E., **Hughes, C.**, Hecht, M., Peragallo, N., & Nickerson, D. (2012). Preventing Pregnancy in Latino Early Adolescent Girls: The Role of Simulated Social Environments. Paper presented at the *Annual Meeting of the American Psychological Association Society*, August, Orlando.
6. Norris, A.E., Smith, E. S. & **Hughes, C. E.** (2011). Building health games through interdisciplinary research: Working the problem. Paper presented at the Sigma Theta Tau 21st *International Nursing Research Congress*. Orlando, FL, July 12-16, 2010.
7. **Hughes, C. E.**, Dieker, L., Smith, E., Bedesem, O., Kalaf, M. & Moss, R. (2009). Clinical experiences via Virtual World. *American Association of Colleges for Teacher Education 61st Annual Meeting and Exhibits (AACTE 2009)*, Chicago, IL, February 6-9, 2009.
8. **Hughes, C. E.** (2009). Virtual and Mixed Reality: New Ways of Looking at KM. *Knowledge Management 2009*, Washington, DC, April 28-29, 2009.
9. Smith, E., Hughes, D., Salva, A., & **Hughes, C. E.** (2009). An Innovation Workshop on Mixed Reality. *Medical Technology, Training and Treatment (MT3) Conference*, Orlando, FL, May 28, 2009.
10. Hamza-Lup, F. G. *, **Hughes, C. E.**, & Rolland, J. P. (2004). Distributed Consistency Maintenance Scheme for Interactive Mixed Reality Environments. *CITSA 2004*, Orlando, FL, July 21-26, 2004.
11. Hamza-Lup, F. G. *, **Hughes, C. E.**, & Rolland, J. P. (2004). Hybrid Nodes with sensors – Architecture for Interactive Distributed Mixed and Virtual Reality Environments. *SCI 2004*, Orlando, FL, July 18-21, 2004.

12. Stapleton, C. B., **Hughes, C. E.**, & Moshell, J. M. (2002). Mixed Reality and the Interactive Imagination. *First Swedish-American Workshop on Modeling and Simulation, SAWMAS 2002*, Orlando, FL, October 30-31, 2002.
13. Stapleton, C. B., Garfield, K. *, **Hughes, C. E.**, Moshell, J. M., Garrity, P., & Dumanoir, P. (2002). The Use of Basic Object Models (BOM) in the Virtual Backlot (VB) Development. *2002 Fall Simulation Interoperability Workshop*, Orlando, FL, September 8-13, 2002.
14. Chen, J. X. *, Lobo, N., **Hughes, C. E.**, & Moshell, J. M. (1995). Simulation and Synchronization of Fluids in a DIS. *First Workshop on Simulation and Interaction in Virtual Environments (SIVE)*, University of Iowa, Iowa City, Iowa, July 1995.
15. Petty, M. *, **Hughes, C. E.**, & Moshell, J. M. (1989). “Constraints as a Specification Mechanism for Automated Opposing Forces in Networked Simulators,” *Proceedings of the First IST Simulation and Training Research Symposium*, Orlando, FL, April 1989, 84-90.
16. Aiken, R. M., **Hughes, C. E.**, & Moshell, J. M. (1980). An Introductory Computer Science Curriculum Based on an Affordable Computer System. *Proceedings of IFIP Working Conference on Microcomputers and Secondary Education*, Paris, April 1980.
17. Leaders, F., Van Hoose, M., O’Kane, K., & **Hughes, C. E.** (1979). A computer-based system for acquisition and reporting of animal data: I. The biomedical scientists' perspective,” *15th Annual Meeting of the Drug Information Association*, Chicago, 1979.
18. O’Kane, K., **Hughes, C. E.**, Leaders, F., Van Hoose, M. (1979). A computer-based system for acquisition and reporting of animal data: II. The computer scientists' perspective. *15th Annual Meeting of the Drug Information Association*, Chicago, 1979.

Invention Patents, Disclosures and Trademarks:

Lisa A. Dieker, Michael Hynes, **Charles E. Hughes**, Eleazar Vasquez, Kathleen Ingraham, Claire Donehower, Taylor Bousfield, “Sensor-based Complexity Modulation for Therapeutic Computer-Simulation,” US Patent No. 10,783,800. Awarded September 22, 2020; Filed February 26, 2020. Assigned to University of Central Florida Research Foundation, Inc.

Eric Imperiale, Lisa A. Dieker, **Charles E. Hughes**, Kathleen Ingraham, Michael C. Hynes, “US Design Patent D895,027 S: 3-Dimensional Character,” Awarded September 1, 2020; Filed May 5, 2020. Assigned to University of Central Florida Research Foundation, Inc.

Charles E. Hughes, Lisa A. Dieker, Arjun Nagendran, Michael C. Hynes, “Semi-Automated Digital Puppetry Control,” US Patent No. 9,381,426 B1. Awarded July 5, 2016; Filed March 17, 2014; Provisional Application March 15, 2013. Assigned to University of Central Florida Research Foundation, Inc.

Charles E. Hughes, Tracy St. Benoit, “Culturally Adaptive Avatar Simulator,” US Patent No. 9,690,784 B1. Awarded June 27, 2017; Filed March 17, 2014; Provisional Application March 15, 2013. Assigned to University of Central Florida Research Foundation, Inc.

Nicholas Beato, **Charles E. Hughes**, Mark Colbert, Yunjun Zhang, Kazumasa Yamazawa, “Real-time Chromakey Matting Using Image Statistics,” Awarded July 2, 2013. US Patent No. 8,477,149 B2.

Lisa Dieker, **Charles Hughes** and Michael Hynes, *TLE TeachLivE™*, Educational services, namely, providing web based and classroom training for certification of teachers and continuing education for teachers and principals, 8/19/2011. Service Mark, UCF listed as owner.

External Research Grants and Contracts (PI underlined):

Active – Awarded: \$1,977,452; Credit: \$779,512

US Department of Education, *DebriefScape™ Suite: Personalized Dashboard and Open Education Resources for STEM Coaches to Support Special Education Teachers*, \$2,481,403 (25% credit=\$612,351), (PI: Lisa Dieker, R. Hines, **C. E. Hughes**, Eleazar Vasquez). 07/01/2021-06/30/2026.

US Department of Education via UCP of Central Florida, *PROJECT RAISE: Robots and Artificial Intelligence to Improve Social Skills for Elementary Students*, \$997,746 (33% credit=\$332,230), (PI: Lisa Dieker, R. Hines, **C. E. Hughes**). 01/01/2021-12/31/2025.

National Science Foundation, *EAGER: SaTC-EDU: Improving Cybersecurity Education for Adolescents with Autism Through Automated Augmented Self-Monitoring Applications*, \$299,987 (62.5% credit=\$187,562), (PI: **C. E. Hughes**, L. Dieker). 05/01/2021-04/30/2023.

National Science Foundation, *Simulated Practice: Using Socially-Responsive Avatars to Prepare STEM GTAs for Student-Centered Instruction*, \$599,999 (30% credit=\$180,000), (PI: J. Chini, **C. E. Hughes**, E Saitta). 11/15/2017-10/31/2021.

Orlando Health Foundation, *Student Support*, \$79,720 (100% credit=\$79,720), (PI: **C. E. Hughes**, P Wiegand). 06/24/2019-06/30/2022.

Completed – Awarded and Completed since 2000: \$23,410,003; Credit since 2000: \$6,524,457

Walt Disney Attractions, *Lifelong Learning Program: A New Paradigm in STEM and Business Workforce Development*, \$398,000 (40% credit=\$159,200), (PIs: I. Garibay, **C. E. Hughes**). 1/7/2019-4/30/2020.

National Science Foundation via University of Idaho, *Arbor: Comparative Analysis Workflows for Tree of Life*, \$290,461 (100% credit=\$290,461), (PI: **C. E. Hughes**). 5/1/2012-4/30/2019.

Walt Disney Attractions, *Lifelong Learning Program: Deep Learning Intrapreneurship Pilot*, (PIs: I. Garibay, **C. E. Hughes**). \$397,479 (40% credit=\$158,992), 1/1/2018-12/31/2018.

Office of Naval Research, *DURIP: Transportable Human-Surrogate Interaction System (THuSIS)*, \$148,216 (16.7% credit=\$24,752), (PIs: G. Welch, **C. E. Hughes**, A. Raij). 09/15/2016-09/14/2018.

Office of Naval Research, *Human Surrogate Interaction*, (PIs: Greg Welch, **C. E. Hughes**). \$2,312,188 (20% credit=\$462,438), 3/1/2014-2/28/2017.

Carnegie Mellon University, *Towards Automatic Understanding and Recognition of Curiosity in Children*. \$10,591 (100% credit=\$10,591) (PI: **C. E. Hughes**). 8/22/2016-5/2/2017.

Bert W. Martin Foundation, *TeachLivE™ elementary classroom*, \$124,000 (33% credit=\$41,333), (PIs: L. Dieker, M. Hynes, **C. E. Hughes**). 4/1/2016-3/31/2017.

Bill & Melinda Gates Foundation, *TeachLivE™*, \$1,500,055 (33% credit=\$500,018), (PIs: L. Dieker, M. Hynes, **C. E. Hughes**). 4/1/2012-6/30/2016.

Bert W. Martin Foundation, *TeachLivE™ Avatar Proposal for an elementary classroom and student with autism*, \$65,000 (33% credit=\$21,666), (PIs: L. Dieker, M. Hynes, **C. E. Hughes**). 4/1/2015-3/31/2016.

National Science Foundation, *Reducing Alcohol Use among College Students Using Digital Puppetry*, \$257,721 (75% credit=\$193,291), (PIs: **C. E. Hughes**, Tom Hall), joint with Weill Cornell College of Medicine. 9/1/2011-12/31/2015.

National Science Foundation via University of Illinois, *Meteor Year 3*, \$177,808 (35% credit=\$62,233), (PIs: E. Smith, **C. E. Hughes**). 9/1/2013-8/31/2015.

Bert W. Martin Foundation, *TeachLivE™ Avatar Proposal for a student with autism and a student with intellectual disabilities*, \$40,000 (33% credit=\$13,333), (PIs: L. Dieker, M. Hynes, **C. E. Hughes**). 3/16/2014-3/15/2015.

Office of Naval Research, *3D Display and Capture of Humans for Live Virtual Training*, (PIs: Greg Welch, **C. E. Hughes**). \$1,316,334 (20% credit=\$263,223), (PIs: Greg Welch, **C. E. Hughes**). 10/1/2011-9/30/2014.

National Science Foundation, *Interconnections: Revisiting the Future*, (PIs: L. Walters, **C. E. Hughes**, D. Hughes, J. M. Moshell, S. Fiore, M. Adams, D. Mapes, E. Smith). \$1,476,967 (20% credit = \$295,393), 9/1/2009-8/31/2014.

Office of Naval Research, *DURIP: A Physical-Virtual Human-Robot Interaction System for Training, Education and Rehabilitation*, \$268,598 (20% credit=\$53,720), (PIs: Greg Welch, **C. E. Hughes**, Arjun Nagendran). 7/10/2012-7/31/2014.

National Endowment for the Humanities, *Journey beyond the Fairs*, \$49,715 (30% credit - \$14,915), (PIs: L. Walters, **C. E. Hughes**, D. Hughes). 5/1/2011-4/30/2014.

National Science Foundation, *Metaphor-Based Learning of Physics Concepts through Whole-Body Interaction in a Mixed Reality Science Center Exhibit*, (PIs: R. Lindgren, **C. E. Hughes**, J. M. Moshell, E. Smith, S. Gallagher). \$963,359 (20% credit = \$192,674). 9/1/2011-8/31/2014.

NewSchools Venture Fund, *TeachLivE™*, \$189,878, (33% credit=\$63,293), (PIs: M. Hynes, C. E. Hughes, L. Dieker). 6/15/2013-9/30/2013.

Army PEO-STRI via Cole Engineering Services, *Joint Urban Capabilities Design*, \$84,376, (50% credit=\$42,188), (PIs: C. E. Hughes, Lori Walters), 6/26/2013- 9/30/2013.

U.S. Department of Veterans Affairs, *Intergovernmental Personnel Act Agreement for Charles Hughes*, \$63,342, (100% credit=\$63,342), (PI: C. E. Hughes), 9/24/2012-9/23/2013.

National Science Foundation, *EAGER: Efficient control and transmission of digital puppetry*, \$199,754, (100% credit=\$199,754), (PIs: C. E. Hughes), 9/01/2010-8/31/2013.

National Science Foundation, *EAGER: Efficient control and transmission of digital puppetry*, \$20,000, (50% credit=\$10,000), (PIs: C. E. Hughes, M. Tappen). 9/01/2010-8/31/2013.

Bill & Melinda Gates Foundation, *TeachLivE™*, (PIs: L. Dieker, M. Hynes, C. E. Hughes), \$103,000 (33% credit = \$34,333). 7/1/2011-6/30/2013.

National Institutes of Health, *ARRA: Using Mixed Reality to Build Peer Resistance Skills in Latina Middle Schoolers*, \$434,812 (40% credit = \$173,925). (PIs: Anne Norris, C. E. Hughes, D. Nickerson). 3/15/2010-2/28/2013.

National Science Foundation, *Water's Journey through the Everglades*, (PIs: E. Smith, C. E. Hughes, L. Walters, K. Kitalong, M. Johnson), \$3,029,353 (40% credit = \$1,211,741), Role: co-PI). 5/15/2007-7/31/2012.

Army RDECOM, *Mixed Reality Immersion Research*, (PIs: E. Smith, C. E. Hughes). \$224,880. 6/8/2010-6/30/2011. (50% credit = \$112,440; Role: co-PI).

West Virginia University, *TeachME Classroom Sessions and Software Program Services*, (PIs: L. Dieker, C. E. Hughes, M. Hynes). \$7,998 (33% credit = \$2,639), 9/1/2010-3/31/2011.

Old Dominion University Research Foundation, *TeachME*, (PIs: L. Dieker, C. E. Hughes, M. Hynes), \$7,998 (25% credit = \$2,000), 7/1/2010-3/31/2011. (25% credit = \$2,000; Role: co-PI).

University of Wisconsin Milwaukee, *TeachME Classroom Sessions and Software Program Agreement*, (PIs: L. Dieker, C. E. Hughes, M. Hynes), \$4,000, (25% credit = \$1,000), 11/1/2010-3/31/2011.

University Center of Greenville, *TeachME Classroom Sessions and Software Program*, (PIs: L. Dieker, C. E. Hughes, M. Hynes), \$25,000 (33% credit = \$8,250), 11/1/2010-3/31/2011.

Utah State University, *TeachME*, \$20,521 (50% credit=\$10,261), (PIs: C. E. Hughes, E. Smith), 2009-2010.

National Science Foundation, *DRU: Cognition in Natural Environments: Using Simulated Scenarios in Complex Decision-Making Experiments*, \$647,430, (20% credit=\$129,486), (PIs: G. Harrison, S. Fiore, C. E. Hughes, E. Salas, S. Burke, S. Pattanaik, E. Rutström, C. B. Stapleton, J. Weishampel), 2006-2010.

National Science Foundation, *STTR Phase II: Developing a Mixed Reality Rehabilitation System*, \$199,628 (50% credit=\$99,814), (UCF PIs: C. E. Hughes, E. Smith), joint with Virtual Reality Medical Center, 2008-2010.

I4 High Tech Corridor, *STTR Phase II: Developing a Mixed Reality Rehabilitation System*, \$99,814 (50% credit=\$49,907), (PIs: C. E. Hughes, E. Smith), 2007- 2010.

National Science Foundation, *GRA VRMC Fellowship*, \$15,540 (50% credit=\$7,770), (UCF PIs: C. E. Hughes, E. Smith), 2007-2010.

National Science Foundation, *STTR Phase I: Developing a Mixed Reality Rehabilitation System*, \$61,581 (50% credit=\$30,791), (UCF PIs: C. E. Hughes, E. Smith), joint with Virtual Reality Medical Center, 2007.

I4 High Tech Corridor, *Developing a Mixed Reality Rehabilitation System for Stroke Victims*, \$30,290 (50% credit=\$15,145), (PIs: C. E. Hughes, E. Smith), 2007- 2010.

Army RDECOM via IST, *MR MOUT Revitalization*, \$200,000 (35% credit-\$70,000), (PIs: E. Smith, C. E. Hughes, D. Mapes, D. Hughes), 2008-2009.

ARI via NAVAIR, *Virtual Technologies and Environments (VIRTE) for Advanced Research on Agents and Teams*, \$2,137,500 (5% credit=\$106,875), (PIs: D. Nicholson, S. Burke, S. Fiore, **C. E. Hughes**, G. Martin, J. Rolland, E. Salas, E. Smith), 2006-2009.

National Endowment for the Humanities, *Come Back to the Fair*, \$29,989 (33% credit=\$9,896), (PIs: L. Walters, **C. E. Hughes**, K. Kitalong), 2007-2008.

Air Force Office of Scientific Research, *SBIR Phase I: A Mixed Reality System for Cognitive Rehabilitation of Traumatic Brain Injuries*, \$32,757, (20% credit=\$6551), (UCF PIs: **C. E. Hughes**, C. Fidopiastis, Fiore, S., D. Hughes, D. Mapes, E. Smith), joint with Virtual Reality Medical Center, 2007-2008.

Army RDE Command, *Evaluating the Impact of Mixed Reality on Human Performance and Interaction with Adolescents and Young Adults*, \$173,900 (40% credit=\$69,560), (PIs: **C. E. Hughes**, E. Smith, C. Stapleton), 2007.

Department of Education, *SBIR Phase I: The Virtual STAR Classroom Simulator*, \$32,940 (50% credit = \$16470), (UCF PIs: E. Smith, **C. E. Hughes**), subcontract from Simiosys LLC, 2006.

Army Research Institute, *ARI Virtual Environment Research Testbed*, \$240,000 (8.7% credit=\$21,000), (PIs: G. Martin, **C. E. Hughes**, J. Daly, E. Smith), 2005-2006.

Office of Naval Research DURIP (Defense University Research Instrumentation Program), *Mixed Reality: Anytime, Anywhere*, \$350,220 (30% credit: \$105,066), (PIs: **C. E. Hughes**, J. M. Moshell, S. Pattanaik, C. Stapleton, H. Foroosh), 2004-2005.

Office of Naval Research, *Research in Augmented and Virtual Environment Systems: Pervasive Computing in Augmented and Mixed Reality*, \$221,000 (54% Credit=\$119,340), (PIs: **C. E. Hughes**, B. Goldiez, S. Teicher), 2003-2005.

Office of Naval Research, *Research in Augmented and Virtual Environment Systems: Rendering*, \$196,445 (31% credit=\$60,898), (PIs: S. N. Pattanaik, **C. E. Hughes**, J. P. Rolland, V. Sims, E. Reinhard), 2003-2005.

Office of Naval Research, *Research in Augmented and Virtual Environment Systems: Content*, \$235,734 (11% credit=\$25,932), (PIs: C. B. Stapleton, **C. E. Hughes**), 2003-2005.

Office of Naval Research, *Research in Augmented and Virtual Environment Systems: Battlefield Augmented Reality System*, \$343,779 (46% Credit=\$158,138), (PIs: B. Goldiez, **C. E. Hughes**, C. B. Stapleton, K. Garfield), 2003-2005.

Office of Naval Research, *Research in Augmented and Virtual Environment Systems*, \$235,734 (11% credit=\$25,932), (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell), 2003-2005.

Army RDE Command, *Part 1: The Enhancement of MOUT Training with Mixed Reality and Theme Park Technology (CLIN003)*, \$190,000 (33% credit=\$62,700), (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell), 2001-2004.

Army RDE Command, *Part 1: The Enhancement of MOUT Training with Mixed Reality and Theme Park Technology*, \$59,290 (25% credit=\$14,823), (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell), 2001-2004.

Army RDE Command, *MR MOUT III: The Enhancement of MOUT Training with Mixed Reality and Theme Park Technology*, \$271,888 (40% credit=\$108,755), (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell), 2001-2005.

Association to Preserve Eatonville Community, *Carol Mundy Digital Archive Prototype Project*, \$32,000 (50% credit=\$16,000), (PIs: **C. E. Hughes**, J. M. Moshell), 2003-2004.

Silicon Graphics, *OpenIR Development*, \$40,000 (50% credit=\$20,000), (PIs: J. M. Moshell, **C. E. Hughes**), 2003.

Canon Mixed Reality Labs, *Mixed Reality Infotainment*, \$200,000 (32% credit=\$64,000), (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell, C. Ford), 2003.

Canon Mixed Reality Labs, *MR Canon IAAPA*, \$199,422 (32% credit=\$63,815), (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell), 2002.

Canon Mixed Reality Labs, *Mixed Reality Tests for Nickelodeon Studios*, \$50,578 (33% credit=\$16,691), (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell), 2002.

Army STRICOM, *The Enhancement of Training in Virtual and Mixed Reality Environments with Realistic Vegetation*, \$149,789 (45% credit=\$67,405), (PIs: **C. E. Hughes**, J. M. Moshell, V. Sims, J. Weishampel), 2002-2003.

Army STRICOM, *Populating a MOUT Facility with Spatially Registered Features: The Virtual Backlot*, \$116,000 (35% credit=\$40,600), (PIs: **C. E. Hughes**, J. M. Moshell, C. Stapleton, A. Cortes), 2002-2003.

Army STRICOM, *Tracking Systems for Multiplayer Mixed Reality*, \$75,000 (30% credit=\$22,500) (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell, A. Cortes), 2002-2003.

Army STRICOM, *Virtual Object Rendering and Registration for Mixed Reality MOUT*, \$96,000 (20% credit=\$19,200), (PIs: J. M. Moshell, Cortes, A., **C. E. Hughes**, C. Stapleton, S. Pattanaik, J. Malala), 2002-2003.

National Science Foundation, *Augmented Reality and Interactive Distributed Physical Modeling*, \$176,928 (33% credit=\$58,386), (PIs: J. Rolland, **C. E. Hughes**, R. Parsons), 2000-2003.

Army STRICOM, *Automatic Construction and Evaluation of Efficient Databases for Virtual Simulation from SEDRIS Data*, \$222,566 (50% credit=\$111,283), (PIs: J. M. Moshell, **C. E. Hughes**, A. Cortes, V. Sims, G. Schiavone), 2000-2002.

Orlando Science Center, *Measure Me - An Interactive Exhibit*, \$34,857 (50% credit=\$17,429), (PIs: J. M. Moshell, **C. E. Hughes**, C. Stapleton), 2000-2002.

I-4 Corridor Initiative and Real3D, *Developing Content for the Virtual Theme Park*, (PIs: J. M. Moshell, **C. E. Hughes**), 1999-2000.

Real3D, *Empirical Studies of Graphics Acceleration for PC Environments*, (PIs: J. M. Moshell, **C. E. Hughes**), 1998.

Advanced Research Projects Agency, *ExploreNet*, (PIs: J. M. Moshell, **C. E. Hughes**), 1995-97.

National Science Foundation, *Undergraduate Parallel Processing*, \$589,690, (PIs: R. K. Guha, **C. E. Hughes**, Narsingh Deo, T. J. Frederick and A. Mukherjee), NSF Grant #CDA9115281. 1991-96.

ARI-PM-TRADE, *Visual Display Technologies for Simulation*, (PIs: J. M. Moshell, **C. E. Hughes**, E. Smart), 1990-92.

Florida High Technology and Industry Council, *Constraint-Based Declarative Programming for Modeling Complex Motions*, (PIs: J. M. Moshell, **C. E. Hughes**), 1990-91.

Florida High Technology and Industry Council, *A Graphical Simulation Environment for Problem Solving Based on Parallel Processing*, (PIs: J. M. Moshell, **C. E. Hughes**), 1988-90.

ARI-PM-TRADE, *Time Varying Visual Features for Low Cost Simulation Systems*, (PIs: J. M. Moshell, **C. E. Hughes**, E. Smart), 1988-89.

ARI-PM-TRADE, *Rapidly Reconfigurable Object-Oriented Databases for Simulation*, (PIs: A. Orooji, **C. E. Hughes**, J. M. Moshell), 1988-90

Naval Training Systems Center, *Action Graphics*, (PIs: J. M. Moshell, **C. E. Hughes**), 1987-88.

Naval Training Systems Center, *Ada Risk Assessment*, (PIs: **C. E. Hughes**, C. Bauer), 1985-1986.

National Science Foundation, *Computer System/VLSI Design Laboratory*, \$94,961, (PIs: T. Frederick, **C. E. Hughes**, R. Guha and A. Mukherjee), 1982.

National Science Foundation, *High School Microcomputer Science Education*, \$245,280, (PIs: J. M. Moshell, **C. E. Hughes**, R. M. Aiken), NSF Grant #SED79-18992, 1979-1982.

National Bureau of Standards, *Program Optimization and Specialization*, (PI: **C. E. Hughes**), 1979-1981.

National Bureau of Standards, *Incremental Program Analysis*, (PIs: **C. E. Hughes**, C. P. Pfleeger), 1979.

National Science Foundation, *Systematic Debugging*, \$23,700, (PIs: **C. E. Hughes**, C. P. Pfleeger), NSF Grant #MCS77-03308, 1977-1978.

National Science Foundation, *Development of a Machine Simulator for Teaching Operating Systems Concepts*, \$23,700, (PIs: **C. E. Hughes**, C. P. Pfleeger), NSF Grant #SED76-14494, 1976-1978.

Internal Grants:

UCF Internal, IR2: Exploratory Effort Aimed at a Center for Virtual and Augmented Reality for Healthcare, \$40,000 (PI: G. Welch, M. Anderson, J. Cendan, G. Bruder, C. Cruz-Neira, L. Dieker, **C. E. Hughes**, B. Noel), January 2020-February 2022.

UCF Quality Enhancement Plan, QEP Assessing UCF Student's Interviewing Skills using Simulation, (PIs: J. Andreasen, F. Safi, L. Dieker, **C. E. Hughes**), May 2016-April 2017.

Support for Mixed Reality Learning Project (NSF-funded), *Metaphor-Based Learning of Physics Concepts through Whole-Body Interaction in a Mixed Reality Science Center Exhibit*, (PIs: R. Lindgren, **C. E. Hughes**, J. M. Moshell, E. Smith, S. Gallagher). 7/1/2012-6/30/2015.

Matching to National Science Foundation, *Interconnections: Revisiting the Future*, (PIs: L. Walters, **C. E. Hughes**, D. Hughes, J. M. Moshell, S. Fiore, M. Adams, D. Mapes, E. Smith). \$80,194. 9/1/2009-8/31/2013. (20% credit = \$16,039; Role:co-PI).

Matching to National Science Foundation, *Water's Journey through the Everglades*, (PIs: E. Smith, **C. E. Hughes**, L. Walters, K. Kitalong, M. Johnson). \$100,648. 5/15/2007-7/31/2012. (40% credit = \$40,259; Role: co-PI).

Florida Board of Governors, *Florida Biomedical Engineering Partnership*, (PI: Tony Waldrop; Proposal Writers: L. Chow, **C. E. Hughes**, A. Kassab, V. Patel, Z. Qu). \$325,000. New Florida 2010 Clustering, 7/1/2010-12/31/2011.

UCF/IST SHELL Grant, *Haptic Feedback Architecture for Remote Surgical Procedures*, (PIs: Remo Pillat, **C. E. Hughes**, A. Nagendran), \$25,000. 2011.

Current and Recent Professional Service:

Societies, Journals and Conferences

Virtual Reality (Springer Nature), Editorial Board, 2021-

Frontiers in Virtual Reality, Editorial Board of Virtual Reality in Industry 2020-

IEEE VR Program Committee, 2011-2015, 2017-

IEEE SEGAH 2017 Program Committee, 2016-

IEEE VR 2016 Best Paper and Best Demo Selection Committee, Member

Entertainment Computing, Associate Editor, 2011-

IEEE VR 2013 Research Demos Committee, Co-Chair

HCI Program Committee, 2008-

Journal of Cybertherapy and Rehabilitation, Member of Scientific Board, 2009-

ISMAR 2010 Program Committee (Science and Arts&Humanities reviewer), 2009-2010

ISMAR 2009 Tutorial Chair, 2009

Eurographics 2008 Short Papers Program Committee, 2007-2008

International Conference on Information and Knowledge Sharing Program Committee, 2002-2006

Reviewer for *ACM Transaction of Applied Perception*, *Transactions on Computer-Human Interaction*, *IEEE CG&A*, *IEEE VR*, *PLOS ONE*, *International Journal of Human-Computer Studies*, *Entertainment Computing*, *Virtual Reality*, *Journal of Cybertherapy and Rehabilitation*, *Advances in Computer Entertainment Technology*, *Association for the Advancement of Artificial Intelligence (AAAI)*, *ACM Conference on Human Factors in Computing Systems (CHI)*, *ACM Spatial User Interaction (SUI)*, *ACM Virtual Reality Software and Technology (VRST)*, *Eurographics Symposium on Rendering (EGSR)*, *IEEE International Symposium on Mixed and Augmented Reality (ISMAR)* *International Conference on Digital Media and Digital Content Management*

UCF Computer Science

Computer Science Promotion & Tenure Committee, Chair, 2017-2018; member 1980-

Computer Science Division Executive Committee, 2011-2015

Computer Science Graduate Committee, 2003-2006, 2010-2015

Computer Science Division Instructor Search Committee, 2012

Associate Director, 2007-2008

ABET Accreditation Team Member, 2007-2008

Computer Science Graduate Coordinator, 2003-2007
Computer Science Self-Assessment Committee, Chair, 2003-2007
Information Technology Advisory Committee, 2003-2007
NRC CS Graduate Program Assessment, 2006-2007
Undergraduate Curriculum Development Committee, Member, 2005-2006
Computer Science Budget Advisory Committee, Member, 2003-2005
Computer Science Director's Search Committee, 2003-2004
Computer Science Undergraduate Coordinator and Program Committee Chair, 1999-2001
CSAB Accreditation Committee, Member, 2000-2001
Accountability Committee, Member, 2000-2001
Information Technology Program Founding Director and Program Committee Chair, 2000-2001
Strategic Planning Review Committee, Chair 2001

UCF School of Modeling, Simulation & Training (SMST)/College of Graduate Studies (CGS)

SMST Search Committee, 2021
Interim Director, SMST Graduate Programs 2020-
CGS Excellence in Research Committee, Chair, 2021
RIA Awards Committee, Chair, 2021
TIP Awards Committee, Member, 2021
SMST Curriculum Committee, Chair 2020-
SMST P&T Committee, Chair, 2017-2019/2021, Member 2017-
SMST Program Director Search Committee, Member, 2018-2019
Faculty Search Committee for M&S Program, Member, 2015-2019
Research Professor Search Committees, Member, 2013-2015
Synthetic Reality Laboratory, Founding and Co-Director 2010-
Media Convergence Laboratory, Chief Scientist, 2001-2010; Director, 2006-2010
Research Associate Search Committee, 2006-2007
SMST Graduate Program Faculty Member, 2004-
IST Contributing Faculty, 1982-

UCF College of Engineering and Computer Science

RIA Selection Committee, Chair, 2009-2011, 2016-2020, Member, 2021
AEER Research Committee, Member, 2018-
50th Anniversary Committee, Member, 2018
TIP Awards Committee, Chair, 2006, 2016-2017, Member, 2018
CECS Provost Professor Search Committee, Member 2013-2014
CECS Research Committee, Member, 2011-2013
In-House Research Committee, Chair, 2010, 2011, 2012
Bioengineering Minor Admission Committee, 2009-
Graduate Program Coordinators Committee, Member, 2003-2007
I2Labs Fellowship Selection Committee, Member, 2005-2007
I2Lab Steering Committee, Member 2006-2007
Civil and Environmental Engineering Chair Search Committee, Chair, 2004-2005
Director of Development Search Committee, Member 2001
ABET Accreditation Committee, Member, 2000

UCF College of Community Innovation and Education

Postdoc Search Committee, 2021
Co-Director, Center for Research in Education Simulation, 2018-
Co-PI, TeachLivE Project, 2006-
College of Education TeachLivE Research Director Search Committee, 2017
Provost Faculty Cluster Research Proposal Evaluation Committee, 2014-2015
College of Education Interactor Search Committee, 2014
College of Education Director of Research for Gates Grant, 2013

UCF Nicholson School of Communication and Media

Games and Interactive Media GaIM Promotion and Tenure Committee, Member, 2019-
GaIM Digital Media Graduate Program Committee, Member, 2020-

UCF School of Visual Arts and Design, and Florida Interactive Entertainment Academy

SVAD Promotion and Tenure Committee, Member, 2005-2018

Film Faculty Search Committee, Chair, 2006

School of Film and Digital Media Promotion/Tenure Review Committee, Chair, 2005

Florida Interactive Entertainment Academy Faculty Search Committee, 2005

Florida Interactive Entertainment Academy Planning Committee, 2004-2005

Digital Media Faculty Search Committee, 2002-2005

Digital Media Industrial Affiliates Committee, Member, 2000-2005

Arts and Sciences Digital Media Director Search Committee, Member, 2000-2001

UCF (other)

Co-Founder and Co-Lead, Learning Sciences Faculty Cluster 2017-

Learning Science Faculty Cluster Search Committee, Chair, 2017-2020

Disability, Aging and Technology Cluster, Member, 2020-

Marchioli Collective Awards Committee, 2017-2020

STEM Research and Education Council, Member, 2010, 2011

Nanoscience Director Review Committee, 2009

Cognitive Sciences Faculty Member, 2007-

Commencement and Convocation Committee, Member, 2004-2011

University Promotion/Tenure Review Committee, Member, 2005-2007; Chair, 2006-2007

Text and Technology Ph.D. Program Affiliate Faculty Member, 2000-.2007

Task Force on International Student Services. 2004-2005

Interdisciplinary Council, 1998-2000

UCF Strategic Planning Council, Chair 1991-94, Executive Comm., 1990-2001

Chaired Review of All UCF Academic Programs, 1995-1997

Selected Recognitions and Awards:

Modeling & Simulation Hall of Fame, 2020 Inductee

UCF Grand Marshall and Faculty Representative, Spring 2021 Graduation of College of Graduate Studies

UCF Grand Marshall, Fall 2019 Graduation of College of Engineering & Computer Science

Senior Life Member, Institute of Electrical and Electronics Engineers (IEEE) & IEEE Computer Society

Senior Life Member, Association for Computing Machinery (ACM)

ACM SIGGRAPH Computer Graphics Pioneer

UCF Teaching Incentive Award, 2015, 2009, 2002, 1985

TeachLivE Selected by New Schools Summit for *2014 Learning to Teach Impact Award*

2014 CECS Excellence in Research, UCF College of Engineering and Computer Science

UCF Research Incentive Award, 2013, 2007, 1995 (under Professional Excellence Program Award)

2013 CECS Advisory Board Award for Faculty Excellence.

2013 Dean's Research Professorship Award

TeachLivE Selected by National Simulation & Training Association (NTSA) for *2013 Governor's Award for Excellence in Modeling and Simulation*

TeachLivE Selected by National Simulation & Training Association (NTSA) for *2013 Excellence in Modeling and Simulation (Training Category)*

2012 UCF Fellow of the Academy for Teaching, Learning and Leadership

TeachLivE Selected for Honorable Mention Winner of National Consortium for Continuous Improvement in Higher Education (NCCI) *2012 Leveraging Excellence Award*.

TeachLivE Selected by American Association of Colleges of Teacher Education for *2012 Best Practice Award for Innovations in Technology*

Pegasus Professor, 2007-

Excellence in Undergraduate Teaching, UCF, 2001 (top university teaching award)