JOSEPH J. LAVIOLA JR.
Curriculum Vitae

University of Central Florida
School of Electrical Engineering and Computer Science
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RESEARCH INTERESTS

User interfaces, interactive 2D and 3D graphics, motion tracking and estimation, pattern recognition

EDUCATION

2005: **Ph.D.**, Computer Science, Brown University
Dissertation: "Mathematical Sketching: A New Approach to Creating and Exploring Dynamic Illustrations"
Advisor: Andries van Dam

2001: **Sc.M.**, Applied Mathematics, Brown University

2000: **Sc.M**., Computer Science, Brown University
Thesis: "Whole-Hand and Speech Input in Virtual Environments"

1996: **B.S**., Computer Science, Florida Atlantic University

PROFESSIONAL EXPERIENCE

2007-Present: Assistant Professor, University of Central Florida, Orlando, FL

2006-Present: Adjunct Assistant Professor of Computer Science (Research), Brown University, Providence, RI

2005-2006: Postdoctoral Research Associate, Brown University, Providence, RI

Continuing work in mathematical sketching as well as exploring how different orientation tracking algorithms work in augmented reality environments.

2000-Present: Consultant, JJL Interface Consultants, Inc., Providence, RI

Consulting services for user interface problems including web site design and development.
My consultancies include Nextron Medical Technologies, Physion, Inc., Bellissima Cosmetics and Rosebud LMS, Inc.

1998-2005: Research Assistant**,** Brown University Computer Graphics Lab, Providence, RI

Developed mathematical sketching, an approach to making dynamic illustrations through the combination of handwritten mathematics and free-form drawings and created a mathematical expression recognition system. Studied how different factors such as motion style, sampling rate, prediction time, and noise variance affected various prediction algorithms for human motion tracking in virtual environments. Explored how multimodal interfaces could be used in virtual environments as well as the general topic of

improving 3D interfaces in virtual environments. Assisted in the startup and development of the Brown University Technology Center for Advanced Scientific Computing and Visualization.

1999: Teaching Assistant, Brown University, CS-295-5, Interdisciplinary Scientific Visualization

Maintained course web page, prepared class notes, graded homework.

1997: Research Scientist, Fraunhofer Center for Research in Computer Graphics, Providence, RI

Developed demonstration applications for a table-based virtual environment display system utilizing 2D and 3D gesture-based interface techniques.

1996: Software Technician, UCS, Inc., Fort Lauderdale, FL

Performed software test automation and software quality assurance.

1995: Student Intern, IBM, Boca Raton FL

Maintained SQL database query system and performed website development tasks.

HONORS AND AWARDS

2004: Best Paper Presentation (Applied Estimation Session), 2004 American Control Conference

2000-2002, 2004: The van Dam Fellowship

1998: IBM Cooperative Fellowship

1996: FAU's Aaron Finerman Award

1996: FAU's Faculty Award for Outstanding Undergraduate Achievement

1995: Microsoft Senior Achievement Award

Also elected to Sigma Xi (1998), Phi Kappa Phi (1995), and Phi Eta Sigma (1993)

PUBLICATIONS

Book

Bowman, D., Kruijff, E., LaViola, J., and Poupyrev, I. *3D User Interfaces: Theory and Practice*, Addison Wesley, July 2004.

Journals and Periodicals

LaViola, J. "An Initial Evaluation of MathPad^2: A Tool for Creating Dynamic Mathematical Illustrations", To appear *Computers and Graphics*.

LaViola, J., and Zeleznik, R. "A Practical Approach to Writer-Dependent Symbol Recognition Using a Writer-Independent Recognizer", To appear *IEEE Transactions on Pattern Analysis and Machine Intelligence*.

Julier, S., and LaViola, J. "On Kalman Filtering with Nonlinear Equality Constraints", *IEEE Transactions on Signal Processing*, 55(6):2774-2784, June 2007.

LaViola, J. “Advances in Mathematical Sketching: Moving Toward the Paradigm’s Full Potential”, *IEEE Computer Graphics and Applications*, 27(1):38-48, January/February 2007.

Katzourin, M., Ignatoff, D., Quirk, L., LaViola, J., and Jenkins, O. “SwordPlay: Innovating Game Development through VR”, *IEEE Computer Graphics and Applications*, 26(6):15-19, November/December 2006.

LaViola, J. and Zeleznik, R. “MathPad^2: A System for the Creation and Exploration of Mathematical Sketches”, *ACM Transactions on Graphics (Proceedings of SIGGRAPH 2004)*, 23(3):432-440, August 2004.

Bowman, D., Kruijff, E., LaViola, J., and Poupyrev, I. “An Introduction to 3-D User Interface Design”, *PRESENCE: Teleoperators and Virtual Environments*, 10(1):96-108, February 2001.

Van Dam, A., Forsberg, A. Laidlaw, D., LaViola, J., and Simpson, R. “Immersive VR for Scientific Visualization: A Progress Report”, *IEEE Computer Graphics and Applications*, 20(6):26-52, November/December 2000.

LaViola, J. “A Discussion of Cybersickness in Virtual Environments”, *SIGCHI Bulletin* 32(1):47-56, January 2000.

Forsberg, A., LaViola, J., Markosian, L., and Zeleznik, R. “Seamless Interaction in Virtual Reality”, *IEEE Computer Graphics and Applications*, 17(6):6-9, November/December 1997.

Refereed Conferences and Workshops

Lemmerman, D. and LaViola J. “An Exploration of Interaction-Display Offset in Surround Screen Virtual Environments”, *Proceedings of the IEEE Symposium on 3D User Interfaces 2007*, 9-15, March 2007.

LaViola, J. and Katzourin, M. “An Exploration of Non-Isomorphic 3D Rotation in Surround Screen Virtual Environments”, *Proceedings of the IEEE Symposium on 3D User Interfaces 2007*, 49-54, March 2007.

Lemmerman, D. and LaViola J. “Effects of Interaction-Display Offset on User Performance in Surround Screen Virtual Environments”, *Proceedings of IEEE Virtual Reality 2007*, 303-304, March 2007.

LaViola, J. “An Initial Evaluation of a Pen-Based Tool for Creating Dynamic Mathematical Illustrations”, Proceedings of the *Eurographics Workshop on Sketch-Based Interfaces and Modeling 2006*, 157-164, September 2006.

Julier, S. and LaViola, J. “An Empirical Study into the Robustness of Split Covariance Addition (SCA) for Human Motion Tracking”, *Proceedings of the 2004 American Control Conference, IEEE Press*, 2190-2195, June 2004.

LaViola, J., Keefe, D., Acevedo, D., and Zeleznik, R. “Case Studies in Building Custom Input Devices for Virtual Environment Interaction”, Proceedings of the *IEEE VR 2004 Workshop on Beyond Wand and Glove-Based Interaction*, 67-71, March 2004.

LaViola, J. “A Comparison of Unscented and Extended Kalman Filtering for Estimating Quaternion Motion”, *Proceedings of the 2003 American Control Conference*, IEEE Press, 2435-2440, June 2003.

LaViola, J. “A Testbed for Studying and Choosing Predictive Tracking Algorithms in Virtual Environments”, *Proceedings of Immersive Projection Technology and Virtual Environments 2003*, ACM Press, 189-198, May 2003.

LaViola, J. “Double Exponential Smoothing: An Alternative to Kalman Filter-Based Predictive Tracking”, *Proceedings of Immersive Projection Technology and Virtual Environments 2003*, ACM Press, 199-206, May 2003.

LaViola, J. “An Experiment Comparing Double Exponential Smoothing and Kalman Filter-Based Predictive Tracking Algorithms”, *Proceedings of IEEE Virtual Reality 2003*, 283-284, March 2003.

Zeleznik, R., LaViola, J., Acevedo, D., and Keefe, D. “Pop Through Button Devices for VE Navigation and Interaction”, *Proceedings of IEEE Virtual Reality 2002*, 127-134, March 2002.

LaViola, J., Zeleznik, R., Acevedo, D., and Keefe, D. “Hands-Free Multi-Scale Navigation in Virtual Environments”, *Proceedings of the 2001 Symposium on Interactive 3D Graphics*, 9-15, March 2001.

Keefe, D., Acevedo, D., Moscovich, T., Laidlaw, D., and LaViola, J. “CavePainting: A Fully Immersive 3D Artistic Medium and Interactive Experience”, *Proceedings of the 2001 Symposium on Interactive 3D Graphics*, 85-93, March 2001.

LaViola, J. “MSVT: A Virtual Reality-Based Multimodal Scientific Visualization Tool”, *Proceedings of the Third IASTED International Conference on Computer Graphics and Imaging*, 1-7, November 2000.

LaViola, J. and Zeleznik, R. “Flex and Pinch: A Case Study of Whole Hand Input Design for Virtual Environment Interaction”, *Proceedings of the Second IASTED International Conference on Computer Graphics and Imaging*, 221-225, October 1999.

LaViola, J. “A Multimodal Interface Framework For Using Hand Gestures and Speech in Virtual Environment Applications”, *Lecture Notes in Artificial Intelligence #1739, Gesture-Based Communication in Human-Computer Interaction*, 303-314, March 1999.

LaViola, J., Holden, L., Forsberg, A., Bhuphaibool, D., and Zeleznik, R. “Collaborative Conceptual Modeling Using the SKETCH Framework”, *Proceedings of the First IASTED International Conference on Computer Graphics and Imaging*, 154-158, June 1998.

Forsberg, A., LaViola, J., and Zeleznik, R. “ErgoDesk: A Framework for Two- and Three-Dimensional Interaction at the ActiveDesk”, *Proceedings of the Second International Immersive Projection Technology Workshop*, Ames, Iowa, May 11-12, 1998.

LaViola, J., Barton, R., Goettsch, A., and Cross, R. “A Real-Time Distributed Virtual Environment for Collaborative Engineering”, *Proceedings of Computer Applications in Production and Engineering* (CAPE), 712-726, November 1997.

Courses and Tutorials

LaViola, J. Igarashi, I., Alvarado, C., and Lipson, H. “Sketch-Based Interfaces: Techniques and Applications”, Course #3, Presented at ACM SIGGRAPH 2007, San Diego, California, August 2007.

LaViola, J., Davis, R., and Igarashi, I. “An Introduction to Sketch-Based Interfaces”, Course #18, Presented at ACM SIGGRAPH 2006, Boston, Massachusetts, July 2006.

Bowman, D., LaViola, J., Mine, M., and Poupyrev, I. “Advanced Topics in 3D User Interface Design”, Course #44, Presented at ACM SIGGRAPH 2001, Los Angeles, California, August, 2001.

Bowman, D., Kruijff, E., LaViola, J., Mine, M., and Poupyrev, I. “3D User Interface Design: Fundamental Techniques, Theory, and Practice”, Course #36, Presented at ACM SIGGRAPH 2000, New Orleans, Louisiana, July, 2000.

Bowman, D., Kruijff, E., LaViola, J., and Poupyrev, I. “The Art and Science of 3D Interaction”, Full-day tutorial presented at IEEE Virtual Reality 2000, New Brunswick, New Jersey, March, 2000.

Bowman, D. Kruijff, E., LaViola, J., Mine, M., and Poupyrev, I. “The Art and Science of 3D Interaction”, Full-day tutorial presented at the ACM Symposium on Virtual Reality Software and Technology, London, England, December 1999.

Bowman, D., Kruijff, E., LaViola, J., and Poupyrev, I. “The Art and Science of 3D Interaction”, Full-day tutorial presented at IEEE Virtual Reality '99, Houston, Texas, March, 1999.

Other Publications

Reiter, J., Kirby, R. M., and LaViola, J. “Immersive Hierarchical Visualization and Steering for Spectral/hp Element Methods”, Technical Report CS-01-03, Brown University, Department of Computer Science, Providence RI, May, 2001.

LaViola, J. “A Survey of Hand Posture and Gesture Recognition Techniques and Technology”, Technical Report CS-99-11, Brown University, Department of Computer Science, Providence RI, June, 1999.

Pickering, J., Bhuphaibool, D., LaViola, J., and Pollard, N. “The Coach’s Playbook”, Technical Report CS-99-08, Brown University, Department of Computer Science, Providence RI, May, 1999.

Forsberg, A., LaViola, J., and Zeleznik, R. “Incorporating Speech Input into Gesture-Based Graphics Applications at The Brown University Graphics Lab”, CHI'99 Workshop on Designing the User Interface for Pen and Speech Multimedia Applications, May 1999.

LaViola, J., Forsberg, A., and Zeleznik, R. “Jot: A Framework for Interface Research”, IBM’s interVisions Online Magazine, Issue #11, February, 1998.

LaViola, J. “Analysis of Mouse Movement Time Based on Varying Control to Display Ratios Using Fitts’ Law”, Technical Report CS-97-17, Brown University, Department of Computer Science, Providence RI, October 1997.

LaViola, J. “Experiment in VM Reduction, Conversion of Site Operating Procedures to the World Wide Web”, IBM Technical Report, TR54.922, December 29, 1995.

RESEARCH CONTACTS AND GRANTS

“Sketching Mathematical Algorithms”, Co-PI (Andries van Dam, PI), Disruptive Technology Office A-SpaceX Award N61339-06-C-0186, 400K, Sept. 2006 – Sept. 2007.

“Adaptive Real-Time Learning for Mathematical Expression Recognition in Mathematical Sketching”, Co-PI (Donald P. Carney, PI), NSF STTR Phase I Award OII-0611012, $132K, July 2006 – June 2007.

TEACHING AND ADVISING

COP3502H: Honors Computer Science I (Spring 2007)

CS193-33: Independent Study with Michael Katzourin, taught at Brown University (Fall 2006)

INVITED TALKS

"Mathematics, Physics, and Chemistry: Tablet PC Research and Education at Brown University"

- Pace University, NY, NY (April 2006)

"Mathematical Sketching: A New Approach for Creating and Exploring Dynamic Illustrations"

- Aptima, Woburn, MA (September 2005)
- Wolfram Research, Champaign, IL (May 2005)
- Microsoft Research, Seattle, WA (February 2005)
- IBM Thomas J. Watson Research Center, Hawthorne, NY (December 2004)

SERVICE TO THE PROFESSION

Panels Chair: IEEE Virtual Reality 2006

Publications Chair: IEEE Virtual Reality 2007

Program Committees: 2nd International Symposium on Visual Computing (2006), 2nd IEEE Symposium on 3D User Interfaces (2007), IEEE Virtual Reality 2007, 4th Eurographics Workshop on Sketch-Based Interfaces and Modeling (2007), 6th IEEE International Symposium on Mixed and Augmented Reality (2007)

Journal Reviewer: *Pattern Recognition* (2007), *IEEE Transactions on Pattern Analysis and Machine Intelligence* (2007), Computer Animation & Virtual Worlds (2006), *IEEE Transactions on Visualization and Computer Graphics* (2005,2006), *IEEE Transactions on Robotics* (2005), *Virtual Reality* (2005), *Pattern Recognition Letters* (2005), *IEEE Computer Graphics and Applications* (2002-2003, 2005-2006), *Computers and Graphics* (2001,2006)

External Conference Reviewer: ACM SIGGRAPH Sketches and Poster's Juror (2007), ACM Virtual Reality Software and Technology (2005), Graphics Interface (2005,2007), IEEE Virtual Reality (2005), ACM CHI (2005-2006), IEEE Visualization (2004), ACM SIGGRAPH (2004), 12th IEEE Mediterranean Conference on Control and Automation (2004), Second IEEE and ACM International Symposium on Mixed and Augmented Reality (2003), ACM User Interface Software and Technology (2003, 2005,2006), ACM Symposium on Interactive 3D Graphics (2003), Eurographics Workshop on Virtual Environments (2002,2004,2007), ACM SIGGRAPH courses (1999)

EXTRACURRICULAR ACTIVITIES

Manager and Player of Computer Science Department intramural football and softball teams (1998-2006), Assistant Varsity Baseball Coach at Olympic Heights High School, Boca Raton, FL (1993-1994), Assistant Baseball Coach at American Legion Post 164, Boynton Beach, FL (1993). Hobbies include sports, computer games, and film

REFRENCES

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