

# Aijun Bai

## Résumé

### EXPERIENCE

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MAY 2017 — PRESENT

**Researcher, Microsoft Cloud & AI**

*Cognition Intelligence*

Developed reinforcement learning based pipeline optimization algorithms for computer vision tasks. Implemented in Python with PyTorch and applied on OCR and object detection pipelines with significant improvements. Publish in progress.

APRIL 2015 — MAY 2017

**Postdoctoral Researcher, UC Berkeley**

*Hierarchical Decision-Making*

Developed Markovian state/action abstractions for MDPs via hierarchical MCTS. Developed efficient concurrent hierarchical reinforcement learning algorithms. Implemented in C++ and achieved state-of-the-art results on RoboCup Keepaway task. Published 3 papers on **IJCAI** and **RoboCup Symposium**. Advised by Prof. Stuart Russell.

DECEMBER 2013 — MARCH 2015

**Visiting Research Scholar, CMU**

*Human-Robot Interaction*

Developed particle filtering over sets algorithm for multi-human tracking. Implemented in C++ with ROS and applied on CoBots – mobile service robots of CMU. Published 2 papers on **AAAI Symposium** and **Fusion**. Advised by Prof. Manuela Veloso and Prof. Reid Simmons.

SEPTEMBER 2009 — NOVEMBER 2014

**Research Assistant, USTC**

*Hierarchical Online Planning*

Developed hierarchical online planning algorithms for MDPs and POMDPs via MAX-Q decomposition. Implemented in C++ and applied on WrightEagle soccer simulation team in annual RoboCup competitions. Won 3 **World Champions** and 5 **National Champions**. Published 6 papers on **NIPS**, **ICAPS**, **AAMAS**, **ACM Trans** and **RoboCup Symposium**. Advised by Prof. Xiaoping Chen.

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### EDUCATION

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2014 **Ph.D. in Computer Science**

UNIV OF SCI & TECH OF CHINA

2009 **B.E. in Computer Science**

UNIV OF SCI & TECH OF CHINA

### QUALIFICATIONS

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- Strong research and engineering skills
- Rich **Artificial Intelligence**, **Machine Learning**, and **Robotics** experience
- Excellent interpersonal, communicating, writing and analytical skills
- Reliable, versatile, cooperative, good team member and independent worker

### TECHNICAL SKILLS

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CODING	C/C++, Python, BASH, Java
ENGINEERING	Linux/UNIX, PyTorch, Tensorflow, Keras, ROS, OpenCV, NumPy
EXPERTISE	Planning, (Deep) Reinforcement Learning, (Deep) Machine Learning, Computer Vision, Robotics

### LINKS

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HOMEPAGE [aijunbai.net](http://aijunbai.net)  
GITHUB [github.com/aijunbai](https://github.com/aijunbai)  
LINKEDIN [linkedin.com/in/aijunbai](https://linkedin.com/in/aijunbai)

# Aijun Bai

Researcher, Microsoft Cloud & AI  
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Homepage: <http://aijunbai.net/>

## Experience

**Microsoft**, Cloud & AI, Redmond, WA, United States, 2017.5 - present

Position: Researcher  
Project: Cognition intelligence

**University of California at Berkeley**, EECS, Berkeley, CA, United States, 2015.4 - 2017.5

Position: Postdoctoral Researcher  
Project: Hierarchical decision-making and reinforcement learning  
Adviser: Prof. Stuart Russell

**Carnegie Mellon University**, CSD, Pittsburgh, PA, United States, 2013.12 - 2015.3

Position: Visiting Research Scholar  
Project: Human-robot interaction and multi-object tracking  
Adviser: Prof. Manuela Veloso and Prof. Reid Simmons

**University of Science and Technology of China**, CSD, Hefei, Anhui, China, 2009.9 - 2014.11

Position: Research Assistant  
Project: Hierarchical decision-making in RoboCup domains  
Adviser: Prof. Xiaoping Chen

## Education

**University of Science and Technology of China**, Hefei, Anhui, China, 2009.9 - 2014.11

Ph.D. in Computer Science, advised by Prof. Xiaoping Chen

**University of Science and Technology of China**, Hefei, Anhui, China, 2005.9 - 2009.6

B.E. in Computer Science

## Research Interests

Decision-theoretic Planning, Reinforcement Learning, Deep Learning, Computer Vision and Robotics

## Publications

- [1] **Aijun Bai**, Feng Wu, and Xiaoping Chen. Posterior sampling for monte carlo planning under uncertainty. *Applied Intelligence (AI)*, 2018.
- [2] Mikhail Prokopenko, Peter Wang, Sebastian Marian, **Aijun Bai**, Xiao Li, and Xiaoping Chen. RoboCup 2d soccer simulation league: Evaluation challenges. In *RoboCup-2017: Robot World Cup XX*, Lecture Notes in Computer Science. Springer, 2017.
- [3] **Aijun Bai**, Reid Simmons, and Manuela Veloso. Multi-Object tracking and identification via particle filtering over sets. In *2017 20th International Conference on Information Fusion, FUSION 2017*, Xi'an, P.R. China, July 2017.

- [4] **Aijun Bai**, Stuart Russell, and Xiaoping Chen. Concurrent hierarchical reinforcement learning for RoboCup Keepaway. In *RoboCup-2017: Robot World Cup XX*, Lecture Notes in Computer Science. Springer, 2017.
- [5] **Aijun Bai** and Stuart Russell. Speeding up HAM learning with internal transitions. In *The Multi-disciplinary Conference on Reinforcement Learning and Decision Making, RLDM 2017, Ann Arbor, Michigan, USA, June 11-14, 2017*.
- [6] **Aijun Bai** and Stuart Russell. Efficient reinforcement learning with hierarchies of machines by leveraging internal transitions. In *Proceedings of the Twenty-Sixth International Joint Conference on Artificial Intelligence, IJCAI 2017, Melbourne, Australia, August 19-26, 2017*, pages 1418–1424, 2017.
- [7] **Aijun Bai**, Siddharth Srivastava, and Stuart Russell. Markovian state and action abstractions for MDPs via hierarchical MCTS. In *Proceedings of the Twenty-Fifth International Joint Conference on Artificial Intelligence, IJCAI 2016, New York, NY, USA, 9-15 July 2016*, pages 3029–3039, 2016.
- [8] Zongzhang Zhang, David Hsu, Wee Sun Lee, Zhan Wei Lim, and **Aijun Bai**. PLEASE: palm leaf search for POMDPs with large observation spaces (extended abstract). In *Proceedings of the Eighth Annual Symposium on Combinatorial Search, SOCS 2015, 11-13 June 2015, Ein Gedi, the Dead Sea, Israel.*, pages 238–240, 2015.
- [9] Zongzhang Zhang, David Hsu, Wee Sun Lee, Zhan Wei Lim, and **Aijun Bai**. PLEASE: palm leaf search for POMDPs with large observation spaces. In *Proceedings of the Twenty-Fifth International Conference on Automated Planning and Scheduling, ICAPS 2015, Jerusalem, Israel, June 7-11, 2015.*, pages 249–258, 2015.
- [10] **Aijun Bai**, Feng Wu, and Xiaoping Chen. Online planning for large Markov decision processes with hierarchical decomposition. *ACM Transactions on Intelligent Systems and Technology (TIST)*, 6(4):45:1–45:28, Jul 2015.
- [11] **Aijun Bai**, Feng Wu, Zongzhang Zhang, and Xiaoping Chen. Thompson sampling based Monte-Carlo planning in POMDPs. In *Proceedings of the Twenty-Fourth International Conference on Automated Planning and Scheduling, ICAPS 2014, Portsmouth, New Hampshire, USA, June 21-26, 2014*, 2014.
- [12] **Aijun Bai**, Reid Simmons, Manuela Veloso, and Xiaoping Chen. Intention-aware multi-human tracking for human-robot interaction via particle filtering over sets. In *AAAI Fall Symposium Series*, 2014.
- [13] Qiang Lu, Guanghui Lu, **Aijun Bai**, Dongxiang Zhang, and Xiaoping Chen. An intelligent service system with multiple robots. In *Robot Competition of International Joint Conference on Artificial Intelligence, IJCAI 2013, Beijing, China, 2013*.
- [14] **Aijun Bai**, Feng Wu, and Xiaoping Chen. Bayesian mixture modelling and inference based Thompson sampling in Monte-Carlo tree search. In C. J. C. Burges, L. Bottou, M. Welling, Z. Ghahramani, and K. Q. Weinberger, editors, *Advances in Neural Information Processing Systems (NIPS) 26*, pages 1646–1654. Curran Associates, Inc., 2013.
- [15] **Aijun Bai**, Feng Wu, and Xiaoping Chen. Towards a principled solution to simulated robot soccer. In Xiaoping Chen, Peter Stone, Luis Enrique Sucar, and Tijn van der Zant, editors, *RoboCup-2012: Robot Soccer World Cup XVI*, volume 7500 of *Lecture Notes in Computer Science*, pages 141–153. Springer, 2012.
- [16] **Aijun Bai**, Feng Wu, and Xiaoping Chen. Online planning for large MDPs with MAXQ decomposition (extended abstract). In Wiebe van der Hoek, Lin Padgham, Vincent Conitzer, and Michael Winikoff, editors, *International Conference on Autonomous Agents and Multiagent Systems, AAMAS 2012, Valencia, Spain, June 4-8, 2012 (3 Volumes)*, pages 1215–1216. IFAAMAS, 2012.
- [17] **Aijun Bai**, Feng Wu, and Xiaoping Chen. Online planning for large MDPs with MAXQ decomposition. In *Proc. of the Autonomous Robots and Multirobot Systems workshop (at AAMAS 2012)*, Jun 2012.

- [18] **Aijun Bai**, Xiaoping Chen, Patrick MacAlpine, Daniel Urieli, Samuel Barrett, and Peter Stone. WrightEagle and UT Austin Villa: RoboCup 2011 simulation league champions. In Thomas Röfer, Norbert Michael Mayer, Jesus Savage, and Uluc Saranli, editors, *RoboCup-2011: Robot Soccer World Cup XV*, volume 7416 of *Lecture Notes in Computer Science*, pages 1–12. Springer, 2011.

## Honors and Awards

**World Champion** of Soccer Simulation 2D, RoboCup 2013, Eindhoven, The Netherlands, Jul 2013.  
**Champion** of Soccer Simulation 2D, RoboCup China Open 2012, Hefei, China, Dec 2012.  
**First Place** of Soccer Simulation 2D Free Challenge, RoboCup 2012, Mexico City, Mexico, Jun 2012.  
Second Place of Soccer Simulation 2D, RoboCup 2012, Mexico City, Mexico, Jun 2012.  
**Champion** of Soccer Simulation 2D, RoboCup China Open 2011, Lanzhou, China, Aug 2011.  
**World Champion** of Soccer Simulation 2D, RoboCup 2011, Istanbul, Turkey, Jul 2011.  
**Champion** of Soccer Simulation 2D, RoboCup China Open 2010, Ordos, China, Jul 2010.  
Second Place of Soccer Simulation 2D, RoboCup 2010, Singapore, Singapore, Jul 2010.  
**Champion** of Soccer Simulation 2D, RoboCup China Open 2009, Dalian, China, Nov 2009.  
**World Champion** of Soccer Simulation 2D, RoboCup 2009, Graz, Austria, Jun 2009.  
Second Place of Soccer Simulation 2D, RoboCup China Open 2008, Zhongshan, China, Dec 2008.  
Second Place of Soccer Simulation 2D, RoboCup 2008, Suzhou, China, Jul 2008.  
**Champion** of Soccer Simulation 2D, RoboCup China Open 2007, Jinan, China, Oct 2007.

## Scholarships

Early Researcher Support of ICAPS, 2014.  
Travel Award of NIPS Foundation, 2013.  
Glarun Scholarship of CETC-14, 2013.  
Scholarship of China Scholarship Council (CSC), 2013.  
Kwang-Hua Scholarship of USTC, 2012.  
Aegon-Industrial Responsibility Scholarship of USTC, 2012.  
Outstanding Student Scholarship of USTC, 2006, 2007, 2008.  
Outstanding Freshman Scholarship of USTC, 2005.

## Professional Services

**Reviewer:** AAMAS 2011-2013;2017, Agent CN 2012, AAAI 2012;2015, RoboCup 2012-2014, IAS 2013;2014, ACCV 2018, IEEE Intelligent Systems, Artificial Life and Robotics, Autonomous Robots  
**Programme Committee:** IJCAI 2015-2018, AAAI 2016-2019, RLDM 2017  
**Organizing Committee:** RoboCup 2012;2013, RoboCup China Open 2007-2012  
**Technical Committee:** RoboCup 2011, RoboCup China Open 2007-2012

## Qualifications

Strong research and engineering skills

Rich **artificial intelligence**, **machine learning** and **robotics** experience

Excellent interpersonal, communicating, writing, analytical and research skills

Reliable, versatile, cooperative, good team member or independent worker

## Technical Skills

Proficiency in C/C++, Python, BASH and Java languages

Rich Linux/UNIX, PyTorch, Tensorflow, Keras, OpenCV and ROS experience

Expertise on planning, (deep) reinforcement learning and (deep) machine learning