


Lecture Notes in Mechanical Engineering

Series Editors


Fakher Chaari, National School of Engineers, University of Sfax, Sfax, Tunisia

Francesco Gherardini , Dipartimento di Ingegneria “Enzo Ferrari”, Università di Modena e Reggio Emilia, Modena, Italy

Vitalii Ivanov, Department of Manufacturing Engineering, Machines and Tools, Sumy State University, Sumy, Ukraine

Mohamed Haddar, National School of Engineers of Sfax (ENIS), Sfax, Tunisia

Editorial Board

Francisco Cavas-Martínez , Departamento de Estructuras, Construcción y Expresión Gráfica Universidad Politécnica de Cartagena, Cartagena, Murcia, Spain

Francesca di Mare, Institute of Energy Technology, Ruhr-Universität Bochum, Bochum, Nordrhein-Westfalen, Germany

Young W. Kwon, Department of Manufacturing Engineering and Aerospace Engineering, Graduate School of Engineering and Applied Science, Monterey, CA, USA

Justyna Trojanowska, Poznan University of Technology, Poznan, Poland

Jinyang Xu, School of Mechanical Engineering, Shanghai Jiao Tong University, Shanghai, China

Lecture Notes in Mechanical Engineering (LNME) publishes the latest developments in Mechanical Engineering—quickly, informally and with high quality. Original research reported in proceedings and post-proceedings represents the core of LNME. Volumes published in LNME embrace all aspects, subfields and new challenges of mechanical engineering.

To submit a proposal or request further information, please contact the Springer Editor of your location:

Europe, USA, Africa: Leontina Di Cecco at Leontina.dicecco@springer.com

China: Ella Zhang at ella.zhang@springer.com

India: Priya Vyas at priya.vyas@springer.com

Rest of Asia, Australia, New Zealand: Swati Meherishi at swati.meherishi@springer.com

Topics in the series include:

- Engineering Design
- Machinery and Machine Elements
- Mechanical Structures and Stress Analysis
- Automotive Engineering
- Engine Technology
- Aerospace Technology and Astronautics
- Nanotechnology and Microengineering
- Control, Robotics, Mechatronics
- MEMS
- Theoretical and Applied Mechanics
- Dynamical Systems, Control
- Fluid Mechanics
- Engineering Thermodynamics, Heat and Mass Transfer
- Manufacturing Engineering and Smart Manufacturing
- Precision Engineering, Instrumentation, Measurement
- Materials Engineering
- Tribology and Surface Technology

Indexed by SCOPUS, EI Compendex, and INSPEC.

All books published in the series are evaluated by Web of Science for the Conference Proceedings Citation Index (CPCI).

To submit a proposal for a monograph, please check our Springer Tracts in Mechanical Engineering at <https://link.springer.com/bookseries/11693>.

Mohd Hasnun Arif Hassan · Mohd Nadzeri Omar ·
Nasrul Hadi Johari · Yongmin Zhong
Editors

Proceedings of the 2nd Human Engineering Symposium

HUMENS 2023, Pekan, Pahang, Malaysia

Editors

Mohd Hasnun Arif Hassan
Faculty of Mechanical and Automotive
Engineering Technology
Universiti Malaysia Pahang Al-Sultan
Abdullah
Pekan, Pahang, Malaysia

Mohd Nadzeri Omar
Faculty of Mechanical and Automotive
Engineering Technology
Universiti Malaysia Pahang Al-Sultan
Abdullah
Pekan, Pahang, Malaysia

Nasrul Hadi Johari
Faculty of Mechanical and Automotive
Engineering Technology
Universiti Malaysia Pahang Al-Sultan
Abdullah
Pekan, Pahang, Malaysia

Yongmin Zhong
School of Engineering
RMIT University
Melbourne, VIC, Australia

ISSN 2195-4356

ISSN 2195-4364 (electronic)

Lecture Notes in Mechanical Engineering

ISBN 978-981-99-6889-3

ISBN 978-981-99-6890-9 (eBook)

<https://doi.org/10.1007/978-981-99-6890-9>

© The Editor(s) (if applicable) and The Author(s), under exclusive license to Springer Nature Singapore Pte Ltd. 2024

This work is subject to copyright. All rights are solely and exclusively licensed by the Publisher, whether the whole or part of the material is concerned, specifically the rights of translation, reprinting, reuse of illustrations, recitation, broadcasting, reproduction on microfilms or in any other physical way, and transmission or information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed.

The use of general descriptive names, registered names, trademarks, service marks, etc. in this publication does not imply, even in the absence of a specific statement, that such names are exempt from the relevant protective laws and regulations and therefore free for general use.

The publisher, the authors, and the editors are safe to assume that the advice and information in this book are believed to be true and accurate at the date of publication. Neither the publisher nor the authors or the editors give a warranty, expressed or implied, with respect to the material contained herein or for any errors or omissions that may have been made. The publisher remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

This Springer imprint is published by the registered company Springer Nature Singapore Pte Ltd.

The registered company address is: 152 Beach Road, #21-01/04 Gateway East, Singapore 189721, Singapore

Paper in this product is recyclable.

Preface

Technological advancements have significantly benefited humans. Technology has led to the development of ergonomic tools and equipment that improve human comfort, reduce strain, and enhance overall productivity. From adjustable office chairs to ergonomic keyboards, these innovations promote proper posture and reduce the risk of musculoskeletal disorders. When it comes to road safety, technology has played a pivotal role in saving lives and preventing accidents. Advanced driver assistance systems (ADAS) equipped with sensors, cameras, and artificial intelligence algorithms help detect potential hazards, warn drivers, and even intervene if necessary. In the realm of sports technology, advancements have revolutionized training methodologies and performance analysis. Athletes now have access to wearable devices that monitor their biometric data, providing insights into their physical condition, performance metrics, and injury prevention. Further, technological advancements have led to sophisticated tools and methods for studying the human body's mechanics and movement. High-speed cameras, force sensors, and motion-tracking systems enable researchers to gain deeper insights into human locomotion, joint mechanics, and muscle activation patterns. These findings help design better prosthetics, rehabilitation programs, and ergonomic solutions tailored to individual needs.

The “Unlocking Human Potential: The Future of Human Engineering” symposium seeks to delve into the cutting-edge field of human engineering, exploring the possibilities of augmenting and optimizing human capabilities through advancements in science, technology, and design. This symposium brings together experts from various disciplines to discuss and showcase innovative approaches, methodologies, and ethical considerations in the realm of human engineering. From neuroenhancement to prosthetics, cognitive augmentation to genetic engineering, this symposium aims to stimulate insightful discussions and inspire the creation of a future where human potential knows no bounds.

Pekan, Malaysia

Mohd Hasnun Arif Hassan

Contents

Developing a Survey Tool to Measure Psychosocial Risk and Work Performance at a Workplace	1
Nuruzzakiyah Mohd Ishanuddin, Hanida Abdul Aziz, and Ezrin Hani Sukadarin	
Enhancing Mental Health Through Ambient Lighting	19
Ilhamy Isyraq bin Ahmad Fadzil, Aimi Shazwani Ghazali, Farahiyah Jasni, and Muhammad Hariz bin Hafizalshah	
Parameter Extraction of Muscle Contraction Signals from Children with ASD During Fine Motor Activities	33
Nor Zainah Mohamad, Nur Azah Hamzaid, and Muhammad Haziq Ahmad Fauzi	
Design of Hose Roller for Firefighter: A Fatigue Study	43
Mohammad Luqman Hakim Mustapha, Salwa Mahmood, Helmy Mustafa El Bakri, Ismail Abdul Rahman, Noorul Azreen Azis, and Mohd Rizal Buang	
Noise Risk Assessment on Noise Exposure Among Urban Rail Maintenance Workers Using Personal Monitoring Method	57
M. Mifzal-Nazhan, J. Azlis-Sani, A. Nor-Azali, Y. Nur-Annuar, S. Shahrul-Azhar, and A. Mohd-Zulhelmi	
Bangla Text Summarization Analysis Using Machine Learning: An Extractive Approach	65
Mizanur Rahman, Sajib Debnath, Masud Rana, Saydul Akbar Murad, Abu Jafar Md Muzahid, Syed Zahidur Rashid, and Abdul Gafur	
Human Factors: Drivers' Speed Choice on Relatively Low-Speed Limit Roads	81
Othman Che Puan, Azlina Ismail, Khairil Azman Masri, and Muhammad Shafiq Mohd Rozainee	

Topology Optimization for Custom Bed-Resting Ankle Foot Orthosis	95
Amir Mustakim Ab Rashid, Effi Zuhairah Md Nazid, Muhammad Hazli Mazlan, Azizah Intan Pangesty, and Abdul Halim Abdullah	
Influence of Environmental Factors and Road Characteristics in Commuting Accidents Among Public University Staffs	107
Mohd Najib Yaacob and Khairiah M. Mokhtar	
Effects of Material Properties in Developing the Ear Prosthetics	119
Abdul Halim Abdullah, Mohd Noor Asnawi Mohd Noordin, Suziana Ahmad, Nor Fazli Adull Manan, and Shahrul Hisyam Marwan	
Study of Primary Stability of Hip Implant for Semi Hip Replacement by Using Finite Element Analysis	133
Haslina Abdullah, Mohamad Shukri Zakaria, and Norfazillah Talib	
Investigation of Mental Health Condition Among Factory Worker During Covid pandemic–A Cross-Sectional Study	145
Irna Syahira Hassan, Nur Fazhilah Abdul Razak, Junaidah Zakaria, and Ezrin Hani Sukadarin	
The Influence of Body Balance Towards the Golf Putting Performance	161
Abdul Raouf Abas, Mohd Nadzeri Omar, Nasrul Hadi Johari, and Mohd Hasnun Arif Hassan	
Risk Assessment for Manual Handling Activities in a Dairy Industry ...	173
Khairulhafiy Muhammad Ruzairi, Ezrin Hani Sukadarin, Mirta Widia, and A. Alaman	
Brief Review of Recent Study on Fluid–Structure Interaction Modeling of Blood Flow in Peripheral Arterial Disease	185
M. Firdaus M. Fauzi, Nasrul Hadi Johari, and M. Jamil M. Mokhtarudin	
Head Injury During Heading of Two Types of Sepak Takraw Balls: Analytical Approach	199
Nik M. Haikal M. Hassan, Nasrul Hadi Johari, Mohd Hasnun Arif Hassan, Idris Mat Sahat, Mohd Nazderi Omar, and Zulkifli Ahmad	
Fluid–Structure Interaction (FSI) Modelling in Stenotic Carotid Artery Bifurcation	209
A. Rusydan Alias and Nasrul Hadi Johari	
Prediction of Atherosclerosis in Peripheral Arterial Disease Using Computational Fluid Dynamics Modelling	223
Ukasyah Zulfaqar Shahrulakmar, Nasrul Hadi Johari, Juhara Haron, Chandran Nadarajan, and M. Nadzeri Omar	

Impact Analysis of Motorcycle Helmet: Finite Element Modeling 239
 N. Aimi Huda and M. S. Salwani

The Protective Performance of Different Types of Motorcycle Helmets in Terms of HIC and BrIC 249
 N. Q. Radzuan, M. H. A. Hassan, M. N. Omar, and K. A. Abu Kassim

Measuring Running Performance Through Technology: A Brief Review 263
 Siti Rabiattull Aisha Idris

Experimental Study of Gait Monitoring on Wearable Shoes Insole and Analysis: A Review 273
 Nur Wahida Saadion and Mohd Azrul Hisham Mohd Adib

Preliminary Ergonomics Analysis of Sit-Stand (STS) Desk on the Patient with Lower Back Pain Problem: A Case Study 289
 Muhammad Rafli Salim Hasan Raza, Mohd Azrul Hisham Mohd Adib, and Nurul Shahida Mohd Shalahim

Developing a Survey Tool to Measure Human Factors Constructs for Personal Hearing Protector (PHP) Use Among Industrial Workers—First Phase 299
 Nur Syafiqah Fauzan, Mirta Widia, and Ezrin Hani Sukadarin

A Review on the Pedal Error Cases Among Car Drivers in Malaysia ... 313
 Nursya Mimie Ayuny Ismail, Mohamad Zairi Baharom, Zulkifli Ahmad, Mohd Hasnun Arif Hassan, Juffrizal Karjanto, Zulhaidi Mohd Jawi, and Khairil Anwar Abu Kassim

Study of Anxiety Parameters and Sensors Related to Monitoring the Anxiety Concentration Index Level Among Archer Athletes: A Review 327
 Nur Khalijah Kamarudin, Wan Nurlisa Wan Ahmad, and Mohd Azrul Hisham Mohd Adib

EEG and EMG-Based Multimodal Driver Drowsiness Detection: A CWT and Improved VGG-16 Pipeline 339
 Mamunur Rashid, Mahfuzah Mustafa, Norizam Sulaiman, and Md Nahidul Islam

Rehabilitation and Gamification Technology Device for Lower Extremities Patient: A Review 351
 Mohd Adib Syazwi Ismail and Mohd Azrul Hisham Mohd Adib

The Importance of Proper Motorcycle Helmet Buckling: A Scientific Study 363
 N. Q. Radzuan, M. H. A. Hassan, M. N. Omar, N. A. Othman, M. A. Mohamad Radzi, and K. A. Abu Kassim

A Short Review on Development of Table Tennis Robotic Launcher	377
Irlina Jazlin Jamaludin, Zulkifli Ahmad, and Mohamad Zairi Baharom	
Reusability Study of 3D Printing Mould and Resin Casting for Takraw Ball Launcher Wheel	389
Idris Mat Sahat and Nasrul Hadi Johari	
Development of Noise Risk Assessment (NRA) and Management System	399
Kirubalini Asok Kumar, Nur Syafiqah Fauzan, Mirta Widia, Ezrin Hani Sukadarin, Nor Liyana Man, and Mohd Ikhwan Mohd Ibrahim	
Framework of Safety Helmet Compliance Detection and Employee Tracking by Using Quick Response (QR Code) Technology	415
Nuraini Wahidah Rusli, Hanida Abdul Aziz, and Naz Edayu Mat Nawi	
e-HIRARC Tool for Brick Laboratory in Civil Engineering Department at TVET (Technical and Vocational Education Training) Campus	425
Masita Hassan, Hanida Abdul Aziz, and Mohd Zahidi Rahim	
A Review of Biomechanical and Psychosocial Risk Factors Among Workers	437
Khairulhafiy Muhammad Ruzairi, Ezrin Hani Sukadarin, Mirta Widia, and A. Alaman	
Knowledge and Awareness of Road Safety Among University Students	445
Nur Nakhirah Najwa Musni, Wan Norlinda Roshana Mohd Nawi, and Mirta Widia	
Riding Towards Safety: Examining the Patterns of Motorcycle Accidents in Malaysia	455
N. Q. Radzuan, M. H. A. Hassan, M. N. Omar, N. A. Othman, and K. A. Abu Kassim	
Development of Automatic Cervical Brace for Neck Pain Rehabilitation	469
M. Z. Ahmad Fazril, Nur Haizal Mat Yaacob, Norsuhaily Abu Bakar, Mohamad Shaban AlSmadi, and Nasrul Hadi Johari	

About the Editors

Dr. Mohd Hasnun Arif Hassan earned his first degree in Mechanical Engineering from the Technische Hochschule Bingen, Germany, in 2010. During the final year of his undergraduate study, he was offered a scholarship by Universiti Malaysia Pahang (UMP) to pursue a Master's degree in Mechanical Engineering at the University of Malaya in Kuala Lumpur, which he graduated with distinction in 2012. After that, he embarked on his Ph.D. journey at UMP where he studied about the head injury sustained by soccer players due to heading manoeuvre. He completed his Ph.D. study in 2016 and then continued to serve UMP as a senior lecturer. His research interests include finite element modelling of the interaction between human and sports equipment, instrumentation of sports equipment, and injury prevention particularly with regards to sports and traffic accidents. His work aims to apply engineering principles in sports not only to enhance the performance of an athlete but also to prevent injuries.

Dr. Mohd Nadzeri Omar received the B.Eng. (Hons) and Ph.D. degrees from RMIT University, Melbourne, Australia, in 2013 and 2017, respectively. He is a senior lecturer with the Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang. He is also attached to the Human Engineering Research Group which focuses on research, development, and innovations in human-centered technology and products. His research interests include soft tissue modelling, sports technology, biomechanical engineering, and mechatronics.

Dr. Nasrul Hadi Johari obtained his Ph.D. in Biofluid Mechanics from Imperial College London, United Kingdom. He is currently a senior lecturer at the Faculty of Mechanical and Automotive Engineering Technology, Universiti Malaysia Pahang. Dr. Johari's research activities include computational modeling of blood flow, tissue mechanics, and mass transport in the cardiovascular system, with applications ranging from evaluating the hemodynamic performance of medical devices to predict the outcome of endovascular interventional procedures. He is also interested in computational and experimental modeling of the interaction between human

and sports equipment particularly in improving training aid systems and injury prevention.

Dr. Yongmin Zhong is currently an Associate Professor with the School of Aerospace, Mechanical and Manufacturing Engineering, at RMIT University, Australia. His research interests include computational engineering, haptics, soft tissue modeling, surgical simulation, aerospace navigation and control, intelligent systems, and robotics.