



UNIVERSITI
TEKNOLOGI
MARA

E-PROCEEDINGS

INTERNATIONAL TINKER INNOVATION & ENTREPRENEURSHIP CHALLENGE (i-TIEC 2025)

"Fostering a Culture of Innovation and Entrepreneurial Excellence"



e ISBN 978-967-0033-34-1



23 January 2025
PTDI, UiTM Cawangan Johor
Kampus Pasir Gudang

ORGANIZED BY:

Electrical Engineering Studies, College of Engineering
Universiti Teknologi MARA (UiTM) Cawangan Johor
Kampus Pasir Gudang

<https://tieg-uitmpg.wixsite.com/tieg>

**E-PROCEEDINGS
of International Tinker Innovation & Entrepreneurship
Challenge (i-TIEC 2025)**



“Fostering a Culture of Innovation and Entrepreneurial Excellence”

**23rd JANUARY 2025
PTDI, UiTM Cawangan Johor, Kampus Pasir Gudang**

Organized by

Electrical Engineering Studies, College of Engineering,
Universiti Teknologi MARA (UiTM) Cawangan Johor, Kampus Pasir Gudang.
<https://tieg-uitmpg.wixsite.com/tieg>

Editors

Aznilinda Zainuddin
Maisarah Noorezam

Copyright © 2025 Universiti Teknologi MARA Cawangan Johor, Kampus Pasir Gudang, Jalan Purnama, Bandar Seri Alam, 81750 Masai Johor.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, whether electronic, mechanical, or otherwise, without prior written consent from the Undergraduate Coordinator, Electrical Engineering Studies, College of Engineering, Universiti Teknologi MARA (UiTM) Cawangan Johor, Kampus Pasir Gudang.

e ISBN: 978-967-0033-34-1

The author and publisher assume no responsibility for errors or omissions in this e-proceeding book or for any outcomes related to the use of the information contained herein.

The extended abstracts featured in this e-proceeding book have not undergone peer review or verification by i-TIEC 2025. The authors bear full responsibility for the content of their abstracts, guaranteeing that they are original, unpublished, and not concurrently submitted elsewhere. The opinions presented in the abstracts reflect those of the authors and do not necessarily align with the views of the editor.

Published in Malaysia by
Universiti Teknologi MARA (UiTM) Cawangan Johor
Kampus Pasir Gudang, 81750 Masai



CONTENTS

PREFACE	i
FOREWORD RECTOR	ii
FOREWORD ASSISTANT RECTOR	iii
PREFACE PROGRAM DIRECTOR	iv
ORGANIZING COMMITTEE	v
EXTENDED ABSTRACTS SCIENCE & TECHNOLOGY	1 - 618
EXTENDED ABSTRACTS SOCIAL SCIENCES	619 - 806

PREFACE

It is with great pleasure that we present the e-proceedings of International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), which compiles the extended abstracts submitted to the International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), held on 23 January 2025 at **PTDI, Universiti Teknologi MARA (UiTM) Cawangan Johor, Kampus Pasir Gudang**. This publication serves as a valuable resource, showcasing the intellectual contributions on the invention and innovation among students, academics, researchers, and professionals.

The International Tinker Innovation & Entrepreneurship Challenge (i-TIEC 2025), organized under the theme "Fostering a Culture of Innovation and Entrepreneurial Excellence," is designed to inspire participants at various academic levels, from secondary students to higher education students and professionals. The competition emphasizes both innovation and entrepreneurship, encouraging the development of product prototypes that address real-world problems and have clear commercialization potential. By focusing on technological and social innovations, i-TIEC 2025 highlights the importance of turning creative ideas into viable, market-ready solutions that can benefit users and society. The extended abstracts in this e-proceedings book showcase the diverse perspectives and depth of research presented during the event, reflecting the strong entrepreneurial element at its core.

We extend our sincere gratitude to the contributors for their dedication in sharing their innovation and the organizing committee for their hard work in ensuring the success of the event and this publication. We also appreciate the support of our collaborators; Mass Rapid Transit Corporation Sdn. Bhd. (MRT Corp), Universitas Labuhanbatu, Indonesia (ULB), Universitas Riau Kepulauan, Indonesia (UNRIKA) and IEEE Young Professionals Malaysia, whose contributions have been instrumental in making this event and publication possible.

We hope that this e-proceedings book will serve as a valuable reference for researchers, educators, and practitioners, inspiring further studies and collaborations in both innovation and entrepreneurship. May the knowledge shared here continue to spark new ideas and market-ready solutions, advancing our collective expertise and fostering the growth of entrepreneurial ventures.

B-ST112: SMART AUTOMATIC RAIN COVER CONTROL SYSTEM FOR ENHANCED FISH DRYING	530
B-ST118: ROBOHARVEST: AI-DRIVEN ROBOTIC SYSTEM FOR AUTOMATED LOOSE PALM OIL FRUITLET DETECTION AND COLLECTION IN PLANTATIONS	535
B-ST126: PENTAHHELIX CO-WORKING SPACE FOR FISHERMEN WITH AN AQUATECTURE APPROACH.....	545
B-ST127: DESIGN OF GEN-Z MEDITATION CENTER IN BATAM WITH ZEN ARCHITECTURE CONCEPT	550
B-ST129: DESIGNING A SPECIAL NEED SCHOOL TYPE C WITH A BEHAVIORAL ARCHITECTURE APPROACH IN BATAM CITY	555
B-ST130: SCREEN PRINTED GOLD ELECTRODE FOR BACTERIA PANICLE BLIGHT DETECTION FROM IN SILICO DESIGNED APTAMERS.....	560
B-ST131: INNOVATIVE LOW-COST FOGGING FOR DENGUE MOSQUITO ERADICATION AND CLEAN LIVING SPACE.....	565
B-ST132: MEDMATHEMATICA: ADVANCING CANCER SEGMENTATION THROUGH MATHEMATICAL MODELING.....	570
B-ST135: ENHANCEMENT OF SODIUM BISMUTH TITANATE (NBT) DIELECTRIC PROPERTIES THROUGH ALUMINUM (AL ³⁺) SUBSTITUTION FOR ENERGY STORAGE	575
B-ST137: HYDROPONICS: A SMART SOLUTION FOR GARDENING ON LIMITED LAND	583
B-ST143: WEB AI IN EDUCATION INTERACTIVE WEB-BASED TUTOR FOR SELF-DIRECTED LEARNING.....	587
B-ST145: SIAUMKM : WEB AND ANDROID MOBILE DESIGN MODEL IN STRENGTHENING MSME ACCOUNTING INFORMATION SYSTEMS WITH AN R&D MODEL	593
B-ST148: VE TESTER.....	599
B-ST149: UTILIZATION OF OIL PALM FRONDS INTO BIOCHAR TO SUPPORT SUSTAINABLE SOIL IMPROVEMENT	604
B-ST150: ULTILIZATION OF PALM FROND WASTE IN THE MANUFACTURE OF LIQUID SMOKE FOR SUSTAINABLE AGRICULTURE	609
B-ST152: ASTROTOURISM INNOVATING FOR ENTREPRENEURIAL EXCELLENCE: ENHANCING USER EXPERIENCES AND ADVANCING ASTRONOMY EDUCATION AT KUSZA OBSERVATORY, UNIVERSITI SULTAN ZAINAL ABIDIN	613

B-ST130: SCREEN PRINTED GOLD ELECTRODE FOR BACTERIA PANICLE BLIGHT DETECTION FROM IN SILICO DESIGNED APTAMERS

Siti Sarah Jumali^{1,3}, Muhamad Arif Mohamad Jamali², and Amir Syahir Amir Hamzah³

¹Faculty of Biosciences and Biomolecular Sciences, Universiti Putra Malaysia 43400 Serdang, Selangor, Malaysia.

²Faculty of Science and Technology, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan, Malaysia

³Faculty of Plantation and Agrotechnology, Universiti Teknologi MARA, Melaka Branch, 77300 Merlimau, Melaka, Malaysia

Corresponding author: Siti Sarah Jumali, sarahjumali@uitm.edu.my

ABSTRACT

Bacteria Panicle Blight (BPB) is a newly emerging disease of paddy caused by *Burkholderia glumae*. Its devastating effect to paddy is owed to the pathogenicity of toxoflavin that is produced by the bacterium through the assistance of sequential protein expression event. Usually, the detection is made by manual observation or sending them to the laboratory for testing. These methods are quite laborious and time consuming for immediate action. Usually, real time sensors require antibody for the disease detection which may be costly and produce inconsistent results. In this study, aptamers are used as capturing agents in place of traditional antibody methods. Also, the selected aptamers were innovatively designed in silico, unlike the conventional SELEX method that is costly, laborious and time consuming. After screening 33 aptamers through molecular docking, 4 were objected to molecular dynamics simulation and MM-PBSA to predict binding properties. Through computational results, the aptamer candidates exhibited lowest docking energy and best interaction when simulated at 200nanoseconds and when tested experimentally, they give high affinity towards target protein. This innovation may cut short the time needed to develop drugs and sensing agents while having high commercialization potential as the only material it needs is a high-end computer.

Keywords: aptamer; in-silico; Molecular Dynamics, SPGE

1. Product Description

This product is named BPB biosensor is basically screen printed gold electrode (SPGE) that has been functionalized only with avidin and biotinylated aptamer that has been previously screened from in silico studies to detect paddy disease called Bacteria Panicle Blight. In silico designed aptamers through computational design process significantly reduces the time and cost associated with traditional aptamer selection methods especially in biosensors development. This is because silico modeling allows for the prediction of high-affinity aptamers tailored to specific targets, enhancing the specificity of the biosensors. In addition, in the AI era, the development of drug and capture agents such as aptamers that are facilitated by computers can expedite the process and therefore will save more time while being cost effective, making it aligned with Industrial Revolution 4.0.

2. Method Flow Chart and Product Model

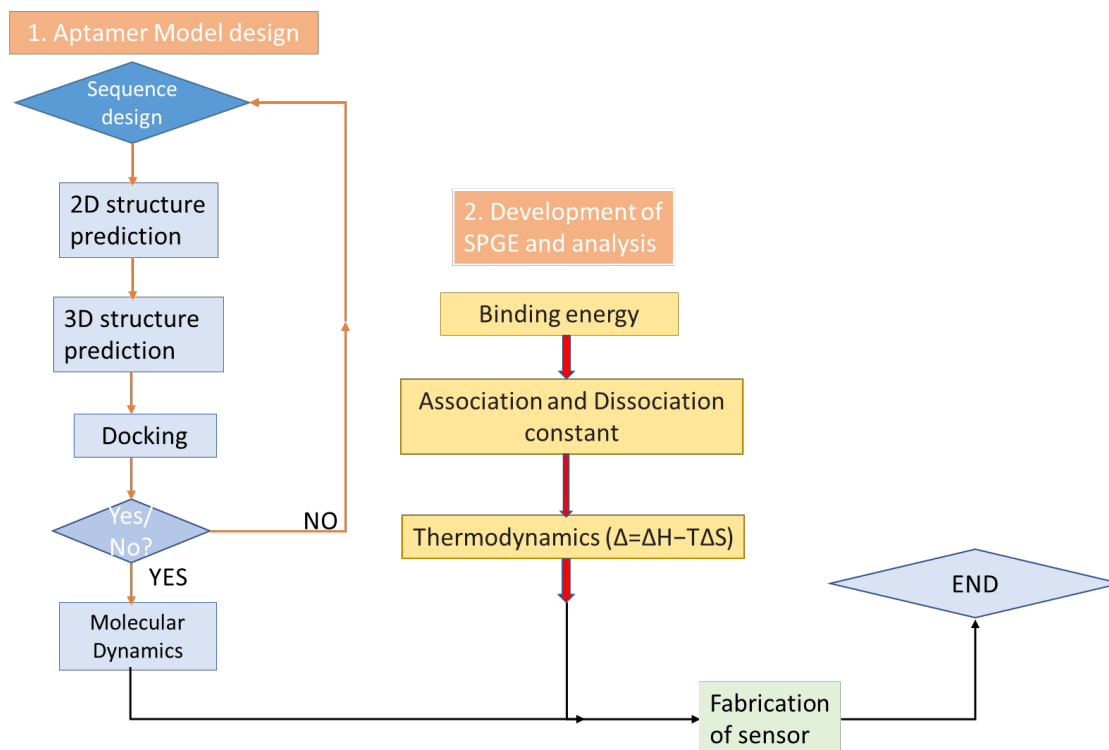


Figure 1. The flow for the *in-silico* design of aptamer and development of the biosensor. One can proceed with a regular computer up to docking. The simulation with a more powerful computer operated by Linux is required to run the procedure. For the development of SPGE and analysis, Isothermal Titration Calorimetry can be used.

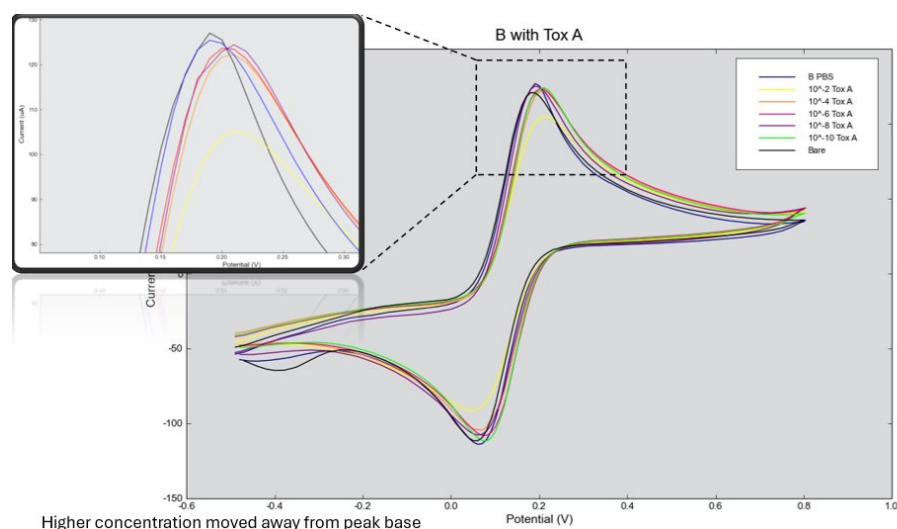


Figure 2. Caption figure 2. This is the detection obtained electrochemically where the presence of the candidate protein ToxA is exhibited by peak shift away from B PBS and Bare.

Table 1. In docking, hdock was used to see the possibility in binding. The result obtained from hdock and Autodock Vina through rigid docking showed very low docking score that shows promise in binding.

<i>Aptamer Name</i>	<i>Docking Score (Hdock)</i>	<i>Ligand Rmsd (Å) (Hdock)</i>	<i>Confidence Score</i>	<i>Binding Affinity (Kcal/Mol) (Autodock Vina, Gromacs)</i>
BG11A	-307.74	N/A	0.9591	-17.7; -130
HGTRNA7	-355.17	48.26	0.9838	-16; 120

3. Novelty and uniqueness

Our techniques produced comparable results to many other aptamers designed from the laborious SELEX experiment i.e. Alpha-fetoprotein (AFP) aptamer AP273 which may take about 6 months to complete. They adopt computational modelling and Molecular Dynamics to help enhance the binding of drug towards the target (Zhang et al., 2023). Meanwhile, our group designed it from scratch which exempts the need to perform SELEX in order to design an aptamer.

4. Benefit to mankind

Bacteria Panicle Blight has been discovered quite recently in 2017 in Penang, Malaysia. Its disease devastation may hamper production to up to 75% if not taken care seriously from the beginning. Since Malaysia has only 70% self-sufficiency, the emergence will disrupt our food security.

5. Innovation and Entrepreneurial Impact

Since the disease has become more widespread in many paddy fields across the globe, many countries now are concerned with controlling its entry through custom clearings since it is seed-borne. It is thought that regulations on phytosanitary should be imposed in international trade where traditional methods of colony morphology should be better replaced with more rapid and accurate diagnostic tools in deterring its entry (Zhou-qi et al, 2016) and as early prevention upon its onset in field. The detection can be done using aptamers in place of antibodies due to their stability, cheap, ease and fast synthesis as compared to antibody. This can be an attractive innovation and entrepreneurial impact.

6. Potential commercialization

The potential can be towards the agricultural sector and also in custom clearings where the market targets are big enough since rice-consuming countries are more than half of the world population. In silico designed aptamers represent a significant advancement in biosensor technology, with successful applications across various domains, including food safety, environmental monitoring, and medical diagnostics.

7. Acknowledgment

The author would like to express highest gratitude to UPM-SEARCA for funding the project, along with UiTM as a co-sponsor.

8. Authors' Biography



Assoc Prof. Ts. Dr. Amir Syahir Amir Hamzah is a Senior Lecturer in UPM. He completed his Ph.D. in 2010 at Tokyo Institute of Technology, with the Kamata Izumi award for best Ph.D. thesis. He is a biochemist and bioengineer with a more specific expertise in the field of biosensor. His primary research area is the integration of Nano x Bio science and technology. Currently, he is a deputy director of Centre for Industrial Relation and Network (CiRNeT). He was awarded an Outstanding Contribution in Reviewing award by the Elsevier, evaluator panel for Malaysian Board of Technologists (MBOT) and Technical Accreditation Council (TTAC). As well as panel for Ministry of Science, Technology, and Innovation (MOSTI) for grant evaluation. With over 15 years of experience, he has pioneered methods for detecting energy theft and improving grid reliability through real-time monitoring and predictive maintenance.



Dr. Muhamad Arif Mohamad Jamali is a lecturer at the Faculty of Science and Technology, Universiti Sains Islam Malaysia (USIM), specializing in structural biology, computational biology, and protein chemistry. During his PhD studies, in University of Hyogo, Japan, Dr. Arif has extensive experience in academia, having participated in research projects that range from the structural analysis of biomolecules to the exploration of bioactive compounds. His expertise includes computational simulations, protein crystallization, and biochemical assays, which he has utilized in several interdisciplinary studies. Notably, he has worked on the antagonistic potential of eel mucus extract against common pathogenic microbes and has published his findings in high-impact journals.



Siti Sarah Jumali is currently a PhD student specializing in biochemistry and nanobiotechnology whom previously had Master's in molecular biology in UKM. She obtained her undergraduate degree in Biotechnology from The Pennsylvania State University, University Park, USA. She is also a lecturer in Universiti Teknologi MARA (UiTM), Melaka Branch, Malaysia, where she takes care of Plant Biotechnology student in Faculty of Plantation and Agrotechnology. She displays interest in surface chemistry and the development of biosensors.