

# Junkai Ren

Ph.D. in Computer Science – National University of Defense Technology – Changsha, China

✉ junkai.ren@ualberta.ca    [www.jkren6.github.io](http://www.jkren6.github.io)

## Education

---

### National University of Defense Technology (NUDT)

Changsha, China

- Ph.D. Student, Institute of Unmanned Systems
- Advisor: Prof. [Xin Xu](#)

*Feb. 2017 – Now*

### National University of Defense Technology (NUDT)

Changsha, China

- Master of Engineering in Control Science, Department of Automation
- Advisor: Prof. [Chenggang Xie](#) and Prof. [Zhiqiang Zheng](#)

*Sep. 2014 – Dec. 2016*

### Henan University of Science and Technology (HAUST)

Luoyang, China

- Bachelor of Engineering in Vehicle
- GPA: 4.28/5 (**Ranking: 2<sup>nd</sup>/144**)
- In Sep.2014, I was enrolled by NUDT for graduate study without the entrance examination, because of the excellent performance during my undergraduate period.

*Sep. 2010 – July. 2014*

## Research Interests

---

My research interests lie in the general area of machine learning, particularly in reinforcement learning and transfer learning, as well as their applications in sequential decision making, autonomous driving, and mobile robots.

## Publications

---

### A Novel Real-time Motion Control Approach for Omni-directional Mobile Robots

- **Junkai Ren**, Wei Dai, Kuangye Xie, Junhao Xiao, Huimin Lu.
- In Proceedings of the 37th Chinese control conference. CCC 2018. IEEE.

### A Reinforcement Learning Approach to Autonomous Decision Making of Intelligent Vehicles on Highways

- Xin Xu, Lei Zuo, Xin Li, Lilin Qian, **Junkai Ren**, Zhenping Sun.
- In Proceedings of the IEEE Transactions on Systems, Man, and Cybernetics: Systems. IEEE.

### Pedestrian trajectory prediction via the Social-Grid LSTM model

- Bang Cheng, Xin Xu, Yujun Zeng, **Junkai Ren**, Seul Jung.
- In Proceedings of the 2<sup>nd</sup> Asian Conference on Artificial Intelligence Technology & The Journal of Engineering. ACAIT 2018, IEEE. **Best Paper Award.**

### Control System for Active Ball Handling in the RoboCup Middle Size League

- **Junkai Ren**, Chenggang Xie, Junhao Xiao, Kaihong Huang, Huimin Lu.
- In Proceedings of the 28th Chinese Control and Decision Conference. CCDC 2016, IEEE

### Content-Based Top-N Recommendation Using Heterogeneous Relations

- Yifan Chen, Xiang Zhao, Junjiao Gan, **Junkai Ren**, Yanli Hu.
- In Proceedings of the 27th Australasian Database Conference. ADC 2016, Springer. **Best Paper Award.**

## Projects

---

### **Chinese Intelligent Vehicle Future Challenge 2017, (IVFC) Dec. 2017**

- I have been involved in the UGV team under the supervision of Prof. Xin Xu in NUDT since Mar. 2017.
- My work mainly focused on the overtaking policy learning for autonomous vehicles based on RL methods and multi-perception fusion.

### **An Indoor Patrol Robot Controlled by Android App Based on Robot Operating System. Jan. 2015-Jan. 2016**

- A graduate student innovation project supported by NUDT.
- The project was intended to design an autonomous navigation robot which can realize indoor patrol, environmental monitoring and communicating with remote device.
- I was the team leader and we had five members who came from different specialties. I mainly focused on the precise localization and fast environment mapping part based on an existing 2D-SLAM algorithm using Kinect. I achieved the goal of making the robot work automatically, which means the mobile robot can now go through multi rooms automatically after mapping.

### **RoboCup Middle Size League Oct. 2014 - Jul. 2016**

- I was involved in the NuBot soccer robot team since Oct. 2014.
- We participated in World RoboCup 2015, 2016. We won second place in Technical Challenge and third place in Scientific Challenge in 2015, better grades were awarded in 2016.
- We designed a new generation robot platform including mechanical system, electrical system and control system, after that we focus our research mainly on multi-robot cooperation, robust robot vision and the distributed strategy.
- I was responsible for control system and mechanical parts of these soccer robots. In addition, I adopted some useful algorithms like PID and Sliding-mode to make the robots work more efficiently and robustly in the highly competitive and dynamic environments like RoboCup Middle Size League (MSL). To the mechanical part, I designed a new generation robot platform which showed excellent dynamic performance in RoboCup 2016

### **Minibus General Design Especially Frame and Brake System Design Mar. 2014 - Jun. 2014**

- A rational vehicle frame and brake system were designed. It aims at a better balance between fuel economy and driving performance. Difficulties lies in the arrangement of various vehicle components and parameters.
- Through this project, I reviewed lots of knowledge related to vehicle engineering which I learned during the undergraduate stage, besides, I have gotten a good mechanical drawing skill.

## Honors and Awards

---

### **Scholarships**

- Guanghua Scholarship awarded by NUDT. 2015
- The First Prize Scholarship awarded by HAUST. 2013, 2014
- National Scholarship awarded by Ministry of Education of the People's Republic of China. 2013
- National Endeavor Scholarship ranking 2<sup>nd</sup> out of 144 students. 2014

### **Competitions**

- First runner-up in World RoboCup 2015 Technical Challenge and second runner-up in Scientific Challenge. 2015
- Second prize in National Postgraduate Mathematic Contest in Modeling. 2015
- Best Debater Honored by Student Team of College of Mechatronic Engineering and Automation, NUDT. 2015

### **Honors**

- Excellent Student Honored by NUDT. 2015, 2016
- Outstanding Graduate Honored by the Education Department of Henan Province. 2014