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СЪДЪРЖАНИЕ

***Key Words**: Artificial intelligence; control theory; deep learning; industrial automation; machine learning; reinforcement learning.*

***Abstract.** The study shows that the existence of fundamental similarities between control theory and machine learning is a real basis for productive interpenetration and enrichment with new concepts, methods and tools, which are mutually beneficial for overcoming a number of serious modern challenges such as the control of complex and autonomous systems, cybersecurity, intelligent robotics, bioautomatics. The continuous development of the control theory as a result of its own progress and under the influence of the ideas of artificial intelligence will not allow the transformation of automation into a routine engineering discipline. In turn, the systems based on artificial intelligence and machine learning are enriched with well-developed methods and procedures from the control theory in order to improve and create new algorithms and to ensure a higher speed, robust stability and optimality of the learning process. Industrial automation systems will absorb the innovative results of the interpenetrating development of artificial intelligence and control theory improving both the quality and scope, safety and security of operations.*

***Key Words**: Fuzzy sets theory; random search with back step; combined algorithm; initial condition.*

***Abstract.** A combined algorithm for optimisation of biotechnological processes has been developed. The algorithm includes a random search method for an optimal choice of an initial point and a method based of the fuzzy sets theory. Combining both methods overcomes a major disadvantage of the fuzzy optimisation method, connected with a determination of large scale problems. The combined algorithm has been successfully applied for optimisation of the initial condition and optimal control of the biotransformation process of whey fermentation by a strain Kluyveromyces lactis MC5.*

***Key Words**: Beacon deployment; indoor localization, indoor positioning systems.*

***Abstract.** Localization of visitors in public buildings is a key technology to create accessible environments using location-based services. The usability of these services and the satisfaction of their clients depend on the accurate calculation of the position of visitors. This is most often realized using wireless sensor networks. The localization accuracy depends on a number of factors, one of which is the deployment of the sensor nodes. This is a complex task, which is most often realized by experts. In this article, we offer a complete solution for creating systems for indoor localization, which includes: (1) Algorithm for fast partitioning of the building components into non-overlapping rectangles; (2) Algorithm for sensor nodes deployment based on the geometry of the rectangles obtained; and (3) Algorithm for optimizing the sensor nodes placement taking into account the connectivity between the building components (rooms and corridors), as well as the static objects, which are obstacles for radio signals. Numerous experiments have been implemented in stimulating and real environments, which prove the applicability of the proposed solution.*

Key Words*: RAMI 4.0; IEC/EN 62264; asset; communication and presentation capabilities; activity; scheduling; model; web services; B2MML.*
Abstract. *The Reference Architectural Model for Industry 4.0 tends to unify the efforts for rapid development of new technologies of the information and communication technology sector by stating definitions of an asset and its role in the cyber-physical world with the use of presentation and communication functions applied to the asset. Furthermore, the standard describes how an asset should interact with the cyber-physical world. In order to introduce the asset as a conceptual fundament, the standard RAMI 4.0 extends the Equipment hierarchy model of another standard – IEC/EN 62264, which is well known and applied as an architectural framework within software integration projects of various information systems. The differences between, are that in IEC/EN 62264, a physical asset model corresponds to the equipment model, whereas the RAMI 4.0 states that an asset may present even a Product or Connected World (Cyber-Physical World). The introduced extension is necessary because the perspective of the two standards is different. IEC/EN 62264 defines objects and models for integration, in which a Product, as an abstraction of "what should be made?" is a part of Product Definition Model (Operations Definition Model), and when it is physically performed "what is actually made?", it is a part of Material Model. As such, the objects "carrying" the integration information are different. The Connected world also is an asset in RAMI 4.0, because it has value for a company, while the whole subject of the IEC/EN 62264 standard is to integrate information systems, thus achieving "Connected World". This is why the standard IEC/EN 62264 should be considered as a "roadmap" for the cyber-physical transformation of the RAMI 4.0 standard. The aim of the article is to discuss the importance and the assumption of non-implicit relations between the two standards as well as the concept for development of RAMI 4.0 administration shell based on IEC/EN 62264 architecture.*

ОБУЧЕНИЕ И КВАЛИФИКАЦИЯ

Key Words*: Artificial intelligence; intelligent learning system; integration, learning technologies, optimization, system of systems.*
Abstract. *The main problems related to the integration of diverse functional elements of advanced intelligent learning systems are considered. It is shown that the integration of the elements in the learning process is a complex multilayered process due to the great variety and complexity of the ongoing basic processes – cognitive, pedagogical, technological, social and interpersonal. It is emphasized that the need for the integration process to be solved as a multifactor optimization data-driven problem and the use of modern techniques in the field of artificial intelligence – machine learning, pattern recognition, natural language processes, network management.*

НОВОСТИ, ИНФОРМАЦИЯ, ОБЩЕСТВО

IN MEMORIAM

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