

Low-Cost Digital Solutions for Industrial Automation (LoDiSA 2023)

IET Conference Publications 838

Cambridge, United Kingdom
25-26 September 2023

ISBN: 978-1-7138-8714-0

Printed from e-media with permission by:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571

Some format issues inherent in the e-media version may also appear in this print version.

Copyright© (2023) by the Institution of Engineering and Technology
All rights reserved.

Printed with permission by Curran Associates, Inc. (2025)

For permission requests, please contact the Institution of Engineering and Technology
at the address below.

Institution of Engineering and Technology
P. O. Box 96
Stevenage, Hertfordshire
U.K. SG1 2SD

Phone: 01-441-438-767-328-328
Fax: 01-441-438-767-328-375

www.theiet.org

Additional copies of this publication are available from:

Curran Associates, Inc.
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: 845-758-0400
Fax: 845-758-2633
Email: curran@proceedings.com
Web: www.proceedings.com

TABLE OF CONTENTS

Methodology for On-Machine Calibration of Low-Cost Wireless Sensors.....	1
<i>K. S. Saleeby, M. Foley, M. Kosmala, T. R. Kurfess</i>	
Embedded AI System of Low-Cost Sensor for Robotic Gripper in the Box Handling Process	6
<i>S. A. Murdivien, J. Park, J. Um</i>	
Low-Cost Construction of Digital Twins Using Administration Asset Shell in Augmented Reality	
Guide Service for Machine Tool Operators.....	12
<i>Y. -D. Kim, J. -H. Moon, J. -S. Park, E. -Y. Kim, S. -S. Kim, J. Um</i>	
Industry 4.0-Compliant Asset Administration Shell Service Collector Using Single-Board	
Computers	19
<i>M. A. Bär, A. W. Colombo</i>	
Lightweight Digital Twin as a Service (LDTaaS): A Cost-Efficient Digital Transformation	
Approach for Manufacturing SMEs	28
<i>D. Guo, T. Zhang, Y. Rong, G. Q. Huang, J. S. Srari</i>	
Analytics on a Shoestring: Evolving the Requirements	34
<i>A. Mukherjee, G. Hawkrige, D. C. McFarlane, K. P. Thomas</i>	
Maintenance on a Shoestring: The Low-Cost Journey from Zero to Condition-Based Maintenance	41
<i>P. J. Rivera Torres, C. Chen</i>	
Enhancing Digital Manufacturing with Affordable Vision Systems: Exploring Low-Cost	
Applications.....	48
<i>Z. Ling, G. Hawkrige, D. McFarlane, A. Thorne</i>	
Low-Cost Digitalisation Opportunities in Healthcare: A Histopathology Department Case Study.....	56
<i>N. Moretti, A. Mukherjee, Y. -C. Chan, G. Yilmaz, J. Merino, M. Sasidharan, Z. Rosun, C. Carr, D. McFarlane, A. K. Parlikad</i>	
Efficient Decision-Making in SMEs: Leveraging Knowledge Graphs with Neo4j and AI Vision.....	63
<i>F. Mo, H. U. Rehman, B. Elshafei, J. C. Chaplin, D. Sanderson, G. Martínez-Arellano, S. Ratchev</i>	
Intelligent Low-Cost Monitoring for Smart Digital Manufacturing.....	70
<i>C. Chen, G. Hawkrige, A. Mukherjee, P. J. Rivera Torres, Z. Ling, C. Santos, D. McFarlane</i>	
A Systematic Method for Retrofitting Legacy Machines Using the “shoestring” Philosophy	76
<i>J. Polzer, X. Xu, K. Selitskiy, R. Archibald, A. Gill</i>	
Innovative VS. Traditional: A Framework to Assess the Sustainable Trade-Off of Maintenance	
Strategies	84
<i>A. P. Pomè, G. Orlandini, C. Tagliaro</i>	
How Much Do Choices Impact Environmentally the Maintenance Activities? a Measurement	
Framework Based on Ecological Footprint	94
<i>A. P. Pomè, A. Basile, A. Ciaramella</i>	
Unlocking the Potential of Data in Circular Manufacturing: Opportunities for Data Sharing and	
Stakeholders' Collaboration.....	103
<i>T. A. Abdel-Aty, F. Acerbi, E. Negri, M. Macchi</i>	

Cost-Effective Digital Transformation of SMEs Through Low-Cost Digital Solutions.....	111
<i>G. Yilmaz, K. Qurban, J. Kaiser, D. C. McFarlane</i>	
Empowering the Food Industry Through IIoT Platforms: Takeaways for IT/OT Integration in Industry 4.0.....	116
<i>S. Mantravadi</i>	
Digital-Twin Based Data Modelling for Digital Building Logbook Implementation.....	124
<i>M. Signorini, N. Moretti, J. Merino, B. Daniotti, A. Parlikad</i>	
Evaluation of No-Cost MTConnect-Enabled Machine Monitoring Architecture in Google Sheets.....	132
<i>M. Kosmala, M. Foley, T. R. Kurfess, K. S. Saleeby</i>	
Low-Cost Very Narrow Aisle Pallet Racking Vehicle Utilisation Monitoring Solution.....	138
<i>M. Dhada, J. Macias-Aguayo, A. Mukherjee, D. McFarlane</i>	
Explainable AI-Powered Edge Computing Solution for Smart Building Energy Management in Green IoT	144
<i>İ. Kök, Y. Ergun, N. Uğur</i>	
Low-Cost Vibration Sensor with Low Frequency Resonance for Condition Monitoring of Low Speed Bearings: A Feasibility Study	152
<i>A. P. Ompusunggu, C. R. Carcel</i>	
Virtual Sensor Architecture for Indoor Air Quality Monitoring	159
<i>J. Merino, D. Ikeuchi, N. Moretti, A. Mukerjee, L. Li, S. Karatzas, S. Pattinson, A. Parlikad</i>	
Methodology for Digital Transformation: A Continuous Improvement Approach.....	169
<i>K. H. Oliver, G. Martínez-Arellano, J. Segal</i>	
Low-Cost System for Visual Inspection of Corrosion: An Industrial Case Study	177
<i>K. H. Oliver, G. Martínez-Arellano, J. Segal</i>	
Investigating Multi-Level Ontology to Support Manufacturing During Demand Fluctuation	184
<i>N. Kazantsev, K. Niewiadomski, G. Martínez-Arellano, B. Elshafei, F. Mo, S. R. Murthy</i>	
Towards a Comparison of Low-Cost Technologies for Monitoring the Consumption of Power.....	188
<i>G. Terrazas, C. Santos, A. Mukherjee</i>	

Author Index