# JIE WANG

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## RESEARCH INTERESTS

Apply machine learning to classic robotics framework safely and effectively. A combination of model-based and learning-based methods to achieve a high-performance robot interaction with unstructured environments while respecting a set of safety constraints.

## EMPLOYMENT

Postdoctoral Fellow (Advisor: Prof. Joshua Marshall) 2020–2021
Ingenuity Labs Research Institute, Queen's University.
- Proposed a high-performance path following algorithm that combines Gaussian Processes based learning with Feedback Linearized Model Predictive Control for ground mobile robots operating in off-road terrains.

Postdoctoral Fellow (Advisor: Prof. Mozhdeh Shahbazi) 2018–2020
Dept. of Geomatics Engineering, University of Calgary.
- Developed a robust multi-vehicle tracking method for drones that combined a Convolutional Neural Network to extract deep appearance features and a Kalman filter to estimate motions.
- Implemented visual SLAM solutions including LSD-SLAM, ORB-SLAM2, and LDSO on micro aerial vehicles.

Research Assistant (Advisor: Prof. Alex Ramirez-Serrano) 2011–2017
Dept. of Mechanical and Manufacturing Engineering, University of Calgary.
- Worked on the multibody dynamics modeling, locomotion mode selection and motion planning of a leg-tracked quadrupedal robot.

## EDUCATION

Ph.D. Robotics, University of Calgary, Canada. 2011–2017
Unmanned Vehicles Robotarium Lab, Dept. of Mechanical and Manufacturing Engineering.
Advisor: Prof. Alex Ramirez-Serrano.
Thesis title: "Autonomous Locomotion Mode Transition of Ground Hybrid Robots."

B.Sc. Mechanical and Electrical Engineering, Northwest A&F University, China. 2007–2011

## AWARDS

Full Registration Fee Scholarship of DLRL summer school, CIFAR & Amii. 2019
Mitacs Career Connect Award, University of Calgary. 2018–2019
Research Assistant Scholarship, University of Calgary. 2011–2015

First-Class Academic Scholarship, Northwest A&F University. 2010–2011
Outstanding Student Leader Award, Northwest A&F University. 2008–2009

## PUBLICATIONS

[J4] **Jie Wang***, Michael T. H. Fader and Joshua A. Marshall. "Learning-Based Model Predictive Control for Improved Mobile Robot Path Following using Gaussian Processes and Feedback Linearization". Submitted to IEEE/ASME Transactions on Mechatronics on December 20, 2021. Manuscript # TMECH-12-2021-12868. [pdf][video]

[J3] **Jie Wang***. "An intuitive tutorial to Gaussian processes regression". Submitted to Artificial Intelligence Review on November 21, 2021. Manuscript # AIRE-D-21-01207. (arXiv: 2009.10862, 2020). [pdf]

[J2] Andrew Farley, **Jie Wang*** and Joshua A. Marshall. "How to Pick a Mobile Robot Simulator: A Quantitative Comparison of CoppeliaSim, Gazebo, MORSE and Webots with a Focus on the Accuracy of Motion Simulations". Submitted to Simulation Modelling Practice and Theory on November 11, 2021. Manuscript # SIMPAT-D-21-1068. [pdf]

[J1] **Jie Wang***, Sandra Simeonova, and Mozhdeh Shahbazi. "Orientation- and Scale-Invariant Multi-Vehicle Detection and Tracking from Unmanned Aerial Videos". Remote Sensing, vol. 11, no. 18, pp. 2155, 2019. [pdf]

[C4] Mozhdeh Shahbazi, Sandra Simeonova, Derek Lichti and **Jie Wang**. "Vehicle Tracking and Speed Estimation from Unmanned Aerial Videos". International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences (XXIV ISPRS Congress), vol. XLIII-B2-2020, pp. 623-630, 2020. [pdf]

[C3] **Jie Wang*** and Mozhdeh Shahbazi. "Mapping Quality Evaluation of Monocular SLAM Solutions for Micro Aerial Vehicles". International Archives of Photogrammetry, Remote Sensing and Spatial Information Sciences (ISPRS Archives), vol. XLII-2/W17, pp. 413-420, 2019. [pdf]

[C2] **Jie Wang*** and Alex Ramirez-Serrano. "Stair-climbing and Energy Consumption Evaluation of a Leg-tracked Quadruped Robot". In Proceedings of the IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM), pp. 1448–1453, 2016. [pdf]

[C1] **Jie Wang*** and Alex Ramirez-Serrano. "Locomotion Mode Transition Study of Ground Hybrid Robots". In Proceedings of the International Conference on Climbing and Walking Robots and Support Technologies for Mobile Machines (CLAWAR), pp. 531–538, 2016. [pdf]

## TEACHING

Light Prototyping Technician

Schulich School of Engineering, University of Calgary. 2014–2016
Provided technical supports (e.g., 3D prints, Arduino, NI myDAQ) for undergraduate capstone projects.

Teaching Assistant

Dept. of Mechanical and Manufacturing Engineering, University of Calgary.
ENGG 200: Engineering Design and Communication. 2016
ENME 461: Foundations of Mechatronics. 2014
ENME 339: Engineering Graphics and CAD. 2014
ENME 337: Computing Tools for Engineering Design. 2013
ENME 538: Mechanical Design Methodology and Application. 2011–2013

## MENTORING

Master's Students

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|---|---|
| Sandra Simeonova (Geomatics Engineering, University of Calgary) | 2019–2020 |
| Camilo Cortes (Geomatics Engineering, University of Calgary) | 2019–2020 |
| Eric Wang (Geomatics Engineering, University of Calgary) | 2019–2020 |
| Parnia Shokri (Electrical Engineering, University of Calgary) | 2019–2020 |
| Michael Fader (Mechanical and materials Engineering, Queen's University) | 2020–2021 |
| Natassia Lunzmann (Electrical and Computer Engineering, Queen's University) | 2020 |
| Jack Caldwell (Electrical and Computer Engineering, Queen's University) | 2021 |

Undergraduate Students

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| Kaela Johnson (Mechanical Engineering, University of Calgary) | 2019 |
| Liége Maldaner (Electrical, Federal University of Santa Maria) | 2019 |
| Andrew Farley (Electrical and Computer Engineering, Queen's University) | 2020 |
| Dean Sacoransky (Electrical and Computer Engineering, Queen's University) | 2021 |
| Jinhao Ruan (Electrical and Computer Engineering, Queen's University) | 2021 |

## SERVICE

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|---|---|
| Reviewer of Artificial Intelligence Review | 2021 |
| Reviewer of IEEE/ASME Transactions on Mechatronics | 2021 |
| Reviewer of IEEE International Conference on Robotics and Intelligent Systems | 2017–2020 |
| Reviewer of IEEE Transactions on Systems, Man and Cybernetics: Systems | 2020 |

## OUTREACH

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| Referee of hacking and designing Geomathon event at University of Calgary. | 2019 |
| Mentor of FIRST LEGO League of Calgary team Supernova. | 2019 |

## PERSONAL INFORMATION

Languages: Chinese (native), English (fluent).
Hobbies: Hiking, Cooking.