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THE 5TH INTERNATIONAL CONFERENCE
ON COMPUTATIONAL INTELLIGENCE IN
INFORMATION SYSTEMS (CIIS 2022)



ONLINE CONFERENCE

**INTELLIGENT AND RESILIENT DIGITAL INNOVATIONS
FOR SUSTAINABLE LIVING**



CONFERENCE DATES

**17 - 19
October 2022**

Universiti Teknologi Brunei,
Brunei Darussalam

Organizer:



Technical Support:



Organizer:



Technical Support:



Sponsors:



CONFERENCE ON COMPUTATIONAL INTELLIGENCE IN INFORMATION SYSTEMS (CIIS 2022)

The 5th International Conference on Computational Intelligence in Information Systems (CIIS 2022) will be held on 17th to 19th October 2022 in Brunei Darussalam and is being organised and hosted by School of Computing and Informatics (SCI), Universiti Teknologi Brunei (UTB) to provide an opportunity to research scholars, academicians, industrialists and research students to interact and share their experience and knowledge in the recent technological advancements in the field of Computing and Information Systems. Due to COVID19 pandemic, the conference will be using online mode.

The Conference looks for significant contributions to all major fields of the Computing and Information Systems in theoretical and practical aspects. It brings together experts from industry, government and academia, experienced in innovation, design, innovation and research. CIIS 2022 offers a rich program, including keynote address, paper and poster presentations. The conference therefore provides UTB an excellent opportunity to attract expertise and professionals from academia and industries from all over the world to come to Brunei Darussalam for sharing, networking and collaboration.

Theme of the Conference:

Intelligent and Resilient Digital Innovations for Sustainable Living

Over the last few decades, due to high population growth and overuse of the natural resources, including fossil fuels, our Earth has been experiencing climate change, global warming, and depletion of the ozone layer unprecedentedly. At this point of time, we need to emphasize on promoting sustainable living practices and translating sustainable policies into action. Rapid technological advancement has been leveraging the digital innovation, which can contribute for paving the way for the society to practice sustainable living. We need to rethink, through digital innovation how we can better utilize resources, manage waste and recycle materials as well as reduce carbon footprint of transportation, manufacturing and

ICT sectors. Around the globe, researchers from diverse fields have been putting effort relentlessly for harnessing frontier technologies to realise sustainable living. With this, CIIS-2022 program, we would like to bring together the researchers from industries and academia having diverse fields and provide an excellent international platform for sharing knowledge and latest innovations and developments in realising an intelligent and resilient digital innovation for sustainable living.

The focus areas of this conference include Big Data, the Internet of Things (IoTs), Machine Learning, Business Intelligence, Predictive Analytics, Digital reality, Blockchain, SMAC (Social, Mobile, Analytics, Cloud), Product and Design technology, Smart Products, User Experience (UX), Human Centred Design (HCD), Additive Manufacturing, Information Security, Computer Networks and Cyber Technologies.

Conference Objectives:

- ✳ To provide a platform for UTB researchers to be able to engage and interact with international researchers, experts, and professionals.
- ✳ To encourage academics and researchers to participate and generate research outputs.
- ✳ To enhance SCI, UTB visibilities as leading research institution on Computing and Informatics in Brunei Darussalam.
- ✳ To provide a platform for international and regional researchers and experts to share their findings.

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WELCOMING MESSAGE BY THE VICE CHANCELLOR



Bismillahirrahmannirrahim

Assalamualaikum Warahmatullahi Wabarakatuh

On behalf of Universiti Teknologi Brunei, I would like to welcome you all to the 5th International Conference of Computational Intelligence in Information Systems (CIIS 2022) that will be held from 17th to 19th October 2022. Due to the continued uncertainty over the possibility of holding an on-site conference, once again the organising committee has decided to hold the conference remotely via a digital platform.

The CIIS 2022 conference is organised and hosted by the School of Computing and Informatics (SCI) to attract expertise and professionals from academia and industries from all over the world to exchange ideas, present recent research outcomes, and discuss possible collaborations in areas related to computational intelligence, networking, and creative computing, and their applications in various domains.

The theme of the CIIS 2022 is **"Intelligent and Resilient Digital Innovations for Sustainable Living"**. This broadly cover all disciplines of Computing and Information Systems in theoretical and practical aspects, which includes Big Data, the Internet of Things (IoT), Machine Learning, Business Intelligence, Predictive Analytics, Digital reality, Blockchain, SMAC (Social, Mobile, Analytics, Cloud), Product and Design technology, Smart Products, User Experience (UX), Human Centered Design (HCD), Additive Manufacturing, Information Security, Computer Networks and Cyber Technologies.

We are pleased to have Prof Abdullah Gani (Director, Research Management Centre, University Malaysia Sabah (UMS)) and Prof Miura Jun (Toyohashi University of Technology, Japan) as the keynote speakers, and

Professor Joarder Kamruzzaman from Federation University Australia and Prof Ts Dr Zuriati Ahmad Zukarnain (Faculty of Computer Science and Information Technology, Universiti Putra Malaysia) as the invited speakers.

This year we received 35 submissions from local and overseas countries such as Malaysia, Indonesia, Australia, and after rigorous review, 24 papers are accepted for presentation at the conference. The papers have gone through the single-blind review, and we are confident that all papers presented at this conference are of exceptional quality and will impact their respective fields, inspiring future research in the areas relevant to our societal development.

The conference also introduces a pre-conference workshop to the participants. The workshop focuses on two sessions. Morning session is the Hands-on workshop - Deep Learning with MATLAB, a collaboration with TechSource System, and the afternoon session is facilitated by IBM Digital Business Automation, entitled Advance the promise of AI and automation to power autonomous intelligence - creating similar self-operating technologies for businesses.

Many individuals have contributed to the success of this conference. I would like to take this opportunity to congratulate the organising committee who has put in so much work and effort. I would like to thank AUN/SEED-NET JICA and Konsortium Komputeran dan Informatik Borneo (KKIB) for engaging us with the keynote speakers; our Gold Sponsor, Bank Islam Brunei Darussalam (BIBD) and other sponsors, AUN/SEED-Net JICA, AP Solution and Datastream Digital Sdn Bhd (DST). And last but not least, I would also like to thank all the workshop facilitators, authors and participants of CIIS 2022.

All members from UTB Organising Committee wish you an excellent conference experience and successful networking on the virtual platforms.

Thank you

Wabillahi Taufik Walhidayah Wassalamuaalaikum Warahmatullahi
Wabarakatuh

A handwritten signature in blue ink, consisting of a circular initial followed by a long, sweeping horizontal stroke.

Datin Paduka Professor Dr. Dayang Hjh Zohrah binti Haji Sulaiman,
Vice Chancellor
Universiti Teknologi Brunei

WELCOME MESSAGE FROM CONFERENCE CO-CHAIRS



On behalf of the conference organizing committee, it is our great honor to welcome all the attendees of the 5th International Conference on Computational Intelligence in Information Systems (CIIS 2022). This conference is organised and hosted by the School of Computing and Informatics

(SCI), Universiti Teknologi Brunei (UTB). The theme of this conference is ***Intelligent and Resilient Digital Innovations for Sustainable Living***.

The prime aim of this conference is to provide an opportunity to research scholars, academicians, industrialists, and research students to interact and share their knowledge on the recent technological advancements for leveraging intelligent and resilient digital innovations for sustainable living. This conference is a virtual conference, and it will take place using Zoom meeting platform from 17th to 19th October, 2022. The conference generally touches upon four main areas: (i) Intelligent Information System, (ii) Network and Information Security, (iii) Advancement of Digital Innovation and (iv) Theoretical foundations of Digital Innovation.

On the first day of the conference, two workshops and a poster competition are organized. On the following days, the conference hosts three events: keynotes and invited talks, technical paper presentation, and forum. Aligning with the theme of CIIS 2022, these activities are tailored during the conference.

We are very glad to mention that the conference has attracted submissions of 35 papers. All the papers went through a stringent peer review process and finally 24 papers are accepted for presentation and publication. All the presented papers will be published in the AIP Scopus-index Conference Proceedings. The papers in the AIP Digital Library will have open access for a year to the researchers worldwide.

This conference has five sessions, namely Data Science for Health and Well-being, Information Systems, Intelligent Systems, Intelligent Applications in Agriculture, and Creative Computing. It is our honour to have Prof. Abdullah Gani, University Malaysia Sabah, Malaysia; Prof. Miura Jun, Toyohashi University of Technology, Japan; Prof. Joarder Kamruzzaman, Federation University Australia, Australia and Prof. Ts. Dr. Zuriati Ahmad Zukarnain, University Putra Malaysia, Malaysia as our keynotes and invited speakers. For the poster competition, we have received 36 submissions. The forum, which is organized on the last day of the conference, aims at bringing a group of experts from industries and academia to discuss how Brunei Darussalam is working towards the UN SDG and Wawasan 2035.

This conference would not have been successful without the relentless and untiring efforts of our colleagues who have been serving under various committees. We are very thankful to all of our sponsors for supporting CIIS 2022 namely BIBD, AUN/SEED-Net JICA, AP Solution and DST. Our utmost appreciation to all the reviewers of the conference for their invaluable service for the peer review process, allowing us to maintain a high standard of quality for this conference.

Once again, we would like to thank all attendees for joining us at CIIS 2022. We strongly believe that your active participation will make this conference more engaging and make the conference a successful knowledge sharing platform.

Yours sincerely,

Zainah Siau and S. H. Shah Newaz
Co-chairs CIIS 2022

Day 1: CIIS 2022 Workshop (Online) Monday, 17 October 2022	
08:00 onwards	Judging of Poster Exhibition
08:00 – 09:00	Registration and Networking
09:00 – 12:00	Workshop Morning Session: - Hands-On Workshop Deep Learning with MATLAB
Lunch Break	
14:00 – 16:00	Workshop Afternoon Session: - Advance the Promise of AI and Automation to Power Autonomous Intelligence: Creating Similar Self-Operating Technologies for Businesses

Day 2: CIIS 2022 Conference (Online) Tuesday, 18 October 2022	
08:00 – 09:00	Registration and Networking
09:00 – 09:30	Opening Ceremony
09:40 – 10:40	Keynote Speaker 1 Presentation
10:40 – 11:40	Keynote Speaker 2 Presentation
11:40 – 12:00	AUN-SEED Promotional Session
Lunch Break	
13:30 – 14:15	Invited Speaker 1 Presentation
14:20 – 15:50	Parallel Sessions 1: - Data Science for Health and Well-Being - Information Systems
15:50 – 16:00	Refreshment Break
16:00 – 17:00	Parallel Sessions 2: - Intelligent Systems

Day 3: CIIS 2022 Conference (Online) Wednesday, 19 October 2022	
08:00 – 8:30	Registration
08:30 – 09:15	Invited Speaker 2 Presentation
09:20 – 11:50	Parallel Sessions 3: - Intelligent Applications in Agriculture - Creative Computing
Lunch Break	
14:00 – 16:00	Forum
16:00 – 16:30	Closing Ceremony

WORKSHOP DETAILS (DAY 1)

MORNING SESSION:

Hands-On Workshop | Deep Learning with MATLAB

Online workshop in collaboration with TechSource Systems

Seats are limited. Register now and secure your seat to avoid disappointment.

This workshop will give attendees a brief background on MATLAB's Neural Network capabilities and introduce the ways that MATLAB makes designing, training, and implementing neural networks systems easier.

Learn how to do deep learning in 6 lines of code, perform transfer learning using a GUI-based app and accelerate your code using MATLAB.

AFTERNOON SESSION:

Advance the Promise of AI and Automation to Power
Autonomous Intelligence: Creating Similar Self-Operating
Technologies for Businesses

Wong Sheau Pei,

Solution Specialist, IBM Digital Business Automation

Sheau Pei has at least 28 years of IT experience, with focus on technical sales and solution design as well as a passion for being a trusted technical advisor for clients and partners to drive conversations on technology enablers and successful deployments. She is currently leading technical sales engagement for digital business automation in IBM Malaysia, working closely with both clients and partner ecosystem on trending technology to drive business growth and improve outcome. She has a Degree (Hons) in Computer Science and Information System from National University of Singapore(NUS). Her highest academic qualification is Master in Computer Science from NUS.

OPENING CEREMONY PROGRAMME

Tuesday,

22 Rabiulawal 1444H | 18 October 2022,

Zoom (Online)

- 8:00 am : Registration of conference participants
- : Guest joins online opening ceremony room
- 8:59 am : Guest of Honour join the online opening ceremony room
Yang Mulia Dr Haji Azman bin Ahmad
Permanent Secretary (Higher Education),
Ministry of Education
- 9:01 am : Recital of Surah Al-Fatihah & Doa Selamat by
Yang Mulia Ustaz Mohammad Fazalley bin Haji Hidup
Head of Religious Unit, Universiti Teknologi Brunei
- 9:04 am : Welcoming speech by the Honorary Chair and Advisor
Yang Mulia Datin Paduka Professor Dr Hajah Zohrah
binti Haji Sulaiman
Vice Chancellor Universiti Teknologi Brunei
- 9:12 am : Greeting from AUN/SEED-Net
Yang Mulia Professor Emeritus Dr. Ueda Tamon
Chief Advisor and Acting Executive Director JICA
Project for AUN/SEED-Net
- 9:20 am : Speech and Official Opening of CIIS 2022 by
the Guest of Honor
Yang Mulia Dr Haji Azman bin Ahmad
Permanent Secretary (Higher Education),
Ministry of Education
- 9:28 am : Multimedia Presentation
- 9:30 am : Photo Session

* * * END OF CEREMONY * * *

- 9:31 am : Short Break (Promotional Video)
- 9:35 am : Keynote Speech by
Yang Mulia Professor Abdullah Gani
Universiti Malaysia Sabah, Malaysia
Chaired by Dr Haji Sharul Tazrajiman bin Haji Tajuddin
- 10:35 am : Keynote Speech by
Yang Mulia Professor Miura Jun
Toyohashi University of Technology, Japan
Chaired by Dr Ravi Kumar Patchmuthu
* * * END OF KEYNOTE PRESENTATION * * *
- 11:35 am : Short Break (Promotional Video)
- 11:40 am : AUN/Seed-Net Promotional Session by
Yang Mulia Ms. Sarunphak Kittivorapoom
Senior Project Officer JICA Project for AUN/SEED-Net
- : End

KEYNOTE SPEAKERS



Professor Abdullah Gani

Department of Computer System and Technology,
Faculty of Computer Science & Information
Technology, UMS, Malaysia

Virtual Citizen for Border Crossing Control

Abstract:

Economic inequality between countries has led to negative consequences to the whole world today. People are naturally having the tendency to migrate to greener pasture for better living. This has caused an increment of illegal border crossing trespassing. Despite many efforts have been taken to curb such illegal activities, the numbers are still alarming. Many assets of immigration agencies are deployed and it incurs substantial cost. By virtue, illegal immigrants are not welcomed by any countries because they are by passing the screening procedure on the entry visitor information and therefore putting the security at risk. Immigration control systems are always facing big challenges in enforcing the rules of laws. There was a system glitch in delivering its roles. Virtual Citizen is a shadow of the real citizen, and therefore it can be used for national security protection and enforcement, economic digital transaction, cross border administration and management. Data of individual citizen is available at the virtual citizen entity and accessible by authority. The talk will be discussing the concept of Virtual Citizen and its architecture in addressing the issue of border crossing control.



Professor Miura Jun

Department of Computer Science and Engineering, Toyohashi University of Technology, Japan

Dataset Issues in Applying Deep Learning to Robotics

Abstract:

Recent advances in deep learning (DL) technologies enable robots to achieve complex tasks in real environments, such as mobile service robots, autonomous driving, and industrial robots. A part of DL's amazing power benefits from high-quality, large-scale datasets (e.g., CityScapes, COCO). However, when used in a specific environment, we face the lack of such datasets. In this talk, I will talk about some of our recent attempts to solve such dataset issues.

INVITED SPEAKERS



Professor Joarder Kamruzzaman

Centre for Smart Analytics, Federation University
Australia, Australia

Machine Learning in Cyber-Security Application

Abstract:

Machine learning, including deep learning, has been successfully applied in many recent cutting-edge applications, including automation, robotics, natural language processing, computer vision, malware detection, network intrusion detection, etc. This talk will give an overview of how machine learning plays a vital role in building robust and secured systems, particularly in malware detection and intrusion prevention. It will also discuss how adversarial learning and fuzzy oversampling can help to build robust detection models.



Prof. Ts. Dr. Zuriati Ahmad Zukarnain

Faculty of Computer Science and Information Technology, Universiti Putra Malaysia, Malaysia

Security and Privacy in Cloud-Based E-Health System

Abstract:

Cloud based healthcare computing have changed the face of healthcare in many ways. The main advantages of cloud computing in healthcare are scalability of the required service and the provision to upscale or downsize the data storage, collaborating Artificial Intelligence (AI) and machine learning. Particularly, there are various research works showed the utilization of intelligent techniques in health systems and mainly focused into the security and privacy issues in the current technologies.

Despite the various benefits related to cloud-computing applications for healthcare, there are different types of management, technology handling, security measures, and legal issues to be considered and addressed. The key focus of this talk is to address the increased demand for cloud computing and its definition, technologies widely used in healthcare, their problems and possibilities, and the way protection mechanisms are organized and prepared when the company chooses to implement the latest evolving service model.

In this work, it is focused on a thorough review of current and existing literature on different approaches and mechanisms used in e-Health to deal with security and privacy issues. Some of these approaches have strengths and weaknesses. It is end up with several models adopted in their solutions as well as comparing those related used models.

DATA SCIENCE FOR HEALTH AND WELL-BEING

Survey on Online Learning During COVID-19

Saiful Omar, Datin Paduka Zohrah Sulaiman and Noor Maya Salleh

Understanding the Effects of COVID-19 Pandemic on Brunei Students Learning Activities: A Data Analytics Approach

Siti Salihah Siti Nabilah Binti Sahari, D S Sankar, S H Shah Newaz and K K Viswanathan

Health Benefits of Active Physical Exercises by Bruneians: A Data Analytics Approach

Lai Chee Chiang, D S Sankar, Siti Mazulianawati Binti Haji Majid and K K Viswanathan

Cardiovascular Disease Risk Prediction using Machine Learning

Md Najibudin Hakiim Hj Md Midun, Mohammad Saiful Hj Omar and Arif Bramantoro

INFORMATION SYSTEMS

Public Opinion on Electric Vehicle Public Transportation in Brunei Darussalam

Hadi Isa and Dina Shona Laila

Linking Big Data and Total Quality Management: A Proposed Theoretical Research Framework of Digital Maturity Mediation

Zahidah Ismail and Shahid Anjum.

Understanding External Factors affecting Expansion: A Proposed Framework for Internationalising MSMEs in Factor-Driven and Efficiency-Driven Economies

Mohammad Izzuddin Mohammad Jamil

Residual Stress Measurement in Thin Films Using ANSYS Approach

Anitha Dhanasekaran, Anbukarasi K, Yathavan Subramanian, Lukman Ahmed Omeiza, Veena Raj, Hayati Y, Avinash Kumar and Abul K Azad

INTELLIGENT SYSTEMS

Kalman Filter for RSSI-based Indoor Positioning System with Min-Max Technique

Muhammad Hilmi Dwiputranto, Dwi Joko Suroso and Nur Abdillah Siddiq

Implementation of Wi-Fi-based Indoor Positioning System: Challenges and Future Possibilities

Dwi Joko Suroso, Farid Yuli Martin Adiyatma, Panarat Cherntanomwong and Pitikhate Sooraksa

Bankruptcy Prediction for Imbalanced Dataset Using Oversampling and Ensemble Machine Learning Methods

Abdullahi Chowdhury, Shahriar Kaisar and Ranesh Naha

Blockchain Technology in Securing Academic Credentials: Mobile QR Block CV

Vincent Kok Seng Lew, Thien Wan Au, Ibrahim Venkat, Ravi Kumar Pachmuthu and Serina Mohd Ali

INTELLIGENT APPLICATIONS IN AGRICULTURE

Machine Learning and Internet of Things for Fertiliser Prediction - Pepper Vines

Anding Nyuak, Edwin Mit and Kedung Fletcher

Banana Fruit Classification Using Computer Vision

Noraisyah Mohamed Shah, Felice Maynelia Makain and Norrima Mokhtar

Classification of Oyster Mushroom Diseases in Brunei

Dk Azreen Pg Hj Tajudin, Dr. Ravi Kumar Patchmuthu and Dayang Serina Mohd Ali

Analysis of Export and Import for Aquaculture Products in Brunei

Arif Bramantoro, Nor Zainah Siau and Wida Susanty Haji Suhaili

Prediction Model for Marine Shrimp Production in Brunei Darussalam

Nor Zainah Siau, Mohammad Najwan Muhammad Azri, Arif Bramantoro and Wida Susanty Haji Suhaili

Photonic Crystal Fibre Sensor for Unhealthy Food Additive

Abdul Mu'iz Maidi, Erma Suryani and Feroza Begum

CREATIVE COMPUTING

Transcending the Metaverse and the Metaphygit: An Early Review and Trial of Metaverse Technologies

Pengiran Shaiffadzillah Pengiran Omarali

Students' Satisfaction Levels of an Immersive Extended Reality for Engine Assembly Tasks in Engineering Empirical Education

Lai Lai Win, Faieza Abdul Aziz, Abdul Aziz Hairuddin, Lili Nurliyana Abdullah, Hwa Jen Yap, Hideo Saito and Norhisham Seyajah

Automated Lip-Sync Framework for Video Game

Hazim Adfarid Maz Adanan, Idham Mashud and Somnuk Phon-Amnuaisuk

An Educator-Oriented Method for Designing Serious Role-Playing Games: An Initial Exploration

Azhan Ahmad, Effie Lai-Chong Law and Kok Yueh Lee

Investigation on the Impact of Cognitive Computer Game on Memory Recall

Nurwathiqah Ali, Sharul Tajuddin and Ibrahim Edris

Investigating Designers' Choices of Typeface Selection in Graphic Design through Situation Approach

Siew Leing Woo and Sharul Tajuddin

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