

# Aijun Bai

## Curriculum vitae

### EXPERIENCE

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MAY 2017 — PRESENT

**Researcher, Microsoft AI & Research**

*Machine Perception and Cognition*

APRIL 2015 — MAY 2017

**Postdoctoral Researcher, UC Berkeley**

*Hierarchical Decision-Making and Reinforcement Learning*

Developed Markovian state and action abstractions for MDPs via hierarchical Monte Carlo tree search. Worked on multi-agent reinforcement learning problems in stochastic games. Advised by Prof. Stuart Russell. Published 6 papers in **IJCAI**, **ACM Trans**, **RoboCup** and **ICAPS**.

DECEMBER 2013 — MARCH 2015

**Visiting Research Scholar, CMU**

*Multi-Human Tracking for CoBots*

Developed particle filtering over sets algorithm for multi-human tracking. Deployed implemented algorithm on CoBots — mobile service robots of CMU. Enabled CoBots to interact with humans, such as saying hello and following human. Advised by Prof. Manuela Veloso and Prof. Reid Simmons. Published 1 paper in **AAAI** symposium.

SEPTEMBER 2009 — NOVEMBER 2014

**Research Assistant, USTC**

*Hierarchical Planning for RoboCup Soccer*

Worked on Markov theories (MDPs and POMDPs) based online planning and sensing under uncertainty. Developed WrightEagle soccer simulation team. Participated annual RoboCup competitions. Won 3 **World Champions** and 5 **National Champions**. Advised by Prof. Xiaoping Chen. Published 5 papers in **NIPS**, **ICAPS**, **AAMAS** and **RoboCup**.

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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 programming and software engineering abilities
- Rich **Artificial Intelligence**, **Decision-Making**, **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, Shell, Java, SQL, <del>TeX</del>                |
| DEVELOPMENT | Linux/UNIX, ROS, Qt, ODPS, OpenRAVE                            |
| KNOWLEDGE   | Decision-Making, Reinforcement Learning, Data Mining, 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

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Homepage: <http://aijunbai.net/>

## Experience

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

Position: Researcher

Project: Machine perception and cognition

**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 on CoBots

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

Thesis: Markov Theory based Planning and Sensing under Uncertainty

**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 and Robotics

## Publications

- [1] 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.
- [2] **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.
- [3] **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.

- [4] **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*.
- [5] **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.
- [6] **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.
- [7] 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.
- [8] 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.
- [9] **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.
- [10] **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.
- [11] **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.
- [12] 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*.
- [13] **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.
- [14] **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.
- [15] **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.
- [16] **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.
- [17] **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 Saranlı, 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, AAI 2012;2015, RoboCup 2012-2014, IAS 2013;2014, IEEE Intelligent Systems, Journal of Artificial Life and Robotics  
**Programme Committee:** IJCAI 2015-2017, AAI 2016-2018, RLDM 2017  
**Organizing Committee:** RoboCup 2012;2013, RoboCup China Open 2007-2012  
**Technical Committee:** RoboCup 2011, RoboCup China Open 2007-2012

## Qualifications

Strong programming and software development abilities

Rich **artificial intelligence**, **automated planning**, **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 L<sup>A</sup>T<sub>E</sub>X coding languages

Rich Qt, Boost, ODPS, SQL, ROS and OpenRAVE experience

Experienced Linux/UNIX administration and programming skills

Familiar with agent, database, web, cloud computing and robotics development