

Evaluation of Fusion Sonar and Stereo Camera System for 3D Reconstruction of Underwater Archaeological Object

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Abstract : The objective of this paper is to develop the 3D underwater reconstruction of archaeology object, which is based on the fusion between a sonar system and stereo camera system. The underwater images are obtained from a calibrated camera system. The multiples image pairs are input, and we first solve the problem of image processing by applying the well-known filter, therefore to improve the quality of underwater images. The features of interest between image pairs are selected by well-known methods: a FAST detector and FLANN descriptor. Subsequently, the RANSAC method is applied to reject outlier points. The putative inliers are matched by triangulation to produce the local sparse point clouds in 3D space, using a pinhole camera model and Euclidean distance estimation. The SFM technique is used to carry out the global sparse point clouds. Finally, the ICP method is used to fusion the sonar information with the stereo model. The final 3D models have a précised by measurement comparing with the real object.

Keywords : 3D reconstruction, archaeology, fusion, stereo system, sonar system, underwater

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