Guest Editorial Column:
Special Issue of
Journal of Mobile Multimedia
"Control and Decision-making Systems
with Mobile Applications"

Dear Readers,

It is a great pleasure for me to introduce this Special Issue of the Journal of Mobile Multimedia "Control and Decision-making Systems with Mobile Applications".

This Special Issue aims to present the systematized research, description, and analysis of new theoretical results and applications of modern mobile technologies in various control and decision-making systems for increasing their efficiency. Optimization of ship operations, decision support system for ballasting floating docks, face recognition for access control in security systems, control of unmanned aerial vehicles in meteorological measurements, conception and strategy of the artificial intelligence development relating to mobile technologies, neural networks for objects classification, machine learning for recognition of image components, mobile approach to uncertainty and color optical networks in decision-making processes are considered by authors among the priority directions in applications of published research results. This Special Issue is published in collaboration with authors from different countries (Ukraine, the United States of America, and Uzbekistan) who represent the universities and research institutes and who have great experience in the development of international research projects on control systems, artificial intelligence, decision support systems, mobile

technologies, cyber-physical systems, the internet of things, robotics, and soft computing.

The Special Issue consists of ten articles:

The article "*Some Aspects of Artificial Intelligence Development Strategy for Mobile Technologies*", by V. I. Slyusar et al., is devoted to hardware-software and other key aspects of the artificial intelligence development strategy for mobile technologies. The proposed components of the strategy include a series of approaches to address issues related to the development and deployment of large language models on mobile devices, and suggestions for improving connectivity, memory management, and data security.

In "*Just-in-Accuracy: a Mobile Approach to Uncertainty*", M. Ceberio et al. discuss how to make a mobile device last longer and propose to limit computations to a bare minimum. One way to do that, in complex control and decision-making problems, is to limit the computation precision by limiting the number of bits in the numbers' representation. Authors propose to first do computations with very low precision, then, based on these computations, estimate what precision is needed to achieve the given accuracy, and then perform computations with this precision.

The article "*Intelligent IoT-based Control System of the UAV for Meteorological Measurements*", by O. Kozlov et al., focuses on the creation and examination of an intelligent control system for UAVs utilized in meteorological measurements based on the IoT and mobile technologies. The proposed system enables the achievement of commendable flight control standards for UAVs during meteorological data gathering, thereby markedly enhancing the overall effectiveness of meteorological stations. The system is constructed on the foundation of three integrated principles: a hierarchical two-level IoT-driven approach for control and data collection, a straightforward and dependable fuzzy logic control characterized by high performance, and the effective optimization of fuzzy control components through the application of bio-inspired multi-agent computing techniques.

Y. Zhukov et al. in the article "*Ship Operation Analysis and Optimization via Mobile Application*", consider the structure and prospects of ship operations analysis and optimization via mobile applications, focusing on integrating multiple existing onboard monitoring and control systems. The article describes the current state of the important components of future overall shipping and ship design optimization using onboard and cloud-based monitoring systems. Special attention is paid to the ship's and its equipment's energy efficiency improvements, fuel consumption and emissions reduction, cost-effectiveness enhancement, metrological accuracy, and

compliance with current regulations. Timely development and deployment of the proposed onboard monitoring systems, in combination with up-to-date mobile applications and cloud computing, should play a crucial role in promoting sustainable and environmentally friendly shipping practices, improving operational performance, and reducing risks to human life at sea and the environmental impact of shipping.

The article "*From Fuzzy to Mobile Fuzzy*", by O. Kosheleva et al., focuses on the main limitation of mobile computing - the possibility for the battery to last as long as possible that requires to decrease in the number of computational steps. The authors analyze how this affects fuzzy computations and show that the need for the fastest computations leads (a) to triangular membership functions, (b) simplest "AND"- and "OR"-operations (min and max, correspondingly), and (c) a few-bit description of fuzzy degrees, which leads to 3-bit descriptions similar to the optical implementation of fuzzy computing.

In "*Neural Technologies for Object Classification with Mobile Applications*", I. Sidenko et al. aim to increase the accuracy of recognition and classification of objects in photographs by using various models of the ResNet neural network. The process of data formation for training neural networks, their processing and sorting as well as the web and mobile applications for recognizing and classifying objects in a photo are described. The accuracy of classifying objects, in particular, airplanes in photographs, is about 95%. The results of the study will help to implement ResNet in various fields, including medicine, automatic pattern recognition, and other areas where the classification of objects in photographs is an important task.

The article "*An Ensemble Approach to Face Recognition in Access Control Systems*", by V. Opanasenko et al., presents an ensemble method for face recognition in mobile devices based on an algebraic approach that applied two operators: a recognition operator and a decision rule. The recognition operator calculates estimates of the proximity of the tested object to the given classes. The decision rule, based on these estimates, determines whether the tested object belongs to one of the given classes. The ensemble of recognizing operators is formed in the form of a linear polynomial where the polynomial parameters are calculated based on solving the multi-parameter optimization problem. Experimental studies were carried out using open databases of facial images.

V. Timchenko et al. in the article "*Logical Platforms for Mobile Application in Decision Support Systems Based on Color Information Processing*",

consider the creation of mobile applications for a wide class of decision-making tasks with large databases based on effective optical logical systems. Optical processing of color information reflecting various values of input data is carried out by the proposed structural design of fuzzy logical gates (logical coloroid). Input data are formed based on expert assessments. The fuzzy database is formed by defining the corresponding color as a quantum of information. The use of color as a carrier of logical information allows the creation of high-speed mobile devices with convenient visualization.

The article "*Mobile Recognition of Image Components Based on Machine Learning Methods*", by G. Kondratenko et al., is related to the recognition of certain components in images using machine learning methods and mobile technologies. In particular, it concerns recognizing a mask using an image, which provides all the necessary information in real-time about the presence or absence of a mask on the face. The statistics about the presence/absence of the mask will be recorded in the database. Practical application has a wide range, in particular, the developed intelligent system may be used in the subway, industrial enterprises, state or educational institutions, offices, and other public places.

In "*A Mobile Application of a Decision Support System for Ballasting a Floating Dock*", A. Topalov et al. focus on increasing the automation level of the docking operations through the development of a mobile application for a decision support system capable of determining the optimal option for loading ballast into floating dock compartments when setting up and launching ships. The proposed decision support system and the mobile application allow the implementation of effective ballasting of the floating dock before docking the ship based on mathematical calculations of the impact of the ship on the floating dock and the ballasting rules. To test the developed system, the article presents the functioning of the mobile application for a case of calculation of the docking up process of a 4,100-ton ship.

All of the presented articles have been double-blind reviewed according to the publication's standards.

I hope each reader will enjoy reading this Special Issue and will get valuable information about the advanced approaches to the design and investigation of modern control and decision-making systems with mobile applications.

Thank you very much to all of the authors for their contributions, to reviewers for their timely and interesting comments and suggestions as well as to River Publishers' staff for their kind technical assistance.

Guest Editor:

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