DOI: 10.37102/1992-4429_2026_57_03_05

OPTIMIZED UNDERWATER TRACKING METHOD PIPELINE BASED ON STEREO IMAGES

V.A. Bobkov, A.A. Shupikova

The problem of automatic tracking of an underwater pipeline (UP) from stereo images using an autonomous uninhabited underwater vehicle (AUV) is considered. It is noted that traditional methods of boundary recognition on vectorized images are often ineffective in an underwater environment due to poor image quality, partial immersion of the pipeline in the ground, and high computational complexity. A modification of the method previously developed by the authors for calculating the centerline of UP based on the generation of a 3D point cloud is proposed, which includes two improvements: varying the starting point of the current section of the centerline in a small neighborhood to reduce the error and replacing the complete enumeration of angular positions with optimization using the Nelder–Meade algorithm. The experiments were carried out on model data in a virtual environment with a realistic seabed texture at different image resolutions, the heights of the AUV movement and the degree of siltation of the UP. It is shown that the modified method provides higher accuracy of localization of the centerline and significantly exceeds the basic version in computational performance. It has been established that the method remains operational when the pipeline is silted, and is also resistant to the curvature of the route. In conclusion, it is noted that further research will be aimed at testing the method on real data.

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Information about the authors

BOBKOV Valery Alexandrovich, д-р техн. наук, глав. науч. сотр.
Institute of Automation and Control Processes Far Eastern Branch of Russian Academy of Sciences
Work address: Russia, Vladivostok, st. Radio 5
Research Interests: computer graphics, computer vision, image processing and pattern recognition
E-mail: bobkov@iacp.dvo.ru
Тел. раб.: (+74232)313776
ORCID: 0000-0001-9722-5158

SHUPIKOVA Antonina Arkadyevna, вед. инженер-программист,
Institute of Automation and Control Processes Far Eastern Branch of Russian Academy of Sciences
Work address: Russia, Vladivostok, st. Radio 5
Research Interests: computer graphics, computer vision, image processing and pattern recognition
E-mail: antoninash@inbox.ru
Тел. раб.: (+74232)313776,
ORCID: 0000-0003-4308-9191