

Zhiyi Xiang

Ph.D. Candidate, College of Advanced Interdisciplinary Studies, National University of Defense Technology, Changsha, Hunan, China

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Employment History

2019 **Xuelong 2**, Jiangnan Shipyard, Shanghai.

Education

- 2022 – 2025 **Ph.D.** in Optical Engineering, National University of Defense Technology, China.
- 2019 – 2021 **M.Sc.** in Optical Engineering, National University of Defense Technology, China.
- 2015 – 2019 **B.Sc.** in Optoelectronic Information Science and Engineering, Anhui University of Technology, China.

Selected Awards and Fellowships

- 2022 First Prize Freshman Scholarship of National University of Defense Technology.
- 2019 Outstanding Graduate for Excellence in Both Character and Academics by Anhui Province.

Research Interests

- **Vehicle-Mounted Laser Doppler Velocimetry:** Researching various structures of vehicle-mounted laser Doppler velocimeters and using them to obtain multi-dimensional velocity information and attitude information of vehicles.
- **Integrated Navigation Technology:** Studying integrated navigation methods for SINS of various accuracy levels with GNSS, OD, LDV, and other systems, with particular emphasis on deep integration with LDV.
- **Inertial Navigation Technology:** Focusing on error modeling and suppression of SINS at different accuracy levels.

Research Publications (Main Contributor - Top Three)

Journal Articles

- 1 **Z. Xiang**, Q. Wang, X. Nie, and J. Zhou, "Deep learning-aided laser doppler velocimeter-inertial measurement unit fusion for robust vehicle localization in global navigation satellite systems-denied environments," *Engineering Applications of Artificial Intelligence*, vol. 165, p. 113 425, Feb. 2026. DOI: 10.1016/j.engappai.2025.113425.
- 2 **Z. Xiang**, Q. Wang, R. Huang, S. Jin, X. Nie, and J. Zhou, "Further application of pitch independent laser doppler velocimeter in land vehicle autonomous navigation," *IEEE Transactions on Vehicular Technology*, pp. 1–13, Mar. 2025. DOI: 10.1109/TVT.2025.3546606.
- 3 **Z. Xiang**, Q. Wang, S. Jin, X. Nie, and J. Zhou, "A fault-tolerant sins/dual 2D-LDV tightly coupled integration scheme for autonomous vehicle navigation," *Scientific Reports*, vol. 15, no. 1, p. 35 671, Oct. 2025. DOI: 10.1038/s41598-025-19574-7.

- 4 R. Huang, Q. Wang, **Z. Xiang**, X. Nie, J. Zhou, and H. Luo, "A water track laser doppler velocimeter for use in underwater navigation," *Measurement Science and Technology*, vol. 35, no. 5, p. 056 301, Feb. 2024.  DOI: 10.1088/1361-6501/ad21d6.
- 5 **Z. Xiang**, Q. Wang, R. Huang, S. Jin, X. Nie, and J. Zhou, "A robust online calibration method for sins/ldv integrated navigation system based on position observation," *IEEE Sensors Journal*, vol. 24, no. 1, pp. 895–908, Jan. 2024.  DOI: 10.1109/JSEN.2023.3333898.
- 6 **Z. Xiang**, Q. Wang, S. Jin, X. Nie, and J. Zhou, "Online calibration method for sins/ldv integrated navigation system based on left group error definition," *Measurement Science and Technology*, vol. 35, no. 5, p. 055 106, Feb. 2024.  DOI: 10.1088/1361-6501/ad24b8.
- 7 **Z. Xiang**, Q. Wang, X. Nie, S. Jin, and J. Zhou, "Lstm-assisted sins/2d-ldv tightly coupled integration approach using local outlier factor and adaptive filter," *IEEE Transactions on Instrumentation and Measurement*, vol. 74, pp. 1–15, Nov. 2024.  DOI: 10.1109/TIM.2024.3502729.
- 8 R. Huang, Q. Wang, **Z. Xiang**, X. Nie, J. Zhou, and H. Luo, "Water track laser doppler velocimeter [invited]," *Chinese Optics Letters*, vol. 21, no. 9, p. 090 005, Sep. 2023.  DOI: 10.3788/COL202321.090005.
- 9 **Z. Xiang**, Q. Wang, R. Huang, S. Jin, X. Nie, and J. Zhou, "Online calibration method for pitch-independent laser doppler velocimeter based on improved integrated navigation model," *IEEE Transactions on Instrumentation and Measurement*, vol. 72, pp. 1–13, Sep. 2023.  DOI: 10.1109/TIM.2023.3315425.
- 10 **Z. Xiang**, T. Zhang, Q. Wang, et al., "A sins/gnss/2d-ldv integrated navigation scheme for unmanned ground vehicles," *Measurement Science and Technology*, vol. 34, no. 12, p. 125 116, Aug. 2023.  DOI: 10.1088/1361-6501/acf2b4.
- 11 **Z. Xiang**, Q. Wang, R. Huang, C. Xi, X. Nie, and J. Zhou, "A fast robust in-motion alignment method for laser doppler velocimeter-aided strapdown inertial navigation system," *IEEE Sensors Journal*, vol. 22, no. 17, pp. 17 254–17 265, Aug. 2022.  DOI: 10.1109/JSEN.2022.3191120.
- 12 **Z. Xiang**, Q. Wang, R. Huang, C. Xi, X. Nie, and J. Zhou, "In-motion initial alignment method for a laser doppler velocimeter-aided strapdown inertial navigation system based on an adaptive unscented quaternion h-infinite filter," *Measurement Science and Technology*, vol. 33, no. 3, p. 035 001, Dec. 2021.  DOI: 10.1088/1361-6501/ac37e9.
- 13 **Z. Xiang**, Q. Wang, R. Huang, C. Xi, X. Nie, and J. Zhou, "Position observation-based calibration method for an ldv/sins integrated navigation system," *Applied Optics*, vol. 60, no. 26, pp. 7869–7877, Sep. 2021.  DOI: 10.1364/AO.430866.

Conference Proceedings

- 1 **Z. Xiang**, Q. Wang, and J. Zhou, "In-motion initial alignment method for ldv-aided sins based on robust unscented quaternion filter," in *Proceedings of the 2021 5th International Conference on Electronic Information Technology and Computer Engineering*, Xiamen, China, 2022, pp. 254–259.
- 2 **Z. Xiang** and J. Zhou, "An in-motion alignment method for laser doppler velocimeter-aided strapdown inertial navigation system," in *Advances in Precision Instruments and Optical Engineering*, Singapore, 2022, pp. 323–334.

Patents

- 1 J. Zhou, **Z. Xiang**, Q. Wang, et al., *High-precision inertial navigation method and device based on 2d ldv and inertial navigation system (in chinese)*, Invention Patent, Chinese Patent CN202311519458.3, Feb. 2024.
- 2 J. Zhou, **Z. Xiang**, Q. Wang, et al., *A loosely coupled land integrated navigation method, apparatus, computer equipment and medium (in chinese)*, Invention Patent, Chinese Patent CN202211725821.2, Mar. 2023.

- 3 J. Zhou, **Z. Xiang**, Q. Wang, et al., *A tightly coupled land integrated navigation method, apparatus, computer equipment and medium (in chinese)*, Invention Patent, Chinese Patent CN202211725810.4, Apr. 2023.
- 4 J. Zhou, **Z. Xiang**, Q. Wang, et al., *Calibration method, apparatus, computer equipment and medium for two-dimensional doppler velocimeters (in chinese)*, Invention Patent, Chinese Patent CN202211726268.4, Apr. 2023.
- 5 J. Zhou, **Z. Xiang**, Q. Wang, et al., *Fault-tolerant integrated navigation method and device based on 2d ldv and inertial navigation system (in chinese)*, Invention Patent, Chinese Patent CN202311512395.9, Dec. 2023.
- 6 J. Zhou, **Z. Xiang**, Q. Wang, et al., *Method and apparatus for online calibration of laser doppler velocimeter based on position observation (in chinese)*, Invention Patent, Chinese Patent CN202310586804.3, Aug. 2023.
- 7 **Z. Xiang**, J. Zhou, Q. Wang, et al., *Integrated navigation method and device based on dual laser doppler velocimeter and inertial navigation system (in chinese)*, Invention Patent, Chinese Patent CN202210410200.9, Jul. 2022.
- 8 **Z. Xiang**, J. Zhou, X. Nie, et al., *A phase modulated double homodyne interferometer based on measuring multiple reflections of optical paths (in chinese)*, Invention Patent, Chinese Patent CN202110391840.5, Jun. 2021.
- 9 **Z. Xiang**, J. Zhou, Q. Wang, et al., *An in-motion initial alignment method for inertial navigation system based on laser doppler velocimeter (in chinese)*, Invention Patent, Chinese Patent CN202110403858.2, May 2021.

Skills

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|-----------|---|
| Languages | ■ Mandarin Chinese (Native language), English (CET6). |
| Coding | ■ Matlab, Qt, C/C++, Markdown, L ^A T _E X, ... |
| Sports | ■ Table tennis, basketball, running, e-sports, ... |
| Misc. | ■ Academic research, reading and writing academic papers, ... |

Academic Service

Journal Reviewer

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| Independent Review | ■ IEEE TIE, IEEE TMECH, IEEE TITS, IEEE TASE, IEEE TIM, Measurement, IEEE Sensors Journal, Scientific Reports, Measurement Science and Technology, Engineering Reports, IEEE journal of selected areas in sensors. |
| Co-review | ■ IEEE TAES, IEEE TVT. |

Certification

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| 2024 | ■ IOP Trusted Reviewer. |
| 2023 | ■ Outstanding Volunteer of the Frontier Interdisciplinary Science Conference on Optical Engineering. |
| 2022 | ■ Outstanding Volunteer of the Frontier Interdisciplinary Science Conference on Optical Engineering. |

References

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