Shengwu Zhao

An Integrated Navigation PH.D. Candidate from BIT

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Education

Beijing Institute of Technology, School of Automation — Beijing, China
PH.D. in Control Science and Engineering — *Sep 2020 - Expected Jun 2026*
Major: Navigation, Guidance and Control

Beijing Institute of Technology, School of Xuteli — Beijing, China
Bachelor of Engineering; Ranking:4/13 — *Aug 2016 - Jun 2020*

Publications

Journal Paper

- **Zhao S**, Deng Z, Wang Q, Zhang W, Gong X. Terrain Matching Algorithm Based on Trajectory Reconstruction and Correlation Analysis of Sliding Measurement Sequence[J]. IEEE/ASME Transactions on Mechatronics, 2024. (SCI Q1, IF: 6.1)
- **Zhao S**, Xiao X, Pang X, Wang Y, Deng Z. Gravity Matching Algorithm Based on Backtracking for Small Range Adaptation Area[J]. IEEE Transactions on Instrumentation and Measurement, 2024, 73, 9504413. (SCI Q1, IF: 5.6) [paper]
- **Zhao S**, Xiao X, Wang Y, Deng Z. An improved particle filter based on gravity measurement feature in gravity-aided inertial navigation system[J].IEEE Sensors Journal, 2022, 23(2): 1423-1435. (SCI Q1, IF: 4.3) [paper]
- **Zhao S**, Xiao X, Deng Z, Shi L. Gravity matching algorithm based on correlation filter[J]. IEEE Sensors Journal, 2022, 23(3): 2618-2629. (SCI Q1, IF: 4.3) [paper]
- **Zhao S**, Shi L, Zhang W, Deng Z. Global dynamic path-planning algorithm in gravity-aided inertial navigation system[J]. IET Signal Processing, 2021, 15(8): 510-520. (SCI Q3, IF: 1.7) [paper]
- Wang Y, Deng Z, Zhang P, Wang B, **Zhao S**. A Gravity-Aided Navigation Matching Algorithm Based on Triangulation[J]. IEEE Sensors Journal, 2024. (SCI Q1, IF: 4.3)

Conference Paper

- **Zhao S**, Zhang W, Wang Y, Deng Z. The analysis of influencing factors on geophysical field matching[C]//2024 International Conference on Guidance, Navigation and Control (ICGNC), Springer, 2024. (EI)
- **Zhao S**, Pang X, Deng Z. Gravity Matching Algorithm Based on Backtracking[C]// 2022China Inertia Technology Symposium, 2022, Dalian, China.
- Wang Y, Deng Z, Zhang W, **Zhao S**. An improved ICCP gravity matching algorithm based on Mahalanobis distance[C]//2021 40th Chinese Control Conference (CCC). IEEE, 2021: 3503-3508. (EI) [paper]
- Chen X, Jiao Z, **Zhao S**, Deng Z. Research on Polar Navigation Problem of North-Seeking Strapdown Inertial Navigation System[C]//2024 International Conference on Guidance, Navigation and Control (ICGNC), Springer, 2024. (EI)
- Wang Q, Gong X, Bai X, Deng Z, **Zhao S**. The method for selecting adaptation zones of terrain matching based on Arctic seabed terrain features[C]//2024 International Conference on Guidance, Navigation and Control (ICGNC), Springer, 2024. (EI)

Patents

CN202110545814.3 (3rd), CN202311811811.5 (2nd), CN202311694509.6 (3rd), CN202110545816.2 (3rd), CN202110838109.2 (3rd), CN202211221726.9 (4th), CN202210856742.9 (2nd), CN201911385476.0 (4th).

Awards

Technical Invention Award of Chinese Society of Inertial Technology (**First Prize**)	Aug, 2022
APMCM Mathematical Modeling (**First Prize, TOP 4**)	Jan, 2022
Huawei Cup Mathematical Modeling (**Third Prize**)	Dec, 2021
MathorCup Mathematical Modeling (**Third Prize**)	Jun, 2021
Outstanding graduate of School of Xuteli	Jun, 2020
The Artificial Intelligence Challenge of Robomaster, perception (**Excellence Award**)	Jun, 2020
NXP National College Student Smart Car Competition (**Second Prize in North China**)	Jul, 2020
China Undergraduate Mathematical Contest in Modeling (**Second Prize in Beijing**)	Jan, 2019

Experience

Underwater geophysical field matching navigation Beijing China

PH.D student, Supervisor: ***Zhihong Deng*** *May 2019 - Now*

The accumulated error of inertial navigation system is corrected by using underwater geophysical field for matching and positioning. My work content is to study the underwater carrier path planning method and matching positioning method. In the field of path planning, I consider the change rate of gravity field and mismatching phenomenon, and use Astar and DWA algorithms to plan the trajectory of underwater vehicles. In order to integrate inertial navigation information, geophysical field reference map and gravimeter measurement information, some matching algorithms are designed to realize positioning. It includes introducing the correlation filter in target recognition and particle filter, considering the potential relationship of geophysical field characteristics.

In the past, I worked on gravity field aided navigation. Now I work on terrain aided navigation and positioning. The localization of underwater vehicle is studied by inertial navigation system, single-beam echosounder or multi-beam echosounder.

Robomaster robot positioning and decision making Beijing China

Undergraduate students, Supervisor: ***Robomaster Team*** *Sep 2019 - May 2020*

In the specified area, four robots need to fight against enemy robots, by designing different decision-making strategies to defeat the enemy robots. I work on robot positioning and decision making. The calculation amount is reduced by optimizing the AMCL algorithm, and the comparison of several algorithms is made. Handle battlefield complexities by designing different decisions, such as how robots behave when they don't have bullets.

Hardware circuit design of intelligent energy-saving car Beijing China

Undergraduate students, Supervisor: ***Smart Car Club*** *Sep 2019 - July 2020*

In the case that the battery is not applicable as a power source, the coil and the changing magnetic field are used to provide power for the smart car, so that the car can complete the driving within the specified time. My work is to design the circuit of the whole car and the design of the PCB, including the voltage regulator circuit design, control circuit design and signal circuit design. After that, as vice captain of the team club, participated in guiding the preparation and organization of the next race.