

# Eric Patterson, Ph.D.

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## CURRENT RESEARCH INTERESTS

Aspects of analyzing and modeling the human face in images and three-dimensions, expression and emotion recognition and processing, audio-visual speech recognition, computer graphics and animation, digital film-making, and other computer arts.

## EDUCATION

Clemson University, Clemson, SC

Ph.D., Computer Engineering, GPA: 3.86, 2002

B.S., Computer Engineering, Summa Cum Laude, GPA: 3.97, 1995

Minors: Spanish Language, Mathematical Sciences

## PROFESSIONAL EXPERIENCE

**Associate Professor (previously Assistant Professor 2002-2007)**

**2008-Present**

**Department of Computer Science, University of North Carolina Wilmington**

Digital Arts Coordinator, Computer Science Technology Committee Chair, Computer Science Curriculum Committee, Film Studies Advisory Committee, Film Studies Equipment Committee, Search Committees, International Programs Advisory Committee, University of North Carolina Nonpublic Post-Secondary Educational Institution License Team

Courses Offered: CSC 577: Pattern Recognition, CSC/FST 430: Digital Special Effects, CSC 421: 3D Computer Gaming, ART/CSC/FST 320: Computer Animation, ART/CSC/FST 220: Introduction to 3D Computer Graphics, FST 201: Introduction to Film Production, CSC 275: iPhone Development, CSC 370: Computer Graphics Programming, CSC 112: Introduction to Programming (C++, Python), CSC 121: Introduction to Computer Science, CSC 133: Discrete Mathematical Structures, CSC 495: Seminar in Computer Science, CSC 385: Issues and Ethics in Computer Science.

**Sony Pictures Imageworks, Culver City, CA**

**2011**

**Faculty Fellowship**

Visited during the summer as a faculty fellow through the IPAX program. Completed in-house training in lighting/compositing, Katana, and a survey of other areas including modeling, rigging, and animation. Worked on training shots for *Arthur Christmas* and *The Smurfs*. Attended production and crewing meetings, dailies, and technical presentations. Collaborated with a variety of SPI staff in various divisions regarding production workflow, FX techniques, and particularly face and performance capture, modeling, and rigging.

**Research Assistant and Graduate Teacher of Record**

**1995-2002**

**Electrical and Computer Engineering Department, Clemson University**

Research Assistant in the Digital Speech Processing Lab, Fluor-Daniel Engineering Innovation Building

Courses Offered: ECE 201: Digital Logic, ENGR 120: Introduction to Engineering, ECE 371 Lab: Micro-interfacing, ECE 201 Lab: Digital Logic

**Instructor in Talent Identification Program, Duke University, NC**

**1998**

Summer Instructor for course in Java programming designed for advanced students.

**Consulting**

Development consulting for multi-platform video effects software for Digieffects, Wilmington, NC.

**2009**

Network design consulting for AT&T GIS production plant, Liberty, SC.

**1995**

**Media Production**

**1991-Present**

Photographer, editor, director, and content producer for various film, video, digital, and still-image projects.

**Spanish Translator and Migrant Caseworker****1995**

Translated &amp; performed client interviews and assessments, Beaufort County Department of Social Services, SC.

**Sales Associate and Programmer, Customware Computer Center****1994**

Sold, installed, and repaired network, business, and home computer products; staff programmer, Beaufort, SC.

**PUBLICATIONS**

Yang, W., Sethuram, A., Patterson, E., Ricanek, K., and Sun, C., "Gender Classification Using the Profile," Proceedings of the 8th International Symposium on Neural Networks, China, May, 2011.

Gaweda, A. and Patterson, E., "Individual Identification Based on Facial Dynamics During Expressions Using Active-Appearance-Based Hidden Markov Models," International Workshop on Emotion Synthesis, rePresentation, and Analysis in Continuous spaces, Proceedings of IEEE FG 2011, Santa Barbara, March, 2011.

Patterson, E., "Toward Accurate Synthetic Age Progression of Three-Dimensional Face Models for Adult Aging Representation," IASTED International Conference on Computational Intelligence, Maui, Hawaii, August, 2010.

Patterson, E. and Gaweda, A., "Toward Using Dynamics of Facial Expressions and Gestures for Person Identification," IASTED International Conference on Computational Intelligence, Maui, Hawaii, August, 2010.

Sethuram, A., Patterson, E., and Ricanek, K., "A Hierarchical Approach to Facial Aging," Proceedings of the IEEE Computer Society Workshop on AMFG in assoc. with CVPR, 2010.

Patterson, E., Sethuram, A., Ricanek, K., and Bingham, F., "Improvements in Active Appearance Model Based Synthetic Age Progression for Adult Aging," Proceedings of the IEEE Conference on Biometrics: Theory, Applications, Applications, and Systems, Washington, DC, September, 2009.

Sethuram, A., Patterson, E., and Ricanek, K., "The Aging Face: Developments in AAM-based Synthetic Age Progression," 13th International Conference on Computer Analysis of Images and Patterns, Munster, Germany, September, 2009.

Sethuram, A., Patterson, E., and Ricanek, K., "Improvements and Performance Evaluation Concerning Synthetic Age Progression and Face Recognition Affected by Adult Aging," Proceedings of the 3rd IAPR International Conference on Biometrics, Sardinia, Italy, June, 2009.

Ricanek, K., Patterson, E., and Albert, M., "Craniofacial Aging," chapter in Wiley Handbook of Science and Technology for Homeland Defense, March 2009.

Ratliff, M. and Patterson, E., "Emotion Recognition Using Facial Expressions with Active Appearance Models," Proceedings of the IASTED International Conference on Human-Computer Interface, Innsbruck, Austria, 2008.

Patterson, E., Sethuram, A., Albert, M., and Ricanek, K., "Aspects of Face Aging Concerning Biometrics," IEEE Conference on Biometrics: Theory, Applications, and Systems, Baltimore, September, 2007.

Patterson, E., Sethuram, A., Albert, M., and Ricanek, K., "Comparison of Synthetic Age Progression to Forensic Sketch Artist," Transactions of the IASTED International Conference on Visualization, Imaging, and Image Processing, Palma de Mallorca, Spain, August, 2007.

Ricanek, K., Wilkins, R., Sethuram, A., and Patterson, E., "A Novel Cognitive-Psychology-Based Face-Recognition System for Improved Identification Rates for the Problem of Age-Progressions," Proceedings of the IASTED International Conference on Visualization, Imaging, and Image Processing, Spain, 2007.

Albert, M., Ricanek, K., and Patterson, E., "A Review of the Literature on the Aging Adult Skull and Face: Implications for Forensic Science Research and Applications," Forensic Science International, October, 2007.

Tufekci, Z., Gowdy, J., Grubuz, S., and Patterson, E., "Applied Mel-Frequency Discrete Wavelet Coefficients and Parallel Model Compensation for Noise-Robust Speech Recognition," *Speech Communication*, Elsevier, October, 2006.

Patterson, E., Ricanek, K., Albert, M., and Boone, E., "Automatic Representation of Adult Aging in Facial Images," *IASTED International Conference on Visualization, Imaging, and Image Processing*, Palma de Mallorca, Spain, August, 2006.

Patterson, E. and Gowdy, J., "An Audio-Visual Approach to Simultaneous-Speaker Speech Recognition," *IEEE International Conference on Acoustics, Speech, and Signal Processing*, Hong Kong, April, 2003.

Gowdy, J., Patterson, E., Wu., D. and Niska, A., "Development and Use of Simulation Models for Teaching a Distance-Learning Course on Digital Processing of Speech Signals," *e-Technologies in Engineering Education Conference*, Switzerland, August, 2002.

Patterson, E., Gurbuz, S., Tufekci, Z., and Gowdy, J., "Moving-Talker, Speaker-Independent Feature Study and Baseline Results Using the CUAVE Multimodal Speech Corpus," *EURASIP Journal on Applied Signal Processing*, December, 2002.

Patterson, E. and Gowdy, J., "Experiments Using the CUAVE Audio-Visual Speech Corpus in Rotation and Scale Correction of Visual Speech Features," *DARPA Workshop on Multi-Modal Speech Recognition*, Greensboro, NC, June, 2002.

Patterson, E., Gurbuz, S., Tufekci, Z., and Gowdy, J., "CUAVE: A New Audio-Visual Database for Multimodal Human-Computer Interface Research," *International Conference on Acoustics, Speech, and Signal Processing*, Orlando, May, 2002.

Gurbuz, S., Patterson, E., Tufekci, Z. and Gowdy, J., "Lip-reading from Parametric Lip Contours for Audio-Visual Speech Recognition," *Eurospeech*, Aalborg, Denmark, 2001.

Tufekci, Z., Gowdy, J., Gurbuz, S., and Patterson, E., "Applying Parallel Model Combination with Mel-Scaled Discrete Wavelet Coefficients for Noise-Robust Speech Recognition," *Eurospeech*, Aalborg, Denmark, 2001.

Gurbuz, S., Patterson, E., Tufekci, Z., and Gowdy, J., "Affine-Invariant Visual Features Contain Supplementary Information to Enhance Speech Recognition," *International Conference on Audio-and-Visual-Based Biometric Person Authentication*, Sweden, 2001.

Patterson, E., Gurbuz, S., Tufekci, Z., and Gowdy, J., "Noise-Based Audio-Visual Fusion for Robust Speech Recognition," *International Conference on Auditory-Visual Speech Processing*, Scheelsminde, Denmark, September, 2001.

Gurbuz, S., Tufekci, Z., Patterson, E., and Gowdy, J., "Application of Affine-Invariant Fourier Descriptors to Lipreading for Audio-Visual Speech Recognition," *IEEE International Conference on Acoustics, Speech, and Signal Processing*, Salt Lake City, May 2001.

Patterson, E. and Gowdy, J., "Modeling Speech-Interfering Noise with Applied Chaos Theory," *IEEE Southeastern Conference*, March, 2001.

Patterson, E., Gowdy, J., and Wu., D., "Multi-Platform CBI Tools Using Linux and Java-Based Solutions for Distance Learning," *International Conference on Acoustics, Speech, and Signal Processing*, Seattle, May, 1998.

## FUNDED PROJECTS

*Exploration of 3-D Craniofacial and Ocular Micro-Features for Robust 2-D Biometric Signals Against Aging and Pose Variation*, Intelligence Advanced Research Project Activity, \$2,878,521, 2009-2011.

*3D Synthesis of Facial Changes with Weight in Maya*, with Ricanek, K., Department of Defense, \$50,000, 2009.

*Center for Academic Studies in Identity Sciences*, with Ricanek, K. (director) and Albert, M. (UNCW portion \$334,930), also with Dozier, G. (NC A&T), Woodard, D. (Clemson), and Savvides, M. (CMU), Central Intelligence Agency, 2007-2009.

*Age-Related Morphological Changes: Effects on Facial Recognition Technologies*, with Ricanek, K. and Albert, M., Department of Defense, \$800,000, 2003-2007.

*Digital Special Effects for Teaching and Research*, with Monahan, D., UNCW Information Technology Services Division Innovations Grant, \$3,600, 2006.

*3-D Digitizer Arm for Teaching and Research*, with Burgh, T., UNCW Information Technology Services Division Innovations Grant, \$4,000, 2006.

*Audio-Visual Speech Recognition Using Stereovision Techniques*, Charles L. Cahill Award, \$2,500, 2003.

*Audio-Visual Speech Recognition Using Stereovision Techniques*, UNCW Summer Research Initiative, \$3,000, 2003.

*Speech Recognition in Difficult Environments*, NASA GSRP Fellowship, \$66,000, 1999-2001.

## CREATIVE WORK

*Madeline Makes a Man*, RED One, short film, assistant director, camera assistant, in post-production, 2010.

*Static*, RED One, short film, camera operator & assistant, various film festivals, 2009.

*Wine-Tasting*, HD, short film, assistant director, various national film festivals, 2009.

*Two Hours in the Dark*, Super-16mm short film, production stills, various national film festivals, 2009.

*Snapshot*, Super-16mm short film, sound recordist, special effects, photography, production stills, various national film festivals 2005.

*Sourdough*, animated short film, sound and editing, 2nd Place Animation, Flicks on 66 Film Festival, 2003.

*Fluffy Takes a Walk*, animated short film, modeling and animation, Cucalorus Film Festival, 2003.

*Coffee-Talk*, HD short film, writer, director, director of photography, editor, in post-production.

*Next-Train*, animated short film, co-writer, director, in production.

## PROFESSIONAL MEMBERSHIPS

Institute of Electrical and Electronics Engineers, IEEE Computer Society, IEEE Signal Processing Society

Association for Computing Machinery, ACM SIGGRAPH, ACM SIGCHI

CG Society

University Film and Video Association

## AWARDS

2009 James F. Merritt Million-Dollar Club for aiding in bringing in over one million dollars in research funding.

2004-2009 Named each semester by graduating seniors as Faculty Member with Significant Impact on Undergraduate Years at UNCW

2009 International Conference on Biometrics: Theory, Applications, and Systems: Best Poster Presentation.

2000 Clemson University College of Engineering Outstanding Graduate Instructor

1999 Harris Outstanding Laboratory Instructor

Other honors and memberships: Tau Beta Pi, Mortar Board, Phi Kappa Phi, S.R. Rhodes ECE Senior Award, Phi Kappa Phi Outstanding Senior Award, Stanford Fellow, NASA GSRP Fellow, Brown University Writing Award.

## **LANGUAGES**

Fluent in English and Spanish. Basic reading comprehension in French.

## **COMPUTER EXPERIENCE**

MacOS, Unix, Linux, Windows, System Administration, C, C++, Objective-C, Python, MEL, Java, Processing, Arduino, LISP, Prolog, Modula-2, Fortran, HTML/CSS, Javascript, VRML, PVM, OpenGL, Matlab, HTK, Verilog HDL, TCP/IP, Maya, Zbrush, Nuke, Katana, Shake, Final Cut Pro, After Effects, Photoshop, various other post-production software for editing, compositing, and match-moving, etc. for film and video, MIDI sequencing, audio-recording and design, and more.

## **FILM, VIDEO, AND PHOTOGRAPHY EQUIPMENT EXPERIENCE**

Various motion-picture film cameras and related accessories, film loading and handling, various grip and lighting equipment, various digital cinema and video cameras including RED and a variety of HD and DV cameras, various still cameras including small, medium, and large-format film cameras and lenses, darkroom and processing experience, digital stills cameras of several formats, and digital processing and workflow.

## **OTHER SKILLS AND INTERESTS**

Sailing, SCUBA diving, piano, guitar, kung fu, karate, yoga, running, snowboarding, skiing, mountain biking, soccer, drawing, painting, auto-cross, and auto restoration.