

**REAL-WORLD APPLICATION OF
CYBER-PHYSICAL
SYSTEMS**

Editors
ZAKIAH AYOP
NURUL AZMA ZAKARIA

REAL-WORLD APPLICATION OF CYBER-PHYSICAL SYSTEMS

The main goal of this book is to encourage both researchers and practitioners to share and exchange their experiences and recent studies between academia and industry. The overall objectives are:

- To improve the awareness of readers about CPS concepts, technologies, and application areas.
- To present case-studies and innovative applications of the CPS.
- To highlight and discuss the recent development and emerging trends in the CPS.
- To propose new models, practical solutions and technological advances of the CPS.
- To address implementation issues and challenges.



ZAKIAH AYOP graduated with Bachelor of Computer Science and Master of Science in Distributed Computing from Universiti Teknologi Malaysia and Universiti Putra Malaysia respectively. Currently, she is a senior lecturer in Department of Computer System and Communications, Faculty of Information and Communication Technology (FTMK), Universiti Teknikal Malaysia Melaka (UTeM), Melaka, Malaysia. She is a member of the Information Security, Digital Forensic, and Computer Networking research group. Her research interest is Information System, Internet of Things (IoT), Cyber-physical System (CPS) and Networking. She is a certified CCNA Instructor. You can connect with Zakiah at zakiah@utem.edu.my.



NURUL AZMA ZAKARIA graduated with Bachelor of Engineering in Electronic Computer Systems (1999) and Master of Science in Information System Engineering (2003) from University of Salford and University of Manchester Institute of Science and Engineering (UMIST), UK respectively. In 2010, she received her PhD in Information and Mathematical Sciences from Saitama University, Japan. As senior lecturer in Department of Computer System and Communications, Faculty of Information and Communication Technology (FTMK), Universiti Teknikal Malaysia Melaka (UTeM) and a member of Information Security, Digital Forensic and Computer Networking (INSFORNET) research group, she explores various research themes related to engineering and ICT, specifically in System-Level Design, Embedded System Design, Cyber-Physical System (CPS), Internet of Things (IoT), IPv6 Migration and 6LoWPAN. You can connect with Nurul Azma at azma@utem.edu.my.



**PENERBIT
UTeM
Press**

Website : <https://penerbit.utem.edu.my>
Books Online : <https://utembooks.utem.edu.my>
Email : penerbit@utem.edu.my

ISBN 978-629-7658-86-5



03900

© Universiti Teknikal Malaysia Melaka
ISBN: 978-629-7658-86-5

FIRST PUBLISHED 2025

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, electronic, mechanical photocopying, recording or otherwise, without the prior permission of the Penerbit UTeM Press, Universiti Teknikal Malaysia Melaka.

Member of the Malaysian Scholarly Publishing Council (MAPIM)
Member of the Malaysian Book Publishers Association (MABOPA)
Member of Clarivate Analytics

Manuscript Editor

Mohd Hafizuddin Yusof

Book Cover Designer and Typesetter

Ahmad Masmuliyadi Mohd Yusof

Published and Printed in Malaysia by

Penerbit UTeM Press

Universiti Teknikal Malaysia Melaka

Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia.

Phone: +606 270 1241 Fax: +606 270 1038



Cataloguing-in-Publication Data

Perpustakaan Negara Malaysia

A catalogue record for this book is available
from the National Library of Malaysia

ISBN 978-629-7658-86-5

PERPUSTAKAAN

Universiti Teknikal Malaysia Melaka

No. Aksesan

87519191

No. Panggilan

TK
7895
1642
R413
2025

Tarikh
19 AUG 2025

u mial

CONTENTS



Dedication	v
Preface.....	ix
Acknowledgement.....	xi
List of Contributors.....	xiii
Abbreviations	xvii
Introduction	xix

Theme 1: Review of CPS

Chapter 1: Cyber-Physical Systems in Manufacturing Technology

<i>Fairul Azni Jafar, Ahamad Zaki Mohamed Noor</i>	3
--	---

Chapter 2: Cyber-Physical Systems: Research Trends in Smart Home Systems

<i>Nurul Azma Zakaria, Fairul Azni Jafar, Robiah Yusof, Nin Hayati Mohd Yusoff, Erman Hamid</i>	15
---	----

Chapter 3: The Significance of Cyber-Physical Systems in Blockchain Technology

<i>Norazida Ali, Abdul Aziz Jamaluddin, Siti Hidayati Kamsari, Muhd Amin Saad, Norhafizah Burham, Norhana Arsad</i>	31
---	----

Theme 2: Real-World Applications of CPS Technology

Chapter 4: Smart CCTV Home Camera Using Modified Histogram of Oriented Gradients

<i>Mohd Faizal Abdollah, Robiah Yusof, S. M. Warusia Mohamed S. M. M Yassin, Thennarasu Paramasivan</i>	57
---	----

Chapter 5: Cyber-Physical Systems Application Development Using Machine Learning Approach for Smart Building	
<i>Nin Hayati Mohd Yusoff, Nurul Azma Zakaria</i>	<i>77</i>
Chapter 6: Smart Auto Feeder Application on Cyber-Physical Systems	
<i>Zakiah Ayop, Ahmad Tarmizi Masketar, Syarulnaziah Anawar, Nur Fadzilah Othman</i>	<i>91</i>
Chapter 7: Transforming Food Bank Management: Design and Development of an IoT Solution	
<i>Raja Rina Raja Ikram, Nur Khalida Khalisha Khalid, Natasha Shafiq A. Najebudin, Muhammad Nabil Mustafa, Muhammad Syariff Kamil Syputin, Rafizah Mohd Hanifa, Wan Mohd Ya'akob Wan Bejuri</i>	<i>109</i>
Index	123