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FUNCTIONAL-SEMANTIC FEATURES OF ENGLISH AND UZBEK ROBOTICS TERMS IN SPECIALIZED LITERATURE

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Abstract. The rapid development of robotics has resulted in the continuous expansion of its terminological system and the emergence of new lexical units representing technical objects, processes, relations, and parameters. This study examines the functional-semantic features of English and Uzbek robotics terms used in specialized scientific and technical literature. The research aims to identify the major semantic fields of robotics terminology and determine the communicative functions performed by terms in specialized discourse. **Keywords:** robotics terminology, functional semantics, specialized literature, semantic field, terminology, robotics discourse, control terminology, sensor terminology, English, Uzbek.

INTRODUCTION

The rapid development of science and technology is accompanied by the continuous formation of new concepts and, consequently, new terminological units. Robotics represents one of the most dynamically developing interdisciplinary fields because it integrates mechanical engineering, electronics, automatic control, computer science, sensor technology, programming, and artificial intelligence. As a result, robotics terminology forms a complex system comprising terms originating from several scientific and technical domains.

In specialized literature, robotics terms are not limited to the function of naming technical objects. They may denote processes, describe relationships between system components, characterize technical parameters, identify spatial relations, and organize specialized knowledge. Therefore, the investigation of robotics terminology requires an approach that considers not only the lexical meaning of individual terms but also their semantic position and communicative function within specialized discourse.

MATERIALS AND METHODS

The theoretical basis of the study combines several approaches to terminology. E.Wüster's classical theory considers a term primarily as an exact designation of a specialized concept. M.T.Cabré's communicative theory of terminology broadens this interpretation by treating terminological units as elements functioning within specialized communication. J.Pearson emphasizes the role of specialized context in determining terminological meaning, while H.Felber draws attention to terminological systems and standardization. These approaches

provide a theoretical basis for analyzing robotics terms not merely as isolated lexical units but as components of specialized discourse.

The semantic-field approach was applied to identify groups of conceptually related terminological units. The analyzed terms were divided into three major semantic fields: motion and kinematics, control and monitoring, and sensors and information. The empirical material included English and Uzbek robotics terms extracted from specialized sources. The English material included theoretical and practical terminology related to robot modelling, control, kinematics, sensors, and programming. The Uzbek material included terminology occurring in works by X.N.Nazarov and N.B.Alimova. M.W.Spong, S.Hutchinson and M.Vidyasagar's Robot Modeling and Control was among the principal English-language sources.

The study employed comparative, descriptive, functional-semantic, contextual, componential, and quantitative-statistical methods. First, relevant terminological units were extracted and classified according to their conceptual meanings. Second, their distribution across the three semantic fields was calculated. Finally, their communicative functions in specialized discourse were identified and compared in English and Uzbek. A total of 113 English and 104 Uzbek terminological units were analyzed.

RESULTS AND DISCUSSION

The quantitative analysis demonstrates that the three semantic fields are represented to different degrees in the investigated material.

The control and monitoring field constitutes the largest group, accounting for 39.1% of the analyzed terminological material. It includes 48 English and 39 Uzbek units. The predominance of this field can be associated with the central role of automatic control in robotic systems. The sensor and information field represents 32.5%, while motion and kinematics accounts for 28.4%.

The motion and kinematics field includes such English core terms as kinematics, joint, link, workspace, trajectory, and motion. More specialized units, including configuration space, Denavit–Hartenberg parameters, and Jacobian matrix, form the peripheral part of the field. Uzbek specialized literature contains corresponding terms such as kinematik zanjir, erkinlik darajasi, ishchi zona, trayektoriya, and konfiguratsiya fazosi. The analyzed material indicates that English sources demonstrate a more differentiated representation of mathematical and kinematic concepts.

The control and monitoring field is characterized by a combination of theoretical, mathematical, practical, and software-related terminology. Terms such as PD control, PID control, computed torque, feedforward control, feedback

linearization, impedance control, and hybrid position/force control represent the theoretical layer, while PID controller, set point, error, motor speed adjustment, and control loop represent practical applications. Uzbek sources contain programmali boshqarish, adaptiv boshqarish, siklli boshqarish, PID-rostlagich, and teskari aloqa konturi. Feedback / teskari aloqa is particularly significant because it can function at the intersection of control and sensor-related semantic fields.

Functional analysis made it possible to distinguish five principal types of robotics terms. Object-denoting terms nominate technical objects and components, for example robot, joint, end-effector, payload, and gripper. Process-denoting terms describe actions and operations, including trajectory planning, force control, motion planning, calibration, and visual servoing. Relational terms such as kinematic chain, Jacobian, transformation chain, and Denavit-Hartenberg parameters express relationships between system elements. Evaluative-parametric terms, including degree of freedom, payload capacity, positioning accuracy, and grasp stability, characterize measurable properties. Spatial-coordinate terms such as workspace, configuration space, Cartesian coordinates, task space, and joint space represent spatial organization.

CONCLUSION

The study demonstrates that English and Uzbek robotics terminology constitutes an organized functional-semantic system rather than a simple collection of technical designations. The analyzed terms represent objects, processes, relations, technical parameters, and spatial characteristics, thereby performing several interconnected functions in specialized scientific discourse. The quantitative analysis of 113 English and 104 Uzbek terms showed that the control and monitoring field is dominant, accounting for 39.1% of the material. The sensor and information field constitutes 32.5%, while motion and kinematics accounts for 28.4%. These results indicate the central role of control-related concepts in robotics terminology and reveal a comparatively high representation of sensor-related terminology in the analyzed Uzbek sources.

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