

David Andre, PhD

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Education

- Ph.D. in Electrical Engineering and Computer Science, University of California at Berkeley. (2003). Advisor: S. J. Russell. Dissertation title: *Programmable Reinforcement Learning Agents*.
- Graduate study in Machine Learning and Robotics, Carnegie Mellon University. (1997). Advisors: I. Nourbakhsh, A. Moore
- B.S. in Symbolic Systems, Stanford University. (1994). Honors and distinction.
- B.A. in Psychology, Stanford University. (1994). Honors and distinction.

Experience & Experience

- *Chief Executive Officer, Cerebellum Capital, Inc. San Francisco, CA (May 2010 – present)*
Chief Technical Officer, Cerebellum Capital, Inc. San Francisco, CA (March 2008 – present)
 - *Cerebellum Capital is a hedge fund management firm whose investment programs are continuously designed, executed, and improved by a software system based on techniques from statistical machine learning. As CTO, built the trading system and managed the team that continues to improve it. As CEO, managed the growth of our assets under management by a factor of 10x in 15 months.*
- *Research Consultant, BodyMedia, Inc. Pittsburgh, PA (March 2008-present)*
 - Principal Investigator for multi-million dollar research grant utilizing machine learning to enable non-invasive glucose monitoring.
- *Director of Research, BodyMedia, Inc. Pittsburgh, PA. (Aug 2007-March 2008).*
 - Directing research team responsible for future product research and advanced research projects.
- *Director of Informatics, BodyMedia, Inc. Pittsburgh, PA. (2002-2007).*
 - Directed team responsible for collecting and analyzing clinical data, creating machine learning models of that data, and developing algorithms that provide high level metrics over that data (e.g., predicting energy expenditure or detecting sleep).
 - Designed and led the implementation of all machine learning and algorithms for the BodyBugg (bodybugg.com) behavior-modification and weight-loss product, now being marketed by 24-Hour Fitness, the SenseWear (sensewear.com) line of clinical products, and the GoWear Fit line of consumer products (pharmanex.com/corp/product/myvictory/gowearfit.shtml).
 - Designed and led the implementation of all information processing for HealthWear body-monitoring product, winner of the Medical Device Excellence Award (given by Medical Device & Diagnostic Industry magazine) in the over-the-counter category (2004).
 - Principal Investigator for federally funded study into non-invasive glucose monitoring using a multi-sensor device and statistical machine learning; study funded for four million dollars over three years.
 - Invented device and method for accurately measuring a patient's heart rate on the upper arm.
 - Designed system to provide objective and actionable feedback for diabetics and their nurses using a multi-sensor wearable device and web software that is leading to improved compliance with treatments.
 - Led project to incorporate physical activity modeling as an outcome measure for clinical trials.
 - Led the creation of a new data storage infrastructure to track BodyMedia's repository of more than two billion minutes of human lifestyle data.
 - Led the redesign of a new infrastructure for algorithmic operations resulting in speedups of more than 25x.
 - Invented methodology for determining body temperature in infants from a simple band-aid sized patch.
- *Partner, Just Passing Through, LLC, San Francisco, CA, (2001-present).*
 - Co-founded Just Passing Through, a company that creates and runs puzzle-based adventure races such as the Shinteki games (shinteki.com), The Jackpot Game (thejackpotgame.com), and corporate events such as

the Google Intern Scavenger Hunts. Contributed puzzles to many events; was a primary contributor for The Jackpot Game and an upcoming conference-based game. Member of “Team Gold” and the “Scooby-Doobies”, two teams that have each won three or more games.

- *Expert Witness, Consultant, Witness Systems (remote), Roswell, GA (2005).*
 - Testified on aspects of a patent infringement lawsuit relating to my inventions at Blue Pumpkin Software.
 - Wrote expert reports on Enablement and Infringement.
- *Biometric Data Modeling Consultant, BodyMedia, Inc, Pittsburgh, PA. (2001-2002).*
 - Developed method for generating models that predict high-level physiological parameters such as energy-expenditure or activity-type from sequences of low-level biomedical sensor readings.
- *Software Engineer and part-time co-founder, Blue Pumpkin Software, Sunnyvale, CA. (1996-2002).*
 - Invented algorithms and coded the scheduling engine for workforce scheduling problems that led to Blue Pumpkin Software becoming the industry leader in market-share (1998). Blue Pumpkin was sold to Witness Systems in 2005 for \$70 million dollars.
 - Best paper award, *Innovative Applications in Artificial Intelligence Conference* (2002), for "Staff scheduling for inbound call centers and customer contact centers."
 - Developed a new product for the company that utilized a new non-simulation-based iterative approximation method for the long-term skill-based scheduling problem.
- *Graduate researcher, Computer Science Division, University of California, Berkeley, (1996-2002).*
 - Designed, implemented, and evaluated a Lisp-based high-level programming language that allows the programmer to partially specify a program and express his or her prior knowledge in a concise manner. Using reinforcement learning, the system finishes the program using hints and shaping provided by the programmer. Gave plenary talk on this dissertation research at 2002 AAAI conference.
 - Created a Robocup software team for the 1998 competition using evolutionary computation techniques. Created a Beowulf-style parallel processing implementation to do faster search and sped up the Robocup simulator using SMP parallelism. Our machine-learned solution placed in the top half of the field.
 - Researched machine learning and reinforcement learning and published on a variety of topics including using Bayesian techniques to improve exploration in reinforcement learning, hierarchical reinforcement learning, and maximizing the utility of trials in both evolutionary computation and reinforcement learning.
 - Inducted as Hertz Fellow (1999).
 - Won & Accepted National Defense Science and Engineering Grant for Graduate Study (1996).
- *Research Scientist, Genetic Algorithm Technology Corporation, Los Altos Hills, CA. (1994-1996).*
 - Researched genetic programming applied to problems in molecular biology, control theory, machine learning, artificial intelligence, digital circuit design, artificial life, signal processing and classification, and data mining, resulting in more than forty publications.
 - Designed, implemented, and maintained the Genetic Programming Code for three operating systems: a 66-node parallel transputer environment, a 64-node parallel PowerPC environment, and the Microsoft NT operating system.
- *Visiting Scholar, Stanford University. Bio-informatics and robotics. (1994-1996).*
 - Continued research in the field of evolutionary computation, leading to presentation of work at the International Joint Conference of Artificial Intelligence (1995).
 - Researched new vision algorithms for robotics utilizing depth from focus; participated in the design, experimentation, execution, and preparation of journal article.
- *Research consultant, Canon Research Center of America, Palo Alto. OCR group. (1992-1994).*
 - Researched optical character recognition and segmentation of noisy images.
 - Developed Windows NT based networking software for distributed computing over several PCs.
 - Developed Windows NT research tool for viewing of images
- *Intern at US Department of Energy Ames Lab, Fundamental Interactions Program. (Summer, 1991)*
 - Wrote analysis programs for results from computer simulations of atomic cluster behavior on metallic surfaces. Aided in design and execution of the research.

- *Undergraduate, Stanford University, (1990-1994).*
 - Investigated novel alternative theory in children's acquisition of biological knowledge that took the confound of familiarity into account; honor's thesis on this topic won the Firestone medal.
 - Designed evolutionary computation test-bed that became a standard in the research community and performed independent research into genetic programming resulting in three publications.
 - Served as lighting designer or set designer on major campus productions with budgets up to \$60,000.
 - Dean's Award for Academic Achievement at Stanford University (given to only 8 students/year, 1994).
 - Elected to Phi Beta Kappa in Junior Year at Stanford University (1993).

Selected Patents (several others pending)

- 7,959,567 Device to enable quick entry of caloric content
- 7,904,325 System and method for complex schedule generation
- 7,634,422 System and method for complex schedule generation
- 7,502,643 Method and apparatus for measuring heart related parameters
- 7,478,051 Method and apparatus for long-range planning
- 7,285,090 Apparatus for detecting, receiving, deriving and displaying human physiological and contextual information
- 7,254,546 System and method for complex schedule generation
- 7,155,399 System and method for complex schedule generation
- 6,532,453 Genetic programming problem solver with automatically defined stores loops and recursions
- 6,360,191 Method and apparatus for automated design of complex structures using genetic programming
- 6,278,978 Agent scheduling system and method having improved post-processing step
- 6,058,385 Simultaneous evolution of the architecture of a multi-part program while solving a problem using architecture altering operations
- 5,867,397 Method and apparatus for automated design of complex structures using genetic programming
- 5,793,900 Generating categorical depth maps using passive defocus sensing
- 5,742,738 Simultaneous evolution of the architecture of a multi-part program to solve a problem using architecture altering operations

Selected Publications

1. Vyas, N., Farrington, J., Andre, D., Stivoric, I. (2011) Machine Learning and Sensor Fusion for Estimating Continuous Energy Expenditure. *Proceedings of the 2011 Conference on Innovative Applications in Artificial Intelligence*. AAAI press.
2. Troosters, T., Scirba, F., Battaglia, S., Langer, D., Rao Valluri, S., Martino, L., Benzo, Andre, D., Weisman, I., Decramer, M. (2010). Physical inactivity in patients with COPD, a controlled multi-center pilot-study. *Respiratory Medicine*. Vol 104(7), July 2010, pp 1005-1011.
3. Rollins, D. K., N. Bhandari, J. Kleinedler, K. Kotz, A. Strohhahn, L. Boland, M. Murphy, D. Andre, N. Vyas, G. Welk and W. Franke, (2010). Free-living inferential modeling of blood glucose level using only noninvasive inputs. *Journal of Process Control*. Vol 20, 95-107.
4. Andre, D., and Wolf D. L. (2007). Recent advances in free-living physical activity monitoring: a review. *Journal of Diabetes Science and Technology*. Vol 1(5), Sept 2007, pp 760-767.
5. Troosters, T., Battaglia, S., Valuri, S. Rao, Andre, D, Bellia, M., Langer, D., Weisman, I., Martino, L., Decramer, M, and, F. Scirba, (2007). Two approaches to assess physical activities of daily life; steps and energy expenditure, *Proceedings of the 2007 Annual Conference of the European Respiratory Society*. (In Press)
6. Andre D. Assessing resting metabolic rate using a multi-sensor armband. *Obesity* (Silver Spring). 2007 May;15(5):1337;author reply 1337-8.
7. Goodpaster, B.H., Wolf, D.L., Andre, D., Vyas, N. (2006). Development and validation of a non-invasive glucose monitoring system during dynamic conditions. *Proceedings of the 6th Annual Diabetes Technology Meeting*.
8. Marthi, B., Russell, S.J, Andre, D., (2006). A compact, hierarchical, Q-function decomposition. *Proceedings of the 22nd Conference on Uncertainty in Artificial Intelligence*.
9. Andre, D., Teller, A. (2005). Health. Care. Anywhere. Today. *Studies in Health Technology and Informatics*, 2005;118:89-110.

10. Andre, D. (2003). *Programmable reinforcement learning agents*. Ph.D. dissertation, University of California, Berkeley, California.
11. Andre, D., and Russell, S.J., (2002). State abstraction for programmable reinforcement learning agents. *Proceedings of the 18th National Conference on Artificial Intelligence*. AAAI press.
12. Fukunaga, A., Hamilton, E., Fama, J., Andre, D., Matan, O., and Nourbakhsh, I. (2002). Staff scheduling for inbound call centers and customer contact centers. *Proceedings of the 2002 Conference on Innovative Applications in Artificial Intelligence*. AAAI press.
13. Andre, D., and Russell, S.J., (2001). Programmable reinforcement learning agents. *Proceedings of the 13th Conference on Neural Information Processing Systems*. MIT Press, pp 1019-1025.
14. Koza, J., Bennett, F., Andre, D., Keane, M. (200). Synthesis of topology and sizing of analog electrical circuits by means of genetic programming. *Computer Methods in Applied Mechanics and Engineering*, 186(2-4):459-482, 2000.
15. Dearden, R., Friedman, N., and Andre, D. (1999). Model based Bayesian exploration. *Proceedings of the 15th Conf. on Uncertainty in Artificial Intelligence*. pp 150-159.
16. Koza, J.R., Andre, D, Bennet, F. H, Keane, M. (1999). *Genetic Programming III: Automatic Programming and Circuit Synthesis*. Morgan Kaufman.
17. Andre, D., and Teller, A. (1999). Evolving team Darwin united. In Asada, M., and Kitano, H., eds., *RoboCup-98: Robot Soccer World Cup II*. Berlin: Springer Verlag.
18. Koza, John R., Bennett III, Forrest H, Andre, David, and Keane, Martin A. (1999). Genetic programming: biologically inspired computation that creatively solves non-trivial problems. *Proceedings of DIMACS Workshop on Evolution as Computation, January 11 - 12, 1999, Princeton University*.
19. Andre, D., J.R. Koza. (1998) A Parallel implementation of genetic programming that achieves super-linear performance. *Information Sciences Journal*. Vol 106:3-4. pp. 201-218.
20. Andre, D., Friedman, N., Parr, R. (1998). Generalized prioritized sweeping. In *Advances in Neural Information Processing Systems. Vol 10*. MIT Press: Cambridge, MA.
21. Koza, J.R, Bennett, F. H, Andre, D., Keane, M. (1998). Using programmatic motifs and genetic programming to classify protein sequences as to extracellular and membrane cellular location. *Proceedings of Evolutionary Programming VII. Lecture Notes in Computer Science*, Volume 1447, Springer-Verlag.
22. Nourbakhsh, I, Andre, D., Tomasi, C. and Genesereth, M. (1997) Mobile Robot Obstacle Avoidance via Depth from Focus. *Robotics and Autonomous Systems*. Vol. 22, June, 1997, pp. 151-158.
23. Koza, J. R., Bennett III, F. H., Andre, D., Keane, M. A, and Dunlap, F. (1997). Automated synthesis of analog electrical circuits by means of genetic programming. *IEEE Transactions on Evolutionary Computation*. 1(2). pp. 109-128.
24. Andre, D., and Teller, A. (1996). A Study in Program Response and the Negative Effects of Introns in Genetic Programming. In Koza, J.R., Goldberg, D.E., Fogel, D.B., and Riolo, R. L. (editors). *Genetic Programming 1996: Proceedings of the First Annual Conference*. Cambridge, MA: MIT Press.
25. Koza, J. R. and Andre, D. (1996). A case study where biology inspired a solution to a computer science problem. In Hunter, L. and Klein, T. E. (eds). *Pacific Symposium on Biocomputing '96*. World Scientific. pp. 500-511.
26. Andre, D, Bennett III, F. H., and Koza, J. R. (1996). Evolution of intricate long-distance communication signals in cellular automata using genetic programming. In *Artificial Life V: Proceedings of the Fifth International Workshop on the Synthesis and Simulation of Living*
27. Koza, J.R. and Andre, D. (1996). Classifying Protein Segments as Transmembrane Domains Using Architecture-Altering Operations in Genetic Programming. In Angeline, Peter J. and Kinnear, K. E. Jr. (editors). *Advances in Genetic Programming II*. Cambridge, MA: The MIT Press.
28. Koza, J. R. and Andre, D. (1996). Automatic discovery of protein motifs using genetic programming. In Yao, Xin (editor). *Evolutionary Computation: Theory and Applications*. Singapore: World Scientific.
29. Andre, D. (1995). The automatic programming of agents that learn mental models and create simple plans of action. *Proceedings of the 14th International Joint Conference on Artificial Intelligence*. San Francisco, CA: Morgan Kaufmann. pp. 741-747.
30. Andre, D. (1994). Learning and upgrading rules for an OCR system using genetic programming. *Proceedings of the First IEEE Conference on Evolutionary Computation*. IEEE Press. Volume I. pp. 462-467.

References available upon request.