UNIVERSITI TEKNIKAL MALAYSIA MELAKA

MINISTRY OF HIGHER EDUCATION
DEPARTMENT OF HIGHER EDUCATION

MEIPTA
MAJLIS KETUA-KETUA PENYELARAS E-PEMBELAJARAN IPTA MALAYSIA

Proceeding of

International University Carnival on E-Learning

IUCEL2025

INTERNATIONAL UNIVERSITY CARNIVAL ON E-LEARNING

" Embracing AI for Innovative Learning and Inclusive Education "

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Loh Ser Lee

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Penerbit UTeM Press
Universiti Teknikal Malaysia Melaka
2026

eISBN: 978-629-7892-04-7

FIRST PUBLISHED 2026

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

Published and Printed in Malaysia by
Penerbit UTeM Press
Universiti Teknikal Malaysia Melaka
Hang Tuah Jaya, 76100 Durian Tunggal, Melaka, Malaysia.
Tel: +606 229 2133 Faks: +606 229 2433

Cataloguing-in-Publication Data

National Library of Malaysia

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

eISBN 978-629-7892-04-7

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Preface

We are pleased to present the e-Proceedings of the International University Carnival on E-Learning 2025 (IUCEL2025), organised by the Centre for Open and Distance Learning (CODL), Universiti Teknikal Malaysia Melaka (UTeM), in collaboration with the Ministry of Higher Education Malaysia (MoHE). The event was supported by the Department of Higher Education, MoHE, and the Public University e-Learning Council (MEIPTA).

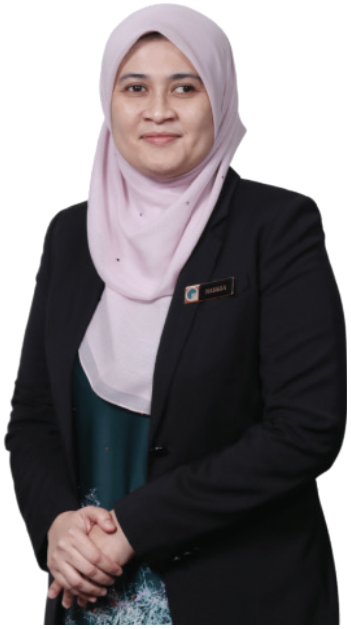
Held on 13 November 2025, IUCEL2025 brought together 196 e-learning innovators from 26 institutions. All presenters were invited to submit extended abstracts in August 2025. After a thorough evaluation and peer-review process completed in September 2025, a total of 160 articles were accepted for inclusion in this publication. The papers compiled here represent diverse perspectives and practices aligned with the event's theme, *"Embracing AI for Innovative Learning and Inclusive Education."*

We extend our sincere appreciation to all authors for their valuable contributions, as well as to the panel of reviewers for their time and expertise. Special acknowledgement is also extended to the Patron of IUCEL2025, Professor Datuk Ts. Dr. Massila binti Kamalrudin, and Chairman, Professor Ir. Dr. Gan Chin Kim, for their leadership and guidance throughout the preparation of this event.

We also express our heartfelt gratitude to the CODL and UTeM team members whose dedication made this publication possible. We hope that the research and ideas presented in this e-proceedings will serve as a meaningful reference for educators, researchers, and practitioners committed to advancing e-learning innovation.

Editors
IUCEL2025 E-Proceedings

Foreword



As Patron of the International University Carnival on E-Learning 2025 (IUCEL2025), I am pleased to present this e-proceedings, which reflects Universiti Teknikal Malaysia Melaka's (UTeM) continued commitment to advancing innovation in digital learning. In collaboration with the Ministry of Higher Education Malaysia (MoHE), IUCEL2025 stands as a testament to our aspiration to nurture a progressive and inclusive educational ecosystem enriched by emerging technologies.

The theme, *"Embracing AI for Innovative Learning and Inclusive Education,"* captures the spirit of transformation shaping higher education today. Artificial intelligence, when applied thoughtfully, has the capacity to broaden access, personalise learning experiences, and strengthen teaching effectiveness across diverse disciplines. IUCEL2025 offered a valuable avenue for educators, researchers, and practitioners to reflect on these opportunities and share meaningful insights that will guide the future of e-learning in Malaysia and beyond.

I would like to express my appreciation to all contributors who have shared their work in this publication. My gratitude also goes to the organising committee members, especially those from Centre for Open and Distance Learning (CODL), for their dedication in ensuring the success of IUCEL2025.

I hope that this e-proceedings will serve as a useful resource and inspire continued exploration, collaboration, and innovation in the pursuit of excellence in teaching and learning.

PROFESSOR DATUK TS. DR. MASSILA BINTI KAMALRUDIN
Vice-Chancellor
Universiti Teknikal Malaysia Melaka (UTeM)
Patron, IUCEL2025

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INCLUSIVE LEARNING THROUGH IOT-ENABLED WATER QUALITY MONITORING FOR NIPA PALM AND GULA APONG PRODUCTION- TOWARDS AI EDUCATION

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Abstract

Water quality plays a vital role in the growth and development of agricultural crops, including the Nipa palm. This project aims to investigate and develop a reliable water quality monitoring system specifically designed to assess physicochemical parameters near Nipa palm plantations. This project introduces an IoT-powered real-time water quality monitoring system tailored for nipa palm agriculture and gula apong production. It integrates low-cost sensors to measure temperature, pH, electrical conductivity (EC), turbidity, and other physicochemical sensors to measure a more comprehensive range of water quality parameters thus delivering accurate and continuous data essential for maintaining optimal palm growth conditions. The temperature sensor also plays a vital role in identifying the ideal cooking time for gula apong, ensuring consistent taste, texture, and quality. The data collected is then analysed to assess the relationship between the physicochemical parameters of the water and the growth of the nipa palm. The collected data is transmitted wirelessly to a cloud platform, where it is visualized in graphical analysis. With the guidance from the designer, both villagers and students can monitor water quality on the spot or via analysis and detemine suitable locations for better quality of nipa palm thus enhance production quality of gula apong. Together with the material, an iot system also created to analyze the ideal time for gula apong production. Beyond supporting agricultural productivity, the system functions as an inclusive learning platform. For villagers, it provides a practical introduction to IoT technology while opening the door to AI applications in farming. For students, it offers hands-on experience in environmental monitoring, sensor integration, and AI-based data analysis—skills that align with modern educational goals and industry demands. By combining local knowledge with modern technology, this project empowers communities to adopt sustainable practices, safeguards the heritage of gula apong production, and serves as a beginning for AI in bridging the gap between rural traditions and digital innovation.

Keywords: Inclusive learning, AI, IOT, water monitoring, nipa, gula apong

BACKGROUND OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

Water quality greatly affects the growth of nipa palms and the quality of gula apong. In many rural areas, water monitoring is done manually and irregularly, leading to poor growth and inconsistent product quality. This project introduces an affordable IoT-based system to monitor water conditions in real time, helping farmers improve production and maintain the traditional gula apong production and also the beginning of AI.

DESCRIPTION OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

The system uses low-cost sensors to measure temperature, pH, electrical conductivity (EC), turbidity, and other water quality parameters. Temperature data is also used to determine the ideal cooking time for gula apong. All data is sent wirelessly to a cloud platform for easy viewing on mobile devices or computers. The system helps farmers choose the best planting areas and ensures consistent product quality. It is designed to be simple, practical, and easy for both villagers and students to use.

SIGNIFICANCE OF THE RESEARCH / INNOVATION / INVENTION / DESIGN

- Improves nipa palm growth and sap yield.
- Ensures consistent taste and quality of gula apong.
- Provides easy-to-use technology for rural communities.
- Gives hands-on learning experience in IoT and AI.

IMPACT OF THE INNOVATION/INVENTION/DESIGN TOWARDS EDUCATION OR COMMUNITY

- For the community, it offers a practical way to improve gula apong production and plantation health, while introducing digital tools to traditional farming.
- For education, it gives students real-world experience with sensors, IoT systems, and environmental monitoring—skills useful for future careers.
- As the beginning towards AI.

COMMERCIALIZATION POTENTIAL

- Can be sold as a water monitoring package for nipa palms and other crops.
- Its low cost and adaptability make it suitable for both local and wider markets.

CONCLUSION

This IoT water monitoring system blends traditional knowledge with modern technology to improve gula apong quality, support farmers, and provide an engaging learning tool. It preserves cultural heritage while opening opportunities for sustainable growth and income. To enhance this, AI can be implement in the system.

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e ISBN 978-629-7892-04-7