

Liding Zhang, Ph.D.candidate (Dr.rer.nat)

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Employment History

- 2022 – ...
- **Research Assistant**
Chair of Robotics, Artificial Intelligence and Real-Time Systems, TUM School of Computation, Information and Technology (CIT), Technical University of Munich (TUM).
 - **Scientific Researcher**
TUM School of Munich Institute of Robotics and Machine Intelligence (MIRMI), Technical University of Munich (TUM).
 - **Project Associate**
Bavarian State Ministry for Economic Affairs, Regional Development and Energy (StMWi) for the Lighthouse Initiative KI.FABRIK (AI.Factory), (Grant no. DIKO249).
 - **Project Associate**
Federal Ministry of Education and Research of Germany (BMBF) in the programme of "Souverän. Digital. Vernetzt." Joint project 6G-life, (Grant no. 16KISK002).
 - **Project Associate**
Alice Wallenberg Foundation and by the European Union's Horizon 2020 research and innovation program, DARKO (Dynamic Agile Production Robot) (Grant No. 101017274).
- 2021 – 2022
- **Project Assistant**
German Research Foundation (DFG), "Chemical Expansion of Fault-Cerium Mixed Oxide Layers at High Temperatures" (Project No. 404875250), Technical University of Clausthal.
 - **Project Assistant**
E-Bicycle ergometer in the laboratory for the biomechanics project, Institute of Mechanical Engineering, Technical University of Clausthal.
- 2019 – 2020
- **Assistant Mechanical Engineer**
Noise, vibration, and harshness (NVH) group of Volkswagen Automatic Transmission (Tianjin) Co. Ltd. · Full-time.
- 2016 – 2017
- **Mechanical Engineer Intern**
Industrial Manufacturing group of Kisters-Stiftung gemeinnützige GmbH · Part-time.

Education

- 2022 – ...
- **Ph.D., Technical University of Munich (DE) - Computer Science - Robotics.**
Supervisor: Prof. Dr.-Ing Alois Knoll
Thesis title: *Multi-Robot Collaborative Intelligence: A Unified Framework for Optimal Task and Motion Planning. (Heterogeneous Robotic Manipulation)*
- 2020 – 2022
- **M.Sc., Technical University of Clausthal (DE) - Automation Technology.**
Supervisor: Prof. Dr.-Ing Christian Rembe
Thesis title: *Vibration Measurement in the Gigahertz Range at Frequencies Exceeding the Bandwidth of Photodetectors in the Visible Frequency Range (about >2.5 GHz)*.
- 2016 – 2020
- **B.Sc., Rhine-Waal University of Applied Science (DE) - Mechanical Engineering.**
Supervisor: Prof. Dr.-Ing Niels Ostergaard
Thesis title: *Comprehensive Analytic and Numerical Inverse Dynamics Approaches to the Classic Sliding-Rod Problem.*

Selected Research Publications (*Equal Contribution)

Journal Articles

- 1 L. Zhang, K. Cai, Y. Zhang, Z. Bing, C. Wang, F. Wu, S. Haddadin, and A. Knoll, "Estimated informed anytime search for sampling-based planning via adaptive sampler," *IEEE Transactions on Automation Science and Engineering (T-ASE)*, vol. 22, pp. 18 580–18 593, 2025, [JCR Q1, IF: 6.4].  DOI: 10.1109/TASE.2025.3590084.
- 2 K. Cai*, L. Zhang*, X. Su, K. Chen, C. Wang, S. Haddadin, A. Knoll, A. Ajoudani, and L. Figueredo, "Just in time informed trees: Manipulability-aware asymptotically optimized motion planning," *IEEE/ASME Transactions on Mechatronics (T-Mech)*, pp. 1–12, 2025, [JCR Q1, IF: 7.3].  DOI: 10.1109/TMECH.2025.3570573.
- 3 L. Zhang, K. Cai, Z. Bing, C. Wang, and A. Knoll, "Genetic informed trees (GIT*): Path planning via reinforced genetic programming heuristics," *Biomimetic Intelligence and Robotics*, vol. 5, no. 3, p. 100 237, 2025, [JCR Q1, IF: 5.5], ISSN: 2667-3797.  DOI: 10.1016/j.birob.2025.100237.
- 4 L. Zhang, K. Cai, Z. Sun, Z. Bing, C. Wang, L. Figueredo, S. Haddadin, and A. Knoll, "Motion planning for robotics: A review for sampling-based planners," *Biomimetic Intelligence and Robotics*, vol. 5, no. 1, p. 100 207, 2025, [JCR Q1, IF: 5.5], ISSN: 2667-3797.  DOI: 10.1016/j.birob.2024.100207.
- 5 L. Zhang, Y. Ling, Z. Bing, F. Wu, S. Haddadin, and A. Knoll, "Tree-based grafting approach for bidirectional motion planning with local subsets optimization," *IEEE Robotics and Automation Letters (RA-L)*, vol. 10, no. 6, pp. 5815–5822, 2025, [JCR Q1, IF: 5.3].  DOI: 10.1109/LRA.2025.3562369.
- 6 L. Zhang, S. Wang, K. Cai, Z. Bing, F. Wu, C. Wang, S. Haddadin, and A. Knoll, "APT*: Asymptotically optimal motion planning via adaptively prolated elliptical r-nearest neighbors," *IEEE Robotics and Automation Letters (RA-L)*, vol. 10, no. 10, pp. 10 242–10 249, 2025, [JCR Q1, IF: 5.3].  DOI: 10.1109/LRA.2025.3598616.

Conference Proceedings

- 1 L. Zhang, K. Chen, K. Cai, Y. Zhang, Y. Dang, Y. Wu, Z. Bing, F. Wu, S. Haddadin, and A. Knoll, "Direction informed trees (DIT*): Optimal path planning via direction filter and direction cost heuristic," in *2025 IEEE International Conference on Robotics and Automation (ICRA)*, 2025, pp. 1766–1772.  DOI: 10.1109/ICRA55743.2025.11127725.
- 2 L. Zhang, Z. Li, K. Cai, Q. Huang, Z. Bing, and A. Knoll, "Language-enhanced mobile manipulation for efficient object search in indoor environments," in *2025 IEEE International Conference on Cyborg and Bionic Systems (CBS)*, 2025, pp. 425–430.  DOI: 10.1109/CBS65871.2025.11267741.
- 3 L. Zhang, S. Wang, K. Cai, Z. Bing, and A. Knoll, "Multi-sets trees (MST*): Accelerated asymptotically optimal motion planning optimization informed by multiple domain subsets," in *2025 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025, pp. 11 389–11 396.  DOI: 10.1109/IROS60139.2025.11246371.
- 4 L. Zhang, Y. Wei, K. Cai, Z. Bing, Y. Meng, F. Wu, S. Haddadin, and A. Knoll, "CIT*: Context-based biased batch-sampling for almost-surely asymptotically optimal motion planning," in *2025 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2025, pp. 4421–4428.  DOI: 10.1109/IROS60139.2025.11246858.
- 5 L. Zhang, Q. Zong, Y. Zhang, Z. Bing, and A. Knoll, "Deep fuzzy optimization for batch-size and nearest neighbors in optimal robot motion planning," in *2025 IEEE International Conference on Cyborg and Bionic Systems (CBS)*, 2025, pp. 419–424.  DOI: 10.1109/CBS65871.2025.11267553.
- 6 M. Schewe*, L. Zhang*, and C. Rembe, "Signal processing scheme for broadband heterodyne gigahertz interferometry with a broadband and a second low-noise photodetector with limited bandwidth," in *Journal of Physics: Conference Series*, vol. 2698, 2024, p. 012 012.  DOI: 10.1088/1742-6596/2698/1/012012.

- 7 L. Zhang, Z. Bing, K. Chen, L. Chen, K. Cai, Y. Zhang, F. Wu, P. Krumbholz, Z. Yuan, S. Haddadin, and A. Knoll, "Flexible informed trees (FIT*): Adaptive batch-size approach in informed sampling-based path planning," in *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024, pp. 3146–3152. doi: 10.1109/IROS58592.2024.10802466.
- 8 L. Zhang, Z. Bing, Y. Zhang, K. Cai, L. Chen, F. Wu, S. Haddadin, and A. Knoll, "Elliptical k-nearest neighbors - path optimization via coulomb's law and invalid vertices in c-space obstacles," in *2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2024, pp. 12 032–12 039. doi: 10.1109/IROS58592.2024.10802280.

Skills

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| Languages | Proficient in reading, writing, and speaking English, Chinese (native), and German. |
| Coding | C++, C, Python, MATLAB/Simulink, JSON, XML, URDF, XACRO, L ^A T _E X, Arduino ... |
| Drafting | Solidworks, AutoCAD, Catia, ANSYS, PLC (Ladder/Functional block diagrams) ... |
| Robot Dev. | ROS1/ROS2, Git, Linux, DOCKER, Moveit!, CoppeliaSim, Gazebo, Mujoco, OMPL ... |
| Misc. | Academic research, teaching, training, consultation, L ^A T _E X typesetting, and publishing. |

Miscellaneous Experience

Awards and Achievements

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| 2025 | Editor's Choice (Elsevier-Biomimetic Intelligence and Robotics) [JCR Q1, IF: 5.5],
The top selected papers from the Survey on Robotic Motion Planning in the Issue 1, 2025. |
| | Outstanding Contribution to Robotics Research Nomination,
Recommended by Prof. Dr. Luis Figueiredo, Project X – Lighthouse Project Leader, Department of Computer Science, Royal College of Science, University of Nottingham (UK). |
| 2023 | China Scholarship Council (CSC),
Full-Scholarship funded by the Ministry of Education of the People's Republic of China. |
| 2022 | Department Nomination of Applied Metrology,
Recommendation letter from Prof. Dr.-Ing Christian Rembe (Chairman of the German University Lecturers), Institute of Electrical Information Technology, Technical University of Clausthal. |
| | Department Nomination for Outstanding Student Performance,
Recommendation letter from Dr.-Ing. Marvin Schewe (Postdoctoral researcher at NIST, USA), Institute of Electrical Information Technology, Technical University of Clausthal. |
| 2019 | Department Nomination of Noise, Vibration, and Harshness (NVH).
Recommendation letter from Mr. Vollrath Andreas (Head of quality assurance) and Mrs. Stefanie Wangemann (Head of org. & education), Volkswagen Automatic Transmission (Tianjin) Co. Ltd. |

Certification

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| 2025 | "HaiChuang Future" Conference Best Report Award Winner,
Awarded by the International Innovation Research Institute of Beijing University of Aeronautics and Astronautics - International Young Scholars Forum and Yuhang District of Hangzhou City. |
| 2022 | Certified Deutsch (German) C1/2 (highest-level),
Awarded by Dr. Jörg Schröder (Stellv. Leiter des Sprachenzentrums), Stufe nach Gemeinsamen Europäischem, Technical University of Clausthal. |
| 2010 | 1st Prize of National Trumpet Junior Group,
Awarded by China Musical Instruments Association (Western Musical Instruments), China. |

Miscellaneous Experience (continued)

2009  **Certified Profession Level 9 in Trumpet.**
Awarded by Wuhan Conservatory Of Music Association, China.

Community Service

- Chair:
- ▷ 2024 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),
Teaser Session of Robot Motion Planning IV, ADNEC in Abu Dhabi, UAE.
 - ▷ 2025 IEEE International Conference on Cyborg and Bionic Systems (CBS),
Teaser Session of Motion Planning and Control T2, Empark Grand in Beijing, China.
- Reviewer:
- IEEE Transactions on Robotics (T-RO),
 - IEEE Transactions on Automation Science and Engineering (T-ASE),
 - IEEE/ASME Transactions on Mechatronics (T-Mech),
 - IEEE Robotics and Automation Letters (RA-L),
 - IEEE Transactions on Neural Networks and Learning Systems (TNNLS),
 - Computers and Electronics in Agriculture,
 - Biomimetic Intelligence and Robotics,
 - Journal of the Franklin Institute,
 - IEEE International Conference on Robotics and Automation (ICRA),
 - IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS),
 - IEEE-RAS International Conference on Humanoid Robots (Humanoids),
 - IEEE International Conference on Cyborg and Bionic Systems (CBS).