# 2024 Progress in Applied Electrical Engineering (PAEE 2024)

Koscielisko, Poland 24-28 June 2024



IEEE Catalog Number: CFP24H21-POD ISBN: 979-8-3315-2757-0

## Copyright © 2024 by the Institute of Electrical and Electronics Engineers, Inc. All Rights Reserved

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.

 IEEE Catalog Number:
 CFP24H21-POD

 ISBN (Print-On-Demand):
 979-8-3315-2757-0

 ISBN (Online):
 979-8-3315-2756-3

ISSN: 2837-8318

#### 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

E-mail: curran@proceedings.com Web: www.proceedings.com



### 2024 Progress in Applied Electrical Engineering (PAEE)

Koscielisko (Zakopane), Poland, June 24 - 28, 2024

#### Table of contents

	Title	Authors
I III	Front cover Table of contents	
1	Analysis of thermal growth of sheet metal roofing as a result of direct lightning discharges	Konrad Sobolewski and Piotr Strużewski
9	Exploring the Intersection of Metrology and Data Mining: A Review of Current Challenges and Future Directions	Mateusz Materlak, Paweł Stasiakiewicz and Marek Suproniuk
14	Optimization of the Brushed DC motor for automotive applications by the use Taguchi method	Łukasz Knypiński, Ramesh Devarapalli, Sebastian Roszak, Reagan Jean Jacques Molu and Mehmet Duman
18	Optimization based on Flower Pollination Algorithm applied for fuzzy speed controller of drive with elastic connection	Grzegorz Kaczmarczyk, Radosław Stanisławski, Danton Diego Ferreira, Łukasz Knypiński and Marcin Kamiński
24	Photovoltaic Systems Installation Issues Affecting the Operational Safety of Public Buildings	Jacek Kusznier, Marcin Sulkowski and Dariusz Gromadka
28	Eye tracking and exploring AI potential in describing and generating images: a contribution to research on generative art	Dominik Piotrowski, Veslava Osińska and Adam Szalach
31	Systemic Neural Modeling of Hourly Power Demand in the National Power System	Jerzy Tchórzewski
37	Intelligent DC microgrids in a power system with a high share of renewable energy sources - challenges and problems	Piotr Grzejszczak
43	ML-powered Bio-medical Signals Processing using Hybrid Filters	Mariusz Pelc, Dariusz Mikołajewski, Patryk Mendoń, Adrian Luckiewicz, Adam Sudoł, Edward J. Gorzelanczyk and Aleksandra Kawala-Sterniuk
48	Methods and tools for automatic or semi-automatic recognition of selected emotions using machine learning algorithms	Piotr Schneider, Dariusz Mikołajewski, Anna Bryniarska, Magdalena Igars-Cybulska, Artur Cybulski, Walery Marcinowicz, Maciej Janiszewski and Aleksandra Kawala- Sterniuk
54	Multi-method analysis of emotional and affective states	Adrian Luckiewicz, Bogdan Ruszczak, Mariusz Pelc, Dariusz Mikołajewski, Adam Sudoł, Barbara Grochowicz, Edward J. Gorzelańczyk, Patryk Mendoń and Aleksandra Kawala- Sterniuk
62	ML-based Expert Products Scoring System	Patryk Mendoń, Mariusz Pelc, Mariusz Gola and Aleksandra Kawala-Sterniuk
67	The application of fuzzy logic for the identification and assessment of a driver's driving style.	Monika Piróg, Przemysław Hawro, Jacek Bartman and Konrad Łukiewicz
72	Applying artificial intelligence techniques in computed tomography for supporting liver cancer diagnosis	Radosław Roszczyk, Justyna Budzyńska and Maria Kujawa
78	Some properties of K-K-T coefficients for use in optimizing intentional commutation in SEE substation branches	Aleksandra Skuza, Marek Suproniuk and Stanisław Ziemianek
83	Modeling photoconductivity of gallium phosphide	Karol Piwowarski, Bogdan Perka, Marek Suproniuk, and Piotr Paziewski
87 91	The effect of moisture on the electrical resistivity of building structures  A Comprehensive Review on Challenges and Possible Solutions	Bogdan Perka, Marek Suproniuk, Karol Piwowarski, Piotr Paziewski, and Patrycja Rechlicz
71	of Battery Management Systems in Electric Vehicles	Joddumahanthi Vijaychandra, and Łukasz Knypiński