

# Contents

|                                                                                                                                                                                 |    |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|
| <b>Screwing Process Monitoring Using MSPC in Large Scale Smart Manufacturing</b> . . . . .                                                                                      | 1  |
| Humberto Nuno Teixeira, Isabel Lopes, Ana Cristina Braga, Pedro Delgado, and Cristina Martins                                                                                   |    |
| <b>Comparison of Neural Networks Aiding Material Compatibility Assessment</b> . . . . .                                                                                         | 14 |
| Izabela Rojek, Ewa Dostatni, and Piotr Kotlarz                                                                                                                                  |    |
| <b>Parameterized State Feedback Control Applied to the 1st Degree of Freedom of a Cylindric Pneumatic Robot</b> . . . . .                                                       | 25 |
| Marcos G. Q. Rijo, Eduardo A. Perondi, Mário R. Sobczyk S., and Carlos A. C. Sarmanho Jr.                                                                                       |    |
| <b>Building a Mobile Application by Combining Third Party Platforms in Order to Reduce Time, Costs and Improve Functionality</b> . . . . .                                      | 37 |
| Marian Tanasie and Ionel Simion                                                                                                                                                 |    |
| <b>Conveyor Belts Joints Remaining Life Time Forecasting with the Use of Monitoring Data and Mathematical Modelling</b> . . . . .                                               | 44 |
| Edward Kozłowski, Anna Borucka, Yiliu Liu, and Dariusz Mazurkiewicz                                                                                                             |    |
| <b>Experience in Implementing Computer-Oriented Methodological Systems of Natural Science and Mathematics Research Learning in Ukrainian Educational Institutions</b> . . . . . | 55 |
| Olena Hrybiuk                                                                                                                                                                   |    |
| <b>Optimal Preventive Maintenance Frequency in Redundant Systems</b> . . .                                                                                                      | 69 |
| Guilherme Kunz                                                                                                                                                                  |    |
| <b>Experimental Investigation of the Effect of Mass Load on Flight Performance of an Octorotor and Dodecarotor UAV</b> . . . . .                                                | 81 |
| Şahin Yildirim, Nihat Çabuk, and Veli Bakircioğlu                                                                                                                               |    |

|                                                                                                                                |     |
|--------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Indoor GPS System for Autonomous Mobile Robots Used in Surveillance Applications</b> . . . . .                              | 90  |
| Philip Coandă, Mihai Avram, Victor Constantin, and Bogdan Grănescu                                                             |     |
| <b>Incorporating Inteco's 3D Crane into Control Engineering Curriculum</b> . . . . .                                           | 99  |
| Frantisek Gazdos and Lenka Sarmanova                                                                                           |     |
| <b>Design of Laser Scanners Data Processing and Their Use in Visual Inspection System</b> . . . . .                            | 112 |
| Ivan Kuric, Matej Kander, Jaromír Klarák, Miroslav Císar, and Ivan Zajačko                                                     |     |
| <b>Monitoring System of Taekwondo Athletes' Movements: First Insights</b> . . .                                                | 119 |
| Tudor Claudiu Țirnovan, Pedro Cunha, Vítor Carvalho, Filomena Soares, Camelia Avram, and Adina Aștilean                        |     |
| <b>Performance Evaluation of the BioBall Device for Wrist Rehabilitation in Adults and Young Adults</b> . . . . .              | 129 |
| Bárbara Silva, Ana Rita Amorim, Valdemar Leiras, Eurico Seabra, Luís F. Silva, Ana Cristina Braga, and Rui Viana               |     |
| <b>Smart Packages Tracking System</b> . . . . .                                                                                | 141 |
| Camelia Avram, Mihai Modoranu, Dan Radu, and Adina Aștilean                                                                    |     |
| <b>Automatic Warehouse for Workshop Tools</b> . . . . .                                                                        | 154 |
| Marco Ferreira, Miguel Rodrigues, and Caetano Monteiro                                                                         |     |
| <b>New Refinement of an Intelligent System Design for Naval Operations</b> . . . . .                                           | 164 |
| M. Filomena Teodoro, Mário J. Simões Marques, Isabel Nunes, Gabriel Calhamonas, and Marina A. P. Andrade                       |     |
| <b>ICT4Silver: Design Guidelines for the Development of Digital Interfaces for Elderly Users</b> . . . . .                     | 178 |
| Nuno Martins, Sónia Ralha, and Ricardo Simoes                                                                                  |     |
| <b>Dynamic Analysis of a Robot Locomotion for an External Pipe Inspection and Monitoring</b> . . . . .                         | 189 |
| Bogdan Grănescu, Adrian Cartal, Ahmed Sachit Hashim, and Constantin Nițu                                                       |     |
| <b>The Choice of the Electric Energy Storage Device Type for the Hybrid Power Drive of Military Wheeled Vehicles</b> . . . . . | 201 |
| Dmitriy Volontsevich, Sergii Strimovskyi, Ievgenii Veretennikov, Dmytro Sivykh, and Vadym Karpov                               |     |
| <b>Machinery Retrofitting for Industry 4.0</b> . . . . .                                                                       | 213 |
| Pedro Torres, Rogério Dionísio, Sérgio Malhão, Luís Neto, and Gil Gonçalves                                                    |     |

|                                                                                                                                        |     |
|----------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Conceptual Design of a Positioning System for Systematic Production of Needle Beds</b> . . . . .                                    | 221 |
| Luis Freitas, Rui Oliveira, Teresa Malheiro, A. Manuela Gonçalves,<br>José Vicente, Paula Monteiro, and Pedro Ribeiro                  |     |
| <b>Selection and Development of Technologies for the Education of Engineers in the Context of Industry 4.0</b> . . . . .               | 236 |
| Pedro José Gabriel Ferreira, Silvia Helena Bonilla,<br>and José Benedito Sacomano                                                      |     |
| <b>An Exploratory Approach with EEG – Electroencephalography in Design as a Research and Development Tool</b> . . . . .                | 245 |
| Bernardo Providência and Rute Silva                                                                                                    |     |
| <b>Modelling IT Specialists Competency in the Era of Industry 4.0</b> . . . . .                                                        | 257 |
| Maciej Szafrński, Selma Gütmen, Magdalena Graczyk-Kucharska,<br>and Gerhard Wilhelm Weber                                              |     |
| <b>Original Constructive Solutions for the Development of Industry 4.0 in Romania</b> . . . . .                                        | 270 |
| Gheorghe Gheorghe, Badea Sorin-Ionut, Iulian Ilie, and Despa Veronica                                                                  |     |
| <b>Metrology Information in Cyber-Physical Systems</b> . . . . .                                                                       | 285 |
| João Sousa, João Silva, and José Machado                                                                                               |     |
| <b>Overview of Collaborative Robot YuMi in Education</b> . . . . .                                                                     | 293 |
| Jiri Vojtesek and Lubos Spacek                                                                                                         |     |
| <b>Reliability of Replicated Distributed Control Systems Applications Based on IEC 61499</b> . . . . .                                 | 301 |
| Adriano A. Santos, António Ferreira da Silva, António Magalhães,<br>and Mário de Sousa                                                 |     |
| <b>Inspection Robotic System: Design and Simulation for Indoor and Outdoor Surveys</b> . . . . .                                       | 313 |
| Pierluigi Rea, Erika Ottaviano, Fernando J. Castillo-García,<br>and Antonio Gonzalez-Rodríguez                                         |     |
| <b>Dutch Auction Based Approach for Task/Resource Allocation</b> . . . . .                                                             | 322 |
| Eliseu Pereira, João Reis, Gil Gonçalves, Luís Paulo Reis,<br>and Ana Paula Rocha                                                      |     |
| <b>MOBEYBOU</b> . . . . .                                                                                                              | 334 |
| Hugo Baptista Lopes, Vítor Carvalho, and Cristina Sylla                                                                                |     |
| <b>Model of Acquiring Transversal Competences Among Students on the Example of the Analysis of Communication Competences</b> . . . . . | 351 |
| Marek Goliński, Małgorzata Spychała, and Marek Miądowicz                                                                               |     |

|                                                                                                                                                                                      |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|
| <b>Mobile Applications in Engineering Based on the Technology of Augmented Reality</b> . . . . .                                                                                     | 366 |
| Tetiana Zhystenko, Vitalii Ivanov, Ivan Pavlenko, Nataliia Martynova, Yurii Zuban, and Dmytro Samokhvalov                                                                            |     |
| <b>A Review in the Use of Artificial Intelligence in Textile Industry</b> . . . . .                                                                                                  | 377 |
| Filipe Pereira, Vítor Carvalho, Rosa Vasconcelos, and Filomena Soares                                                                                                                |     |
| <b>HiZeca: A Serious Game for Emotions Recognition</b> . . . . .                                                                                                                     | 393 |
| Pedro Santos, Vinícius Silva, João Sena Esteves, Ana Paula Pereira, and Filomena Soares                                                                                              |     |
| <b>Portable Bathing System for Bedridden People</b> . . . . .                                                                                                                        | 406 |
| M. Leonor Castro-Ribeiro, A. A. Vilaça, Mariana A. Pires, Karolina Bezerra, Cândida Vilarinho, and Ana Olival                                                                        |     |
| <b>Manufacture of Facial Orthosis in ABS by the Additive Manufacturing Process: A Customized Application in High Performance Sports</b> . . . . .                                    | 422 |
| Anna Kellssya Leite Filgueira, Isabella Diniz Gallardo, Ketinlly Yasmyne Nascimento Martins, Rodolfo Ramos Castelo Branco, Karolina Celi Tavares Bezerra, and Misael Elias de Moraes |     |
| <b>E-Health in IDPs Health Projects in Pakistan</b> . . . . .                                                                                                                        | 433 |
| M. Irfanullah Arfeen, Adil Ali Shah, and Demetrios Sarantis                                                                                                                          |     |
| <b>Environmental Parameters Monitoring System with an Application Interface for Smartphone</b> . . . . .                                                                             | 449 |
| Jorge Ramos, André Teixeira, Carlos Arantes, Sérgio Lopes, and João Sena Esteves                                                                                                     |     |
| <b>Mechatronic Design of a Wall-Climbing Drone for the Inspection of Structures and Infrastructure</b> . . . . .                                                                     | 460 |
| Erika Ottaviano, Pierluigi Rea, Massimo Cavacece, and Giorgio Figliolini                                                                                                             |     |
| <b>Influence of Magnitude of Interaction on Control in Decentralized Adaptive Control of Two Input Two Output Systems</b> . . . . .                                                  | 468 |
| Karel Perutka                                                                                                                                                                        |     |
| <b>Author Index</b> . . . . .                                                                                                                                                        | 481 |