

Curriculum Vitae

Hughes, Charles E.

February 2014

Pegasus Professor, Department of Electrical Engineering & Computer Science

Secondary Appointment: Professor, School of Visual Arts & Design

Contributing Faculty, Institute for Simulation & Training

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

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Member of Graphics Group: <http://www.cs.ucf.edu/graphics>

& 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, Electrical Engineering and Computer Science, University of Central Florida

2010-Present: Co-Director, Synthetic Reality Laboratory

2007-Present: UCF Pegasus Professor

2006-2010: Director, Media Convergence Laboratory

2007-2008: Associate Director, School of EECS

2007-2009: Cognitive Sciences Faculty

2005-Present: Professor, School of Visual Arts & Design

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

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

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/NBS, 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, Parallel & Distributed Processing, Algorithm Design & Analysis, Systems Programming

Teaching Recognitions at UCF:

Teaching Incentive Awards: 2009, 2002, 1995

College Award for Excellence in Undergraduate Teaching: 2001, 1992

University Award for Excellence in Undergraduate Teaching: 2001

Ph.D. Direction (Completed):

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.

Nicholas Beato, *Towards Real-Time Mixed Reality Matting in Natural Scenes*, December 2012. Software Engineer III, Google, Mountain View, CA.

Jared Johnson, *Algorithms for Rendering Optimization*, University of Central Florida, May 2012. Software Engineer III, Google, Mountain View, CA.

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.

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.

Sameer Joshi, *Automation of Concept Acquisition*, University of Central Florida, December 2008. CEO, Datanova Scientific LLC, Washington, DC.

Mark Colbert, *Appearance-Driven Material Design*, University of Central Florida, August 2008 (co-director: Erik Reinhard). Technical Lead Manager, Google, Mountain View, CA.

Yunjun Zhang, *Augmentation in Visual Reality*, University of Central Florida, August 2007. Member of Technical Staff, Advanced Micro Devices, Orlando, FL.

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 & Systems Engineering, Embry-Riddle Aeronautical University, Daytona Beach, FL.

Felix Hamza-Lup, *Dynamic Shared State Maintenance in Distributed Virtual and Mixed Reality Environments*, University of Central Florida, July 2004 (co-director: Jannick Rolland). Associate Professor, Computer Science, Armstrong Atlantic State University, Savannah, GA.

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.

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.

Farah Arefi, *Automatically Generating Syntax-Directed Editors for Graphical Languages*, Univ. of Central Florida, August 1988 (co-director: David A. Workman). Unknown.

Kathryn Kinsley, *An Analytical Model for Evaluating Database Update Schemes*, Univ. of Central Florida, May 1983. President, Datawise Inc., Orlando, FL.

Vida Ghodssi, *Incremental Data Flow Analysis*, Univ. of Central Florida, December 1983. Director of Software Development, Oracle, Sunnyvale, CA.

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:**

Steven Braeger (joint with Hassan Foroosh)

Thomas Carbone (M&S Program)

Elena Erbiceanu

Remo Pillat (joint with Arjun Nagendran)

Yiyang "Lucy" Xiong

Steven Zittrower (joint with Cliff Zou)

Post-Qualifiers:

Roghayeh “Leila” Barmaki
Aleshia Hayes (M&S Program)
Lijuan “Alice” Yin

Pre-Qualifiers:

Jeremy Joseph (M&S Program)
Sungchul Jung
Melanie Kaprocki
Anthony Wehrer (joint with Curt Lisle)

Other Student Research Mentoring:

Current Undergraduates

Michael Hopper
Michael Weinberg

Recent High School Students

Neel Patel (2009-2012); Placed 6th in Intel Science Talent Search Competition; published three papers, including one in ACM Interactions, January 2012; now at Harvard.
Nikhil Patel (2013-)
Nick Stanley (2011); now at Carnegie-Mellon.

Text and Educational Books:

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

C. E. Hughes, *Picture Programming*, John Wiley & Sons, Inc., New York, 1983.

J. M. Moshell, **C. E. Hughes** et al., *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, 1982.

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

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

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

RESEARCH

Current Research Interests (Keywords):

Avatar-Mediated Interaction, Computer Graphics, Digital Puppetry, Human Surrogates, Human-Technology Interaction, Mixed and Virtual Reality, Real-Time Material Design, Real-Time Matting, Virtual Heritage, Embodied Cognition, Theory of Computation, Visualization, Tree of Life

Recent Research Recognitions at UCF

2013 CECS Advisory Board Award for Faculty Excellence
Dean’s Research Professorship Award 2013
Research Incentive Awards: 2007

Current Projects:

Avatar-Mediated Interaction

Basic Research

Agent behaviors, human computer interaction and network protocols

Applications

Training, skills rehearsal, rehabilitation and protective strategies

Active Funding:

NSF; Bill & Melinda Gates Foundation

Collaborations (in addition to those in CECS and IST):

NSF grant is joint with Weill Cornell Medical College and involves a colleague from UCF Student Development & Enrollment Services

Gates Foundation grant involves colleagues in UCF College of Education and from thirty three colleges of education at other universities

Recent Recognition:

TeachLivE Selected for Inclusion in Sesame Workshop Video of Five Most Innovative Approaches to Teacher Professional Development

TeachLivE Selected for 2013 Governor's Award for Outstanding Achievement in Modeling & Simulation

TeachLivE Selected for 2013 **NTSA** Modeling & Simulation Award in Training Category

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

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

Augmented Reality

Basic Research

Computational imaging, computer graphics and human computer interaction

Applications

Virtual heritage, training, rehabilitation and STEM education

Active Funding:

NSF; NEH; ONR

Collaborations (in addition to those in CECS and IST):

NSF and NEH grants involve colleagues in UCF Colleges of Arts & Humanities and Science, at Michigan Tech and from a number of museums and science centers

ONR grants involve colleagues at Stanford, Barcelona and University of North Carolina

Recent Recognition:

Our 1964/65 NY World's Fair digital recreation was selected by NSF for presentation at the American Association for the Advancement of Science meeting in DC on February 16-21, 2011

Visualization

Basic Research

Storage techniques and algorithm design for management and visualization of massively large phylogenetic trees

Applications

Support of phylogenetic research, public awareness of the "Tree of Life"

Funding:

NSF

Collaborations (in addition to those in CECS and IST):

NSF grant involves colleagues at Berkeley, Idaho, Kansas, University of Alabama Birmingham and Kitware

Recent Recognition:

Invited paper appeared in 2013 in *PLoS Currents Tree of Life*.

Other Basic Research

Compression of material reflectance functions to achieve real-time rendering of large numbers of material associated with a single scene

Control of mobile robots in remote environments

Interfaces for multi-touch surfaces

Interactive rendering of complex environments with large number of lighting sources

Real-time matting in noisy environments; natural image matting

Synthesizing agent behaviors from observed human behaviors

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

1. R. Lindgren, J. M. Moshell & **C. E. Hughes**, "Virtual environments as a tool for conceptual learning," *Handbook of virtual environments: Design, implementation, and applications (2nd Edition)*, Eds. K. Hale & K. M. Stanney, in press.
2. L. A. Dieker, B. Lingnugaris-Kraft, M. Hynes & **C. E. Hughes**, "Mixed reality environments in teacher education: Development and future applications," *American Council for Rural Special Educators*, Eds. B. Collins & B. Ludlow, in press.
3. E. Erbiceanu*, D. Mapes & **C. E. Hughes**, "Modeling Attention and Interaction in Small Groups of Virtual Characters," *Non-Verbal communication in Virtual Worlds*, Eds. J. Tanenbaum, M. Nixon & M. Seif el-Nasr, ETC Press, Carnegie-Mellon, 2014.
4. L. E. Schutz, K. O. Rivers, E. A. McNamara and **C. E. Hughes**, "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, 2010, Chapter 3, 71-106.
5. D. Hughes, E. Smith, R. Shumaker and **C. E. Hughes**, "Virtual Reality for Accessibility," *Universal Access Handbook*, CRC Press, 2009, Chapter 12, 12-1 – 12-10.
6. D. Hughes, C. Jerome, **C. E. Hughes** and E. Smith, "The Application and Evaluation of Mixed Reality Simulation," *The PSI Handbook of Virtual Environments for Training and Education: Developments for the Military and Beyond Volume 3*, Praeger Security International, Westport, CT, November 2008, 254-277.
7. L. Walters, E. Smith and **C. E. Hughes**, "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, November 2008, 444-452.
8. **C. E. Hughes**, C. B. Stapleton and M. O'Connor*, "The Evolution of a Framework for Mixed Reality Experiences," *Emerging Technologies of Augmented Reality: Interfaces and Design*, Idea Group, Inc., Hershey, PA, November 2006, 198-216.
9. C. B. Stapleton and **C. E. Hughes**, "Making Memories for a Lifetime," *Emerging Technologies of Augmented Reality: Interfaces and Design*, Idea Group, Inc., Hershey, PA, November 2006, 329-351.
10. N. Adabala and **C. E. Hughes**, "Gridless Controllable Fire," *Game Programming Gems 5* (K. Pallister, Ed.), Charles River Media, 2005, 539-549.
11. F. G. Hamza-Lup*, **C. E. Hughes** and J. P. Rolland, "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, 2004.
12. M. L. Smith*, **C. E. Hughes** and K. W. Burke, "The Denotational Semantics of View-Centric Reasoning," *Concurrent Systems Engineering Series*, Volume 61, (J.F. Broenink and G.H. Hilderink, Eds.), IOS Press, Amsterdam, 2003, 91-96. (Presented at *Communicating Process Architectures 2003*, University of Twente (Enschede, Netherlands), September 7-10, 2003.)
13. M. Smith*, R. Parsons and **C. E. Hughes**. "View-Centric Reasoning for Linda and Tuple Space Computation," in *Concurrent Systems Engineering Series*, Volume 60, (J. S. Pascoe, R. J. Loader, and V. S. Sunderam, Eds.), IOS Press, Amsterdam, 2002, 223-254. (Presented at *Communicating Process Architectures 2002*, The University of Reading (England), September 15-18, 2002.)
14. **C. E. Hughes**, J. M. Moshell and D. Reed*, "Internet-Based Virtual Environments" in *Handbook of Virtual Environments: Design, Implementation, and Applications* (K. M. Stanney, Ed.), Lawrence Erlbaum Associates, 2001, 333-352.
15. J.M. Moshell and **C.E. Hughes**, "Virtual Environments as a Tool for Academic Learning" in *Handbook of Virtual Environments: Design, Implementation, and Applications* (K. M. Stanney, Ed.), Lawrence Erlbaum Associates, 2001, 893-910.
16. **C. E. Hughes** and J. M. Moshell, "ExploreNet," in *The Virtual Reality Casebook*. (C. E. Loeffler and Tim Anderson, ed.), Van Nostrand Reinhold, New York, 1994, 118-122.
17. **C. E. Hughes** and J. M. Moshell, "ExploreNet" in *Virtual Reality: Anthology of Industry and Culture* (C. E. Loeffler, ed.), Gijutsu Hyoron Sha, Tokyo, 1993.

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

Journals:

1. L. A. Dieker, C. Straub, **C. E. Hughes**, M. C. Hynes and S. E. Hardin*, "Virtual environments can take us virtually anywhere," *Educational Leadership*, in press.
2. **C. E. Hughes** and D. P. Mapes, "Mediated Dialogues through Multiple Networked Avatars," *Journal of Immersive Education* (Presented at *iED 2012*, Boston, Ma, June 14-16), in press.
3. L. A. Dieker, J. Rodriguez*, B. Lingnugaris-Kraft, M. Hynes, & **C. E. Hughes**, "The Future of Simulated Environments in Teacher Education: Current Potential and Future Possibilities," *Teacher Education and Special Education*, 37(1), 21-33.
4. A. T. Hayes*, C. L. Straub, L. D. Dieker, C. E. **Hughes** and M. C. Hynes, "Ludic Learning: Exploration of TLE TeachLivE™ and Effective Teacher Training," *International Journal of Gaming and Computer-Mediated Simulations*, 5(2), 2013, 23-36.
5. L. J. Harmon, J. Baumes, **C. Hughes**, J. Soberon, C. D. Specht, W. Turner, C. Lisle and R. W. Thacker, "Arbor: Comparative Analysis Workflows for the Tree of Life," *PLOS Currents Tree of Life*. 2013 Jun 21 [last modified: 2013 Jun 21]. Edition 1.
6. A. E. Norris, **C. Hughes**, M. L. Hecht, N. P. Peragallo and D. Nickerson, "Randomized trial of a peer resistance skill-building game for Hispanic early adolescent girls," *Nursing Research*, 62(1), January/February 2013, 25-35.
7. P. Varcholik*, J. J. LaViola and **C. E. Hughes**, "An Exploration of Multi-Touch Input for Text Entry," *International Journal of Human-Computer Studies*, 70(10), October 2012, 657-672.
8. L. C. Walters, D. E. Hughes and **C. E. Hughes**, "Interconnections: Revisiting the Future," *Game and Culture*, 6(6), November 2011, 538-559.
9. S. Risi*, **C. E. Hughes** and K. O. Stanley, "Evolving Plastic Neural Networks with Novelty Search," *Adaptive Behavior*, 18(6), December 2010, 470-491.
10. N. Beato*, M. Colbert*, Y. Zhang*, K. Yamazawa and **C. E. Hughes**, "Interactive Chroma-keying for Mixed Reality," *Computer Animation and Virtual Worlds* 20(2-3), June 2009, 405-415.
11. S. M. Fiore, G. W. Harrison, **C. E. Hughes** and E. Rutström, "Virtual Experiments and Environmental Policy," *Journal of Environmental Econ. and Management* 57(1), Jan 2009, 65-86.
12. L. Dieker, M. Hynes, **C. E. Hughes** and E. Smith, "Implications of Mixed Reality and Simulation Technologies on Special Education and Teacher Preparation," *Focus on Exceptional Children*, 40(6), February 2008, 1-20.
13. M. Colbert*, E. Reinhard and **C. E. Hughes**, "Painting in High Dynamic Range," *Journal of Visual Communication and Image Representation*, 18(5), October 2007, 387-396.
14. P. Micikevicius and **C. E. Hughes**, "Visibility-based Forest Walk-through Using Inertial Level of Detail Model," *Journal of Defense Modeling and Simulation*, 4(2), April 2007, 80-96.
15. C. M. Fidopiastis, C. B. Stapleton, J. D. Whiteside, **C. E. Hughes**, S. M. Fiore, G. A. Martin*, J. P. Rolland and E. M. Smith, "Human Experience Modeler: Context Driven Cognitive Retraining to Facilitate Transfer of Training," *CyberPsychology and Behavior* 9(2), April, 2006, 183-187.
16. C. B. Stapleton and **C. E. Hughes**, "Believing is Seeing," *IEEE Computer Graphics and Applications* 27(1), January/February 2006, 80-85.
17. R. Xu*, S. N. Pattanaik and **C. E. Hughes**, "HDR Still Image Encoding in JPEG 2000," *IEEE Computer Graphics and Applications*, 26(6), November/December 2005, 69-76.
18. **C. E. Hughes**, C. B. Stapleton, D. E. Hughes and E. Smith, "Mixed Reality in Education, Entertainment and Training: An Interdisciplinary Approach," *IEEE Computer Graphics and Applications*, 26(6), November/December 2005, 24-30.
19. J. Konttinen*, **C. E. Hughes** and S. N. Pattanaik, "The Future of Mixed Reality: Issues in Illumination and Shadows," *Journal of Defense Modeling and Simulation* 2(1), January 2005, 51-59.
20. C. B. Stapleton and **C. E. Hughes**, "Interactive Imagination: Tapping the Emotions through Interactive Story for Compelling Simulations," *IEEE Computer Graphics and Applications* 24(5), September/October 2003, 11-15.

21. M. L. Smith*, R. J. Parsons and **C. E. Hughes**, "View-centric Reasoning for Linda and Tuple Space Computation," *IEE Proceedings-Software* 150(2), April 2003, 71-84.
22. C. B. Stapleton, **C. E. Hughes**, J. M. Moshell, P. Micikevicius and M. Altman*, "Applying Mixed Reality to Entertainment," *IEEE Computer* 35(12), December 2002, 122-124.
23. **C. E. Hughes**, J. M. Moshell, D. Reed*, D. Z. Chase and A. F. Chase, "The Caracol Time Travel Project" *The Journal of Visualization and Computer Animation* 12(4), September, 2001, 203-214.
24. J. X. Chen*, N. Lobo, **C. E. Hughes** and J. M. Moshell, "Real-time Fluid Simulation in a Networked Virtual Environment" *IEEE Computer Graphics and Applications* 17(3), pp. 52-61, May-June 1997.
25. **C. E. Hughes** and J. M. Moshell, "Shared Virtual Worlds for Education: The ExploreNet Experiment" *Multimedia Systems* 5(2), March, 1997, 145-154.
26. J. Burg*, S. D. Lang and **C. E. Hughes**, "Intelligent Backtracking in CLP(R)," *Annals of Artificial Intelligence and Mathematics* 17(3-4), 1996, 189-212.
27. J. M. Moshell and **C. E. Hughes**, "The Virtual Academy: A Simulated Environment for Constructionist Learning" *International Journal of Human-Computer Interaction* 8(1), 1996, 95-110.
28. J. X. Chen*, J. M. Moshell, **C. E. Hughes**, B. Blau* and X. Li*, "Distributed Virtual Environment Real-Time Simulation Network," *Advances in Modeling and Analysis B*, 31(1), 1994, 1-7.
29. K. Kinsley* and **C. E. Hughes**, "Analysis of a Virtual Memory Model for Maintaining Database Views," *IEEE Transactions on Software Engineering*, May, 1992, 402-409.
30. F. Arefi*, D. Workman and **C. E. Hughes**, "Automatically Generating Visual Syntax-Directed Editors," *Communications of the ACM*, 1990, 349-360.
31. K. Kinsley* and **C. E. Hughes**, "Evaluating Database Update Schemes: A Methodology and its Applications to Distributive Systems," *IEEE Trans. on Software Engineering*, 1988, 1081-1089.
32. M. D. Petty*, J. M. Moshell and **C. E. Hughes**, "Tactical Simulation in an Object-Oriented Animated Graphics Environment," *ACM SIGSIM Simulation Digest* 19(2), June 1988, 31-46.
33. **C. E. Hughes**, J. M. Moshell, L. W. Lacy* and R. L. Lewis*, "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.
34. M. Petty*, J. M. Moshell and **C. E. Hughes**, "Tactical Simulation in an Object-Oriented Animated Graphics Environment," *ACM SIGSIM Simulation Digest* 19(2, June 1988), 31-46.
35. **C. E. Hughes** and S. M. Selkow, "The Finite Power Property for Context-Free Languages," *Journal of Theoretical Computer Science*, 15, 1981, 111-114.
36. **C. E. Hughes** and D. W. Straight, "Word Problems for Bidirectional, Single Premise Post Systems," *Notre Dame Journal of Formal Logic*, 21, 1980, 501-508.
37. **C. E. Hughes**, "Derivatives and Quotients of Prefix-Free Context-Free Languages," *Information and Control*, 45, 1980, 229-235.
38. **C. E. Hughes** and C. P. Pflieger*, "ASSIST-V: An Environment Simulator for Systems Software Development," *IEEE Transactions on Software Engineering*, 4, 1978, 526-530.
39. **C. E. Hughes**, "The Equivalence of Vector Addition Systems to a Subclass of Post Canonical Forms," *Information Processing Letters*, 7, 1978, 201-204.
40. **C. E. Hughes** and W. E. Singletary, "The One-One Equivalence of Some General Decision Problems," *Notre Dame Journal of Formal Logic*, 18, 1977, 305-309.
41. **C. E. Hughes**, "Two Variable Implicational Calculi of Prescribed Many-One Degrees of Unsolvability," *Journal of Symbolic Logic*, 41, 1976, 35-44.
42. **C. E. Hughes**, "A Reduction Class Containing Formulas with One Monadic Predicate and One Binary Function Symbol," *Journal of Symbolic Logic*, 4, 1976, 45-49.
43. **C. E. Hughes**, "The General Decision Problem for Markov Algorithms with Axiom," *Notre Dame Journal of Formal Logic*, 16, 1975, 208-216.
44. **C. E. Hughes** and W. E. Singletary, "Triadic Partial Implicational Propositional Calculi," *Z. Math Logik und Grundlagen*, 21, 1975, 21-28.
45. **C. E. Hughes**, "Sets Derived by Deterministic Systems with Axiom," *Z. Math Logik und Grundlagen*, 21, pp. 71-80, 1975.
46. **C. E. Hughes** and W. E. Singletary, "Combinatorial Systems Defined Over One- and Two- Letter Alphabets," *Archiv Math. Logik und Grundlagenforschung*, 17, 1975, 25-33.
47. **C. E. Hughes**, "Single Premise Post Canonical Forms Defined Over One-Letter Alphabets," *Journal of Symbolic Logic*, 39, 1974, 489-495.

48. **C. E. Hughes**, "Many-One Degrees Associated with Problems of Tag," *Journal of Symbolic Logic*, 38, pp. 1-17, 1973.
49. **C. E. Hughes** and W. E. Singletary, "Combinatorial Systems with Axiom," *Notre Dame Journal of Formal Logic*, 14, 1973, 354-260.
50. **C. E. Hughes**, "Many-One Degrees Associated with Semi-Thue Systems," *Journal of Computer and Systems Sciences*, 7, 1973, 497-505.
51. **C. E. Hughes**, "Degrees of Unsolvability Associated with Markov Algorithms," *International Journal of Computer and Information Sciences*, 1, 1972, 355-365.
52. **C. E. Hughes**, R. Overbeek and W. E. Singletary, "The Many-One Equivalence of Some General Combinatorial Decision Problems," *Bulletin of the American Mathematical Soc*, 77, 1971, 467-472.

Refereed Proceedings:

1. J. Abich IV, G. Matthews, L. Reinerman-Jones, G. Welch, S. Lackey, & **C. E. Hughes**, A. Nagendran, "A Preliminary Evaluation of Human Surrogate Interaction," *HCI International 2014 (HCII2014)*, Crete, Greece, July 22-27.
2. A. Nagendran, R. Pillat*, A. Kavanaugh*, G. Welch, & **C. E. Hughes**, "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
3. A. Hayes*, S. Hardin* & **C. E. Hughes**, "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
4. D. E. Hughes, S. Sabbagh*, R., Lindgren, J. M. Moshell & **C. E. Hughes**, "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
5. L. C. Walters, D. E. Hughes, M. Gertrudix Barrio & **C. E. Hughes**, "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
6. S. Braeger*, Y. Xiong* & **C. E. Hughes**, "Photometric Display Calibration for Embedded MR Environments," *IEEE Virtual Reality (IEEE VR 2013)*, Orlando, FL, March 18-20, 2013, Poster 41. 10.1109/VR.2013.6549399
7. A. Nagendran, R. Pillat*, **C. E. Hughes** & G. Welch, "Continuum of Virtual-Human Space: Towards Improved Interaction Strategies for Physical-Virtual Avatars," *ACM SIGGRAPH VRCAI 2012*, Dec. 2-4, 2012, Singapore, 135-142.
8. A. L. Lopez*, **C. E. Hughes**, D. P. Mapes & L. A. Dieker, "Cross Cultural Training through Digital Puppetry," *Advances in Design for Cross-Cultural Activities Part I*, Chapter 25, Edited by Denise M. Nicholson, CRC Press 2012, 247-256.
9. G. A. Martin*, **C. E. Hughes** & J. M. Moshell, "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.
10. S. Braeger* and **C. E. Hughes**, "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.
11. R. Pillat*, A. Nagendran and **C. E. Hughes**, "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.
12. N. Beato*, R. Pillat* and **C. E. Hughes**, "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.
13. E. Charbonneau*, **C. E. Hughes** and J. J. LaViola, "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.

14. G. Martin*, S. Schatz, **C. E. Hughes** and D. Nicholson, "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.
15. D. P. Mapes, P. Tonner* and **C. E. Hughes**, "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.
16. J. Zhu, J. M. Moshell, S. Ontañón, E. Erbiceanu* and **C. E. Hughes**, "Why can't a virtual character be more like a human: A mixed initiative approach to believable agents," *HCI International 2011 (HCII2011)*, Orlando, FL, July 9-14. In *Lecture Notes in Computer Science*, Volume 6774, Springer-Verlag, Heidelberg, 2011, 289-296.
17. G. Martin*, **C. E. Hughes**, S. Schatz, D. Nicholson, "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.
18. G. Martin* and **C. E. Hughes**, "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.
19. G. Martin*, S. Schatz, C. Bowers, **C. E. Hughes**, J. Fowlkes and D. Nicholson, "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.
20. P. Varcholik*, J. LaViola and **C. E. Hughes**, "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.
21. N. Beato*, D. Mapes and **C. E. Hughes**, C. Fidopiastis and E. Smith, "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.
22. S. Risi*, S. Vanderbleek*, **C. E. Hughes** and K. O. Stanley "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]
23. C. Fidopiastis, **C. E. Hughes** and E. Smith, "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, 2009, 216-240.
24. M. Salva, B. K. Wiederhold, A. J. Alban, **C. E. Hughes**, E. Smith, C. Fidopiastis and M. D. Wiederhold, "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.
25. L. C. Walters, **C. E. Hughes** and E. Smith, "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).
26. L. C. Walters, **C. E. Hughes** and E. Smith, "Come Back to the Fair," *14th International Conference on Virtual Systems and Multimedia (VSMM) '08*, Limassol, Cyprus, October 20-26, 2008, 289-293.
27. C. M. Fidopiastis and **C. E. Hughes**, "Use of Psychophysiological Measures in Virtual Rehabilitation", *Virtual Rehabilitation 2008*, Vancouver, BC, August 25-27, 2008, xi. (Invited)
28. C. M. Fidopiastis, D. M. Nicholson, **C. E. Hughes** and E. M. Smith, "Developing Baseline Assessments for Virtual Rehabilitation Environments," *4th INTUITION International Conference and Workshop 2007*, Athens, Greece, October 4-5, 2007, Poster.
29. C. M. Fidopiastis, **C. E. Hughes**, E. M. Smith and D. M. Nicholson, "Assessing Virtual Rehabilitation with Biophysical Metrics," *Virtual Rehabilitation 2007*, Venice, Italy, September 27-29, 2007, Poster.
30. Y. Zhang* and **C. E. Hughes**, "Model-Guided Luminance Range Enhancement in Mixed Reality," *International Conference on Image Analysis and Recognition (ICIAR) 2007*, Montreal, August 22-24, 2007, 1160-1171.
31. J. Konttinen*, S. Pattanaik and **C. E. Hughes**, "Image-Space Particle Emission," *SIGGRAPH 2007*, San Diego, August 6-9, 2007, Poster.

32. S. M. Fiore, G. W. Harrison, **C. E. Hughes** and E. E. Rutström, "Virtual Experiments and Environmental Policy," *Frontiers of Environmental Economics*, Washington, February 2007.
33. L. Dieker, M. Hynes, C. B. Stapleton and **C. E. Hughes**, "Virtual Classrooms: STAR Simulator," *New Learning Technologies 2007*, Orlando, FL, February 2007, 1-22.
34. S. Szumlanski*, A. S. Wu and **C. E. Hughes**, "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.
35. C. B. Stapleton, E. Smith and **C. E. Hughes**, "The Art of Nurturing Citizen Scientists through Mixed Reality," *ISMAR 2005*, Vienna, Austria, October 5-8, 2005, 2-11 (Invited)
36. C. M. Fidopiastis, C. B. Stapleton, J. D. Whiteside, **C. E. Hughes**, S. M. Fiore, G. A. Martin*, J. P. Rolland and E. M. Smith, "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.
37. **C. E. Hughes** and C. B. Stapleton, "The Shared Imagination: Creative Collaboration in Augmented Virtuality," *HCI International 2005*, Las Vegas, NV, July 22-27, 2005.
38. S. R. Szumlanski*, A. S. Wu and **C. E. Hughes**, "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]
39. DanZhou Liu* and **C. E. Hughes**, "Deducing Behaviors from Primitive Movement Attributes," *SPIE Defense and Security Symposium*, Orlando, FL, March 28 - April 1, 2005, 180-189.
40. M. O'Connor* and **C. E. Hughes**, "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.
41. D. E. Hughes, S. Vogelpohl* and **C. E. Hughes**, "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.
42. C. B. Stapleton and **C. E. Hughes**, "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.
43. **C. E. Hughes**, J. Konttinen* and S. N. Pattanaik, "The Future of Mixed Reality: Issues in Illumination and Shadows," *Proceedings of I/ITSEC 2004*, Orlando, December 6-9, 2004.
44. E. Reinhard, A. O. Akyuz*, M. Colbert*, M. O'Connor* and **C. E. Hughes**, "Real-Time Color Blending of Rendered and Captured Video," *Proceedings of I/ITSEC 2004*, Orlando, December 6-9, 2004.
45. S. Malo, C. B. Stapleton and **C. E. Hughes**, "Going beyond Reality: Creating Extreme Multi-Modal Mixed Reality for Training Simulation," *Proceedings of I/ITSEC 2004*, Orlando, December 6-9, 2004.
46. **C. E. Hughes**, Erik Reinhard, J. Konttinen* and S. N. Pattanaik, "Achieving Interactive-Time Realistic Illumination in Mixed Reality," *Proceedings of Army Science Conference (ASC) 2004*, Orlando, FL, November 29-December 2, 2004.
47. **C. E. Hughes**, G. Harrison, S. Fiore, E. Rutstrom, E. Smith and C. B. Stapleton, "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.
48. **C. E. Hughes**, E. Smith, C. B. Stapleton and D. E. Hughes, "Augmenting Museum Experiences with Mixed Reality," *Proceedings of KSCE 2004*, St. Thomas, V.I., November 22-24, 2004.
49. C. B. Stapleton, **C. E. Hughes** and S. Malo, "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.
50. **C. E. Hughes**, C. B. Stapleton, S. N. Pattanaik, E. Smith, and S. Malo, "MR Sea Creatures – A Cretaceous Journey in Augmented Virtuality," *Proceedings of ISMAR 2004*, Washington, D.C., Oct. 31-Nov. 3, 2004.

51. G. A. Schiavone, P. Wahid, R. Palaniappan, J. Tracy, E. Vandoorn, P. Micikevicius, and **C. E. Hughes**, "Intruder Detection and Tracking using UWB Technology," *Proceedings of SPIE Int. Soc. Opt. Eng.* Volume 5431, August 2004, 106-116.
52. R. Xu*, S. N. Pattanaik and **C. E. Hughes**, "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.
53. N. Adabala* and **C. E. Hughes**, "A Parametric Model for Real-Time Flickering Fire," *Computer Animation and Social Agents (CASA 2004)*, Geneva, Switzerland, July 7-9, 2004.
54. **C. E. Hughes**, C. B. Stapleton, P. Micikevicius, D. E. Hughes, S. Malo and M. O'Connor*, "Mixed Fantasy: An Integrated System for Delivering MR Experiences," *VR Usability Workshop: Designing and Evaluating VR Systems*, Nottingham, England, January 22-23, 2004.
55. P. Micikevicius, **C. E. Hughes**, J. M. Moshell, V. Sims and H. Smith, "Perceptual Evaluation of an Interactive Forest Walk-through," *VR Usability Workshop: Designing and Evaluating VR Systems*, Nottingham, England, January 22-23, 2004.
56. C. B. Stapleton, **C. E. Hughes** and J. M. Moshell, "Mixed Fantasy," *Proceedings of ISMAR 2003*, Tokyo. October 8-10, 2003, 354-355.
57. **C. E. Hughes** and M. L. Smith*. "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.
58. M. L. Smith* and **C. E. Hughes**. "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.
59. **C. E. Hughes** and G. A. Marin, "A New Program in Information Technology," *International Conference on Information Technology (ITCC 2003)*, Las Vegas, April 28-30, 2003, 2-8.
60. **C. E. Hughes**, C. B. Stapleton, J. M. Moshell, P. evicius*, P. Garrity and P. Dumanoir, "Challenges & Opportunities Simulating Future Combat Systems via Mixed Reality," *23rd Army Science Conference (ASC 2002)*, Orlando, FL, December 2-5, 2002.
61. M. Smith, R. Parsons and **C. E. Hughes**. "View-Centric Reasoning about Space-Based Middleware," *Information and Knowledge Sharing (IKS 2002)*, St. Thomas, Virgin Islands, November 18-20, 2002.
62. F. G. Hamza-Lup*, L. Davis, **C. E. Hughes** and J. Rolland. "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.
63. D. R. E. Williams*, **C. E. Hughes** and A. Orooji. "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.
64. V. K. Sims, J. M. Moshell, **C. E. Hughes**, J. E. Cotton and J. Xiao*, "Recognition of Computer-Generated Trees," *Proceedings of the Human Factors and Ergonomics Society*, 46, Baltimore, MD, Sept. 30-Oct. 4, 2002, 2215-2218.
65. **C. E. Hughes**, J. Burnett*, J. M. Moshell, C. Stapleton and B. Mauer. "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.
66. M. L. Smith*, R. J. Parsons and **C. E. Hughes**. "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.
67. D. R. E. Williams*, **C. E. Hughes** and A. Orooji. "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.
68. T. M. Riedel, J. F. Weishampel, J. Breedlove, J. M. Moshell, **C. E. Hughes**, C. B. Stapleton, and E. Smith, "The Virtual Forest Canopy Orlando Science Center Exhibit," *International Canopy Conference*, Cairns, Australia, June 23-28, 2002. (Poster)

69. V. K. Sims, J. M. Moshell, **C. E. Hughes**, J. E. Cotton and J. Xiao*, "Salient Characteristics of Virtual Trees," *Proceedings of the Human Factors and Ergonomics Society*, 45, Minneapolis, Minn., Oct. 8-12, 2001, 1935-1938.
70. **C. E. Hughes**, J. M. Moshell, D. Reed*, D. Chase and A. Chase. "The Caracol Time Travel Project," *Visual 2000: 3rd International Conference on Visual Computing*, Mexico City, 18-22 September 2000.
71. **C. E. Hughes**, J. M. Moshell, V. Sims and Q. Yu*. "Dynamic Computation of Levels of Detail in Complex Outdoor Environments," *Visual 2000: 3rd International Conference on Visual Computing*, Mexico City, 18-22 September 2000.
72. J. M. Moshell, **C. E. Hughes**, D. Reed*, D. Chase and A. Chase. "Virtual Drama as a Learning Medium" *IEEE VR 2000*, New Brunswick, NJ, March 2000, 282.
73. H. Morelos-Borja*, A. Wang, J. M. Moshell, R. Parsons and **C. E. Hughes**. "Agents for the Matching of Peer Tutors with Distance Learners," *AACE-WebNet 98 Conference Proceedings*, Orlando, FL. November 1998.
74. **C. E. Hughes**, J. M. Moshell and M. Pullen, "Two dimensional Shared Virtual Worlds in Middle and Elementary Schools: Lessons Learned," *Virtual Worlds and Simulation Conference* 30(2), January, 1998, 139-144.
75. J. Burg*, S. D. Lang and **C. E. Hughes**, "Finding Conflict Sets and Backtrack Points in CLP(R)," *Proceedings of the International Conference on Logic Programming (ICLP94)*, S. Margherita figure, Italy, June 1994, 323-338.
76. J. M. Moshell and **C. E. Hughes**, "The Virtual Academy: Networked Simulation and the Future of Education," *Proceedings of the Imagina Conference*, Monte Carlo, February 1994.
77. J. Burg*, **C. E. Hughes** and S. D. Lang, "Intelligent Backtracking in CLP(R)," *Proceedings of Third International Symposium on Artificial Intelligence and Mathematics*, Boca Raton, FL, January 1994.
78. J. M. Moshell and **C. E. Hughes**, "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.
79. **C. E. Hughes**, J. M. Moshell, S. G. Hughes and M. Smith*, "Cooperative Problem Solving Among K-12 Students: The ExploreNet Project," *Proceedings of Frontiers in Education '92*, November 1992, 522-526.
80. **C. E. Hughes**, R. K. Guha, T. J. Frederick and N. Deo, "Parallel Processing in the Undergraduate Curriculum," *Proceedings of Frontiers in Education '92*, November 1992, 471-474.
81. J. Burg*, **C. E. Hughes** and S. D. Lang, "Parallel Execution of CLP-R Programs," *Proceedings of JICSLP '92 Joint Workshop on Distributed and Parallel Implementations of Logic Programming Systems*, November 1992.
82. B. Blau*, J. M. Moshell, **C. E. Hughes** and C. R. Lisle*, "Networked Virtual Environments," *Computer Graphics Special Issue: Proceedings of 1992 Workshop on Interactive 3D Graphics*, Boston, MA, March 1992, 157-160.
83. J. M. Moshell, B. Blau*, **C. E. Hughes**, X. Lin* and R. Dunn-Roberts*, "Networked Virtual Environments for Simulation and Training," *Proceedings of Simtec '91*, Orlando, FL, October 1991, 210-215.
84. J. M. Moshell, **C. E. Hughes**, B. Blau*, R. Dunn-Roberts*, C. R. Lisle* and X. Li*, "Networked Virtual Environments: Issues and Approaches," *Proceedings of the SRI Virtual Worlds Symposium*, Menlo Park, CA. June 17-19, 1991.
85. J. Burg*, **C. E. Hughes**, C. Lisle*, J. M. Moshell, J. Carrington* and X. Li*, "Behavioral Representation in Virtual Reality," *Proceedings of the 2nd Behavioral Representation and Computer Generated Forces Symposium*, Orlando, FL, May 1991, B.1-B.26.
86. J. Burg*, **C. E. Hughes** and J. M. Moshell "Constraint-Based Modeling of Behaviors," *Proceedings of the Florida Artificial Intelligence Research Symposium 1990*, Cocoa Beach, FL, April 1990.
87. J. M. Moshell, B. Blau*, **C. E. Hughes**, X. Li* and B. Goldiez, "Nap-of-Earth Flight and Realtime Simulation of Dynamic Terrain," *Proceedings of SPIE '90*, Orlando, FL, April 1990.
88. F. Arefi*, D. Workman and **C. E. Hughes**, "The Object-Oriented Design of a Visual Syntax-Directed Editor Generator," *Proceedings of COMPSAC '89*, Orlando, FL, February 1989, 389-396.

89. K. Kinsley* and **C. E. Hughes**, "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.
90. J. E. Mears*, **C. E. Hughes** and J. M. Moshell. "Designing Training Scenarios by Rehearsal," *Proceedings of the 1988 IEEE Workshop on Visual Languages*, Pittsburgh, October 1988, 207-212.
91. J. M. Moshell, **C. E. Hughes**, L. W. Lacy*, R. L. Lewis* and D. Blower "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.
92. J. M. Moshell and **C. E. Hughes**, "Graphical Spreadsheet Environments for Problem Solving," *NCGA Computer Graphics '87 Conference Proceedings*, Philadelphia, 1987, 593-602.
93. **C. E. Hughes**, J. M. Moshell, L. W. Lacy*, R. L. Lewis*, D. Blower "An Educational Animation System Based on Class Inheritance," *NCGA Computer Graphics '87 Conference Proceedings*, Philadelphia, 1987, 618-627.
94. **C. E. Hughes** and J. M. Moshell, "Visible Pascal: A Graphics-Based Learning Environment," *NCGA Computer Graphics '86 Conference Proceedings*, Anaheim, CA, 1986, 401-411.
95. K. Kinsley* and **C. E. Hughes**, "Evaluating Database Update Schemes: A Methodology and its Applications to Distributive Systems," *Proceedings of COMPSAC '86*, Chicago, 1986, 351-357.
96. **C. E. Hughes** and J. M. Moshell, "Picture Programming: A Graphical Programming Environment," *NCGA Computer Graphics '85 Conference Proceedings*, 26, Dallas, 1985, 290-299.
97. **C. E. Hughes** and J. M. Moshell, "A Programming Environment for Pre-literate Children," *Proceedings of the 1983 National Education Computing Conference*, Baltimore, MD, 1983, 103-106.
98. J. M. Moshell, **C. E. Hughes**, C. Gregory* and L. Wittenberg*, "Hobby Robots as Teaching/Learning Tools," *Proceedings of the 1983 National Education Computing Conference*, Baltimore, MD, 1983, 68-74.
99. **C. E. Hughes** and J. M. Moshell, "Computer Power: A Coordinated Series of High School Curricula," *Proceedings of the Association for Educational Data Systems Conference*, Orlando, FL, 1982, 350-355.
100. J. M. Moshell, **C. E. Hughes** and G. W. Amann*, "INTERPAS and Rascal: A Playful Cartoon Programming System," *Proceedings of the 7th West Coast Computer Faire*, San Francisco, 1982, 157-161.
101. R. M. Aiken, J. M. Moshell, **C. E. Hughes** and C. R. Gregory*, "Insights into Universal Computer Education," *ACM SIGCSE Bulletin*, 13, Eleventh Symposium on Computer Science Education, 1981, 8-11.
102. R. M. Aiken, **C. E. Hughes** and J. M. Moshell, "Computer Science Curriculum for High School Students," *ACM SIGCSE Bulletin*, 12, Tenth Symposium on Computer Science Education, 1980, 172-177.
103. **C. E. Hughes** and C. P. Pfleeger, "Pascal Program Development Aids," *Proceedings of the 17th Annual Southeast Regional ACM Conference*, 1979, 38-44.
104. R. M. Aiken, **C. E. Hughes** and J. M. Moshell, "An Integrated Small Computer Laboratory Using a Central Disk Storage Facility," *ACM SIGCSE Bulletin*, 10, Eighth Symposium on Computer Science Education, 1978, 35-37.
105. W. Haynes*, **C. E. Hughes** and C. P. Pfleeger, "Oracle: A Tool for Learning Compiler Writing," *ACM SIGCSE Bulletin*, 9, Seventh Symposium on Computer Science Education, 1977, 37-51.
106. **C. E. Hughes** and C. P. Pfleeger, "ASSIST-V: A Tool for Studying the Implementation of Operating Systems," *ACM SIGCSE Bulletin*, 8, Sixth Symposium on Computer Science Education, 1976, 167-173.
107. **C. E. Hughes** and J. Walker, "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.
108. **C. E. Hughes** and J. Walker, "POPSS – A Parametric Operating System Simulator," *ACM SIGCSE Bulletin*, 5, Third Symposium on Computer Science Education, 1973, 166-169.

Non- or Lightly-Refereed Proceedings:

1. 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.
2. 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.
 3. **C. E. Hughes**, C. Fidopiastis, D. Hughes, A. Salva and R. Shumaker, “Using Mixed Reality to Assess and Improve Performance,” *Medicine Meets Virtual Reality 2009*, Long Beach, CA, January 19-22, 2009.
 4. **C. E. Hughes**, L. Dieker, E. Smith, O. Bedesem, M. Kalaf and R. Moss, “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.
 5. **C. E. Hughes**, Virtual and Mixed Reality: New Ways of looking at KM, *Knowledge Management 2009*, Washington, DC, April 28-29, 2009.
 6. E. Smith, D. Hughes, A. Salva, **C. E. Hughes**, “An Innovation Workshop on Mixed Reality,” *Medical Technology, Training and Treatment (MT3) Conference*, Orlando, FL, May 28, 2009.
 7. F. G. Hamza-Lup*, **C. E. Hughes** and J. P. Rolland, “Distributed Consistency Maintenance Scheme for Interactive Mixed Reality Environments,” *CITSA 2004*, Orlando, FL, July 21-26, 2004.
 8. F. G. Hamza-Lup*, **C. E. Hughes** and J. P. Rolland, “Hybrid Nodes with sensors – Architecture for Interactive Distributed Mixed and Virtual Reality Environments,” *SCI 2004*, Orlando, FL, July 18-21, 2004.
 9. C. B. Stapleton, **C. E. Hughes** and J. M. Moshell, “Mixed Reality and the Interactive Imagination,” *First Swedish-American Workshop on Modeling and Simulation, SAWMAS 2002*, Orlando, FL, October 30-31, 2002.
 10. C. B. Stapleton, K. Garfield*, **C. E. Hughes**, J. M. Moshell, P. Garrity and P. Dumanoir, “The Use of Basic Object Models (BOM) in the Virtual Backlot (VB) Development,” *2002 Fall Simulation Interoperability Workshop*, Orlando, FL, September 8-13, 2002.
 11. J. X. Chen*, N. Lobo, **C. E. Hughes** and J. M. Moshell, “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.
 12. M. Petty*, **C. E. Hughes** and J. M. Moshell, “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.
 13. R. M. Aiken, **C. E. Hughes** and J. M. Moshell, “An Introductory Computer Science Curriculum Based on an Affordable Computer System,” *Proceedings of IFIP Working Conference on Microcomputers and Secondary Education*, Paris, April 1980.
 14. F. Leaders, M. Van Hoose, K. O’Kane, and **C. E. Hughes**, “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.
 15. K. O’Kane, and **C. E. Hughes**, F. Leaders, M. Van Hoose, “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.

Selected Invited Talks (since 2009):

“Preparing the Future Workforce using Avatar-Mediated Interaction”

Panel presentation at *Interservice/Industry Training, Simulation and Education Conference (I/ITSEC)*
Orlando, FL, December 3, 2013.

“Applications of Avatar-Mediated Interaction to Teaching. Wellness & Education”

Dagstuhl Seminars – Virtual Reality,
Dagstuhl, Germany, June 10, 2013.

“TeachLivE”

NewSchools Convening
San Francisco, May 1, 2013.

“Interactors and Spectactors: Mediated Dialogue through Digital Puppetry”

Google Tech Talk

Mountain View, CA, July 27, 2012.

“Avatars, Agents, Animatronics, People, Places and Props”

Veterans Administration National Research Week

Orlando, FL, April 25, 2012.

“Computer Mediated Dialogue: Puppets, People and Props”

Orlando Café Scientifique

Orlando, FL, February 1, 2012.

“Training via Digital Puppetry”

Federal Law Enforcement Center

Glynco, GA, January 20, 2012.

“Synthetic Reality”

NASA

Titusville, FL, April 11, 2011.

“Realism in Simulation-Based Training Environment via Digital Puppetry”

Tufts Health Care Institute (THCI) Program on Opioid Risk Management

Boston, MA, March 10-11, 2011.

“Realism in Simulation-Based Training Environment via Digital Puppetry”

BLUR Conference

Orlando, FL, February 23, 2011.

“Interdisciplinary Research: Preparing Computer Science Students for the Changing Landscape”

Information Management Forum Senior Executive Conference

Orlando, FL, October 4-5, 2010

“Transforming Lives: Technology”

Innovation Workshop

International Symposium on Mixed and Augmented Reality 2009 (ISMAR 2009),

Orlando, FL, October 19-22, 2009.

“Creating Mixed Reality Experiences”

International Symposium on Mixed and Augmented Reality 2009 (ISMAR 2009),

Orlando, FL, October 19-22, 2009.

“Enhancing Human Performance”

co-presenters: C. Fidopiastis, K. Stanney

International Symposium on Mixed and Augmented Reality 2009 (ISMAR 2009),

Orlando, FL, October 19-22, 2009.

“An Innovation Workshop on Mixed Reality”

co-presenters: E. Smith, D. Hughes, A. Salva

Medical Technology, Training and Treatment (MT3) Conference, Orlando, FL, May 28, 2009.

“Virtual and Mixed Reality: New Ways of looking at KM”

Knowledge Management 2009, Washington, DC, April 28-29, 2009.

“Clinical Experiences via Virtual World”

co-presenters: L. Dieker, E. Smith, O. Bedesem, M. Kalaf and R. Moss,

American Association of Colleges for Teacher Education 61st Annual Meeting and Exhibits (AACTE 2009), Chicago, IL, February 6-9, 2009.

“Using Mixed Reality to Assess and Improve Performance”

Naval Research Advisor Committee, Office of Naval Research, Washington, DC, January 29, 2009.

“Using Mixed Reality to Assess and Improve Performance”

Jet Propulsion Lab, Pasadena, CA, January 22, 2009.

“Mixed Reality for Cognitive and Motor Rehabilitation and Assessment”
Workshop co-presenters: C. Fidopiastis, D. Hughes, A. Salva, R. Shumaker
Medicine Meets Virtual Reality 2009, Long Beach, CA, January 19-22, 2009.

Invention Patents, Disclosures and Trademarks:

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.

Charles E. Hughes, Lisa A. Dieker and Michael Hynes, “Semi-Automated Digital Puppetry Control,” Filed March 15, 2013. Provisional patent application.

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.

Other Media:

National Press on TeachLivE (in 2013):

“Learning to Teach through Mixed Reality: UCF's TeachLivE,” *Interactive Multimedia Technology*, October 1, 2013.

<http://interactivemultimediatechnology.blogspot.com/2013/10/learning-to-teach-through-virtual.html>

“My World has been Rocked,” *edSurge*, June 24, 2013.

<https://www.edsurge.com/n/2013-06-24-opinion-my-world-has-been-rocked>

“UM Uses Student avatars for Teacher Training,” *Ole Miss News*, March 18, 2013.

<http://news.olemiss.edu/um-uses-student-avatars-for-teacher-training/#.UqTWtGRgZ88>

National Press (selected from those appearing prior to 2013):

Our cultural heritage research was selected by NSF for presentation at the annual American Association for the Advancement of Science meeting in Washington, DC on February 16-21, 2011.

“Virtual Students Are Used to Train Teachers,” *Education Week*, January 7, 2011

http://www.edweek.org/ew/articles/2011/01/05/15simulate_ep.h30.html

“Let’s Play Abstinence—with Avatars!,” *MS. Blog*, Aug. 6, 2010

<http://msmagazine.com/blog/blog/2010/08/06/let’s-play-abstinence-with-avatars>

“Avatars to Teach the Teachers,” *Inside Higher Ed* and *USA Today*, July 7, 2010

<http://www.insidehighered.com/news/2010/07/07/avatars>

“Students Aid World’s Fair Project,” *Mining Gazette*, May 14, 2010

<http://www.mininggazette.com/page/content.detail/id/510075.html?nav=5006>

“Virtual reality fires Up Research efforts,” *NSF News*, August 24, 2009.

http://www.nsf.gov/news/special_reports/science_nation/wildfire.jsp

“Saved by the Virtual Bell,” A July 30, 2008 on-line video at *MSNBC* on our TeachME system.

<http://www.msnbc.msn.com/id/21134540/vp/25933859#25933932>

External Research Grants and Contracts (PI underlined):

Active – Army PEO-STRI (1), NewSchools (1), NEH (1), NSF (5), ONR (2), VA(1):

National Science Foundation, *Arbor: Comparative Analysis Workflows for Tree of Life*, (PIs: L. Harmon, **C. E. Hughes**, W. Turner). 5/1/2012-4/30/2015.

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). 9/1/2009-8/31/2014.

National Science Foundation, *Reducing Alcohol Use among College Students Using Digital Puppetry*, (PIs: **C. E. Hughes**, Tom Hall), joint with Weill Cornell College of Medicine. 9/1/2011-8/31/2014.

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). 9/1/2011-8/31/2014.

Office of Naval Research, *DURIP: A Physical-Virtual Human-Robot Interaction System for Training, Education and Rehabilitation*, (PIs: Greg Welch, **C. E. Hughes**, Arjun Nagendran). 10/1/2012-7/31/2014.

National Endowment for the Humanities, *Journey beyond the Fairs*, (PIs: L. Walters, **C. E. Hughes**, D. Hughes). 5/1/2011-4/30/2014.

Office of Naval Research, *3D Display and Capture of Humans for Live Virtual Training*, (PIs: Greg Welch, **C. E. Hughes**). 10/1/2011-3/31/2014.

Active through UCF Foundation (1)

Bill & Melinda Gates Foundation, *TeachLivE™*, (PIs: L. Dieker, M. Hynes, **C. E. Hughes**). 4/1/2012-6/30/2015.

Completed:

NewSchools Venture Fund, *TeachLivE™*, (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*, 6/26/2013-9/30/2013.

U.S. Department of Veterans Affairs, *Intergovernmental Personnel Act Agreement for Charles Hughes*, (PI: C. E. Hughes), 9/24/2012-9/23/2013.

National Science Foundation, *EAGER: Efficient control and transmission of digital puppetry*, (PIs: **C. E. Hughes**), 9/01/2010-8/31/2013.

Bill & Melinda Gates Foundation, *TeachLivE™*, (PIs: L. Dieker, M. Hynes, **C. E. Hughes**), 7/1/2011-6/30/2013

Various Universities, *TeachLivE™ Lab*, (PIs: M. Hynes, L. Dieker, **C. E. Hughes**), 2011-2012.

National Institutes of Health, *ARRA: Using Mixed Reality to Build Peer Resistance Skills in Latina Middle Schoolers*, (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). 5/15/2007-7/31/2012.

Army RDECOM, *Mixed Reality Immersion Research*, (PIs: E. Smith, **C. E. Hughes**). 6/8/2010-6/30/2011.

West Virginia University, *TeachME Classroom Sessions and Software Program Services*, (PIs: L. Dieker, **C. E. Hughes**, M. Hynes). 9/1/2010-3/31/2011.

Old Dominion University Research Foundation, *TeachME*, (PIs: L. Dieker, **C. E. Hughes**, M. Hynes). 7/1/2010-3/31/2011.

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

University Center of Greenville, *TeachME Classroom Sessions and Software Program*, (PIs: L. Dieker, **C. E. Hughes**, M. Hynes). 11/1/2010-3/31/2011.

Utah State University, *TeachME*, (PIs: **C. E. Hughes**, E. Smith), 2009-2010.

National Science Foundation, *DRU: Cognition in Natural Environments: Using Simulated Scenarios in Complex Decision Making Experiments*, (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*, (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*, (PIs: **C. E. Hughes**, E. Smith), 2007-2010.

National Science Foundation, *GRA VRMC Fellowship*, (UCF PIs: **C. E. Hughes**, E. Smith), 2007-2010.

National Science Foundation, *STTR Phase I: Developing a Mixed Reality Rehabilitation System*, (UCF PIs: **C. E. Hughes**, E. Smith), joint with Virtual Reality Medical Center, 2007.

I4 High Tech Corridor, *Developing a Mixed Reality Rehabilitation System*, (PIs: **C. E. Hughes**, E. Smith), 2007- 2010.

Army RDECOM via IST, *MR MOUT Revitalization*, (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*, (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*, (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*, (UCF PIs: **C. E. Hughes**, C. Fidopiastis, D. Hughes, D. Mapes, E. Smith), joint with Virtual Reality Medical Center, 2007-2008.

I4 High Tech Corridor, *Developing a Mixed Reality Rehabilitation System for Stroke Patients*, (PIs: **C. E. Hughes**, E. Smith), 2007-2008.

Army RDE Command, *Evaluating the Impact of Mixed Reality on Human Performance and Interaction with Adolescents and Young Adults*, (PIs: **C. E. Hughes**, E. Smith, C. Stapleton), 2007.

Department of Education, *SBIR Phase I: The Virtual STAR Classroom Simulator*, (UCF PIs: **E. Smith**, **C. E. Hughes**, L. Dieker, M. Hynes), subcontract from Simiosys LLC, 2006.

Army Research Institute, *ARI Virtual Environment Research Testbed*, (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*, (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*, (PIs: **C. E. Hughes**, B. Goldiez, S. Teicher), 2003-2005.

Office of Naval Research, *Research in Augmented and Virtual Environment Systems: Rendering*, (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*, (PIs: **C. B. Stapleton**, **C. E. Hughes**), 2003-2005.

Office of Naval Research, *Research in Augmented and Virtual Environment Systems: Battlefield Augmented Reality System*, (PIs: **B. Goldiez**, **C. E. Hughes**, C. B. Stapleton, K. Garfield), 2003-2005.

Army RDE Command, *The Enhancement of MOUT Training with Mixed Reality and Theme Park Technology*, (PIs: **C. Stapleton**, **C. E. Hughes**, J. M. Moshell), 2001-2005.

Association to Preserve Eatonville Community, *Carol Mundy Digital Archive Prototype Project*, (PIs: **C. E. Hughes**, J. M. Moshell), 2003-2004.

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

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

Canon Mixed Reality Labs, *MR Canon IAAPA*, (PIs: **C. Stapleton**, **C. E. Hughes**, J. M. Moshell), 2002.

Canon Mixed Reality Labs, *Mixed Reality Tests for Nickelodeon Studios*, (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*, (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*, (PIs: **C. E. Hughes**, J. M. Moshell, C. Stapleton, A. Cortes), 2002-2003.

Army STRICOM, *Tracking Systems for Multiplayer Mixed Reality*, (PIs: C. Stapleton, **C. E. Hughes**, J. M. Moshell, A. Cortes), 2002-2003.

Army STRICOM, *Virtual Object Rendering and Registration for Mixed Reality MOUT*, (PIs: J. M. Moshell, **C. E. Hughes**, C. Stapleton, S. Pattanaik, J. Malala), 2002-2003.

National Science Foundation, *Augmented Reality and Interactive Distributed Physical Modeling*, (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*, (PIs: J. M. Moshell, **C. E. Hughes**, A. Cortes, V. Sims, G. Schiavone), 2000-2002.

Orlando Science Center, *Measure Me - An Interactive Exhibit*, (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*, (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*, (PIs: T. Frederick, **C. E. Hughes**, R. Guha and A. Mukherjee), 1982.

National Science Foundation, *High School Microcomputer Science Education*, (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*, (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*, (PIs: C. E. Hughes, C. P. Pfleeger), NSF Grant #SED76-14494, 1976-1978.

Recent Internal or State of Florida Grants:

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). 9/1/2009-8/31/2013.

Matching to National Science Foundation, *Water's Journey through the Everglades*, (PIs: E. Smith, **C. E. Hughes**, L. Walters, K. Kitalong, M. Johnson). 5/15/2007-7/31/2012.

Florida Board of Governors, *Florida Biomedical Engineering Partnership*, (PI: Tony Waldrop;
Proposal Writers: L. Chow, **C. E. Hughes**, A. Kassab, V. Patel, Z. Qu). 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), 2011.

Current and Recent Professional Service:

Societies, Journals and Conferences

Entertainment Computing, Associate Editor, 2011-
IEEE VR 2013 Research Demos Committee, Co-Chair
IEEE VR 2012-2013 Program Committee, 2011-
HCII 2009-2013 Program Committee, 2008-
DMDCM 2010-2011 Program Committee, 2010-
Journal of Cybertherapy and Rehabilitation, Member of Editorial 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 IEEE CG&A, IEEE VR, International Journal of Human-Computer Studies, Entertainment Computing, Virtual Reality, Eurographics Symposium on Rendering, International Symposium on Mixed and Augmented reality, International Conference on Digital Media and Digital Content Management, Journal of Cybertherapy and Rehabilitation. Advances in Computer Entertainment Technology

NSF Review panels

Computer Research Infrastructure Panel (Human Centered Computing Cluster), November 2010
Creative IT Panel, January 2007, 2010

UCF Electrical Engineering and Computer Science

Computer Science Division Instructor Search Committee, 2012
Computer Science Division Executive Committee, 2011-
Computer Science Graduate Committee, 2003-2006, 2010-
Computer Science Promotion & Tenure, Chair, 2010-2011
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 College of Engineering and Computer Science

CECS Provost Professor Search Committee, Member 2013-
CECS Research Committee, Member, 2011-2013
In-House Research Committee, Chair, 2010, 2011, 2012
RIA Selection Committee, Chair, 2009-2011
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
TIP Awards Committee, Chair, 2006
Civil and Environmental Engineering Chair Search Committee, Chair, 2004-2005
Director of Development Search Committee, Member 2001
ABET Accreditation Committee, Member, 2000

UCF Institute for Simulation and Training

Research Professor Search Committee, Member, 2013-2014
Synthetic Reality Laboratory, Director 2010-
Media Convergence Laboratory, Chief Scientist, 2001-2010; Director, 2006-2010
Research Associate Search Committee, 2006-2007
M&S Graduate Program Faculty Member, 2004-
IST Contributing Faculty, 1982-

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

SVAD Promotion and Tenure Committee, Member, 2005-
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)

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:

2014 CECS Excellence in Research, UCF College of Engineering and Computer Science
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
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*
Senior Member, Institute of Electrical and Electronics Engineers (IEEE) & IEEE Computer Society
Senior Member, Association for Computing Machinery (ACM)
UCF Teaching Incentive Award, 2009, 2002, 1985
Pegasus Professor, 2007
Research Incentive Award, 2007, 1995 (under Professional Excellence Program Award)
Excellence in Undergraduate Teaching, UCF, 2001 (top university teaching award)
Excellence in Undergraduate Teaching, UCF College of Engineering and Computer Science, 2001