

Larry D. Pyeatt, PhD

Curriculum Vitae

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Levelland, Texas 79336
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Education

Doctor of Philosophy in Computer Science

Colorado State University, 1999

Dissertation: *Integration of Partially Observable Markov Decision Processes and Reinforcement Learning for Simulated Robot Navigation*

Committee: Adele Howe (Chair), Charles Anderson, Darrell Whitley, Wade Troxell

Master of Science in Computer Science

Texas Tech University, 1991

Thesis: *Application of the Neural Ring Pattern Classifier to Speech Recognition*

Committee: W. J. Bryan Oldham (Chair), Thomas M. English, Donald Gustafson

Bachelor of Science in Computer Science

Texas Tech University, 1988

Minor in Psychology with additional course work in Mathematics and Electrical Engineering

Research Interests

Robotics, Partially Observable Markov Decision Processes, Reinforcement Learning, Function Approximation, Bioinformatics, Agent Architectures, Real-time and Embedded Systems, Computer Forensic Analysis

Honors and Awards

Academic

Upsilon Pi Epsilon (computer science honor society), Texas Tech University, 1989

Third Place Team, ACM International Programming Competition, Louisville, Kentucky, 1989

Engineering Academic Scholarship, Texas Tech University, 1983

Texaco

Patent Letter, August 30, 1995

Patent Application Award, July 19, 1993

Exploration & Production Technology Department Award for Outstanding Supplier, February 23, 1993

Individual Outstanding Contribution (IOC) Award for Innovation, August 5, 1992

Professional Experience

Associate Professor Texas Tech University, Lubbock, 1/2006–present. Research in Robotics, Partially Observable Markov Decision Processes, and Reinforcement Learning. Teach several graduate and undergraduate courses, in areas of Robotics, AI, Computer Forensics, and core Computer Science curriculum. Direct research work of MS and PhD students.

Associate Department Chair Texas Tech University at Abilene, 8/2007 – 8/2010. All duties of Associate professor, plus manage the Computer Science department at Abilene. Developed strategic plan to increase enrollment of graduate students, improve Faculty recruitment and retention, and increase research productivity and external funding.

Visiting Associate Professor University of Missouri, Rolla, 1/2005–12/2005. Taught graduate course in Markov Decision Processes and graduate course in Reinforcement Learning. Conducted research on two research projects in collaboration with Donald Wunsch. The projects involved optimal routing in disruption tolerant networks and threat detection and evaluation using smart sensors. We wrote our own event-driven simulator for these projects, so they have taken some time to come into fruition.

Assistant Professor Texas Tech University, Lubbock, 9/99–12/2004. As graduate advisor, led efforts to restructure and improve the graduate programs. Those efforts resulted in growth in enrollment of the MS and PhD programs, while also improving the quality of the students, both incoming and graduating. Performed research in Robotics, Partially Observable Markov Decision Processes, and Reinforcement Learning. Taught graduate and undergraduate courses including courses in digital logic, operating systems, reinforcement learning, and artificial intelligence. Directed research work of MS and PhD students.

Lecturer Colorado State University, Fort Collins, 9/98–9/99. Taught courses in digital logic and assembly language, operating systems, and programming languages.

Graduate Research Assistant Colorado State University, Fort Collins, multiple appointments, 9/93–9/98. Research in areas of partially observable Markov decision processes, robotics, neural networks and reinforcement learning, finding structure in discrete event sequences, geographical information systems (GIS), and genetic algorithms.

Senior Information Systems Programmer Texaco Inc., Houston 9/91–9/93. Applied Artificial Intelligence techniques to Texaco business needs.

Graduate Research Assistant Texas Tech University, Lubbock, 8/88–9/91. Research in neural networks and speech recognition.

Embedded Control Systems Engineer Applied Hydraulics, Lubbock, Texas, 1/87–7/88. Designed and built microprocessor and sequential logic based systems for industrial control and data acquisition.

Refereed Journal Articles Brett L. Moore, Anthony G. Doufas, and Larry D. Pyeatt. Reinforcement learning: A novel method for optimal control in challenging clinical domains. *Anesthesia and Analgesia*, February 2011.

Larry D. Pyeatt and Adele E. Howe. Evaluating robustness in a two layer simulated robot architecture. *Journal of Experimental and Theoretical Artificial Intelligence: Special Issue on Autonomy Control Software*, 12(2):213–234, 2000.

Refereed Conference Papers Arisoa Randrianasolo and Larry D. Pyeatt. An artificial immune system based on Holland’s classifier as network intrusion detection. In *Proceedings of the 4th International Conference on Agents and Artificial Intelligence (ICAART)*, Valamoura, Algarve, Portugal, February 2012. Institute for Systems and Technologies of Information, Control and Communication (INSTICC).

Arisoa Randrianasolo and Larry D. Pyeatt. Using local regression in Monte Carlo search tree. In *Proceedings of the 4th International Conference on Agents and Artificial Intelligence (ICAART)*, Valamoura, Algarve, Portugal, February 2012. Institute for Systems and Technologies of Information, Control and Communication (INSTICC).

Eddy C. Borera and Larry D. Pyeatt. Offline policy optimization: Using online Monte Carlo simulation-based techniques to deal with changes in dynamic environments. In *Proceedings on the IEEE International Conference on Intelligent Computing and Intelligent Systems (ICIS)*, Guangzhou, China, November 18–20 2011.

Eddy C. Borera, Brett L. Moore, Anthony G. Doufas, and Larry D. Pyeatt. An adaptive neural network filter for improved patient state estimation in closed-loop anesthesia control. In *Proceedings of the IEEE International Conference on Tools with Artificial Intelligence (ICTAI)*, Boca Raton, Florida, USA, November 7–9 2011.

Arisoa Randrianasolo and Larry D. Pyeatt. Applying context-based prediction in adversarial Watkins’ $Q(\lambda)$ learning. In *Proceedings of the 2011 International Conference on Artificial Intelligence, ICAI 2011*, Las Vegas, Nevada, July 2011. CSREA Press.

Shubham Shukla and Larry D. Pyeatt. A guided learning algorithm for solving traveling salesman problem. In *Proceedings of the 2011 International Conference on Artificial Intelligence, ICAI 2011*, Las Vegas, Nevada, July 2011. CSREA Press.

Eddy C. Borera, Mahdi Naser-Moghadasi, Arisoa S. Randrianasolo, and Larry D. Pyeatt. POMDP filter: Pruning POMDP value functions with the Kaczmarz iterative method. In *Proceedings of the 9th Mexican International Conference on Artificial Intelligence (MICAI)*, pages 254–265, Pachuca, Mexico, November 2010. Springer.

Brett L. Moore, Periklis Panousis, Vivek Kulkarni, Larry D. Pyeatt, and Anthony G. Doufas. Reinforcement learning for closed-loop propofol anesthesia: A human volunteer study. In *Proceedings of the 22nd IAAI Conference*, Atlanta, GA, July 2010. AAAI Press.

Brett L. Moore, Larry D. Pyeatt, and Anthony G. Doufas. Fuzzy control for closed-loop, patient-specific hypnosis in intraoperative patients: a simulation study. In *Proceedings of the International Society of Anaesthetic Pharmacology Conference*, New Orleans, LA, October 2009.

Brett L. Moore, Larry D. Pyeatt, and Anthony G. Doufas. Fuzzy control for closed-loop, patient-specific hypnosis in intraoperative patients: A simulation study. In *Proceedings of the IEEE Engineering in Medicine and Biology Society Conference*, Minneapolis, Minnesota, USA, September 2009. IEEE.

Tae-Hyung Kim, Larry D. Pyeatt, and Donald C. Wunsch II. Reconfigurable disruption tolerant routing via reinforcement learning. In *Proceedings of the International Joint Conference on Neural Networks (IJCNN)*, Atlanta, GA, June 14–19, 2009. IEEE.

Tae hyung Kim, Larry D. Pyeatt, and Donald C. Wunsch II. Performance comparison of Z-learning to Q-learning for reconfigurable disruption tolerant routing. In *Proceedings of the Eleventh International Conference on Cognitive and Neural Systems (ICCNs)*, Boston University, Boston, MA, May 2007.

Michael Helm, Daniel Cooke, Nelson Rushton, Larry Pyeatt, and Klaus Becker. Reinforcement learning agents applied to a class of control system problems. In *Proceedings of the IEEE Region 5 Technical, Professional, and Student Conference*, San Antonio, Texas, April 2006. IEEE.

Brett Moore, Todd Quasny, Eric Sinzinger, and Larry Pyeatt. An intelligent agent for closed-loop sedation of simulated ICU patients. In *Proceedings of the 17th International Florida AI Research Society Conference (FLAIRS)*, pages 109–113, Miami Beach, Florida, May 2004. Winner of best paper award.

Todd M. Quasny and Larry D. Pyeatt. Reinforcement learning in the control of a simulated life support system. In *Proceedings of the International Conference on Environmental Systems (ICES)*, pages 1–7, Colorado Springs, CO, July 2004. Society of Automotive Engineers. The proceedings were produced on CD-ROM and papers were not assigned individual page numbers.

Chengcheng Li and Larry D. Pyeatt. U.S. vehicle license plate localization. In *Proceedings of the International Conference on Computing, Communications and Control Technologies*, volume VII, pages 314–319, Austin, Texas, August 2004. University of Texas at Austin and the International Institute of Informatics and Systemics (IIS).

Chengcheng Li and Larry D. Pyeatt. Preprocesses of U.S. vehicle license plate” recognition. In *Proceedings of The 6th IASTED International Conference on Signal and Image Processing*, pages 89–94, Honolulu, Hawaii, August 2004. International Association of Science and Technology for Development (IASTED).

Chengcheng Li and Larry D. Pyeatt. Automatic U.S. vehicle license plate extraction and license number splitting under various illumination conditions. In *Proceedings of the International Conference on Computing, Communications and Control Technologies*, volume II, pages 143–148, 2004.

Chengcheng Li and Larry D. Pyeatt. A short tutorial on reinforcement learning: Review and applications. In *Proceedings of the International Conference on Intelligent Information Process*, page not yet available, Beijing, China, October 2004.

Larry D. Pyeatt. Reinforcement learning with decision trees. In *Proceedings of the IASTED International Conference on Applied Informatics (AI 2003)*, pages 26–31, Innsbruck, Austria, February 2003. International Association of Science and Technology for Development (IASTED).

Todd M. Quasny, Larry D. Pyeatt, and Jackie Moore. Curvature-velocity method for differentially steered robots. In *Proceedings of the IASTED International Conference on Modelling, Identification, and Control (MIC 2003)*, pages 618–622, Innsbruck, Austria, February 2003. International Association of Science and Technology for Development (IASTED).

Laura Barnes, Todd Quasny, Richard Garcia, and Larry D. Pyeatt. Multi-agent mapping using dynamic allocation utilizing a centralized storage system. In *Proceedings of the 12th Annual Mediterranean Conference on Control and Automation*, pages 1–6, Kusadasi, Aydin, Turkey, June 2004. The proceedings were produced on CD-ROM and papers were not assigned individual page numbers.

Brett L. Moore, Todd M. Quasny, Larry D. Pyeatt, and Eric D. Sinzinger. Performance of a single action partially observable Markov decision process in a recognition task. In *Proceedings of the Fourth Annual International Conference on Artificial Intelligence and Soft Computing*, pages 367–371, Cancun, Mexico, May 2001. International Association of Science and Technology for Development (IASTED).

Larry D. Pyeatt and Adele E. Howe. Decision tree function approximation in reinforcement learning. In *Proceedings of the Third International Symposium on Adaptive Systems: Evolutionary Computation & Probabilistic Graphical Models*, pages 70–77, Havana, Cuba, March 2001. Institute of Cybernetics, Mathematics and Physics.

Larry D. Pyeatt and Adele E. Howe. Integrating POMDP and reinforcement learning for a two layer simulated robot architecture. In Oren Etzioni, Jörg P. Müller, and Jeffrey M. Bradshaw, editors, *Proceedings of the Third International Conference on Autonomous Agents (Agents'99)*, pages 168–174, Seattle, WA, USA, May 1999. ACM Press.

Larry D. Pyeatt and Adele E. Howe. A parallel algorithm for POMDP solution. In *Proceedings of the Fifth European Conference on Planning (ECP-99)*, pages 73–83, Durham, United Kingdom, September 1999.

Larry D. Pyeatt and Adele E. Howe. Learning to race: Experiments with a simulated race car. In Diane J. Cook, editor, *Proceedings of the Eleventh International Florida Artificial Intelligence Research Symposium Conference*, pages 357–361, Sanibel Island, FL, May 1998. Florida Artificial Intelligence Research Symposium, AAAI Press.

Larry D. Pyeatt and Adele E. Howe. Reinforcement learning for coordinated reactive control. In *Fourth World Congress on Expert Systems: Workshop on machine learning*, page unavailable, March 1998.

Adele E. Howe and Larry D. Pyeatt. Constructing transition models of AI planner behavior. In *Proceedings of the Eleventh Knowledge Based Systems Engineering Conference*, pages 33–41, September 1996.

Frédéric Gruau, Darrell Whitley, and Larry Pyeatt. A comparison between cellular encoding and direct encoding for genetic neural networks. In John R. Koza, David E. Goldberg, David B. Fogel, and Rick L. Riolo, editors, *Genetic Programming 1996: Proceedings of the First Annual Conference*, pages 81–89, Stanford University, CA, USA, 1996. MIT Press.

Darrell Whitley, Keith Mathias, and Larry Pyeatt. Hyperplane ranking and implicit parallelism in simple genetic algorithms. In Larry Eshelman, editor, *Proceedings of the Sixth International Conference on Genetic Algorithms*, pages 231–238, San Francisco, CA, July 1995. Morgan Kaufmann.

Darrell Whitley, Frédéric Gruau, and Larry Pyeatt. Cellular encoding applied to neurocontrol. In Larry Eshelman, editor, *Proceedings of the Sixth International Conference on Genetic Algorithms*, pages 460–467, Pittsburgh, PA, USA, July 1995. Morgan Kaufmann.

Larry D. Pyeatt and W. J. Bryan Oldham. Application of the neural ring pattern classifier to speech recognition. In *Proceedings of the Southeastern Region ACM Conference*, pages 385–387. ACM, 1991.

**Doctoral
Dissertation**

Larry D. Pyeatt. *Integration of Partially Observable Markov Decision Processes and Reinforcement Learning for Simulated Robot Navigation*. PhD dissertation, Colorado State University, Computer Science Department, July 1999.

**Master's
Thesis**

Larry D. Pyeatt. Application of the neural ring pattern classifier to speech recognition. M.S. Thesis, Texas Tech University, May 1991.

**Unrefereed
Symposia &
Workshops**

Larry D. Pyeatt and Adele E. Howe. Testing generalization in learned simulated robot behaviors. In Henry Hexmoore, editor, *Workshop on Autonomy Control Software*, Seattle, Washington, May 1999. Third International Conference on Autonomous Agents.

Larry D. Pyeatt and Adele E. Howe. Integrating POMDP and reinforcement learning for a two layer simulated robot architecture. In Michael Littman and Tony Cassandra, editors, *AAAI 1998 Fall Symposium Series – Planning with Partially Observable Markov Decision Processes: Working Notes*, pages 371–388, Orlando, Florida, October 1998. AAAI. Revised version appeared in *Third International Conference on Autonomous Agents*.

**Unrefereed
Technical
Reports**

Mark R. Stevens, Larry D. Pyeatt, David J. Houlton, and Michael E. Goss. *Locating Shadows in Aerial Photographs Using Imprecise Elevation Data*. Technical Report TR CS-95-105, Colorado State University, Department of Computer Science, Fort Collins, Colorado, 1995.

Larry D. Pyeatt and Adele E. Howe. *Decision Tree Function Approximation in Reinforcement Learning*. Tech Report TR CS-98-112, Colorado State University, Fort Collins, Colorado, October 1998.

**Professional
Presentations**

Reinforcement Learning with Decision Trees. IASTED International Conference on Applied Informatics (AI 2003), February 2003. Innsbruck, Austria.

Curvature-Velocity Method for Differentially Steered Robots. IASTED International Conference on Modelling, Identification, and Control (MIC 2003), February 2003. Innsbruck, Austria.

Invited talk: *Probabilistic Methods for Robot Navigation.* University of Hawaii, March 22 2002. Honolulu, Hawaii.

Invited talk: *Probabilistic Methods for Robot Navigation.* University of Alaska, Fairbanks, July 9 2001. Fairbanks, Alaska.

Decision Tree Function Approximation in Reinforcement Learning. Third International Symposium on Adaptive Systems, March 20 2001. Havana, Cuba.

Invited talk: *Learning Low Level Actions for Robot Navigation.* RIACS, NASA Ames Research Center, November 9 2000. Moffett Field, California.

A Parallel Algorithm for POMDP Solution. Fifth European Conference on Planning (ECP-99), September 1999. Durham, United Kingdom.

Testing Generalization in Learned Simulated Robot Behaviors. Third International Conference on Autonomous Agents: Workshop on Autonomy Control Software, May 1999. Seattle, Washington.

Integrating POMDP and Reinforcement Learning for a Two Layer Simulated Robot Architecture. Third International Conference on Autonomous Agents, May 1999. Seattle, Washington.

Automatic Learning of Extended Actions in a Multi-Level Robot Architecture: Preliminary Results. AAAI Fall Symposium on Planning with Partially Observable Markov Decision Processes, October 1998. Orlando, Florida.

Learning to Race: Experiments with a Simulated Race Car. Eleventh International Florida Artificial Intelligence Research Symposium Conference, July 1998. Sanibel Island, Florida.

Reinforcement Learning for Coordinated Reactive Control. Fourth World Congress on Expert Systems, March 1998. Mexico City, Mexico.

Learning New Behaviors. NSF Sponsored Workshop on Intelligent Agents, July 1997. Porto Alegre, Brazil.

A Comparison between Cellular Encoding and Direct Encoding for Genetic Neural Networks. Genetic Programming Conference, July 1996. Stanford University.

Application of the Neural Ring Pattern Classifier to Speech Recognition. Southeastern Region ACM Conference, 1991. Auburn University, Auburn, Alabama.

Patent

Marilyn V. Reyes and Larry D. Pyeatt. Interpretation of fluorescence fingerprints of crude oils and other hydrocarbon mixtures using neural networks. United States Patent 5424959, property of Texaco Inc., 1995.

Grants Received

Larry D. Pyeatt. *Improved POMDP Solution Method.* Texas Tech Seed Grant, October 2008–2009. Award amount: \$21,000.

Sunanda Mitra and Larry Pyeatt. *Supplemental REU: CRCD: Machine Learning: A Multidisciplinary Computer Engineering Graduate Program.* NSF, February 2003–2004. Award amount: \$12,000.

Michael Parten, Larry Pyeatt, et al. *Plant Research in the EDU, Water Reuse/Recycling, Locomotion in Simulated Partial Gravity, and Human Centered Computing.* NASA, October 2003–2004. Award amount: \$2,250,000.

Michael Parten, Larry Pyeatt, et al. *Plant Research in the EDU (Engineering Development Unit).* NASA - Johnson Space center, October 2002–2003. Award amount: \$1,675,000.

Daniel Cooke, Bryan Oldham, Michael Gelfond, Larry Pyeatt, Hector Hernandez, and Richard Watson. *Exploiting Inherent Features of Problem Solutions Leading to Improvements in Human-Centered Computing.* NASA, September 2002–2004. Award amount: \$701,130.

Larry D. Pyeatt. *Robotics Laboratory Infrastructure*. Sun Microsystems Academic Equipment Grant, August 2000–2002. Award Amount: \$15,250.

James P. Donyak, Larry D. Pyeatt, and Sunanda Mitra. *Machine Learning: A Multidisciplinary Computer Engineering Graduate Program*. National Science Foundation CRCD Grant, January 2000–2003. Award amount: \$493,762.

**Departmental
Service**

Associate department chair, TTU CS at Abilene 2007–2010
Lead Abilene branch of the Texas Tech Computer Science Department
Developed strategy to increase student enrollment
Developed strategy to increase research funding and productivity
Developed strategy to recruit and retain top faculty
Coached Programming Team 1999–2002
Developed System Administrator Guidelines for the CS department network
Developed System Usage Policies for the CS department network
Served as graduate advisor 2000–2001
Re-structured the degree requirements for MS degree
Created new forms and procedures to improve consistency and help enforce requirements
Worked to improve consistency in admissions
Developed new leveling requirements and created mechanisms to ensure compliance
Instituted policies that encourage students to take the thesis option
Drove the creation of posters and brochures to recruit graduate students
Improved the quality of our computer systems support
Configured server to provide more reliable service
Installed numerous software packages on server and clients
Set up accounts for all students enrolled in CS courses
Provided email lists for faculty, staff, and students
Set up web-based system support request forms
Provided systems support to other faculty, staff, and students
Organized the UIL Computer Science competition at Texas Tech
Served on faculty recruiting committees, 2001–2003
Served on several M.S. thesis committees

**Professional
Service**

Reviewer

2010 Journal of Machine Learning Research
2004 International Conference on Machine Learning
2002 IASTED International Conference on Applied Informatics (AI 2003)
2001 IEEE Transactions on Pattern Analysis and Machine Intelligence
2001 International Symposium on Adaptive Systems
2000 IEEE Transactions on Pattern Analysis and Machine Intelligence
1999 Journal of Experimental and Theoretical Artificial Intelligence
1999 IEEE Transactions on Knowledge and Data Engineering
1998 American Journal of Mathematical and Management Sciences

Program Committees

2004 International Conference on Machine Learning
2001 Third International Symposium on Adaptive Systems

**International
Service**

External Examiner PhD defense of Adam Milstein, “Improved Particle Filter Based Localization and Mapping,” University of Waterloo, Waterloo, CA, March 5, 2008.

Courses Taught Undergraduate

Introduction to Systems Programming
Introduction to Digital Logic
Advanced Digital Projects
Operating Systems
Introduction to AI Robotics
Programming Languages
Senior Projects
Introduction to Computer Science

Graduate

Digital Forensics
Computer Architecture
Markov Decision Processes
Reinforcement Learning
Advanced Operating Systems
Intelligent Systems
Introduction to AI Robotics
All-terrain Robotics

**Graduate
Students
Advised**

Doctoral Students

Brett Moore, Graduated April, 2010
Arisoa Randrianasolo, expected gradutation in May 2012
Eddy Borera, expected gradutation December 2012

Master's Students

Amit Yadav, expected gradutation in May 2012
Shubham Shukla, graduated in May, 2011
Mahdi Naser-Moghadasi, graduated in May, 2010
Arisoa Randrianasolo, graduated in May, 2010
Eddy Borera, graduated in May, 2010
Nguyen Bach, graduated in May, 2010
ChengCheng Li, graduated in May, 2005
Srividya Kona, graduated in May, 2002
Ajay Bansal, graduated in May, 2002
Bharani Ellore, graduated in December, 2002
Todd Quasny, graduated in December, 2003
Julian Hooker, graduated in May, 2004
Krishnan Pazhayanoor, graduated in December, 2004
Karan Gupta, graduated in May, 2005
Roger Coffey, expected graduation in May, 2009
Derik Dalton, expected graduation in December, 2009

References

William M. Marcy, Department Chair and Former Provost, Texas Tech University, Department of Computer Science, Box 43104, Lubbock, TX 79409, Telephone: (806)742-3970, Email: william.marcy@ttu.edu

Susan Mengel, Associate Chair, Department of Computer Science, Texas Tech University, Box 43104, Lubbock, TX 79409. Telephone: (806) 742-3527 Email: sinzing@cs.ttu.edu

Henry Hexmoor, Department of Computer Science, Southern Illinois University at Carbondale, Faner Hall, Room 2130, Carbondale, IL 62901, Telephone: (618)453-6047, Email: Hexmoor@gmail.com