



Alborz Geramifard

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Academic Interests

Machine Learning particularly Reinforcement Learning, Planning, Brain and Cognitive Science

Education

- [2013-Now] Research Scientist, Amazon.com, Cambridge, MA
- [2012-2013] Postdoctoral, Massachusetts Institute of Technology, Cambridge, MA
Laboratory for Information and Decision Systems (LIDS)
- [2008-2012] Ph.D. Aero/Astro, Massachusetts Institute of Technology, Cambridge, MA
Major: Autonomy, Minor: Brain and Cognitive Sciences
- Supervisor: Jonathan How & Nicholas Roy
- Thesis: Online Learning within Cooperative Planning
- [2004-2007] M.Sc. Computing Science, University of Alberta, Edmonton, AB
- Supervisors: Richard S. Sutton & Michael Bowling
- Thesis: Incremental Least-Squares Temporal Difference Learning
- [1998-2003] B.Sc. Computer Engineering, Sharif University of Technology, Tehran, Iran
- Supervisor: Jafar Habibi
- Thesis: Implementation of Fire Agent and Fire Station in the Rescue Simulator

Publications

[Refereed]

1. S. Ponda, L. B. Johnson, **A. Geramifard**, J. P. How, "Cooperative Mission Planning for Multi-UAV Teams", in the Handbook of Unmanned Aerial Vehicles, Chapter 16, Springer, 2014 [[Springer Link](#)]
2. **A. Geramifard**, T. Walsh, S. Tellex, G. Chowdhary, N. Roy, J. P. How, "A Tutorial on Linear Function Approximators for Dynamic Programming and Reinforcement Learning", Foundations and Trends in Machine Learning (FTML), 2013 [[Amazon Link](#)]
3. **A. Geramifard**, R. H. Klein, C. Dann, W. Dabney, J. P. How, "RLPy: A Reinforcement Learning Framework for Education and Research", Workshop on Machine Learning Open Source Software 2013: Towards Open Workflows, NIPS, 2013
4. T. Campbell, R. Klein, **A. Geramifard**, J. How, "Simultaneous Clustering on Representation Expansion for Learning Multimodel MDPs", The 1st Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM), 2013
5. **A. Geramifard**, C. Dann, J. How, "Off-Policy Learning Combined with Automatic Feature Expansion for Solving Large MDPs", The 1st Multidisciplinary Conference on Reinforcement Learning and Decision Making (RLDM), 2013

6. C. Amato, G. Chowdhary, **A. Geramifard**, K. Ure, "Decentralized Control of Partially Observable Markov Decision Processes", The 52nd IEEE Conference on Decision and Control (CDC), 2013
7. **A. Geramifard**, T. Walsh, N. Roy, and J. How "Batch iFDD: A Scalable Matching Pursuit Algorithm for Solving MDPs", The Conference on Uncertainty in Artificial Intelligence (UAI), 2013 [31% acceptance]
8. J. Joseph, **A. Geramifard**, W. Roberts, J. How and N. Roy, "Reinforcement Learning with Misspecified Model Classes", IEEE International Conference on Robotics and Automation (ICRA), 2013 [39% acceptance][nominated for Best Cognitive Robotics Paper Award]
9. J. Joseph, **A. Geramifard**, J. How and N. Roy, "Reinforcement Learning with Misspecified Bayesian Nonparametric Model Classes", Workshop on Bayesian Nonparametric Models For Reliable Planning And Decision-Making Under Uncertainty, NIPS, 2012
10. S. Ponda, L. B. Johnson, **A. Geramifard**, J. P. How, "Cooperative Mission Planning for Multi-UAV Teams", in the Handbook of Unmanned Aerial Vehicles, Chapter 16, Springer, 2014
11. **A. Geramifard**, J. Redding, J. P. How, "Intelligent Cooperative Control Architecture: A framework for performance improvement using safe learning", Journal of Intelligent and Robotic Systems (JIRS), 2012 [Under Review]
12. K. Ure, **A. Geramifard**, G. Chowdhary, J. P. How, "Adaptive Planning for Markov Decision Processes with Uncertain Transition Models via Incremental Feature Dependency Discovery", European Conference on Machine Learning (ECML), 2012 [24% acceptance]
13. **A. Geramifard**, S. Tellex, D. Wingate, N. Roy, and J. P. How, "A Bayesian Approach to Finding Compact Representations for Reinforcement Learning", European Workshops on Reinforcement Learning (EWRL), 2012 [68% acceptance]
14. **A. Geramifard**, J. Redding, J. Joseph, N. Roy, and J. P. How, "Model Estimation Within Planning and Learning", American Control Conference (ACC), 2012 [55% acceptance]
15. **A. Geramifard**, J. Redding, J. Joseph, and J. P. How, "Model Estimation Within Planning and Learning", Workshop on Planning and Acting with Uncertain Models, ICML, Bellevue, WA, USA, 2011.
16. **A. Geramifard**, F. Doshi, J. Redding, N. Roy, and J. P. How, "Incremental Feature Dependency Discovery", Proceedings of the 23rd International Conference on Machine Learning (ICML), 2011, [28% acceptance]
17. Josh Redding, Tuna Toksoz, N. Kemal Ure, **Alborz Geramifard**, Jonathan P. How, "Distributed Multi-Agent Persistent Surveillance and Tracking With Health Management", in AIAA Guidance, Navigation, and Control Conference (GNC), 2011.
18. **A. Geramifard**, J. Redding, N. Roy, and J. P. How, "UAV Cooperative Control with Stochastic Risk Model", American Control Conference (ACC), 2011
19. J. Redding, **A. Geramifard**, H.-L. Choi, and J. P. How, "Actor-critic policy learning in cooperative planning," in AIAA Guidance, Navigation, and Control Conference (GNC), 2010.
20. J. Redding, **A. Geramifard**, A. Undurti, H. Choi, and J. How, "An intelligent cooperative control architecture," in American Control Conference (ACC), 2010
21. J. Redding, **A. Geramifard**, J. How "Actor-Critic Policy Learning in Cooperative Planning", Embedded Reasoning: Intelligence in Embedded Systems, AAAI Symposium, 2010
22. R. He, A. Bachrach, M. Achtelik, **A. Geramifard**, D. Gurdan,, S. Prentice, J. Stumpf, N. Roy, "On the Design and Use of a Micro Air Vehicle to Track and Avoid Adversaries", International Journal of Robotics Research (IJRR), 29(5), 529-546, 2010
23. A. Bachrach, **A. Geramifard**, D. Gurdan, R. He, S. Prentice, J. Stumpf, N. Roy, "Co-ordinated Planning Under Uncertainty with Air and Ground Vehicles", Proceedings of the 11th International Symposium on Experimental Robotics (ISER), 2008,
24. R. Sutton, Cs. Szepesvári, **A. Geramifard** and M. Bowling, "Dyna-Style Planning with Linear Function Approximation and Prioritized Sweeping", Proceedings of the 24th Conference on Uncertainty in Artificial Intelligence (UAI), pages 528-536, 2008, [28% acceptance]

25. M. Bowling, **A. Geramifard**, D. Wingate, "Sigma Point Policy Iteration", Proceedings of the 7th International Joint Conference on Autonomous Agents and Multiagent Systems (AAMAS), pages 379-386, 2008, [22% acceptance]
 26. **A. Geramifard**, M. Bowling, M. Zinkevich, R. Sutton, "iLSTD: Eligibility Traces & Convergence Analysis ", In B. Schölkopf and J.C. Platt and T. Hofmann editors, Advances in Neural Information Processing Systems 19 (NIPS), pages 440-448, 2007. [24% acceptance]
 27. **A. Geramifard**, M. Bowling, R. Sutton, "Incremental Least-Square Temporal Difference Learning", Proceedings of 21st Conference, American Association for Artificial Intelligence (AAAI), pages 356-361, 2006. [30% acceptance]
 28. **A. Geramifard**, P. Chubak, V. Bulitko, "Biased Cost Pathfinding", Proceedings of second Conference, Artificial Intelligence and Interactive Digital Entertainment (AIIDE) 2006. [73% acceptance]
 29. **A. Geramifard**, P. Nayyeri, R. Zamaninasab, J. Habibi, "A Hybrid Three Layer Architecture for Fire Agent Management in Rescue Simulation Environment", International Journal of Advanced Robotic Systems, Vol 2, No 2, June 2005.
 30. A Nouri, R. Zamani-Nasab, J. Habibi, **A. Geramifard** " Task Allocation in Complex Multiagent Systems with Parallel Scheduling ", Workshop on Information Technology & its Disciplines, Kish Island, Iran, February 2004
 31. J. Habibi, M. Ahmadi, A. Nouri, M. M. Nevisi, **A. Geramifard**, et al. , " Arian Agents: A Set of Implemented Agents for RoboCup Rescue Simulation Environment ", In Proceedings of the RoboCup Symposium, Padova, Italy, 2003.
- [Non-Refereed]**
32. **A. Geramifard**, "Practical Reinforcement Learning Using Representation Learning and Safe Exploration for Large Scale Markov Decision Processes", PhD thesis, Aeronautics and Astronautics Department, Massachusetts Institute of Technology, MA, Nov 2011
 33. **A. Geramifard**, "Incremental Least-Squares Temporal Difference Learning", M.Sc. thesis, Computing Science Department, University of Alberta, Edmonton, AB, Jan 2007
 34. **A. Geramifard**, S. Sigmundarson, J. Klippenstein, "Recognizing and acting on hand signals using vision on an AIBO", Machine Learning Course Project, Computing Science Department, University of Alberta, Edmonton, AB, Apr 2005.
 35. **A. Geramifard**, P. Nayyeri "Implementation of Fire Agent and Fire Station in the Rescue Multi-Agent Environment", B.Sc. thesis, Computer Engineering Department, Sharif University of Technology, Tehran, Iran, Jun 2003.

Awards

- ❖ Selected as one of Iran's elite scientists to meet with President Dr. Rohani and Foreign Minister Dr. Zarif. at the United Nations, New York, USA [2014]
- ❖ Research assistant at Aerospace Control Laboratory (ACL) funded by AFOSR, MIT, \$61,000 per year [2009-2013]
- ❖ Research Council of Canada (NSERC) scholarship, MIT, \$63,000 CAD for three years [2009-2013]
- ❖ Research Assistant at Computer Science and Artificial Intelligence Laboratory (CSAIL) funded by Boeing, MIT, \$61,000 per year [2008-2009]
- ❖ M.Sc. dissertation was ranked among the top three selections, CS, University of Alberta, 2007
- ❖ Ranked among top 4 posters at Alberta Ingenuity Center For Machine Learning (AICML) site visit, University of Alberta, \$150 [2007]
- ❖ International Difference Tuition Fee Award, University of Alberta, \$3,000 CAD per year [2004-2007]
- ❖ 文部科学省 (Monbusho) Scholarship, Ph.D. studies at Tokyo Institute of Technology, Japan \$20,000 per year [2004-2007] (declined)
- ❖ Research assistant at Reinforcement Learning and Artificial Intelligence Laboratory (RLAI) funded by iCORE, University of Alberta, \$24,000 CAD per year [2004-2007]

- ❖ Selected as a star student (top 1%), Sharif University of Technology, 2004
- ❖ Ranked 29th out of ~20,000 participant in the graduate entrance exam of AI in Iran, 2004
- ❖ Ranked 3rd among the bachelor classmates of my entrance year, 2003
- ❖ Championship of RoboCup Rescue-Simulation, Arian Team, Padova, Italy, 2003
- ❖ Ranked 83rd out of ~1 million participants in Iran's national university entrance exam, 2009
- ❖ Provincial nominee for national computer olympiad competition, 1996

Entrepreneurship

- ❖ Legatum Lecture: Mastering Business Model Innovation, MIT Sloan School, 2012 IAP Workshop
- ❖ Design to Scale, D-Lab at Media Lab, 2012 IAP Workshop
- ❖ Introduction to Corp. Credit Analysis, MIT Alumni, 2012 IAP Workshop
- ❖ From MIT to CEO: Technologists Leading Startup Ventures, 2012 Sales Bootcamp Course - MIT Venture Mentorship Service, 2012
- ❖ Patent: SmartReroute - An intelligent mobile-based route monetizer (with MIT), US Application No. 61/553298 - 2011
- ❖ \$100K MIT - Pitch Competition - 2011
- ❖ \$100K MIT - Executive Summary Competition - 2011
- ❖ Founder of CSAIL Entrepreneurs Group - 2011
- ❖ Nuts and Bolts of Business Plans Course - MIT Sloan - 2011

Employment

- ❖ **Research Scientist, Amazon.com, [2013-Present]**
Working on Natural Language Understanding (NLU) on Amazon Echo product.
- ❖ **Research Assistant, Aerospace Control Laboratory ([ACL](#)), MIT [2009-2013]**
Embedding online learning methods within cooperative planners for multi-agent systems. The work involves designing algorithms for adaptive representational learning for solving MDPs and novel ways to bias learning policies by cooperative planning results ([video](#)). I am the project lead and, my work involves the design and implementation of the algorithms in C++, Matlab, Java and submitting jobs in parallel to a cluster through python scripts.
- ❖ **Research Assistant, Computer Science and Artificial Intelligence Laboratory ([CSAIL](#)), Model-based Embedded and Robotics ([MERS](#)), MIT, [2008-2009]**
Designed algorithms for automated personal vehicle transportation ([video](#)) and autonomous underwater vehicle ([video](#)) both funded by the Boeing company. My work was focused on design and implementation of algorithms in Python.
- ❖ **Research Assistant, Reinforcement Learning and Artificial Intelligence Laboratory ([RLAI](#)), University of Alberta, [2004-2008]**
Designed and implemented an incremental least-squares technique for policy evaluation called iLSTD. Earlier I focused my attention on Sony robot dogs (AIBO) in order to let them learn through experience how to balance themselves on a seesaw. Both projects involved coding in C++ and Matlab.
- ❖ **Computer Researcher, Mohaseb Co. Ltd, [2003-2004]**
Designed and developed web application to simplify team selection process for managers in large scale companies. My work was mostly focused on the algorithmic side and realizing essential web functionalities through implementing DLLs in Visual Basic.

Supervision/Leadership

- ❖ Supervised Andrew J Wang through Undergraduate Research Opportunities Program (UROP), Aerospace Control Laboratory ([ACL](#)), [09/10-present]
Extending the code for the feature discovery process used for adaptive representational learning in solving large MDPs. The process involved object oriented design and implementation in C++ and MEXing the resulting code to have it accessible through Matlab.
- ❖ Supervised Edgar Twigg through Undergraduate Research Opportunities Program (UROP), Model-Based Embedded & Robotics Systems ([MERS](#)), [06/08-02/09]
Making a prototype unmanned air vehicle. The work involved java implementation of a simulator used for navigation and design and manufacturing of a hardware prototype.
- ❖ Public chair officer of Persian Student Association ([PSA](#)), MIT, [06/08-06/10]
Led and managed social events. Designed and updated the official website of PSA.

Grants

[Co-writer]

- ❖ Multidisciplinary University Research Initiative-2 (MURI-2), 2011
- ❖ Health-Aware Task Planning for UAV SWARMS, Boeing, 2011

Presentations

[Conferences]

- ❖ “Convergence Rate Analysis of Incremental Feature Discovery”, Laboratory for Information and Decision Systems (LIDS) annual internal conference, MIT, 2012
- ❖ “Model Estimation Within Planning and Learning”, Workshop on Planning and Acting with Uncertain Models, ICML, Bellevue, 2011
- ❖ “Incremental Feature Dependency Discovery”, International Conference on Machine Learning (ICML), Bellevue, 2011
- ❖ “Incremental Feature Discovery”, Laboratory for Information and Decision Systems (LIDS) annual internal conference, MIT, 2010
- ❖ “Settings and Environments”, Neural Information Processing Systems (NIPS), The first annual reinforcement learning competition workshop, 2006
- ❖ “iLSTD: Eligibility Traces and Convergence Analysis”, Neural Information Processing Systems (NIPS), Poster session, 2006
- ❖ “Incremental Least-Squares Temporal Difference Learning”, American Association for Artificial Intelligence (AAAI), Poster session, 2006
- ❖ “Biased Cost Path-finding”, Artificial Intelligence and Interactive Digital Entertainment (AIIDE), Poster session, 2006

[Invited Talks]

- ❖ “Representation Learning and Safe Exploration in Large MDPs”, Amazon at Seattle, 2013
- ❖ “Representation Learning and Safe Exploration in Large MDPs”, Intel Research at Carnegie Mellon University, Host: Mei Chen, 2011
- ❖ “Representation Learning and Safe Exploration in Large MDPs”, Yahoo! Labs, Host: Autum Ehresmann, 2011
- ❖ “Online Learning within Cooperative Planning”, Department of Mechanical Engineering, MIT, Host: Domitilla Del Vecchio, 2011
- ❖ “Online Learning within Cooperative Planning”, Teleconference with NASA associates and Stanford Aero/Astro colleagues, Host: David Wolpert, 2011
- ❖ “Linear Prioritized Sweeping”, Computer Science Department, Rutgers University, Host: Michael Littman, 2007

[CSAIL at MIT] (Selected)

- ❖ Ph.D. Proposal Defense, 2010
- ❖ Incremental Feature Discovery, 2010

- ❖ Logic Programming and MDPs for Planning, 2009
 - ❖ MHPI: Metropolis Hastings meets Least-squares Policy Iteration, 2009
 - ❖ Online Control with Least-squares Methods, 2009
 - ❖ Learning to Perch using LSPI, 2009
 - ❖ Active Learning in POMDPs: The MEDUSA Algorithm, 2008
 - ❖ Incremental Least-Squares Temporal Difference Learning, 2008
- [Aero/Astro Department, MIT]**
- ❖ Logic Planning using MDPs (Guest Lecturer), 2008
 - ❖ Active Learning in POMDPs and HMMs (Joint with S. Gil and J. Nahm), 2008
- [Computing Science Department, University of Alberta] (Selected)**
- ❖ Linear Prioritized Sweeping, 2007
 - ❖ Online Control with Least-Squares Methods, 2007
 - ❖ M.Sc. Oral Defence, 2007
 - ❖ Reinforcement Learning in the Matrix Form, 2006
 - ❖ Incremental Least-Squares Temporal Difference Learning, 2006
 - ❖ RoboCup in a Glance, 2004
- [Computer Engineering Department, Sharif university of Technology] (Selected)**
- ❖ Blackboard: When there is no other way, 2003
 - ❖ An introduction to Prolog, 2002
 - ❖ A Genetic Method for Evolutionary Agents in a Competitive Environment, 2002

Teaching Experience

- [Massachusetts Institute of Technology]**
- ❖ Cognitive Robotics (16.412), Brian Williams, Guest Lecturer, Winter 2009
 - ❖ Introduction to EECS I (6.01), Hal Abelson, Denny Freeman, Leslie Kaelbling, Jim Kirtly, Tomas Lozano-Perez, Antonio Torralba, TA (Review Score 6.3/7.0), Fall 2008
- [Computing Science Department, University of Alberta]**
- ❖ Probabilistic Graphical Models (CMPUT 652), Russ Greiner, TA, Spring 2002
- [Computer Engineering Department, Sharif university of Technology]**
- ❖ Java Programming - Ramtin Khosravi, TA, Spring 2002
 - ❖ Artificial Intelligence, Ghasem Sani, TA, Fall 2002
 - ❖ Pascal Programming, TA, Spring 2001
 - ❖ Fundamental of Computer Science I, Mohammad Ghodsi, TA, Spring 2001
 - ❖ Computer Workshop, Mahammad Hesabi, Lab Instructor, Fall 2001
 - ❖ PC Assembling, Lab Instructor, Fall 2001
 - ❖ Database, Rasool Jalili, TA, Fall 2001
 - ❖ Logic Circuit, Mohammad Hesabi, TA, Spring 2000

Graduate Course Work

[MIT]

Computational Science and Eng. (A⁺), Cognitive Robotics (A), Principles of Autonomy and Decision Making (A⁺), Planning Under Uncertainty (A), Underactuated Robotics (A), Computational Cognitive Science (A), Human Intelligence Enterprise (A), Exploration within Exploration (A), Japanese Language I (A), New Paradigms in Human Computer Interaction (Audit), What is Intelligence? (Audit)

[University of Alberta]

Introduction to Reinforcement Learning (A⁻), Individual Study AIBO Programming (A), Machine Learning (A), Real-time Search (A⁺), Practical Reinforcement Learning (A⁺), AI and Games (A⁻)

[Tehran University]

Robotics (Audit), Image Processing (Audit)

Community Service

[Organizer/Chair]

- ❖ NIPS Workshop - Advances in Machine Learning for Sensorimotor Control, 2013
- ❖ NIPS Workshop - Bayesian Nonparametric Models For Reliable Planning And Decision-Making Under Uncertainty, 2013
- ❖ IEEE Conference on Decision and Control (CDC) - Workshop on Intelligent Planning and Control, 2012

[PC Member]

- ❖ European Workshops on Reinforcement Learning (EWRL), 2012

[Technical Committee]

- ❖ IEEE Robotics and Automation - Robot Learning, [2011-Present]

[Reviewer]

- ❖ Journal of Machine Learning Research (JMLR), 2012, 2014, 2015
- ❖ International Conference on Machine Learning (ICML), 2013, 2014, 2015
- ❖ IEEE Transactions on Automatic Control, 2014
- ❖ Amazon Machine Learning Conference, 2014
- ❖ Mediterranean Conference on Control and Automation, 2014
- ❖ Journal of Zhejiang University Science C, 2013
- ❖ Intelligent Robots and Systems (IROS), 2012
- ❖ International Conference on Artificial Intelligence and Statistics (AISTATS), 2010
- ❖ IEEE GlobeCom 2010 Workshop on Wireless Networking for UAVs, 2010
- ❖ Journal of Autonomous mobile Robot (AURO), 2009
- ❖ IEEE International Conference on Robotics and Automation (ICRA), 2009

[Co-Reviewer]

- ❖ IEEE Transactions on Automation Science and Engineering, 2008
- ❖ Advances in Neural Information Processing Systems (NIPS), [2005 - 2007]
- ❖ International Joint Conference on Artificial Intelligence (IJCAI), 2005
- ❖ International Conference on Machine Learning (ICML), 2005
- ❖ The Conference on Uncertainty in Artificial Intelligence (UAI), 2005

Conference Workshops Attendance

- ❖ Neural Information Processing Systems (NIPS), Lake Tahoe, USA, 2013
- ❖ Reinforcement Learning and Decision Making Meetings (RLDM), Princeton, USA, 2013
- ❖ Uncertainty in Artificial Intelligence (UAI), Bellevue, USA, 2013
- ❖ Neural Information Processing Systems (NIPS), Lake Tahoe, USA, 2012
- ❖ International Conference on Machine Learning (ICML), Bellevue, USA 2011
- ❖ MIT150 Symposium on Brains, Minds and Machines, USA, 2011
- ❖ MIT150 Symposium on Earth, Air, Ocean and Space: The Future of Exploration, USA, 2011
- ❖ Technology Commercialization Workshop at MIT, USA, 2011
- ❖ Neural Information Processing Systems (NIPS), Vancouver, Canada, 2007
- ❖ Uncertainty in Artificial Intelligence (UAI), Vancouver, Canada, 2007
- ❖ Neural Information Processing Systems (NIPS), Vancouver, Canada, 2006
- ❖ American Association for Artificial Intelligence (AAAI), Boston, USA, 2006
- ❖ Artificial Intelligence and Interactive Digital Environment (AIIDE), Los Angeles, USA, 2006
- ❖ Neural Information Processing Systems (NIPS), Vancouver, Canada, 2005
- ❖ RoboCup Competition & Symposium, Padova, Italy, 2003

Professional Membership

- ❖ Society for Industrial and Applied Mathematics (SIAM 2009-2010)

❖ American Association for Artificial Intelligence (AAAI 2006-2007)

References

- ❖ Jonathan How, Aero/Astro and LIDS at MIT, 617-253-3267, jhow@mit.edu
 - ❖ Nicholas Roy, Aero/Astro and CSAIL at MIT, 617-253-2517, nickroy@csail.mit.edu
 - ❖ Patrick Winston, CSAIL at MIT, 617-253-5895, phw@mit.edu
 - ❖ Richard Sutton, Computer Sci. at University of Alberta, 780-492-4584, rich@richsutton.com
 - ❖ Michael Bowling, Computer Sci. at University of Alberta, 780-492-1766, bowling@cs.ualberta.ca
- *Please arrange with me before contacting references directly.

Media

- ❖ CSAIL Spotlight ([link](#))
- ❖ MIT News ([link](#))

Languages

- [Advanced] English, فارسی (Farsi)
- [Beginner] 日本語 (Japanese)

Programming Languages

- [Advanced] Python*, C++*, Java*, Matlab*, Pascal, Prolog, SQL (* recently used)
- [Intermediate] Lisp, Visual Basic
- [Beginner] Verilog