

DAVID MONTANA

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Software Skills

Programming Languages: Java (12 years), C/C++ (10 years), Python (1 year), Ada (3 years), Lisp (4 years), Objective-C (2 years), PHP (2 years), Perl (1 year)

Other Skills: SQL, HTML, Windows system programming, Linux/UNIX, Visual Studio, JSP, Embedded programming, QuickTime, CoreAudio

Security Clearance – Top Secret

Education

Ph.D. (Applied Mathematics / Robotics) Harvard University, 1986

Thesis: Tactile Sensing and the Kinematics of Contact

B.A. (Applied Mathematics / Decision & Control) Harvard University, 1982

Professional Positions

BBN Technologies (Cambridge, MA), Lead Scientist, 1986 – 2013

Responsibilities:

- Software Developer: Implemented components of deployed military and commercial systems. Developed applied research prototypes.
- Technical Lead: Led small groups of other developers. Managed budget and work responsibilities.
- Business Development: Wrote proposals and white papers. Visited potential customers.

Application Domains (individual projects on page 2, patents on page 2):

- Cyber Security (2007-2012): Mostly classified. Performed some unclassified work on (i) securing BGP using a resource PKI and (ii) malware lineage and provenance.
- Scheduling and Logistics (1995-2007): Helped develop (i) two custom commercial field service scheduling systems, (ii) a military aircrew scheduling system, and (iii) a large multi-agent society for military logistics.
- Acoustic Signal/Information Processing (1986-1995 and 2005-2007): Helped develop distributed underwater sonar system from prototype through deployment. Performed acoustic transient classification. Created system for stock exchange floor surveillance.
- Others: Networking (including protocol optimization, configuration optimization), traffic signal control, evolvable hardware, and topic spotting.

Research Areas (editorial positions on page 2, published papers on page 3):

- Evolutionary Computation: Investigated a range of applications of genetic algorithms and genetic programming for optimization and machine learning (recognized with membership on four journal editorial boards, including one associate editorship).
- Scheduling: Developed a domain-independent reconfigurable scheduler using a genetic solver and domain-specific constraint language.
- Neural networks: Performed early work on connection weight optimization using genetic algorithms and optimization of neuron internal dynamics.
- Robotics: Developed a differential geometric description of contact kinematics applicable to the control of tasks involving multi-fingered manipulation.

Editorial Positions

- *Evolutionary Computation*, Editorial Board Member 1993-2012, Associate Editor 2005-2012
- *International Journal of Applied Intelligence*, 1998-present
- *Genetic Programming and Evolvable Machines*, 1999-present
- *Neural Processing Letters*, 2000-2007
- Special issue of *Evolutionary Computation*, Evolutionary Algorithms for Scheduling, Guest Editor 1998

Patents

- **Montana, D. J.**, Herrero, J. L., & Moore, S. (2004). Domain-Independent Reconfigurable Scheduler. *U.S. Patent No. 6,769,112*. Washington, DC: U.S. Patent and Trademark Office.
- Popp, R. L., **Montana, D. J.**, & Walters, J. B. (2001). System for a Dynamically Reconfigurable Wireless Robot Network. *U.S. Patent No. 6,266,577*. Washington, DC: U.S. Patent and Trademark Office.
- Gabriner, D. C., Milligan, S. D., Destefano, J. J., & **Montana, D. J.** (1998). System and Method for Genetic Algorithm Scheduling System. *U.S. Patent No. 5,848,403*. Washington, DC: U.S. Patent and Trademark Office.

Individual Projects

- GENI (2013): For an NSF-sponsored virtual laboratory for at-scale networking experimentation, implemented services supporting federation among experimenters, resources and administrators.
- Unsupervised Topic Discovery (2012-2013): NASIC-sponsored project for deployed system to create topic labels from a collection of documents and assign the labels to documents.
- KTJL, Gold Rush, ACES, Diamondhead, and Monocle (2007-2012): Research and development projects in the field of cyber security.
- DECODE (2010-2011): A DARPA-sponsored project to automate the process of software / malware attribution via determination of its lineage and provenance.
- RPKI (2007-2009): A DHS-sponsored project to develop software in support of a public key infrastructure (PKI) for the Internet address space and autonomous system numbers, to provide improved security for inter-domain routing.
- CMAC, the automated scheduling component (2009): A DARPA-sponsored program to create a National Cyber Range as a testbed to assess cyber R&D.
- SASSI (2004-2007): A DoD-sponsored project to investigate the use of multiagent scheduling approaches for optimizing the utilization of a large number of computing resources.
- SCR (2005-2007): A commercial project to develop and field a system to collect, process, and play large quantities of audio and visual surveillance data from a stock exchange floor.
- IMPEL (2005): An internal project to investigate the use of gene regulatory networks in neural networks. **[Technical Lead]**
- SPINDLE (2005): A DARPA-sponsored project to research issues involving disruption-tolerant networks (i.e. networks robust with respect to outages, long delays, and sporadic connections), including the use of genetic programming to develop routing logic.
- Adaptive Agents (2003-2004): A DARPA-sponsored project that included the use of genetic programming for learning unmanned aerial vehicle (UAV) control logic.
- Knowledge Discovery Markets (2003): A DARPA-sponsored project to investigate the use of electronic marketplaces for sharing intelligence data by experimentation with an online game.

- ERNI (2003): A DARPA-sponsored project that included the use of genetic algorithms to optimize the parameters of an ad hoc robot networking protocol.
- Vishnu Reconfigurable Scheduler (1999-2002): A DARPA-sponsored project to develop a web-based automated scheduling system whose data formats, scheduling logic, and displays can be reconfigured for different problems and domains without writing any new code. **[Technical Lead]**
- EvoGuard/Salamander (2000-2001): A DARPA-sponsored project investigating: (i) the use of genetic programming to learn effective responses to cyber attacks and (ii) the use of genetic algorithms for dynamic reconfiguration of data networks with wireless components. **[Technical Lead]**
- AirCAMS/ULPS (1998-2000): Projects to develop genetic-algorithm-based aircrew schedulers for airlift and air refueling squadrons for the U.S. Air Force Air Mobility Command. **[Technical Lead for AirCAMS]**
- EvolvaWare (1997-1998): A DARPA-sponsored project for investigating the use of FPGA-based hardware to greatly speed up the genetic programming learning process and the execution of learned algorithms. **[Technical Lead]**
- TOPS (1996-1998): A DARPA-sponsored project developing applications of genetic algorithms to military logistics transportation scheduling and integrating the different applications into a multi-agent society. **[Technical Lead]**
- BEST Field Service Scheduler (1995-1998): A genetic-algorithm-based system for scheduling field engineers to repair tasks, first implemented for Technology Services Solutions (the PC service division of IBM) and then reimplemented in Java for commercial licensing.
- Society of Signals (1993-1995): An FHWA-sponsored research project to investigate the use of genetic programming to learn cooperative adaptive control laws for networks of traffic signals. **[Technical Lead]**
- FDS/IUSS, the Information Processing component (1986-1995): A project to develop the portion of a large operational undersea surveillance system whose function was to automatically detect, associate and track signals of interest. **[Technical Lead 1992-1995]**
- NCAT (1989-1991): A project funded by the DARPA Artificial Neural Network Initiative to investigate using neural networks for identification of transient underwater signals.
- SAF (1991): A project to create simulated unmanned aircraft and ground vehicles with realistic behavior to be part of the environment of SIMNET, a network of interacting battlefield vehicle simulators.

Publications (Partial List)

- **Montana, D.**, VanWyk, E., Brinn, M., Montana, J., & Milligan, S. (2009). Evolution of Internal Dynamics for Neural Network Nodes. *Evolutionary Intelligence*, 1(4), 233-251.
- **Montana, D.**, & Reynolds, M. (2008). Validation Algorithms for a Secure Internet Routing PKI. In *Public Key Infrastructure* (pp. 17-30).
- **Montana, D.**, & Zinky, J. (2008). Optimizing Routing and Backlogs for Job Flows in a Distributed Computing Environment. In *Metaheuristics for Scheduling in Distributed Computing Environments* (pp. 39-59).
- **Montana, D.**, Hussain, T., & Vidaver, G. (2007). A Genetic-Algorithm-Based Reconfigurable Scheduler. In K. Dahal, K.C. Tan & P. Cowling (Eds.), *Evolutionary Scheduling*.

- **Montana, D.** (2005). A Comparison of Combinatorial Optimization and Dispatch Rules for Online Scheduling. In *Proceedings of the 2nd Multidisciplinary Conference on Scheduling: Theory and Application (MISTA)*.
- **Montana, D.,** & Redi, J. (2005, June). Optimizing Parameters of a Mobile Ad Hoc Network Protocol with a Genetic Algorithm. In *Proceedings of the Genetic and Evolutionary Computation Conference, GECCO 2005* (pp. 1993-1998).
- **Montana, D.,** Leung, A., & Brinn, M. (2005, March). Information Sharing Using an Electronic Marketplace. In *IEEE Aerospace Conference* (pp. 1-16).
- **Montana, D.,** Vidaver, G., & Hussain, T. (2005, April). A Reconfigurable Multiagent Society for Transportation Scheduling and Dynamic Rescheduling. In *International Conference on Integration of Knowledge Intensive Multi-Agent Systems (KIMAS)*.
- **Montana, D.,** & Hussain, T. (2004). Adaptive Reconfiguration of Data Networks Using Genetic Algorithms. *Applied Soft Computing*, 4(4), 433-444.
- Hussain, T., **Montana, D.,** & Vidaver, G. (2004, January). Evolution-Based Deliberative Planning for Cooperating Unmanned Ground Vehicles in a Dynamic Environment. In *Proceedings of the Genetic and Evolutionary Computation Conference, GECCO 2004* (pp. 1017-1029). Springer Berlin Heidelberg.
- **Montana, D.** (2003). A Comparison of Vishnu and OPL Studio. In *First Multidisciplinary International Conference on Scheduling: Theory and Applications (MISTA)*.
- **Montana, D.** (2002). How to Make Scheduling Research Relevant. In *Proceedings of the Genetic and Evolutionary Computation Conference, GECCO 2002, Workshop: Scheduling: Bringing Together Theory and Practice*.
- **Montana, D.** (2002). So You Want to Build an Automated Scheduling System. In *Proceedings of the GECCO-2002 Industrial Track*.
- **Montana, D.** (2001). Optimized Scheduling for the Masses. In *Genetic and Evolutionary Computation Conference, GECCO 2001, Workshop: The Next Ten Years of Scheduling Research*.
- **Montana, D.** (2001, July). A Reconfigurable Optimizing Scheduler. In *Proceedings of the Genetic and Evolutionary Computation Conference, GECCO 2001*.
- Rana-Stevens, S., Lubin, B., & **Montana, D.** (2000, July). The Air Crew Scheduling System: The Design of a Real-World, Dynamic Genetic Scheduler. In *Genetic and Evolutionary Computation Conference, GECCO 2000, Late Breaking Papers*.
- **Montana, D.,** Herrero, J., Vidaver, G., & Bidwell, G. (2000). A Multiagent Society for Military Transportation Scheduling. *Journal of Scheduling*, 3(4), 225-246.
- **Montana, D.,** Bidwell, G., Vidaver, G., & Herrero, J. (1999). Scheduling and Route Selection for Military Land Moves Using Genetic Algorithms. In *Proceedings of the 1999 Congress on Evolutionary Computation*.
- **Montana, D.** (1998). Introduction to the Special Issue: Evolutionary Algorithms for Scheduling. *Evolutionary Computation*, 6(1).
- Popp, R. L., **Montana, D. J.,** Gassner, R. R., Vidaver, G., & Iyer, S. (1998, October). Automated Hardware Design Using Genetic Programming, VHDL, and FPGAs. In *IEEE International Conference on Systems, Man, and Cybernetics*.
- **Montana, D.,** Brinn, M., Moore, S., & Bidwell, G. (1998, October). Genetic Algorithms for Complex, Real-Time Scheduling. In *IEEE International Conference on Systems, Man, and Cybernetics*.
- **Montana, D.,** Popp, R., Iyer, S., & Vidaver, G. (1998). EvolveWare: Genetic Programming for Optimal Design of Hardware-Based Algorithms. *Proceedings of the Third Annual Conference on Genetic Programming*.

- **Montana, D. J.**, & Czerwinski, S. (1996, July). Evolving Control Laws for a Network of Traffic Signals. In *Proceedings of the First Annual Conference on Genetic Programming*.
- **Montana, D. J.** (1995). Strongly Typed Genetic Programming. *Evolutionary Computation*, 3(2), 199-230.
- **Montana, D. J.** (1995). The Kinematics of Multi-Fingered Manipulation. *IEEE Transactions on Robotics and Automation*, 11(4), 491-503.
- **Montana, D. J.** (1995). Neural Network Weight Selection Using Genetic Algorithms. In Goonatilake, S., & Khebbal, S. (Eds.), *Intelligent Hybrid Systems*.
- Theriault, K., **Montana, D.**, & Haberl, K. (1993). Detection and Classification of Acoustic Transients Using Neural Networks. *U.S. Navy Journal of Underwater Acoustics*.
- **Montana, D. J.** (1992). Contact Stability for Two-Fingered Grasps. *IEEE Transactions on Robotics and Automation*.
- Brock, D. L., **Montana, D. J.**, & Ceranowicz, A. Z. (1992, May). Coordination and Control of Multiple Autonomous Vehicles. In *Proceedings of the IEEE Conference on Robotics and Automation*.
- **Montana, D.** (1992, August). Genetic Search of a Generalized Hough Transform Space. In *Proceedings of the SPIE Conference on Adaptive and Learning Systems*.
- **Montana, D.** (1992, August). Genetic Optimization of the Parameters of a Track-While-Detect Algorithm. In *Proceedings of the SPIE Conference on Adaptive and Learning Systems*.
- **Montana, D.** (1992). A Weighted Probabilistic Neural Network. In Moody, J.E., Hanson, S.J., & Lippman, R.P. (Eds.), *Advances in Neural Information Processing Systems 4*.
- **Montana, D. J.** (1991, April). The Condition for Contact Grasp Stability. In *Proceedings of the IEEE Conference on Robotics and Automation*.
- **Montana, D.**, & Theriault, K. (1991, August). Neural-Network-Based Classification of Acoustic Transients. In *Proceedings of the IEEE Conference on Neural Networks for Ocean Engineering* (pp. 247-254).
- **Montana, D. J.** (1991). Automated Parameter Tuning for Interpretation of Synthetic Images. In Davis, L. (Ed.), *Handbook of Genetic Algorithms*.
- **Montana, D. J.** (1990). Empirical Learning Using Rule Threshold Optimization for Detection of Events in Synthetic Images. *Machine Learning*, 5(4), 427-450.
- **Montana, D. J.** (1989, May). The Kinematics of Contact with Compliance. In *Proceedings of the IEEE Conference on Robotics and Automation*.
- **Montana, D. J.**, & Davis, L. (1989, August). Training Feedforward Neural Networks Using Genetic Algorithms. In *Proceedings of the International Joint Conference on AI*.
- **Montana, D. J.** (1988). The Kinematics of Contact and Grasp. *The International Journal of Robotics Research*, 7(3), 17-32.