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ANALYSIS AND CLASSIFICATION OF DISTRIBUTED SENSOR SYSTEMS OF COLLABORATIVE ROBOTICS

E.O.CHERSKIKH, A.I. SAVELIEV

St. Petersburg Federal Research Center of the Russian Academy of Sciences,
St. Petersburg Institute for Informatics and Automation of the Russian Academy of Sciences
199178, Russia, St. Petersburg, 39, 14th line of Vasilievsky Island

Abstract. The main goal of this analysis is to identify the most promising sensor nodes for the development of types of sensors used in sensor systems of collaborative robots, structures, and arrangement of nodes on the bodies of robots. To achieve this goal, the existing design solutions for sensor assemblies and systems were considered. The paper analyzes and classifies the nodes of distributed sensor systems according to the composition, the method of communication of the nodes used and their location on the robot bodies. Homogeneous or heterogeneous systems containing one of two types of nodes: combined and non-combined, have been identified. It was found that combined nodes are the most promising for development since include several types of sensors and can measure more environmental parameters through a single node. The most used types of sensors, methods of their manufacture, design and properties have been determined. Combined nodes contain the following types of sensors: pressure, proximity, temperature, humidity, gas, illumination, heat flow, corrosion, accelerometer-gyroscope, infrared and laser rangefinders, radar sensors. Among the listed, the most used are pressure, temperature, humidity sensors, inertial measurement units, light sensors, and microphones. The structures of sensor nodes are considered and the nodes most promising for development are identified, as well as the types of sensors used, methods of manufacturing and arrangement of nodes on the bodies of collaborative robots. The disadvantages of the considered systems are highlighted, and a method is proposed to reduce their influence on the power consumption of the system, the computational load, and delays in data transmission.

Keywords: sensor systems, distributed systems; sensors, sensor system nodes, collaborative robots

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Information about the authors

Cherskikh Ekaterina Olegovna, junior researcher of Laboratory of Autonomous Robotic Systems, St. Petersburg Federal Research Center of the Russian Academy of Sciences;

199178, Russia, St. Petersburg, 39, 14th line of Vasilievsky Island;

cherskikh.e@iias.spb.su, ORCID: https://orcid.org/0000-0002-4443-2281

Saveliev Anton Igorevich, PhD, senior researcher and head of Laboratory of Autonomous Robotic Systems, St. Petersburg Federal Research Center of the Russian Academy of Sciences;

199178, Russia, St. Petersburg, 39, 14th line of Vasilievsky Island;

saveliev@iias.spb.su, ORCID: https://orcid.org/0000-0003-1851-2699