

# Jianhua WANG

Final Year, Automation and Reinforcement learning

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📍 Beijing, China



## EDUCATION BACKGROUND

- Sept. 2019 – Jun. 2021 **Centrale Pékin, Beihang University. Master's Degree in Industrial Engineering**  
(Ongoing) Research Major: Cooperative control and reinforcement learning  
Master Thesis: *Formation tracking control for multi-UAV systems with a dynamic leader*
- Sept. 2014 – Jun. 2018 **Centrale Pékin, Beihang University. Bachelor's Degree in Applied Mathematics**
- Sept. 2017 – Jun. 2018 **ESTACA, France. Specialty in Aeronautics and Aerospace, Exchange Semester**
- Jun. 2014 **College Entrance Examination, Shandong. Grade: 688/750, top 0.7‰**

## PUBLICATIONS

### • Papers

1. **Jianhua Wang**, Liang Han *et al.* Time-varying formation of second-order discrete-time multi-agent systems under non-uniform communication delays and switching topology with application to uav formation flying. *IET Control Theory & Applications*, 14(14):1947–1956, 2020.  
<https://doi.org/10.1049/iet-cta.2020.0183>.
2. **Jianhua Wang**, Liang Han *et al.* Time-varying formation of double-integrator discrete-time multi-agent systems with switching topology and time-delay.  
In *2019 Chinese Automation Congress (CAC)*, pages 3571–3576, IEEE, 2019.  
<https://doi.org/10.1109/CAC48633.2019.8997391>.
3. **Jianhua Wang**, Liang Han *et al.* Bipartite antagonistic time-varying formation tracking for multi-agent system.  
In *2019 Chinese Control Conference (CCC)*, pages 6118–6123, IEEE, 2019.  
<https://doi.org/10.23919/ChiCC.2019.8866328>.
4. **Jianhua Wang**, Fei Liu *et al.* Formation tracking control for second-order nonlinear multi-agent system with unknown maneuvering leader.  
In *2020 Chinese Automation Congress (CAC)*, IEEE, 2020.
5. **Jianhua Wang**, Liang Han *et al.* Distributed sliding mode control for time-varying formation tracking of multi-uav system with a dynamic leader.  
*Aerospace Science and Technology*, 2020. | Under major review.

### • Patent

- **A formation tracking control method based on discrete-time sliding mode control structure**  
Patent number: 202010419920.2 | Preliminary examination passed.

## PROJECTS

Research on multi-UAV formation tracking control technologies and applications

Supported by **National Natural Science Foundation of China**

📅 Oct. 2017 – Jun. 2020

- Design of the multi-UAV cooperative formation tracking controller.
- Verification of the controller's stability via Matlab and Simulink simulations.
- Construction of the multi-UAV virtual formation platform based on ROS and Gazebo simulator.
- Development of a multi-UAV formation experimental platform based on the indoor positioning system<sup>\*video</sup>.

Research on multi-train dynamic formation control method based on virtual coupling frame

(cooperation with Traffic Control Technology Co., Ltd)

Supported by **Beijing Natural Science Foundation**

📅 Nov. 2018 – Jun. 2020

- Redaction of fund project application.

- Design of multi-train formation tracking control protocols under multiple constraints like switching topologies and time-delays.
- Construction of a multi-train formation demonstration platform based on Lego EV3<sup>*\*video*</sup>.

## Air-ground cooperative confrontation system platform based on virtual simulation

Cooperative with **China Aerospace Science & Industry Corporation** 📅 Jun. 2019 – Dec. 2019

- Design of UAV/UGV air-ground cooperative countermeasure demonstration algorithms.
- Construction of a virtual coordinated combat scenario based on Gazebo simulator<sup>*\*video*</sup>.
- Development and redaction of Matlab/Python control API demos.

## Research on intelligent interception method of small aircraft targets for multi-UAV systems

Application for **Beijing Natural Science Foundation** 📅 Jun. 2020

- Redaction of fund project application.
- Design of coordinated interception methods for multiple UAVs based on space-time coverage.
- Construction of a multi-UAV collaborative intercept application demonstration platform.

# EXPERIENCES

## Internships

### Simulation of drone explosive detection scene based on Gazebo

**Suzhou Weimu Intelligent System Co., Ltd**

📅 May 2020 – Nov. 2020

📍 Suzhou, China

- Construction of explosives detection scenarios using multiple UAVs based on Gazebo simulator.
- Development of single UAV control programs based on sliding mode and reinforcement learning methods.
- Achievement of wide-area explosives detection by using multi-UAV intelligent formation algorithms.

### Development of multi-UAV formation experiment platform

**Sino-French UAV Laboratory, Beihang University**

📅 Jun. 2019 – Sept. 2019

📍 Beijing, China

- Construction of a multi-UAV virtual simulation platform based on Gazebo and Simulink.
- Development of a distributed multi-UAV formation experiment platform based on the Optitrack indoor positioning system and on-board Raspberry Pi.
- Responsible for assembling quadrotor UAVs and conducting multi-UAV formation experiments.

### Design of automatic sampling and result recognition device

**Suzhou Weimu Intelligent System Co., Ltd**

📅 Oct. 2018 – Jun. 2019

📍 Beijing, China

- Construction of an automatic sample aspiration transfer device, including slides, servos, motorized suction cups, and a Raspberry Pi<sup>*\*video*</sup>.

### Optimization of the graphene fluoride material preparation process

**Centrale Pékin, Beihang University**

📅 Oct. 2017 – Jun. 2018

📍 Beijing, China

- Preparation of graphene fluoride material and analyses of different experimental conditions' effects.
- Analyses of the fabricated graphene fluoride's surface characteristics by using SEM.

### Modeling and simulation of wind turbine

**ESTACA (Saint-Quentin-en-Yvelines)**

📅 Oct. 2017 – Dec. 2017

📍 Paris, France

- Construction of the wind turbine's 3D models by using CATIA.
- Analyses of the paddle's stress and strain, and improvement of the paddle's configuration.

## Activities

### Tutor for P2018 freshmen

**Centrale Pékin, Beihang University**

📅 Sep. 2018 – Jun. 2019

📍 Beijing, China

- Organization of the team-building activities for freshmen.

- Response of the freshmen's questions about the college's cultivating model.

## Deputy director of the Press Center of the Student Board

Centrale Pékin, Beihang University

📅 Sep. 2015 – Jun. 2016

📍 Beijing, China

- Responsible for arranging news coverage of various college events.
- Organization of photography training for new members.

## Volunteer at rural summer camps

Enjoy Volunteering

📅 May. 2015 – Oct. 2016

📍 Beijing, China

Shangzhuang Primary School

📅 Jul. 2016 – Aug. 2016

📍 Shandong, China

Taiping Middle School

📅 Jul. 2015 – Aug. 2015

📍 Sichuan, China

- Responsible for preparing educational games and picture book reading activities for children.

## TECHNICAL SKILLS

- Advanced knowledge: Matlab  $\LaTeX$  Ubuntu ROS
- Intermediate knowledge: Python Gazebo Java CATIA Visio

## LANGUAGES

- Chinese: Mother tongue
- English: Fluent CET-6
- French: Fluent DALF C1

## AWARDS

Outstanding Academic Paper Award for Graduate Students (1%)	2020
National Scholarship for Postgraduate Students (1%)	2019
Student Medal of Ecole Centrale de Pekin (1%)	2019
Beihang Excellent Student Cadre (3%)	2019
Voluntary Practice Star of Ecole Centrale de Pekin (1%)	2018
Beihang Outstanding Graduate (10%)	2018
First-class Scholarship for Postgraduate Students (30%)	2018,2019,2020
Beihang Postgraduate Freshmen Admission Scholarship (5%)	2018
International Exchange Program Scholarship for Excellent Undergraduates (from CSC: China Scholarship Council)	2017
Merit Student of Beihang University	2015,2016,2017
Beihang Undergraduate Freshmen Admission Scholarship (5%)	2014

## INTERESTS

- Basketball, table-tennis, swimming, badminton, bodybuilding, bicycle
- Reading, photography, watching documentaries