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DEVELOPMENT OF A POLARIZED UNDERWATER VISION SYSTEM AND A METHOD FOR IDENTIFYING A NAVIGATION POLARIZATION PATTERN FOR AUV NAVIGATION

N.A. Budko, V.V. Pivnev, A.Yu. Budko, A.D. Karaev, A.I. Statsenko, Ya.V. Kabachevsky

Recently, AUVs have become increasingly widespread in various fields of human activity. This topic is most relevant for conducting research in the deep sea, as well as in the field of monitoring the condition and ensuring the safety of underwater communications. At the same time, AUV navigation is a complex task, which makes new methods of its implementation relevant. This paper discusses general issues of underwater navigation based on the polarization pattern. Based on reviews of authoritative sources, the possibility of navigation is shown based on an analysis of the polarization of sunlight passing under water and knowledge of the exact world time and date. The following shows the development of our own underwater vision system based on polarization and color cameras. At the end of the work, the result of testing the developed underwater vision system for obtaining underwater images and analyzing polarization pattern data for the purpose of AUV navigation is presented. When processing data in order to detect a navigation polarization pattern, a procedure for forming an image in the HSV color space is proposed based on data calculated for the frame on the degree of linear polarization, angles of linear polarization and pixel intensity. In general, it was concluded that the developed underwater vision system makes it possible to record significant data on the polarization of underwater light for the purposes of AUV navigation.

Keywords: AUV, navigation, polarization of light waves, underwater vision systems

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Information about the authors

BUDKO Natalya Aleksandrovna
Place of work: Southern Federal University
Work address: Taganrog, Russia
Research interests: underwater vision systems, human-machine interfaces, neural networks, machine learning
E-mail: tyumenceva@sfedu.ru

PIVNEV Vitaly Viktorovich, Ph.D. of Engineering Sciences
Place of work: Southern Federal University, Senior Researcher
Work address: Taganrog, Russia
Research interests: Electrical engineering, electric power engineering, robotics, mathematical modeling, information technology, programming
E-mail: pivnev@sfedu.ru. **ORCID**: 0000-0002-9713-7390

BUDKO Artem Yurievich, Ph.D., Senior Researcher
Place of work: Southern Federal University
Work address: Taganrog, Russia
Research interests: system analysis, management, information processing
E-mail: abudko@sfedu.ru. **ORCID**: 0000-0003-0228-2139

KARAEV Artyom D.
Work address: Taganrog, Russia
Research Interests: Computer vision
E-mail: karaev@sfedu.ru

STATSENKO Andrey Ivanovich, Research Engineer
Place of work: Southern Federal University
Work address: Taganrog, Russia
Research Interests: Embedded systems
E-mail: anstacenko@sfedu.ru
ORCID 0000-0001-8588-2644

KABACHEVSKY Yaroslav Valerievich
Place of work: Southern Federal University
Work address: Taganrog, Russian Federation
Research Interests: 3D modeling, robotics
E-mail: yaroslavkabachevsky@yandex.ru