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ROZPRAWA DOKTORSKA

Harmonogramowanie procesów produkcyjnych z zastosowaniem współdzielonego rejestru zasobów zorganizowanego w oparciu o założenia Technologii Blockchain

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Dissertation topic: Scheduling production processes using a shared resource register organized based on the assumptions of Blockchain Technology

Abstract

The scientific goal of the dissertation is to develop a method for selecting resources for tasks and assessing production resources based on a common register that enables scheduling automation. The utilitarian goal is to create a prototype online platform for a common register of production resources that operated on the principles of blockchain.

As part of the preparatory work, a literature review was carried out in terms of issues of scheduling, blockchain and the application of the blockchain in the production sector. The advantages, disadvantages and threats caused by the implementation of Blockchain Technology were analyzed. On this basis, research objectives were formulated.

The use of Blockchain Technology in resource management for production scheduling purposes was verified. The analysis covered a model of procedure based on the selection of human and machine resources and the scheduling of multi-resource production according to the principles applicable in blockchain technology.

In the developed research examples, blockchain supports the reliable selection, evaluation and recording in the register of resources. Blockchain is useful at the stage related to the registration of resources, preparatory scheduling and analysis of these resources.

Models of a shared register and exchange of production resources (human and machine) were developed using nodes communicating in a decentralized system that also serves as an integrator of the virtual and real areas. Particular attention was focused on developing algorithms for the effective distribution of resources among all interested users organized in a consortium of enterprises. An employee assessment method based on the resource's work history and determining its current value within individual competencies is also presented.

As part of the work on the dissertation, an original internet platform based on blockchain was created, which supports production management with its functionality. A model was developed for searching shared resources, showing results consistent with the indicated parameters and returning resources enriched with a grade for the completed task. The system is based on a consensus mechanism (i.e. proof of participation) and a network of smart contracts.

The proposed concept is a solution enabling a modern approach to interdisciplinary management of production resources while maintaining the highest cybersecurity standards. This concept is consistent with development trends in the discipline of mechanical engineering in the area of production engineering.