CSET 2024

The 2nd International Conference on Sustainability and Emerging Technologies

DONG NAI TECHNOLOGY UNIVERSITY

https://dntu.edu.vn/

206 Nguyen Khuyen Str.,Quarter 5, Trang Dai Ward, Bien Hoa City, Dong Nai Province

CSET 2024

The 2nd International Conference on Sustainability and Emerging Technologies

INTRODUCTION

The Conference on Sustainability and Emerging Technologies (CSET) is an international event that has been established to promote sustainable research directions and foster collaboration among experts, scholars, and industry professionals from around the world. Building on the success of the inaugural CSET 2023 conference, which was organized by Dong Nai Technology University, the CSET 2024 edition is poised to extend the impact and reach of this important platform.

CSET 2024 will be held from June 16th – 17th, 2024, at Dong Nai Technology University in Vietnam. The conference is co-organized by four prestigious institutions: Dong Nai Technology University, Deakin University (Australia), National Chung Cheng University (Taiwan), and Nanhua University (Taiwan). By bringing together this diverse consortium of leading academic and research organizations, CSET 2024 aims to foster greater international collaboration and knowledge exchange in the field of sustainability and emerging technologies.

By providing a dedicated platform for the presentation and discussion of the latest research, innovations, and best practices in these critical areas, CSET 2024 seeks to accelerate the development and implementation of sustainable solutions to address global challenges.

Building on the success and momentum of CSET 2023, the 2024 edition of the conference aims to further strengthen the global sustainability research community, foster interdisciplinary collaborations, and contribute to the ongoing efforts to create a more sustainable future. We invite researchers, engineers, policymakers, and industry professionals from around the world to join us at CSET 2024 and be a part of this important dialogue and exchange of ideas.

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STEERING COMMITTEE

Dr. Ngoc Son, Phan
Dr. Manh Quynh, Doan

ORGANIZING COMMITTEE

Dr. Thuy Lan Chi, Nguyen
Prof. Colin Barrow
Ms. Vo Quynh Nhu, Phan
Dr. Thien Khanh, Tran
Dean of the Faculty of Engineering
Dean of the Faculty of Fundamental Sciences
Dean of the Faculty of Technology
Dean of the Faculty of Information Technology
Dean of the Faculty of Economics - Management
Dean of the Faculty of Accounting - Finance
Dean of the Faculty of Foreign Languages
Dean of the Faculty of Health Sciences

SCIENTIFIC COMMITTEE

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Prof. Trong Nhuan, Mai
Prof. Colin Barrow
Prof. Pao-Ann Hsiung
Prof. Wann-Yih Wu
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Dr. Thien Khanh, Tran
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Dean of the Faculty of Fundamental Sciences
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Dean of the Faculty of Information Technology
Dean of the Faculty of Economics - Management
Dean of the Faculty of Accounting - Finance
Dean of the Faculty of Foreign Languages
Dean of the Faculty of Health Sciences

SECRETARIAT

Ms. Thi Thanh Thoan, Dong
Ms. Nhu Yen Nhi, Huynh
Ms. Hoang Yen Nhi, Nguyen
Mr. Thanh Duy, Nguyen

Welcome Message from the Chairman of DNTU, Dr. Ngoc Son, Phan

It is my pleasure to welcome all the participants today to the 2nd International Conference on Sustainability & emerging Technologies CSET 2024. I want to take this opportunity to express my sincere appreciation to all distinguished Professors and Speakers, who are willing to share your knowledge and great experiences with the participants. I would also like to congratulate the organizer – all DNTU members who gave their best to the preparation of the conferences; I also want to express my deepest gratitude towards our friends, our co-organizers from Deakin University, National Chung Cheng University, Nan Hua University, and from all other friends who join with us and making this event a success. At Dong Nai Technology University (DNTU), there were a lot of work has been carried out in the fields of sustainability, technology, engineering, and we especially care much about the development of our homeland Dong Nai, as well as our country Vietnam; So that, we provided many projects and work to improves our capacity, raising awareness for not only our students but also our citizen in Dong Nai. And of course, we want more than that, we are looking forward to extending ourselves more and more to become a social university that contributes greatly to education and technology.

I really hope this event will provide a platform for like-minded scientists, academics, and industry enterprises across different Asian countries to disseminate and discuss their recent findings on current technology, economic value, and social sustainability. We may come here as strangers but after this event, we leave the conferences as friends. In many more international conferences that would be sure to come in the future, I wish I could have more friends as I always said: “The happiest man is the man who has lots of friends”.

Thank you and best regards.

Dr. Ngoc Son, Phan

Chairman of Dong Nai Technology University (DNTU)

Nguyen Khuyen, Trang Dai, Bien Hoa City, Dong Nai, Vietnam.

Welcome Message from Prof. Colin Barrow

Dear Delegates and Guests

It is with great pleasure that I welcome you to the 2nd International Conference on Sustainability and Emerging Technology (CSET 2024). As we gather to explore the nexus between sustainability and emerging technology, we explore and discuss ideas and innovations that will help us to shape a more sustainable future.

Today's world is undergoing unprecedented environmental challenges that can only be solved by the discovery and development of new green, smart technologies. The ideas we share during this conference, both within sessions and through individual discussions with colleagues, will help us to shape a more sustainable future.

With increasing populations and the growth of the global middle class, the only viable solution enabling a coexistence between human development and ecological preservation is innovation and new technology. Technology must be applied to mitigate the adverse effects of climate change, conserve natural resources and provide food and shelter for communities worldwide.

Todays interconnected digital world and sophisticated analytics capabilities presents considerable opportunities for rapid technology implementation toward optimizing resource utilization, improving food production, and enabling growth while also decreasing environmental impact of technology. New smart, green technologies can enable us to transition toward sustainable urbanization and equitable access to resources across the planet.

As we assess the importance and viability of specific technologies, we need to be mindful of working toward achieving the UN Sustainable Development Goals (SDGs). Among the SDGs directly related to our conference themes, SDG 7 (affordable and clean energy), SDG 11 (sustainable cities and communities), SDG 12 (responsible consumption and production) and SDG 13 (climate action) stand out as goals that drive our investment in the application of technology to sustainability, providing a pathway toward a more equitable and sustainable global society.

Critical technologies include nanomaterials, techno-economics and biorefinery approaches to the conversion of waste and underutilised biomass into multiple bioproducts and energy. Moving away from finite fossil fuels requires developing sustainable bio-based alternatives not just to fuel but to petroleum products in general, such as plastics and the many other petroleum-derived materials.

WELCOME MESSAGE

Vietnam's commitment to achieving carbon neutrality by 2050 reflects its recognition of the urgent need to find technological solutions to climate change and transition towards a low-carbon economy. Through the United Nations Framework Convention on Climate Change and other international commitment, countries around the world recognise the need to work toward a sustainable future. Hopefully the 2nd International Conference on Sustainability and Emerging Technology will serve as a catalyst for new ideas and research collaborations. I look forward to participating in thought-provoking discussions, establishing new partnerships, and listening to your views and ideas on how we can achieve a sustainable future together.

Best wishes for an enjoyable conference.

Prof. Colin Barrow, Conference Co-Chair

Distinguished Professor, Deakin University, Australia

Director of the Centre for Sustainable Bioproducts, Australia

AGENDA - CSET 2024 - 16 June, 2024

TIME	MAIN CHANNEL
07:00 - 09:30	**PLENARY SESSION** **Complex Center Building (Building G)**
07:00 - 08:00	Guest Welcoming
08:00 - 08:20	Dong Nai Technology University Introduction Video
08:20 - 08:40	Welcome Speech from Dr. Phan Ngoc Son - the Chairman of Dong Nai Technology University
08:40 - 09:15	Conference Opening Speech and Scientific Report from Prof. Colin Barrow
09:15 - 09:30	Photo Session
09:30 - 10:00	**PANEL SESSION** **Tea Break | Library and Information Center (Building C)**

10:00 - 12:00	**SESSION 1** **Green Technology and Sustainable Solutions** **Prof. Colin Barrow** **Dr. Nguyen Hoang Chinh** **Dr. Nguyen Thanh Cong** (*morning session*) **Dr. Luu Hong Quan** (*afternoon session*) *Interpreter: M.A. Tran Thi Thanh Tram* ***(Meeting room 1)***	**SESSION 2** **Green Economy** **Prof. Wann-Yih Wu** **MBA. Tran Thi Kim Phuong** **Dr. Vu Thinh Truong** (*morning session*) **Dr. Huynh Tan Nguyen** (*afternoon session*) *Interpreter: M.A. Nguyen Thi Kim Ngoc* ***(Meeting room 3)***	**SESSION 3** **Smart Technology for Sustainability Development** **Prof. Pao-Ann Hsiung** **Dr. Le Ngoc Dung** **Dr. Le Thanh Lanh** (*morning session*) **Dr. Nguyen Minh Tan** (*afternoon session*) *Interpreter: M.A. Nguyen Thi Thanh Hue* ***(1st floor of the Library)***
10:00	**VALORISATION OF SEAWEED FOR MULTI-PRODUCT PRODUCTION** *Keynote speaker: Dr. Nguyen Hoang Chinh*	**THE POWER OF ENTREPRENEURIAL ORIENTATION AND DIGITAL LEADERSHIP ON INFORMATION PROCESSING AND NEW PRODUCT DEVELOPMENT** *Keynote speaker: Prof. Wann-Yih Wu*	**AI FOR SOCIAL GOOD (AI4SG)** *Keynote speaker: Prof. Pao-Ann Hsiung*
20 minutes presentation	**CSET-24-036** **ETHYL BIODIESEL PRODUCTION VIA ELECTROLYSIS.** *Thi Hang Dang, Hoang Chinh Nguyen, Fu Ming Wang, Chia Hung Su*	**CSET-24-063** **CORPORATE SOCIAL RESPONSIBILITY AND GREEN SERVICE INNOVATION IN THE HOSPITALITY INDUSTRY: THE MEDIATING ROLE OF GREEN HUMAN CAPITAL.** *Thuy Linh Pham, Yung Fu Huang, Thac Dang Van*	**CSET-24-034** **EFFICIENT MULTI-PERSON ACTION RECOGNITION USING YOLOV7-POSE AND DEEP LEARNING MODELS.** *Trinh Dinh Thang, Hamka Mudin Parah, Nguyen Khanh An*
	CSET-24-008 **EXTRACTION OPTIMIZATION OF ANTIOXIDANT POLYSACCHARIDE FROM Acanthophora spicifera.** *Leonilo F. Endoma Jr., Seasha G. Gonzales, Thea B. Ynion, Hoang Chinh Nguyen*	**CSET-24-010** **A CLOSER LOOK AT THE EFFECT OF FOREIGN DIRECT INVESTMENT AND AIR QUALITY POLLUTION (PM 2.5)- THE CASE OF GLOBAL VIEW AND STIRPAT MODEL.** *Kuo Hsuan Chin, Nhan Nguyen Thanh*	**CSET-24-011** **REAL-TIME FACE SWAPPING AND FACIAL LANDMARK DETECTION USING COMPUTER VISION TECHNIQUES.** *Nam Dong Truong*
12:00	**CSET-24-031** **FORENSIC ANALYSIS OF CRYPTOCURRENCY TRANSACTIONS: INSIGHTS FROM ANDROID DEVICES CONNECTED TO HARDWARE WALLETS.** *Van Ba Tai, Chen Min Huang*	**CSET-24-043** **THE VILLAGE-STAY: A NEW APPROACH FOR SUSTAINABLE AND INCLUSIVE COMMUNITY-BASED TOURISM DEVELOPMENT IN VIETNAM** *Le Tien Tung*	**CSET-24-049** **FORECASTED MODELING FOR AIR QUALITY INDEX IN VIETNAMESE TOURIST DESTINATIONS: LEVERAGING DEEPLEARNING APPROACHES** *Tu Anh Hoang Nguyen, Quang-Dieu Nguyen, Cong-Bang Luan Nguyen, Nguyen Trung Ky*

12:00 - 13:00	**LUNCH BREAK** **Cafeteria UniService**		
13:00 - 13:30	**POSTER EXHIBITION** **Library and Information Center (Building C)**		
13:30	**CSET-24-026** FABRICATION AND CHARACTERIZATION OF CHITOSAN-GELATIN COMPOSITE FILM *Tuyen B. Ly, Giang T.C. Tran, Hoang Chinh Nguyen, Phung K. Le*	**CSET-24-048** SUSTAINABILITY INDICATORS THE CASE OF SUN MOON LAKE'S SPORT EVEN IN TAIWAN. *Danh Na Phan, Nhan Nguyyen Thanh, Su Le, Phuong Thao*	**CSET-24-050** OPTIMIZING BOTANICAL FARM CROP VARIETY SELECTION: INTEGRATION OF MACHINE LEARNING MECHANISMS FOR GREEN TECHNOLOGY AND SUSTAINABLE SOLUTIONS *Ngo Ho Anh Khoi, Vo Khuong Duy, Nguyen Anh Duy, Ngo Ho Anh Khoa*
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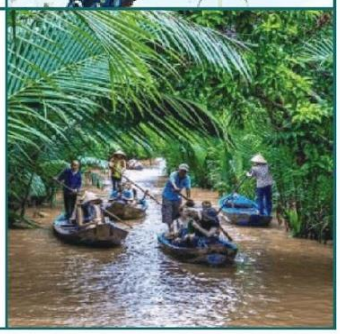
14:30 - 15:00	**DNTU CAMPUS TOUR** **Pickleball Tournament | Pickleball Court** **Traditional Day (DNTU Day)**		
15:00 - 16:00	**CLOSING CEREMONY**		

MEKONG DELTA ONE-DAY TRIP 17.06.2024

Time	Activities	In charge
06:00	**Depart from DNTU to Tien Giang Province**	**Tour guide, Bus**
07:45	Arrive in the My Tho city, Tien Giang province **Have breakfast:** My Tho noodles (specialty)/ Fried Egg with Bánh Mì + drinking.	**Restaurant**
08:30	**Visiting Vinh Trang Pagoda**, an ancient southern architectural gem in Tien Giang Province.	
09:30	Travel by boat on Tien river and sightsee the 4 islets. **Visiting Con Phung Island** - a part of Ben Tre Province, Local Guide introduces about Dao Dua, which is derived from a monk who lived and meditated on the island for three years during which he ate nothing but coconuts. He founded his own sect and pray with his own region which was a bizarre mix of Christianity and Buddhism and called the Coconut Religion. Here remain the ruins of the 1500 square meter complex he built, including the platform with nine columns with dragon carvings where he used to meditate and congregate with his followers.	 
11:00	**Tranfer to Thoi Son Island** Explore the rural village by "Three leaves boat" Visit typical farmer's house and enjoy bee honey tea and some special products from bee such as: Pollen, Royal jelly. Visiting Coconut candy workshop where you can taste a favor of coconut candy.	

Time	Activities	In charge
12:00	**Lunch at local Restaurant.** Appetizer: Lotus root salad with Shrimp – Meat Mussel Pancakes – Spring Roll Main Menu: Deep Fried Elephant ear Fish Deep fried sticky Rice ball Grilled Chicken with Lemon leaves Stir fried Water Morning Glory with Garlic Braised Pork ribs with Pepper Fish sour soup Rice Fruit, Tea, Soft drink	
13:00	**Ennjoying the fresh fruits and listen to the traditional music "Tai tu"** – the lovely and romantic melody of one of the tribes in Mekong Delta. Relaxing on rowing boat along the small canal of Mekong river. Return to My Tho Pier.	
14:00	**Back to DNTU by Trung Luong Highway**	
16:00	**Arriving to DNTU**	

INCLUDE:
- Breakfast.
- WoodenBoat. Sampan (rowing boat).
- English speaking guide.
- All entrance fees: fruits & honey tea, traditional musical performance.
- Lunch at local restaurant.

EXCLUDE:
- Additional drink/beverage. Things are not indicated in the program.
- Personal expenses.

LAVENDER
CÔNG TY TNHH MTV DỊCH VỤ DU LỊCH LAVENDER
Địa chỉ: 62/26, KP1, Phường Quang Vinh, Tp. Biên Hòa, tỉnh Đồng Nai
Điện thoại: 0983 576 676 – 0342469696
Email: travel.lavender.co@gmail.com

Payment of the Field Trip registration fees: 40USD/per person

For Local and DNTU participant, the conference fee will be transferred to the following bank account:

Chủ tài khoản:
TRƯỜNG ĐẠI HỌC CÔNG NGHỆ ĐỒNG NAI
Số tài khoản: 5900201006856
Ngân hàng Agribank - CN Đồng Nai
Nội dung chuyển khoản: Field trip CSET2024 – Họ và tên

Account name:
TRUONG DAI HOC CONG NGHE DONG NAI
Account number (USD): 5900201011993
Bank name: AGRIBANK – BRANCH DONG NAI
SWIFT code: VBAAVNVX610

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CSET-24-016	EXPLORING EFFECTIVE STRATEGIES FOR EFFICIENT EXCIPLEX EMISSION IN ORGANIC LIGHT-EMITTING DIODES
CSET-24-018	IMPLICATION OF SOME SUSTAINABLE DEVELOPMENT SOLUTIONS FOR VIETNAM'S AGRICULTURE
CSET-24-019	ADVANCING RAILWAY SAFETY AND EFFICIENCY: DEVELOPMENT OF A HUMAN-FOLLOWING TRANSPORT ROBOT
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CSET-24-023	STUDY OF THE ROOM-TEMPERATURE LASING OF LEAD BROMIDE PEROVSKITE THIN FILMS VIA SOLVENT ENGINEERING
CSET-24-025	FABRICATION OF BIO-COMPOSITES MATERIAL FROM WATER HYACINTH (EICHHORNIA CRASSIPES) AND POLYESTER RESIN
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The 2nd International Conference on Sustainability and Emerging Technologies

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(CSET-24-008)

EXTRACTION OPTIMIZATION OF ANTIOXIDANT POLYSACCHARIDE FROM *Acanthophora spicifera*

Leonilo F. Endoma Jr.[1*], Seasha G. Gonzales[1], Thea B. Ynion[1], Hoang Chinh Nguyen[2]

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2 Central for Sustainable Bioproducts, Deakin University, Geelong, VIC 3216, Australia.

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ABSTRACT

Acanthophora spicifera is a wild, underutilized carrageenophyte in the Philippines with potential antioxidant properties. Local studies on utilizing this red alga are scarcely documented, so process extraction optimization needs streamlining. This study intends to explore the bioactive properties of A. spicifera as a functional food ingredient and for broader application. Using Central Composite Design, varying %KOH, extraction temperature (^{o}C) and time (h) combinations aimed at optimizing extraction conditions based on yield, galactose, 3,6-anhydrogalactose, sulphate, and ntioxidant assays (DPPH•, ABTS•+, and FRAP). The results in this study suggested the use of 3.01 % KOH and extraction at 65°C for 2.85 h for optimum carrageenan extraction for A. spicifera. The optimized extraction condition could be used to predict carrageenan from A. spicifera with 28.87 % yield, having the chemical properties in terms of GAL (3.26 %), 3,6-AG (1.16 %), sulphate (39.79 %), and possess antioxidant properties in terms of $DPPH$• and $ABTS$•" inhibition activities (32.06% and 62.96%), and 0.08 FRAP value. Our findings also produced 37 muti-criterion conditons having 23 sets with desirability value of 1.00. The findings in this study could provide baseline information for the extraction of carrageenan from A. spicifera with potential antioxidant properties. These optimized conditions can be used for producing carrageenan from A. spicifera with antioxidant properties at scaled-up processes.

Keywords: *carrageenan; sulphated polysaccharide; bioactive phycocolloid…*

(CSET-24-009)

ITPR2, AN ER CALCIUM CHANNEL, REGULATES ER STRESS AND INFLAMMATORY RESPONSE IN PRE-CANCEROUS KIDNEY TUBULE CELLS

Hoai Bac Le[1*], Hieu Huy Nguyen Tran[2]

1 Dong Nai Technology University, Dong Nai Province, Viet Nam

2 China Medical University, Taichung, Taiwan

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ABSTRACT

Mesenchymal stem cells (MSCs) have emerged as promising candidates for cancer therapy due to their ability to modulate the tumor microenvironment. Exosomes derived from MSCs have received significant attention for their roles in cancer treatment. In this study, we investigated the functions of highly expressed exosomal MSC miRNAs in breast cancer. Our data observed the highest level of miR-23a-3p, miR-125b-5p, and miR-1246 in skin, submandibular gland, and adrenal gland, respectively. Interestingly, high expression of miR-1246 significantly reduced the survival rate of breast cancer patients as compared to the low expression group. Of note, the levels of their target genes were related to the clinical outcome of breast cancer patients. The results from this study not only provide the potential of miR-1246 as the biomarker but also the novel therapeutic target for breast cancer.

Keywords: *Breast cancer, Mesenchymal stem cells, miRNA…*

(CSET-24-010)

A CLOSER LOOK AT THE EFFECT OF FOREIGN DIRECT INVESTMENT AND AIR QUALITY POLLUTION (PM 2.5)- THE CASE OF GLOBAL VIEW AND STIRPAT MODEL.

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ABSTRACT

The increasing of air quality pollution poses significant risks to both public health and economic loss. The multinational corporations withdraw their production line in China and invest in other countries in Asia that reshape the FDI maps. The STIRPAT model is one of the key equations of environmental economics, which is widely used to explain the relationship between economic factors and some kinds of emissions. Air quality pollution (PM2.5) is extremely concerning to scholars. The effect of economic sectors on generating PM2.5 should be discussed and explained by using environmental equations. To contribute to the literature, this study uses STIRPAT model to explain the way FDI causes economic loss. The model allows to extend of its equation by adding in variables such as urbanization, and foreign direct investment. Via STIRPAT model scholars have a closer look at the institution that causes the increase of PM2.5. Previous studies gain interesting findings on this topic in some case studies, especially in China provinces. The limitation of the small scale of sample size is that fails to reflect the institution that causes the economic loss of PM2.5. World Bank publishes new panel data of PM2.5 on a wide global scale so this study expects to yield the precision pieces of evidence. This study finds that foreign direct investment inflows and urbanization are two factors that harm the air quality, while people's income reduces harmfully of the air quality. To policymakers, justise whether the FDI inflow is green cash-flow or not green cash-flow. Otherwise, the balance of payment is increased by FDI inflows but economic loss by the increase of PM2.5.

Keywords: *Air quality pollution, FDI, PM2.5, urbanization, STIRPAT model, Residential income…*

(CSET-24-011)

REAL-TIME FACE SWAPPING AND FACIAL LANDMARK DETECTION USING COMPUTER VISION TECHNIQUES

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ABSTRACT

Face swapping is an exciting visual effect with many potential applications in entertainment and privacy protection. This paper presents an efficient approach for real-time face swapping and facial landmark detection using only computer vision techniques. A media pipe-based pipeline is proposed to accurately detect 468 3D face landmarks on source and target faces. The faces are divided into hundreds of triangles using the landmarks and convex hull algorithm. These triangles are then warped from the source to the target face one by one creating a seamless face swapped output. Both landmark detection and triangle warping run in real-time allowing live face swapping on video streams. The pipeline is optimized to run at 25 FPS on 640x480 videos using only CPU. Extensive experiments demonstrate unparalleled speed and robustness of our method in challenging scenarios.

Keywords: *face swap, face landmark detection, computer vision, image processing, mediapipe…*

(CSET-24-016)

EXPLORING EFFECTIVE STRATEGIES FOR EFFICIENT EXCIPLEX EMISSION IN ORGANIC LIGHT-EMITTING DIODES

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ABSTRACT

This paper presents a comprehensive investigation into the optimization of exciplex emission in organic light-emitting diodes (OLEDs). Through a systematic exploration of various combinations of hole-transporting materials (HTMs) and electron-transporting materials (ETMs), we elucidate critical factors influencing exciplex formation and its impact on OLED performance. Our analysis focuses on estimating the energy band gap of exciplexes, guiding the selection of appropriate material combinations. Experimental observations reveal distinct exciplex emission profiles and lifetime characteristics for different HTM/ETM combinations, providing valuable insights into exciplex formation dynamics. Importantly, we emphasize the significance of ensuring that the HTM/ETM combination possesses a higher triplet energy bandgap than the exciplex to optimize OLED performance and enhance energy efficiency. Overall, this study contributes to the advancement of OLED technology by offering effective strategies for achieving efficient exciplex emission, with implications for lighting, displays, and other applications.

Keywords: *OLEDs, exciplex emission, organic electronics, energy band gap, material combinations…*

(CSET-24-019)

ADVANCING RAILWAY SAFETY AND EFFICIENCY: DEVELOPMENT OF A HUMAN-FOLLOWING TRANSPORT ROBOT

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ABSTRACT

This study addresses the critical need to enhance safety measures and accident prevention for railway workers while improving the overall work environment within the railway industry. Recognizing the challenges posed by railway work environments, characterized by heavy equipment and tasks involving the transportation of substantial loads, the objective is to develop a cutting-edge transport robot capable of autonomously carrying heavy loads and collaborating with railway workers. The transport robot is designed to follow railway workers autonomously, ensuring seamless collaboration while prioritizing safety. Equipped with sensors for real-time object detection, it automatically halts when workers or obstacles are detected within proximity, enhancing worker safety. Developed on the ROS 2 platform for seamless integration of hardware and software, and utilizing the YOLOv5 model for precise object detection, the transport robot is poised to establish a secure and efficient work environment for railway workers. Through the implementation of these technologies, this study aims to revolutionize railway operations, enhancing convenience, efficiency, and safety for all involved stakeholders.

Keywords: *Human-following technology, Railway safety, Railroad worker collaboration, Transport robot…*

(CSET-24-021)

COMPARATIVE ANALYSIS OF BLOCKCHAIN-BASED VOTING SYSTEMS USING MACHINE LEARNING TECHNIQUES

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ABSTRACT

Integrating Blockchain technology into electronic voting systems promises to enhance security, transparency, and efficiency in electoral processes. However, the performance and reliability of these systems vary significantly, necessitating a comprehensive evaluation. This research conducts a comparative analysis of various Blockchain-based voting systems using machine learning techniques to assess their performance, security, and user-friendliness. Findings reveal significant variations in system efficiency, scalability, and robustness, with distinct correlations between Blockchain architecture and overall system performance. The study provides empirical insights into the capabilities and limitations of current Blockchain-based voting systems, emphasizing the critical role of machine learning in enhancing system analysis. Results offer valuable guidance for developing more secure, scalable, and user-friendly voting systems, paving the way for their broader adoption in democratic processes

Keywords: *Blockchain, Cryptocurrency, Decentralization, DistributedLedger Technology, Smart Contracts…*

(CSET-24-022)

APPLICATION OF TWO-DIMENSIONAL HYDRODYNAMIC MODEL (MIKE21HD/FM) TO ASSESSING THE IMPACT OF SAND MINING IN THE LO RIVER AREA AND PROPOSING MANAGEMENT SOLUTIONS

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ABSTRACT

Phu Tho is a province with a developed mining industry, making an important contribution to economic development, creating jobs for people. In particular, the industry of exploiting sand as construction materials is also of interest to meet construction needs. However, the sand mining process impacts the environment, landscape and land area in the surrounding area. Therefore, research on application of two-dimensional hydrodynamic model (MIKE21HD/FM) to evaluate the impacts on riverbanks due to Song Lo sand mining activities, the section through Phu My commune, Phu Ninh district, Phu Tho province is necessary. In particular, sand mining lowers the river bottom, potentially changing basic hydraulic parameters such as water level, flow velocity and flow direction. The results show that after dredging all areas to the design exploitation height, the water level fluctuates from 22.16m to 20.2m. Along the center line from T1 to T10, it can be seen that the water level fluctuates, lower about 0.01m (or 1cm). From there, propose environmental management measures in sand mining, ensuring sustainable economic development goals.

Keywords: *MIKE 21FM, sand mining, sustainable economic development...*

(CSET-24-023)

STUDY OF THE ROOM-TEMPERATURE LASING OF LEAD BROMIDE PEROVSKITE THIN FILMS VIA SOLVENT ENGINEERING.

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ABSTRACT

Recent years have seen a significant surge in attention towards hybrid metal-halide perovskites, primarily for their remarkable optoelectronic properties: long carrier lifetimes; direct bandgaps--and large absorption coefficients. Although we've demonstrated the use of low-temperature solution-processed perovskites for lasing, achieving this at room temperature still poses an ongoing challenge. This study introduces our innovative approach—a solvent-engineering technique—to fabricate lead bromide perovskite thin films and create dense surface morphologies that promote room-temperature lasing. We achieved the production of homogeneous perovskite films with enhanced optical properties by optimizing precursor solutions and deposition parameters. Photoluminescence measurements demonstrated efficient room-temperature lasing above a specific optical pumping density, characterized by sharp emission peaks and narrow linewidths. The dense morphology of the perovskite films found confirmation through scanning electron microscopy, while multi-peaks in lasing modes indicated random lasing phenomena presence. The feasibility of room-temperature lasing in lead bromide perovskite thin films shines through our findings, underlining the potential for practical applications as compact and energy-efficient laser sources.

Keywords: *Laser luminescence, Optoelectronic, Perovskite thin films, Solvent-engineering technique…*

(CSET-24-024)

A DEEP LEARNING APPROACH FOR ACCURATE FACIAL WRINKLE SEGMENTATION USING UNET++ MODEL WITH DICE AND FOCAL LOSS FUNCTIONS

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ABSTRACT

Facial wrinkle segmentation is essential for various applications in dermatology and cosmetology, yet existing methods often struggle with accurate delineation due to limited dataset diversity and class imbalance. In this paper, we propose a novel facial wrinkle segmentation method based on the Unet++ model, enhanced with dice and focal loss functions. Our approach begins with the construction of an enriched wrinkle dataset sourced from the Flickr-Faces-HQ dataset, ensuring diversity in wrinkle types and complexities. We then introduce a skin region extraction technique to isolate relevant facial areas, enhancing segmentation accuracy. The Unet++ model is employed for wrinkle segmentation, leveraging its encoder-decoder architecture and densely nested skip pathways to capture fine wrinkle details. By integrating dice and focal loss functions, our method effectively addresses class imbalance and improves segmentation performance. Experimental results demonstrate the superiority of our approach in both qualitative and quantitative evaluations, showcasing enhanced wrinkle extraction capabilities and superior segmentation accuracy compared to existing methods. Overall, our study advances the field of facial wrinkle segmentation, offering a robust and reliable method for accurate wrinkle delineation in facial images.

Keywords: *Deep learning, Dice loss, Facial wrinkle segmentation, Focal loss, Unet++…*

(CSET-24-025)

Fabrication of Bio-Composites Material from Water Hyacinth (*Eichhornia crassipes*) and Polyester Resin

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Abstract:

Natural fiber-reinforced polymer-based composites are proposed as attractive candidates to replace or reduce the use of synthetic fibers because of their many advantages. Water hyacinth fiber (WHF) is a cellulosic material with high absorption and great potential for composite materials used. The WHF is derived from water hyacinth (*Eichhornia crassipes*), a free-floating plant widely distributed in Southeast Asia and Vietnam. With a fast growth rate, it can withstand many different environmental conditions. It has become an environmental problem as a result of the rapid depletion of minerals and oxygen from water. However, the porous interior structure of the fiber results in a low density, and it has a good prospect of enhancing the characteristics of composite materials. In this work, we have developed a composite material by combining unsaturated polyester (UPE) with WHF. Thermal, tensile, flexural, and morphological properties of the WHF/UPE composite samples are determined. Additionally, SEM observation confirms good adhesion between the WHF and UPE matrix with a WHF/UPE percentage ratio of 38:62 (wt%). Furthermore, the mechanical properties of the research sample compared to those of reference material (medium density fiberboard-polyester (MDF-PE), medium density fiberboard-polypropylene (MDF-PP)) showed outstanding results, highlighting the roles of WHF. Therefore, this study suggests the potential of WHF in place of synthetic fibers in the production of composite materials.

Keywords: *Eichhornia crassipes;* water hyacinth fiber; composite materials

(CSET-24-026)

FABRICATION AND CHARACTERIZATION OF CHITOSAN-GELATIN COMPOSITE FILM

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ABSTRACT

Following the demand to convert from using traditional plastic, recent research is focusing on bio-packaging materials, such as chitosan and gelatin, that are environmentally friendly, biodegradable, and biocompatible. Within this scope, one approach is mixing different polymers to enhance the bonding strength within the matrix and combining favorable properties of the constituent materials. In this research, a biopackaging material has been developed combining chitosan, gelatin, and a glycerol plasticizer by studying the effect of the molecular weight of chitosan and the composition of the casting solution. It is concluded that increasing chitosan concentration results in an increased mechanical strength and lowered water solubility. On the other hand, thermogravimetric analysis and UV-vis spectroscopy analysis suggest that increasing gelatin concentration would allow for a more elastic packaging with higher transparency and better thermal stability. From this result, a thin (< 0.05 mm) biopackaging material with a mechanical strength of up to 17 N/mm^2 with an allowed 30% elongation at break can be attained. The surface structure by scanning electron microscope and the effect of different conditions on the properties of the material was evaluated to better understand the bonding structure of the chitosan, gelatine, and glycerol matrix. These results therefore not only develop a functional packaging material with multiple applications in food and healthcare, but also provide a deeper understanding on the linking behavior of biopolymers.

Keywords: *biopackaging, chitosan, galetin, …*

(CSET-24-029)

LIGHTWEIGHT DEEP LEARNING-BASED PRODUCT OBJECT CLASSIFICATION SCHEME FOR EDGE SERVERS

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ABSTRACT

This paper presents a lightweight deep learning-based product object classification scheme designed for deployment on edge servers. Leveraging the ImageNet Large Scale Visual Recognition Challenge 2012 (ILSVRC2012) dataset, six classes relevant to product objects are selected for model training and evaluation. The proposed scheme optimizes hyperparameters within the Vision Transformer (ViT) model architecture to ensure efficient operation on edge servers. Through rigorous evaluation, the model demonstrates high frame per second (FPS) for object classification, achieving 120.43 FPS, and a top-1 accuracy of 71.45%. Additionally, the NetScore metric, assessing the model's practical utility, yields a score of 51.05%. These results indicate the efficacy and potential of the proposed scheme for real-world deployment in online transaction environments.

Keywords: *Edge computing, Deep learning, Lightweight model, Product classification, Real-time inference…*

(CSET-24-30)

SIMULTANEOUS EXTRACTION OF PHENOLICS AND POLYSACCHARIDES FROM PADINA GYMNOSPORA USING ENZYME-ASSISTED METHOD

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ABSTRACT

This study developed a green enzyme-assisted extraction method for simultaneously extracting polysaccharides and phenolics from the brown seaweed Padina gymnospora. Different enzymes (Cellulast, Pectinex, and Alcalase) were screened for the extraction. Among these enzymes, Alcalase demonstrated the highest efficiency for the polysaccharide and phenolics extraction. To maximize the extraction efficiency, the Alcalase-assisted extraction process was then optimized using response surface methodology. The optimal extraction conditions were obtained to achieve maximum polysaccharide and phenolic recovery: a water-to-sample ratio of 61.31 mL/g, enzyme loading of 0.32%, temperature of 60.5°C, and extraction time of 1.95 h. The resulting extract was then fractionated into three fractions: alginate-, fucoidan-, and phenol-rich fractions. These fractions exhibited potential antioxidant activity against 2,2-diphenyl-1-picrylhydrazyl radicals with IC50 values of 140.55 µg/mL, 126.21 µg/mL, and 48.17 µg/mL, respectively. This work suggests that phenolics and bioactive polysaccharides can be effectively extracted utilizing Alcalase-assisted extraction procedure.

Keywords: *enzyme, simultaneous extraction, Padina gymnospora, optimization…*

(CSET-24-031)

FORENSIC ANALYSIS OF CRYPTOCURRENCY TRANSACTIONS: INSIGHTS FROM ANDROID DEVICES CONNECTED TO HARDWARE WALLETS

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ABSTRACT

While blockchain ledgers publicly record cryptocurrency transactions, the anonymity of transaction participants presents challenges for forensic investigation. This study concentrates on analyzing android device-based cryptocurrency transactions tethered to hardware wallets: D'cent Biometric Wallet and Ledger Nano S. Through meticulous scrutiny of artifacts produced by these tools – we engineered CryptoInfoGetter; an application designed to extract data related to cryptocurrencies. We developed the tool 'CryptoInfoGetter' for extracting cryptocurrency-related data from artifacts generated by two specific hardware wallets--the D'cent Biometric Wallet and Ledger Nano S; this development was a result of our analysis into forensic aspects of Android device-connected crypto transactions. Our analysis unveils valuable insights: wallet details; transaction histories and hardware wallet configurations—these provide pivotal evidence for forensic investigations. We also confront challenges--the dynamic nature of transactions, anonymity features in particular—and deliberate over opportunities to bolster investigative techniques. The advancement of cryptocurrency forensic analysis necessitates indispensable collaboration among researchers, law enforcement personnel, as well as industry stakeholders.

Keywords: *Cryptocurrency forensics, Android devices, Hardware wallets, Artifact analysis, Blockchain transactions…*

(CSET-24-032)

COUNTING AND TRACKING OBJECTS FOR CLASSROOM MANAGEMENT AT DONG NAI TECHNOLOGY UNIVERSITY

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ABSTRACT

In the context of advancing technology and increasing demand for efficient management, the application of an automated system capable of counting and tracking objects has become indispensable for improving the management process. This task imposes high requirements on processing time and accuracy. The system size and deployment capabilities also require special attention, particularly in managing classrooms at universities. In this study, we propose a system for counting the number of students and tracking their entry and exit in classrooms at Dong Nai Technology University. The system will provide the current number of students in the class, the number of students entering and leaving the class, and the status of the lecturer. Additionally, we have built the dataset and selected object recognition methods to ensure that the system can deploy operations in real-time. Experimental results show that the system achieves significant accuracy and operational speed when used in classroom monitoring.

Keywords: *Object detection, Object tracking, Object counting, Forensic Analysis, Cryptocurrency…*

(CSET-24-034

EFFICIENT MULTI-PERSON ACTION RECOGNITION USING YOLOV7-POSE AND DEEP LEARNING MODELS

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ABSTRACT

In this paper, we propose a highly efficient methodology for multi-person action recognition. Our approach combines the rapid pose estimation capabilities of YOLOv7-Pose— an advanced model that overcomes traditional speed limitations associated with pose estimation such as OpenPose and PoseNet— with deep learning models like Long Short-Term Memory (LSTM), Gated Recurrent Unit (GRU), and Spatial Temporal-Graph Convolution Network (ST-GCN) to classify actions; it identifies and analyzes the actions of multiple individuals within a single scene simultaneously. We experiment, analyze, and compare the performance of these models in terms of accuracy, testing time, and computational complexity. Our results underscore that combining YOLOv7-Pose with ST-GCN attains superior accuracy; meanwhile, employing YOLOv7-Pose alongside LSTM demonstrates the quickest testing time. This underscores how effectively our proposed methodology balances precision and efficiency in multi-person action recognition tasks.

Keywords: *Deep learning, LSTM, Multi-person action recognition, ST-GCN, YOLOv7-Pose…*

(CSET-24-36)

ETHYL BIODIESEL PRODUCTION VIA ELECTROLYSIS

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ABSTRACT

This study aimed to produce biodiesel using electrolysis method. Different nontoxic alcohols (ethanol, propanol, and butanol) were used as viable alternatives to methanol for the biodiesel production. Amount the alcohol tested; ethanol showed the most effective candidate for the electrolysis. To enhance the reaction efficiency, different homogeneous alkali catalysts were employed for the reaction, among which sodium ethoxide demonstrated exceptional catalytic activity, resulting in the highest biodiesel yield. Response surface methodology (RSM) was then used to optimize the reaction conditions for maximizing the biodiesel yield. The optimal reaction conditions were determined as follows: ethanol-to-oil ratio of 26.6:1, sodium ethoxide concentration of 1.33%, electrolysis voltage of 13.3 V, reaction time of 31 min, water content of 1.5%, and room temperature, yielding 98.65% biodiesel. The properties of the synthesized biodiesel were verified and met the international standards. This study suggested that electrolysis method is a promissing method for ethyl biodiesel production, facilitating and green and efficient method for producing biodiesel.

Keywords: *Ethyl biodiesel, electrolysis, optimization…*

(CSET-24-038)

ADVANCEMENTS IN AUTOMOTIVE SIGNAL LIGHT DESIGN: A NOVEL APPROACH INCORPORATING LIGHT SHAPING DIFFUSER TECHNOLOGY

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ABSTRACT

Automotive signal lights play a crucial role in ensuring road safety and communication between drivers. This paper introduces a novel approach to automotive signal light design that leverages Light Shaping Diffuser (LSD) technology to improve light distribution uniformity, reduce glare, and enhance responsiveness during dynamic driving conditions. The study begins with an overview of the current challenges in automotive lighting and the rationale behind adopting LSD technology. Subsequently, the optics design process is detailed, emphasizing the optimization of optical configurations to achieve superior performance metrics. Simulation experiments, coupled with sensitivity analyses, demonstrate the robustness and versatility of the proposed design across varying operating conditions. Comparative evaluations against conventional LED-based signal lights underscore the significant performance enhancements offered by the proposed design. Result number experiments result further validate the efficacy of the design in real-world scenarios, paving the way for its potential adoption in future automotive platforms. Finally, a discussion on the implications of these findings and avenues for future research is provided, highlighting the transformative impact of advanced lighting technologies on automotive safety and efficiency.

Keywords: *Light Shaping Diffuser (LSD), Automotive Signal Light, Diffuser technology…*

(CSET-24-039)

ADVANCING INDUSTRIAL VISUALIZATION: DESIGN AND IMPLEMENTATION OF A 3D VISUALIZATION SERVICE ARCHITECTURE FOR 2D CAD DATA

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ABSTRACT

This paper introduces a novel 3D visualization service architecture tailored for industrial applications, specifically targeting the translation of 2D CAD data into immersive 3D models. The architecture encompasses parsing, generation, and transmission components, facilitating seamless visualization across diverse device ecosystems. Leveraging advanced technologies such as computer vision and web-based transmission protocols, the architecture offers a robust solution for industrial visualization tasks. Experimental evaluation demonstrates its efficacy in enhancing workflow efficiency and productivity within industrial settings

Keywords: *3D; Architecture, CAD; Industrial, Visualization…*

(CSET-24-040)

INVESTIGATING THE IMPACT OF HIGH VELOCITY OXY-FUEL SPRAYING TECHNOLOGY PARAMETERS ON THE HARDNESS OF CARBIDES MATERIAL COATING FOR INTERNAL SURFACE OF PIPES

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ABSTRACT

The hardness of high-speed oxyfuel thermal spray coatings is a major factor determining coating properties, especially when applying thick coatings for repair purposes. This study aims to optimize and determine the influence of HVOF (High velocity oxy-fuel) spraying parameters on the hardness of WC-12Co coatings applied to the internal surface of 20Cr steel pipes. The parameters investigated are spray distance (L), powder feed rate (P), and relative velocity of spray gun (V). The experimental parameters were determined by using a Taguchi L9 orthogonal design. The results showed that the optimal spraying parameters were L_2 = 0.25 m, P_1 = 20 g/min, and V_3 = 0.2 m/s, resulting in a maximum coating hardness of 1308.6 HV. The effect of spraying parameters on hardness was observed to follow the order P (48.5%) > L (33.7%) > V (17.0%). An experimental function was developed to establish the relationships between hardness and spraying parameters, enabling the evaluation of the influence of the researched spraying parameters on hardness.

Keywords: *Hardness, High-velocity oxygen fuel, WC-12Co, internal surface, process parameter…*

(CSET-24-041)

EFFICIENT INTERACTION RECOGNITION IN VIDEO FOR EDGE DEVICES: A LIGHTWEIGHT APPROACH

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ABSTRACT

Efficient and accurate recognition of human interactions is crucial for numerous service applications, including security surveillance and public safety. However, achieving real-time interaction recognition on resource-constrained edge devices poses significant computational challenges. In this paper, we propose a lightweight methodology for detecting human activity and interactions in video streams, specifically tailored for edge computing environments. Our approach utilizes distance estimation and interaction detection based on pose estimation techniques, enabling rapid analysis of video data while conserving computational resources. By leveraging a distance grid for proximity analysis and TensorFlow's MoveNet for pose estimation, our method achieves promising results in interaction recognition. We demonstrate the feasibility of our approach through empirical evaluation and discuss its potential implications for real-world deployment on edge devices.

Keywords: *Interaction recognition, Edge devices, Lightweight methodology, Pose estimation, Real-time analysis…*

(CSET-24-043)

THE VILLAGE-STAY: A NEW APPROACH FOR SUSTAINABLE AND INCLUSIVE COMMUNITY-BASED TOURISM DEVELOPMENT IN VIETNAM

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ABSTRACT

Community-based tourism (cbt) is a tourism model which utilizes local, traditional cultures, unique landscapes, culinary, and lifestyles of a community to develop tourism products and services to offer experienced travel to visitors. Cbt creates new livelihoods and improves the quality of life for the local people while making a great contribution to local culture promotion and environmental protection. In vietnam, cbt is promoted by the government at all levels and is integrated into the *national target program* (ntp) as a core tourism service to meet the new trend of tourists in recent years. In vietnam, cbt is commonly referred to as homestay services, including accommodation and culinary services. Therefore, the development of a cbt location usually focuses on investment in some selected pioneered families that are willing to renovate their existing traditional houses or build new houses to offer accommodation, culinary, and sightseeing services to the visitors. Consequently, the benefits generated from cbt belong to the families that directly provide tourism products and services. Other families and community members do not receive any benefits from tourism despite making contributions in some ways such as protecting the environment and keeping the community clean and safe. It is evident that the homestay services model increases the incomes of the local people who involve in providing tourism services but also widens inequality amongst community members.

To decrease the inequality caused by the homestay services model and promote sustainable and inclusive cbt in vietnam, a new model called village-stay has been developed and rolled out in vietnam recently. The village-stay encourages all families and members of the local community to engage in tourism activities and receive benefits based on their contribution. Under the village-stay model, service groups are established to provide high-quality services to visitors. The members of these service groups are the selected community members who are willing to participate in tourism development.

The community fund is also created upon the agreement of allcommunity members to redistribute the benefits from tourism to other community members who indirectly offer tourism activities such as protecting the environment and culture and keeping the whole village safe and clean to attract more visitors. This study aims at exploring the experiences and perceptions of the local government and people who are ethnic minorities living in sung village, da bac district, hoa binh province in vietnam about the transformation of cbt in the village from homestay into village-stay model. The qualitative approach was used to collect data. Two focus group discussions were conducted with 10 residents, and two in-depth interviews were organized with the leaders of the district and the village. The focus group discussion members of the community include those who are directly and indirectly engaged in cbt development in the community. The study results indicated that the village-stay model helps decrease inequality of benefit distribution among the community members and provides more financial support to the underserved population in the community, therefore the village-stay model strengthens the relationship within the community members and between the community members and the visitors. The village-stay model also creates more employment opportunities for community members by participating in service groups. The technical trainings and capacity-building events organized during the cbt development improved the tourism and business knowledge of the residents. However, the regulations of the service groups should be more detailed and clearer to encourage the group members to contribute to the common development of the village.

Keywords: *Community-based tourism, national target program, touristm products, fighting poverty, sustainable touristm…*

(CSET-24-045)

TOURIST SATISFACTION, TRAVEL EXPERIENCE, AND INTENTION TO REVISIT BUNG RIENG, VUNG TAU PROVINCE

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ABSTRACT

The tourism development strategy in Vietnam defines eco-friendly tourism as an important sector. This study is to conduct the question about which factors among destination's attractions include natural scenery, culinary culture, etc., social-demographic data, tourists traveling experience and intention to revisit Bung Rieng, Vung Tau province. This research began by investigating research topics that relate to the tourism industry in Vietnam in general, especially in Bung Rieng. Then followed by reviewing and exploring literature concerned with the tourism industry, more detail on tourism image, and tourists' perception. The survey was conducted in Bung Rieng, Vung Tau province with a sample size of 50. And use the SPSS 20.0 software to pretest the hypotheses.

In this research, the tourists had a strongly positive interest in the local food and environment with natural beauty, pleasant beaches and warm climate in Bung Rieng. The culture and social factors are also attractive to visitors because of Bung Rieng's authentic scene. But the tourist leisure, entertainment and physical facilities cannot cater to the needs of visitors. The result of the study obtained is useful information for local government and tourism agencies in Bung Rieng.

It is good to enhance the place with entertaining and physical infrastructures in Bung Rieng to respond to visitors. On the other hand, local government and residents are responsible for protecting the tourism environment as well as the historical sites and heritages of Bung Rieng.

Keywords: *tourist's satisfaction, travel experience, intention to revisit, Bung Rieng…*

(CSET-24-048)

SUSTAINABILITY INDICATORS THE CASE OF SUN MOON LAKE'S SPORT EVEN IN TAIWAN

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ABSTRACT

The scenario of tourism in Sun Moon Lake is dark with COVID-19. However, the pandemic is the chance to rethink everything. At present, we can see that the number of tourists is declining in a decade. The area is managed by Sun Moon Lake National Scenic Area Administration, which provides the tourists full service and oversees sustainable development in the area. It is very hard to keep two main targets together, such as sustainable development, and a well-ecosystem. This study uses social hassles, managerial hassles and their negative effects on tourism satisfaction and loyalty. The framework allows managers to understand and make decisions. The Vensim model is used to perform the low and high situation of one single or both hassles, which show the consequence of the decreasing number of tourist attractions in Sun Moon Lake. The environmental perception of citizens is found as a moderator of the relationship between both hassles and loyalty.

Keywords: *Sun-Moon Lake sports event, tourist attraction, pollution issues, environmental perception…*

(CSET-24-049)

FORECASTED MODELING FOR AIR QUALITY INDEX IN VIETNAMESE TOURIST DESTINATIONS: LEVERAGING DEEP LEARNING APPROACHES

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ABSTRACT

Severe air pollution in Vietnam's tourism areas has become a significant economic issue in recent years. While many studies have found a link between population exposure to air pollution and poor health outcomes, short-term exposure to air pollutants in high-pollution zones can result in acute health consequences; thus, poor air quality jeopardizes visitors' health and well-being and threatens the tourism industry's sustainability. As a result, attempts to correctly estimate the air quality index (AQI) are crucial for effective air quality management, a challenge that smart cities must address as they become more developed. However, there are some challenges to predicting AQI. First, the results are influenced by various factors that low-cost sensors frequently skip due to the nonlinear and dynamic nature of multivariate air quality time series data, leaving a gap for enhancements. Second, standard prediction algorithms often use the training data at fixed intervals and require as many available attributes as possible. This work reviews these issues by applying many Recurrent Neural Network (RNN) deep-learning models for the AQI dataset from PAM AIR stations in 10 Vietnamese tourism areas. Then, it compares each model's impact on the data set by leveraging deep learning models for early predictions based on limited but crucial parameters such as particulate matter 2.5 microns (PM2.5) levels, humidity, and temperature. It presents an appealing method for tackling air pollution problems while dataset quality is uncertain. These findings will result in a fast, efficient, cost-effective, and reliable model that would help reduce the impact on health and add to the literature on meteorology and air pollution while giving theoretical insights and practical guidance in assessing AQI and its dangers.

Keywords: *Air Pollution, Air Quality Index, Deep Learning, Low-cost sensors, Smart Cities…*

(CSET-24-050)

OPTIMIZING BOTANICAL FARM CROP VARIETY SELECTION: INTEGRATION OF MACHINE LEARNING MECHANISMS FOR GREEN TECHNOLOGY AND SUSTAINABLE SOLUTIONS

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ABSTRACT

Currently, the field of science and technology, particularly Artificial Intelligence (AI), is undergoing significant progress. AI involves the computer-based simulation of human cognitive functions. Within the realm of AI, machine learning, a specialized branch, utilizes mathematical algorithms to enhance computational capabilities. The incorporation of AI in agriculture offers opportunities to optimize the selection of viable plant species, leading to improved agricultural productivity, higher incomes for farmers, and overall economic development. By applying machine learning techniques to the "Agricultural Crop Dataset" the study has developed an effective system for predicting the most suitable plant species for farmers. This endeavor promotes the practical utilization of AI in agriculture, paving the way for sustainable economic growth.

Keywords: *AI, green technology, Machine Learning, plant species, sustainable solutions….*

(CSET-24-051)

Controllable synthesis of N-arylhydroxylamines from nitroarenes by highly chemo-selective two-step tandem reduction using a novel bacterial nitroreductase

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ABSTRACT

N-Arylhydroxylamines serve as versatile intermediate organic molecules for the synthesis of industrially valuable fine chemicals, bioactive drugs, and polymerization inhibitors. Due to the active electron group of -NHOH in arylhydroxylamines, it is an extremely unstable and easily further reduced to corresponding amines. In addition, the synthesis of arylhydroxylamines by conventional chemical is usually performed using toxic heavy metals and chemical additives under high pressure and high temperature conditions. Thus, a novel eco-method is urgently needed. In this study, we developed a continuous flow method to synthesize arylhydroxylamines by a novel nitroreductase from Bacillus amyloliquefaciens, which shows high activity and chemo-selectivity in converting nitroarenes to N-Arylhydroxylamines (>99%) under mild condition. This method therefore provides a novel avenue to synthesis N-hydroxylamine.

Keywords: *Biosynthesis, Nitroreductase, N-arylhydroxylamines, green chemistry…*

(CSET-24-053)

OPTIMIZATION OF RING REMOTE PHOSPHOR STRUCTURE FOR LASER-BASED WHITE LIGHTING APPLICATIONS

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ABSTRACT

This study optimizes ring remote phosphor structures for laser-based white lighting applications; it delves into the pursuit of high-brightness and high-luminance lighting solutions that blue laser diodes (LDs) hold promising potential. Nonetheless, challenges arise from the use of conventional phosphor gel formulations--effective in white LEDs--as they tend to carbonize under focused laser irradiation: a problem we aim to mitigate. In order to tackle this issue, we investigate the ring remote phosphor structure as a potential method for guiding laser light from LDs towards adjacent phosphor layers; this strategy helps alleviate the negative impacts of concentrated laser irradiation. Utilizing ray-tracing simulations allows us to scrutinize and analyze the performance of our selected structure under different design parameters: notably, the half-angle of an inverted cone lens--and--the space between LD and encapsulant. Our findings underscore optimal setups that can achieve favorable lighting results while carefully balancing elements such as divergence and intensity. This research actively advances laser-based white lighting technology, thereby paving a path for superiors.

Keywords: *Laser, Ray-Tracing, Ring remote phosphor structure,…*

(CSET-24-054)

SOIL QUALITY OF SOME TYPICAL SLOPING LAND USES IN AGRICULTURE AND AFORESTATION IN BACH THONG DISTRICT, BAC KAN PROVINCE

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ABSTRACT

This article studies on soil quality of typical land uses of Bach Thong district with three main land use types - cultivated land use, productive forest land use, and protective forest land use. Soil samples were taken at 10 locations in Bach Thong district in 2023 October 12-13th. Soil samples were analyzed for mechanical composition, pH, and organic carbon content. The analyzed results show that mechanical composition in crop soil samples is dominated by the medium while heavy mechanical composition is dominant in forest soil samples. pH in soil samples collected from Bach Thong district often ranges from acidic to very acidic, fluctuating from 3,65 to 5,32 for nearly all soil samples. The highest organic carbon content is detected in protective forest soil samples while lower organic carbon content values are found in productive forest soil samples. Organic carbon content in cultivated soil samples is lowest, especially in maize and rice crop soil samples. The acidic soil here is mainly due to sloping soil and sandy soil structure, so alkaline earth ions can easily be washed away, causing the soil to become acidic. Furthermore, organic carbon content is lower in productive forests and crop soil samples mainly due to sloping land without dense ground cover, organic carbon is easily washed away during heavy rain. Some suggestions for sustainable use of sloping land are increasing plant species diversity in afforestation; Cultivation along contour lines and intercropping with diversity of plants on sloping land to preserve soil to avoid erosion and washing away when heavy rain occurs.

Keywords: *contour lines, intercropping, organic carbon, productive forest, protective forest…*

(CSET-24-055)

APPLICATION OF FUZZY LOGIC TO CONTROL THE POWER OF COAXIAL GENERATORS USING DUAL-POWER HETEROGENEOUS POWER MACHINES

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ABSTRACT

Ship power stations are becoming more and more modern with today's energy management and monitoring control systems. With large tonnage ships, the power station always aims at an optimal exploitability in the sea voyage to reduce energy consumption, reduce operating time and reduce noise, reduce environmental pollution, avoid adverse impacts on humans as well as the natural environment. For large vessels, the transmitting station is usually designed with coaxial generators working together with diesel-generator (DG) assemblies. The model of a generating station using the main machine to drive the generator in combination with several diesel generator sets for the purpose of generating electricity is a model that is appreciated for both technical and economic features. With dimming controllers, there is a new development direction in the field of system control research. Dimming controllers are, in principle, nonlinear static controllers. They can be designed with a given system quality to an arbitrary precision and work according to the principles of human thinking.

Keywords: *Fuzzy logic, Generators, Matlab, Simulink, Adaptive control, fuzzy systems and control…*

(CSET-24-058)

MICRORNAS AS NOVEL APPROACH FOR BREAST CANCER TREATMENT

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ABSTRACT

Mesenchymal stem cells (MSCs) have emerged as promising candidates for cancer therapy due to their ability to modulate the tumor microenvironment. Exosomes derived from MSCs have received significant attention for their roles in cancer treatment. In this study, we investigated the functions of highly expressed exosomal MSC miRNAs in breast cancer. Our data observed the highest level of miR-23a-3p, miR-125b-5p, and miR-1246 in skin, submandibular gland, and adrenal gland, respectively. Interestingly, high expression of miR-1246 significantly reduced the survival rate of breast cancer patients as compared to the low expression group. Of note, the levels of their target genes were related to the clinical outcome of breast cancer patients. The results from this study not only provide the potential of miR-1246 as the biomarker but also the novel therapeutic target for breast cancer.

Keywords: *Breast cancer, Mesenchymal stem cells, miRNA…*

(CSET-24-059)

APPLYING GIS AND AHP METHOD TO ASSESS AND ZONE ECOLOGICAL SENSITIVITY IN HA LONG CITY QUANG NINH PROVINCE

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ABSTRACT

Economic development activities such as tourism, services, industry, and especially mineral exploitation activities are creating great pressure on the ecological environment in Ha Long City, Quang Ninh province. Therefore, the assessment and zoning of ecological sensitivity is an important basis for adjusting human activities towards the goal of sustainable use of natural resources and ecological services of Ha Long city. The ecological sensitivity of Ha Long City is assessed through two groups of influencing factors: (i) The group of natural factors including elevation, slope, vegetation cover (ii) The group of human factors consist of land use, traffic, mineral exploitation activities. Each factor has spatially shown on the map according to 5 corresponding levels of ecological sensitivity (1-non-sensitive, 2- less sensitive, 3- moderately sensitive, 4- highly sensitive, and 5- extremely highly sensitivity). The AHP analytical hierarchy method is applied to determine the importance of each factor. The synthetic ecologically sensitive zoning map is built based on weight overlay component maps. Research results have identified 9,0 ha of area with extremely highly level of ecological sensitivity (0,01%); 13.535ha of area has a high level of ecological sensitivity (8,87%), concentrated mainly in mine areas and forest; 90.339 ha of area has an moderately sensitive level (59,18%), and the remaining area is less sensitive and non sensit areas (31,941%). Based on these, suggestions for protection-utilization balance were developed.

Keywords: *AHP, GIS, Ha Long…*

(CSET-24-060)

LINKING ACCOUNTING INFORMATION SYSTEMS PERFORMANCE AND COMPETITIVE ADVANTAGES OF SMES

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ABSTRACT

Competitive advantages and Accounting Information Systems are progressively gaining the attention of management accounting practitioners, managers, and academics due to their significant influence on performance, profit, stainable growth, and growing acceptance by SMEs. Consequently, this study aims to investigate the connections between these two large fields and offer suggestions for their joint consideration. Hence, the research aims to investigate comprises: (1) A review of both frameworks' relevant literature, (2) identifying benefits connected with their concurrent application, and (3) developing a theoretical framework model that integrates their separate concepts. The results contribute to proposing new ways to enhance the Accounting Information Systems performance. These managing approaches are compatible with complementary; consequently, their combined execution could assist SMEs in improving their overall performance and enhancing their Competitive Advantages over a rival. In addition, their combined use could facilitate the dissemination of Accounting Information Systems and strategic management accounting approaches for SMEs.

Keywords: *Accounting Information Systems, Accounting Information Systems Performance, Competitive Advantages, SMEs…*

(CSET-24-061)

DEVELOPMENT AND PERFORMANCE EVALUATION OF A HIGH-EFFICIENCY MICRO LED DISPLAY USING PLANARIZATION AND ELECTRODELESS SHIELDING TECHNIQUES

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ABSTRACT

This paper presents the development and performance evaluation of a novel micro-LED display achieved through innovative planarization and electrodeless shielding techniques. The study focuses on achieving uniform forward voltages across the entire display panel, ensuring consistent performance and optimal light output. Through meticulous measurement and analysis, the study demonstrates impressive results, with variations of only 2.7% in column pixels and 1.08% in row pixels. Additionally, the micro-LED display exhibits remarkable luminance capabilities, achieving a brightness of 430 nits when biased at a pulse-width modulated voltage (PWM) with a frame rate of 105 Hz and a duty cycle of 1/32. Furthermore, the display showcases outstanding power efficiency, with an output power reaching 847 µW at a direct current (DC) of 3 mA. These findings underscore the potential of the developed micro-LED display for various applications, including consumer electronics, automotive displays, and augmented reality/virtual reality (AR/VR) systems, where high brightness, efficiency, and uniformity are paramount.

Keywords: *Electrodeless shielding, High efficiency, Micro LED display, Planarization; Uniform forward voltages…*

(CSET-24-062)

LANDSLIDE RISK ASSESSMENT BASED ON GIS AND REMOTE SENSING TECHNOLOGY IN HOA AN DISTRICT, CAO BANG PROVINCE

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ABSTRACT

Hoa An district in Cao Bang province is known for its important mountainous landscape area for developing geological, geomorphological, and biodiversity values, with economic, scientific, educational, and awareness-raising values for the Earth's geological heritage of Vietnam. However, due to its location in an area where geological and human activities are always strong in high mountainous areas, various disasters in the area along traffic routes, such as landslides and landslides on roads and works, are always at risk of occurring. In addition, due to the impact of climate change and the intensity of floods, the risk of such disasters may occur with increasing frequency and intensity. The study uses remote sensing imagery and logistic regression models to assess the factors and risk of disasters. The analysis results show that the main factors causing disasters are terrain slope, rainfall, and land use changes, and forecast the likelihood of disasters from low to high. Identifying the factors and zoning the risk of disasters occurring helps to plan the natural geological heritage area that needs to be protected, ensuring the development of economic, scientific, and educational values for the protection of special environmental landscapes.

***Keywords**: natural geological heritage landslide disaster, logistic regression, remote sensing…*

(CSET-24-063)

CORPORATE SOCIAL RESPONSIBILITY AND GREEN SERVICE INNOVATION IN THE HOSPITALITY INDUSTRY: THE MEDIATING ROLE OF GREEN HUMAN CAPITAL

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ABSTRACT

This study investigates the relationship between corporate social responsibility and green service innovation in the hospitality industry, with the mediating role of green human capital. A sample data of 351 four stars or above hotels was collected in China. Results of structural equation model show that corporate social responsibility has a positive influence on green service innovation. Furthermore, green human capital positively mediates this relationship. Findings of this study provides theoretical and practical implications for academia and managers in improving green service innovation for their firms from corporate social responsibility perspective.

Keywords: *Corporate social responsibility, green human capital, green service innovation…*

(CSET-24-064)

EXPLORING THE IMPLEMENTATION AND OBSTACLES OF SUSTAINABILITY ACCOUNTING PRACTICES IN VIETNAMESE SMES

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ABSTRACT

This study examines the implementation of and obstacles to sustainability accounting practices in Vietnamese Small and Medium-sized Enterprises (SMEs). Sustainability accounting is gaining prominence globally, as businesses recognize the need to integrate environmental, social, and economic considerations into their decision-making processes. In the context of Vietnam, where SMEs form the backbone of the economy, understanding how these enterprises adopt and grapple with sustainability accounting practices is crucial for advancing sustainable development goals. Through a review of the literature and case studies, this study sheds light on the current state, drivers, barriers, and potential solutions related to sustainability accounting in Vietnamese SMEs. These results contribute to key words relating to sustainability accounting practices in research and motivate SMEs to adopt and implement environmental, social, and governance (ESG) issues, and regulators can refer to their regulations.

Keywords: *environmental, social, and governance (ESG), Sustainability Accounting, Sustainability Accounting Practices…*

(CSET-24-065)

COMPLETING THE DRIED COCONUT VALUE CHAIN OF BEN TRE PROVINCE IN A SUSTAINABLE DIRECTION

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ABSTRACT

By the end of 2023, the area of coconut gardens in Ben Tre province reached 79,000 hectares, accounting for 40% of the country's coconut planted area and about 32.5% of the province's natural area. However, only 23,747 hectares, accounting for 30% of the province's coconut area, participate in the production area associated with the coconut value chain. Production associated with the value chain helps coconut growers have stable output and perform safe production according to the standards set by consuming businesses; Coconut consuming businesses build stable raw materials for production activities and serve as traceability and geographical indications for consumers; is a premise for implementing fair trade and issuing Carbon certificates to coconut growing households. The article focuses on analyzing the benefits of the participants in the desiccated coconut value chain and proposing solutions to organize the production and consumption of desiccated coconuts in a sustainable manner in the relationship between three pillars: economy, society and environment.

Keywords: *value chain, coconut, fair trade, Carbon certificate…*

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LIST OF POSTERS

(CSET-24-015)

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REAL-TIME HEURISTICS FOR BALANCING MIXED-MODEL ASSEMBLY LINES

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ABSTRACT

In a mixed production process, bottlenecks can significantly impede efficiency, particularly when certain products monopolize specific processes. Traditional static scheduling methods struggle to adapt to unforeseen disruptions, resulting in lower production efficiency. To address this issue, this paper proposes a real-time sequencing heuristic designed to dynamically adjust product sequencing to cope with unplanned bottlenecks in mixed-model assembly lines. The proposed method aims to balance production facilities by prioritizing products with shorter processing times after bottleneck determination. Experimental validation conducted on a simulated production line producing multiple types of agricultural tractors demonstrates the efficacy of the proposed approach. Results indicate a reduction in overall production time compared to traditional sequential injection methods, particularly as the number of products waiting in the buffer increases. This study highlights the potential of real-time sequencing heuristics to enhance production efficiency and responsiveness in mixed-model assembly environments.

METHODS

In this study, we focus on the flow shop process encompassing a total of N processes. Our approach to identifying bottlenecks involves scrutinizing the performance of n process times, specifically targeting the longest working time associated with input products. This entails analyzing data from n processes with the lengthiest working times of previously injected products, which are then aggregated with the working time of all currently injected products. Bottlenecks, pivotal in mixed-model assembly lines, denote processes experiencing elevated workloads or protracted processing times compared to others, leading to operational congestion and overall production delays. Efficient bottleneck determination methodologies are paramount for timely intervention and the optimization of production activities (Bock & Boysen, 2021).

Traditionally, bottleneck identification in manufacturing has leaned on scrutinizing process times, throughput rates, and resource utilization metrics to pinpoint critical constraints. Techniques like the Theory of Constraints (TOC) have been instrumental in identifying production system bottlenecks and prioritizing improvement endeavors. Moreover, simulation modeling and mathematical optimization approaches have provided insights into production flow dynamics and potential bottleneck locations (Ebrahimi et al., 2023; Majidian-Eidgahi et al., 2020; Yang et al., 2015).

Our proposed bottleneck determination method represents a novel approach tailored explicitly for mixed-model assembly lines. It involves real-time analysis of individual process performances within the production line to promptly identify potential bottlenecks. Unlike static approaches reliant on pre-established schedules and assumptions, our method dynamically adapts to changing production conditions and unforeseen disruptions.

Central to our proposed method are several key components. These include real-time data collection, which entails continuous monitoring of production metrics such as process times, queue lengths, and resource utilization. We integrate sensor data, production logs, and machine monitoring systems to capture real-time performance data (Liu et al., 2021).

underlying factors contributing to identified bottlenecks. These may include equipment failures, resource constraints, or suboptimal process configurations. Collaboration with production teams and domain experts facilitates the acquisition of insights into potential root causes and mitigation strategies.

DISCUSSION

Despite the benefits of mixed production, its implementation introduces complexities in production scheduling, particularly when faced with dynamic operational environments. Static scheduling approaches, commonly employed in traditional manufacturing settings, struggle to adapt to the inherent uncertainties and disruptions encountered in mixed-model assembly lines. Unforeseen events such as equipment breakdowns, rework due to defects, or changes in production plans can lead to bottlenecks, impeding the smooth flow of operations and diminishing overall production efficiency (Chen et al., 2023).

To address these challenges, researchers have explored various strategies aimed at enhancing the scheduling and sequencing of production activities in mixed-model assembly lines. Prior studies have investigated metaheuristic techniques, including linear planning, heuristic algorithms, and genetic algorithms, to optimize inventory input schedules and improve production efficiency. While these approaches offer valuable insights, they predominantly rely on static scheduling paradigms, limiting their ability to adapt to real-time changes and unexpected disruptions (Sotskov, 2023).

In response to the limitations of static scheduling, this study proposes a novel real-time sequencing heuristic tailored specifically for mixed-model assembly lines. Unlike conventional approaches that pre-plan production schedules in advance, the proposed heuristic dynamically adjusts product sequencing in response to emerging bottlenecks and operational constraints. By continuously monitoring production performance and prioritizing tasks based on real-time data, the heuristic aims to mitigate bottlenecks and optimize production flow, thereby enhancing overall efficiency and resilience in mixed-model assembly environments (Peng et al., 2024).

RESULTS

The experiments demonstrated that the proposed method consistently outperformed the traditional approach in terms of reducing overall production time. Specifically, for scenarios where 10 types of products were waiting in the buffer, the proposed method resulted in a reduction in production time ranging from 2.91% to 3.56%, depending on the number of units waiting. Furthermore, the experiments showed that as the number of products waiting in the buffer increased, the time required for overall production decreased, highlighting the scalability and effectiveness of our method.

Table 1 summarizes the experiments conducted:

n	Previous	Proposed	Improvement
10*100	2.91%	3.09%	6.19%
10*550	3.40%	3.56%	4.71%

CONCLUSIONS

This study presents a novel real-time sequencing heuristic designed to address bottlenecks in mixed-model assembly lines. By dynamically adjusting product sequencing based on real-time data, the proposed method offers a flexible and adaptive approach to production scheduling, effectively mitigating bottlenecks and enhancing overall efficiency. The experiments conducted validate the effectiveness of the proposed method, demonstrating significant improvements in production time compared to traditional static scheduling approaches. Our findings underscore the importance of proactive intervention and dynamic adaptation in addressing the complexities of mixed-model assembly environments. The proposed method provides a valuable tool for manufacturers seeking to optimize production processes, improve resource utilization, and enhance responsiveness to changing production conditions.

Further research is warranted to explore additional factors influencing production efficiency, such as equipment failure rates, setup times, and logistics transportation. Additionally, extending the proposed method to accommodate uncertainty and variability inherent in real-world production environments would be beneficial. The proposed real-time sequencing heuristic offers a promising solution for enhancing the efficiency and resilience of mixed-model assembly lines. By leveraging real-time data analytics and adaptive algorithms, manufacturers can optimize production flow, reduce lead times, and ultimately, improve customer satisfaction and competitiveness in today's dynamic manufacturing landscape.

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Acknowledgement: Pham Van Thanh [1]*Faculty of Engineering, Dong Nai Technology University, Bien Hoa City, Vietnam*

(CSET-24-018)

IMPLICATION OF SOME SUSTAINABLE DEVELOPMENT SOLUTIONS FOR VIETNAM'S AGRICULTURE

Tran Minh Duc

The 2nd Conference on Sustainability and Emerging Technologies CSET 2024

ABSTRACT

Vietnam's Agriculture Has Made Significant Progress Over The Last Few Decades, Contributing To The Country's Economic Growth. However, In Order To Meet Future Goals, Vietnam's Agriculture Needs To Promote Its Strengths, Such As: Well-implementing Land Policies In Agriculture; Training High-quality Human Resources In The Field Of Agriculture; Building Organic, Clean, Safe, And Quality Agriculture; Protecting The Natural Environment, Etc. To Ensure Agricultural Development In A Reliable And Sustainable Way. The Article Employs A Variety Of Methods, Including Surveying, Statistics, Analysis, Comparison, Induction, And Inference, To Shed Light On Vietnam's Agricultural Situation Historically As Well As Its Shortcomings And Issues. It Then Suggests Potential Solutions To Solve Difficulties For The Agricultural Sector In The Future.

METHODS

The research uses data sources from previous reports on Vietnam's agriculture; scientific articles published in relevant journals; data from statistical and environmental agencies, etc., using survey, statistical, analytical, comparative, inductive, and deductive methods to solve the problems posed.

DISCUSSION

The agricultural sector's results in 2018 and 2019 also reflect fluctuations in the global market in 2018, with a focus on the US-China trade war; the increase in protection through standards on quality management and food safety of countries that are Vietnam's major agricultural markets, such as the US, EU, China, Japan, Korea,... with imported agricultural products; the price of industrial plants on the global market fell sharply, particularly pepper. However, Vietnam's agriculture has achieved considerable success: it is estimated that in 2018, agricultural, forestry and fishery exports will reach a record $40 billion. This is a record number of Vietnam's agricultural industry, affirming its position as a major agricultural export power in the world. Notably, export market share was maintained, strengthened and expanded. The five main import markets of agriculture, forestry and fisheries of Vietnam are China, the United States, Japan, ASEAN and South Korea with market shares of 22.9% (up 3.6% compared to 2017), 17.9% (up 9.4%), 19.1% (up 7.1%); 10.64% (up 11.0%) and 6.9% (up 29.4%), respectively (VNA, 2018).

In 2019 and 2020, Vietnam's agriculture continues to integrate more deeply, while also facing many difficulties and challenges, such as the spread of African swine fever throughout the country, causing unprecedented damage to the livestock industry; the impact of climate change leads to extreme weather patterns, droughts, floods, wildfires, landslides, and increasingly serious saltwater intrusion; the impact of trade wars between major economies makes key agricultural export production and import activities always face risks; more new regulations on traceability and actual safety standards. By 2023, the GDP growth of the entire agricultural sector will reach 3.83%, the greatest in recent years, contributing significantly to the economy's growth rate of 5.05% (agriculture will increase by 3.88%, fisheries by 3.71%, and forestry by 3.74%). Agriculture continues to affirm its important position and the backbone of the economy, firmly ensuring food security and contributing to macroeconomic stability (rice production of 43.5 million tons, up 1.9% and productivity reached 61 quintals/ha, up 1 quintal/ha; fresh meat production of 7.79 million tons, up 6.38%; fishery production of 9.32 million tons, up 2.3%; exploited timber production of 20.84 million m^3, up 2.8%; Vietnam sold 10.3 million forest carbon credits for the first time, earning 1,200 billion VND). The total export turnover of agro-forestry-fishery products remained high, over 53 billion USD; the highest trade surplus ever was 12.07 billion USD, up 43.7% (Ministry of Agriculture and Rural Development, 2023).

RESULTS

Vietnam's agriculture nevertheless faces restrictions, difficulties, and obstacles that impede its progress, namely:

First, it is still difficult for enterprises to access land to organize production.;

Second, enterprises continue to struggle to obtain credit capital, owing in part to the lack of defined norms and guidelines for valuing agricultural assets as collateral for bank loans;

Third, the mechanical sector supporting Vietnam's agriculture remains restricted in number and quality;

Fourth, there are complications with plant and animal species;

Fifth, the consumer market is unsustainable;

Sixth, human resources are primarily at a low level, with significant independence and fragmentation; have not been instructed on technological and technical progress.;

Seventh, various administrative procedures and business conditions in agriculture are still unreasonable, policies to support enterprises to develop have not been seriously implemented in some localities, resulting in the production of many types of agricultural materials are still congested by overlapping regulations between the documents of the Law.

In order for the agricultural sector to develop sustainably, Vietnam needs to do well the following solutions:

First, synchronous institutions, methods, and policies must be completed in order to foster agricultural and rural growth;

Second, it is necessary to focus on removing bottlenecks, creating motivation for large-scale production;

Third, it is critical to plan infrastructure investment for agricultural production.;

Fourth, it is vital to strengthen research and transfer the application of science and technology to agriculture;

Fifth, it is critical to concentrate on generating agricultural products with distinct qualities and regional specialties;

Sixth, it is vital to establish powerful agricultural corporations. In the current climate of globalization and economic integration, it is critical to build strong agricultural enterprises.

CONCLUSIONS

Vietnam's agriculture contributes significantly to the development of the national economy, especially in terms of reducing poverty, generating jobs and income for people living in rural areas, and growing in importance as a commodity to further engage in the process of international economic integration. Vietnam's agriculture is dramatically shifting from quantity-oriented production to efficiency and quality, ensuring food safety and sustainability. In light of the enormous triumphs achieved and the challenges posed by sustainable development, Vietnam's agriculture must develop in harmony and in compliance with the objectives of international economic integration. Achieving this demands suitable development measures and roadmaps that balance development and sustainability.

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Evaluation Of Drying Methods And Storage Stability Of Protein Powder From Salted Egg Whites

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ABSTRACT

This study compares convective hot air drying and freeze-drying for producing protein powders from salted egg whites. Freeze-drying achieved higher protein concentration (56.43%) and recovery efficiency (18.43%) than convective drying (50.58% protein yield, 15.57% recovery). Conversely, convective drying provided better solubility (11.13% vs. 3.10%) and water absorption (2.91% vs. 2.62%) and required less time (2.5 hours vs. 15 hours). Over 20 days, convection-dried powders showed a greater increase in moisture content (0.72%) and water activity, while freeze-dried powders had better color stability. Considering quality, efficiency, and storage, convective drying is preferred for large-scale industrial production due to its balance of quality and cost-effectiveness.

METHODS

Materials Collection and Preparation: Salted duck egg whites were obtained from Wind Chimes Bakery Company and stored at -18°C in polypropylene packaging to meet food safety standards and prevent bacterial growth (Pal et al., 2019; Dawson, 2019). Thawing was carefully managed to maintain quality for processing.

Protein Precipitation: A 3.5:1 water-to-egg white ratio was used, heating the mixture to 80°C for 60 minutes to denature proteins and allow precipitation while retaining nutritional value (Yao et al., 2023; Chaiyasit et al., 2019). The resulting precipitate was dried.

Drying Procedure:

Convection Drying: Conducted at 75°C to efficiently remove moisture while preserving protein structure (Zhang et al., 2023).

Freeze-Drying: Pre-frozen at -40°C for 24 hours, then freeze-dried under a vacuum at -50°C, followed by secondary drying at 25°C to ensure moisture removal (Du et al., 2022).

Research Method: The study compared the impact of convective hot air drying and freeze-drying on salted egg white protein powder. Samples were stored in vacuum-sealed, dark-colored zip bags with desiccants. Quality indicators were analyzed after 1, 5, 10, 15, and 20 days of storage. The experiment had one factor, five levels, and three replications per treatment.

Analytical Methods:

Moisture Analysis: KERN moisture analyzer.

Protein Determination: Kjeldahl method (AOAC, 2000).

Whiteness and Color Measurement: Spectrophotometric analysis (Thao and Noomhorm, 2011); color parameters (L*, a*, b*) in the Lab color space.

NaCl and Water Activity Measurement: ISO standards 1841-1981 (NEQ) and ISO 3634-1979; Ez-200 meter.

Water Absorption and Solubility: Methods of Roy & Flynn (1988).

Data Analysis:

Data were analyzed and graphed using Microsoft Excel 2013. ANOVA was used to compare treatments.

DISCUSSION

Table 1.1 illustrates the impact of drying methods on SEWP powder characteristics. Freeze-drying resulted in higher protein content (56.43%) and recovery efficiency (18.43%) compared to convection drying, consistent with previous studies (Shen et al., 2021). Conversely, convection drying exhibited superior solubility (11.13% vs. 3.10%) and water absorption capacity (2.91% vs. 2.62%), attributed to higher temperatures promoting protein unfolding (Pan et al., 2021). Convection drying's efficiency (2.5 hours vs. 15 hours for freeze drying) aligned with its cost-effectiveness, although freeze-drying retained color better (Ratti, 2024).

Considering quality attributes and economic factors, convection hot air drying emerged as the optimal method for SEWP powder production, as supported by previous research (Lyu et al., 2023; Wang et al., 2023). Both methods showed increasing moisture content and water activity over 20 days, with convection drying exhibiting faster rates (Figures 2.1 and 2.2). While freeze-dried powder retained more whiteness during storage, convection drying's color degradation highlighted trade-offs between the two methods (Lee et al., 2024). These findings underscore the importance of considering various factors when selecting a drying method (Suo et al., 2021).

RESULTS

Table 1.1 Table of SEWP powder properties by drying methods

Criteria	Convection drying	Freeze drying
Humidity (%)	7.70 ^{a}±0.01	7.69 ^{a}±0.01
Water activity	0.35 ^{a}±0.01	0.34 ^{a}±0.01
Water absorption	2.91 ^{b}±0.00	2.62 ^{a}±0.00
Solubility	11.13 ^{b}±0.02	3.10 ^{a}±0.12
L*	95.34 ^{a}±0.32	95.33 ^{b}±0.13
a*	-0.53 ^{c}±0.08	-0.56 ^{d}±0.02
b*	8.69 ^{e}±0.41	5.24 ^{f}±0.02
Whiteness (%)	90.11 ^{g}±0.32	92.95 ^{h}±0.09
Protein content after drying (%)	2.5	15

Table 1.2 SEWP powder characteristic over storage time

Day	L*		a*		b*		Whiteness	
	Convection drying	Freeze drying	Convection drying	Freeze drying	Convection drying	Freeze drying	Convection drying	Freeze drying
0	95.34 ^{a}± 0.38	95.33 ^{a}± 0.13	-0.53 ^{a}± 0.1	-0.56 ^{a}± 0.01	8.69 ^{b}± 0.48	5.24 ^{a}± 0.02	90.11 ^{a}± 0,37	92,96 ^{b}± 0,09
5	95.09 ^{b}± 0,03	93,88 ^{a}± 0,16	-0.60 ^{b}± 0,01	-0.70 ^{a}± 0,03	9.07 ^{b}± 0,02	6,26 ^{a}± 0,19	89,67 ^{a}± 0,03	91,21 ^{b}± 0,14
10	94.16 ^{b}± 0,03	93,77 ^{a}± 0,16	-0.64 ^{b}± 0,02	-0.74 ^{a}± 0,01	9,52 ^{b}± 0,02	6,42 ^{a}± 0,07	88,80 ^{a}± 0,01	91.02 ^{b}± 0,16
15	94.08 ^{b}± 0,16	92,92 ^{a}± 0,08	-0.63 ^{a}± 0,04	-0.71 ^{a}± 0,01	9,23 ^{b}± 0,03	5.95 ^{a}± 0,13	89,01^{a}± 0,05	90,72^{b}± 0,05
20	93,80^{b}±0,52	91,90^{a}±0,05	-0,60^{b}±0,02	-0,72^{a}±0,01	9,29^{b}±0,28	5,80^{a}±0,01	88,81^{a}±0,52	90,01^{b}±0,03

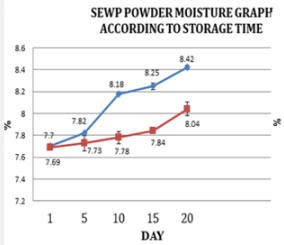

Figure 1: The moisture content of SEWP powder over storage time.

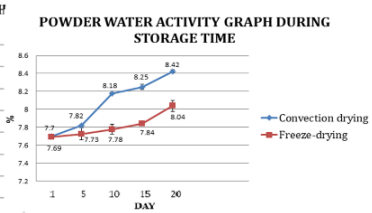

Figure 2: Water activity of SEWP powder over storage time

CONCLUSIONS

This study examines the effects of freeze-drying and convection hot air drying on protein powders from underutilized salted egg whites. Freeze-drying preserves protein content and improves powder recovery, while convection drying enhances solubility, water absorption, and requires less time. Convection-dried powders showed faster increases in moisture and water activity during storage, whereas freeze-dried powders retained better color and whiteness. Convection drying is recommended for large-scale production for its balance of quality and cost-effectiveness. The findings highlight the potential of utilizing underused protein sources and suggest future research on storage, packaging, and functional properties for broader industrial use.

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Extraction of Flavonoids from *Rosa Laevigata* Michx using deep eutectic solvents and evaluation of antioxidant activity of the extract

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ABSTRACT

Rosa laevigata Michx. are widely used as a medicinal herb due to their bioactive compounds. This work developed a new extraction method for extracting flavonoids from *Rosa laevigata* Michx by using a deep eutectic solvent. Response surface methodology (RSM) was then used to optimize the extraction conditions for maximizing flavonoid content from *Rosa laevigata* Michx. Through RSM, the optimal conditions were determined as follows: solvent concentration of 52%, solvent to sample ratio of 31 mL/g, temperature of 70 °C, and extraction time of 2 h. Under the optimal extraction condition, the highest total flavonoid content was 3.30 ± 0.04 mg QE/g. The flavonoid extract from *Rosa laevigata* Michx fruit showed potential antioxidant activity with an IC_{50} value of 35.05 ± 0.217 µg/mL. This study suggests that deep eutectic solvent-assisted extraction is a promising process for extraction of flavonoids from *Rosa laevigata* Michx fruit and the obtained extract is a potential antioxidant agent for further applications.

Keyworks: Deep eutectic solvent, flavonoids, optimization, antioxidant activity.

METHODS

Fig. 1. Experimental design

Table 1: Determine the range of variables from the investigated conditions for the Box-Behnken design

Variable	Symbol	Variable levels		
		-1	0	1
Solvent concentration (%)	X_1	40	50	60
Solvent/sample (g/mL)	X_2	20	30	40
Temperature (°C)	X_3	60	70	80
Time (h)	X_4	2	3	4

RESULTS

Table 2: The result of different DES effects on flavonoid content

DES	TFC (mg QE/g)	DES	TFC (mg QE/g)
CC	1.501 ± 0.008	BG	1.443 ± 0.010
CG	1.585 ± 0.003	BC	1.049 ± 0.015
CD	1.549 ± 0.009	BD	1.376 ± 0.008
CF	1.319 ± 0.004	BF	1.443 ± 0.011
CA	1.777 ± 0.003	BA	1.726 ± 0.003

Table 3: The result of optimization conditions

	Optimization conditions	TFC (mg QE/g)
Prediction optimization conditions	52% 31 mL/g 70°C 2 h	3.19
Realistic optimization conditions		3.298 ± 0.0404

Table 4: The ability to inhibit 50% of DPPH free radicals of flavonoid extract and vitamin C

Sample	IC_{50} (µg/mL)
Vitamin C	31.810 ± 0.252
Flavonoid	35.050 ± 0.217

DISCUSSION

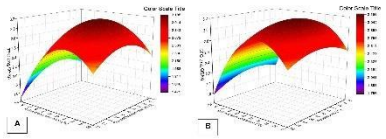

Fig. 2. 3D surface plot shows the interaction between solvent concentration and (A) Solvent/sample ratio; (B) Temperature

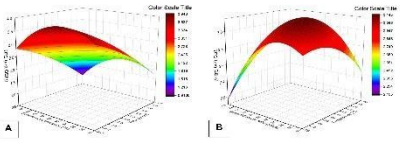

Fig. 3. 3D surface plot shows the interaction between (A) Solvent concentration and time; (B) Solvent/sample ratio and temperature

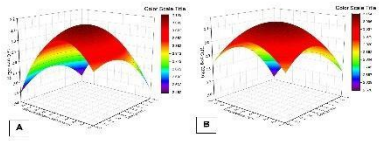

Fig. 4. 3D surface plot shows the interaction between (A) Solvent/sample ratio and time; (B) Temperature and time

CONCLUSIONS

- ✓ Conditions affecting flavonoid content were investigated and optimized for the extraction process.
- ✓ Flavonoids extracted from *Rosa Laevigata* Michx by Deep eutectic solvents exhibited potential antioxidant activity.
- ✓ The extraction method using Deep eutectic solvents is considered environmentally friendly and effective in obtaining flavonoids.

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EFFECT OF SEAWEED EXTRACT AS BIOFERTILIZER ON THE GROWTH OF *Brassica juncea*

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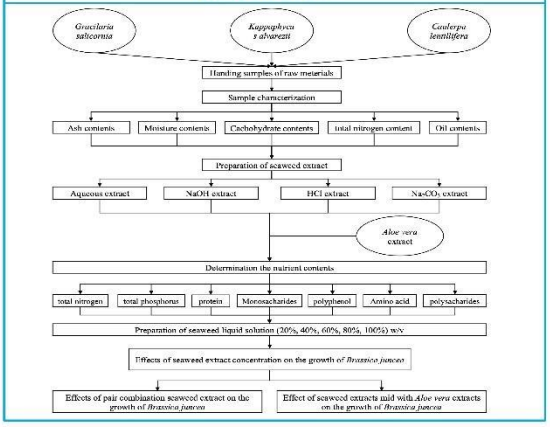
ABSTRACT

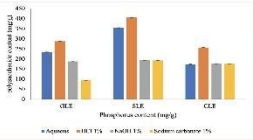
The study aimed to investigate the effect of seaweed extracts obtained from three seaweed species (*S. henlowianum, G. salicornia,* and *C. Lentillifera*) on the growth of *Brassica juncea*. Different extraction methods (water, HCl, NaOH, Na_2CO_3)were used to obtain the seaweed extracts. The extracts were then assessed for the presence of essential nutrients, including polysaccharides, monosaccharides, polyphenols, amino acids, proteins, and vital minerals like potassium, phosphorus, and iron. The study also determined the ideal combination ratio of the seaweed extracts and their mixing proportion with *Aloe vera* extract to examine their effect on the plant growth. Among three seaweed species, the *S. henslowianum* extract obtained by 1% HCl extraction demonstrated the most plant growth-promoting efficiency, resulting in a plant height of 18.27 ± 1.74 cm. Notably, a mixture of *G. salicornia* and *S. henslowianum* (1:1, v/v) significantly enhanced the plan growth, reaching the height of 24.82 ± 1.01 cm. This study suggested that the seaweed extract could be as a potential fertilizer for further application.

METHODS

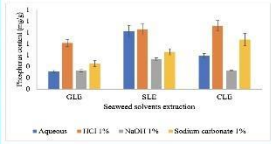


RESULTS

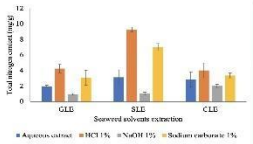
Effect of different solvents on polysaccharides extraction polysaccharides from *G. salicornia*, *S. henslowianum*, and *C. lentillifera*.



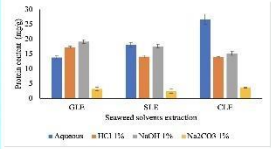
Effect of different solvents on phosphorus extraction from *G. salicornia*, *S. henslowianum*, and *C. lentillifera*.



Effect of different solvents on total nitrogen extraction from *G. salicornia*, *S. henslowianum*, and *C. lentillifera*



Effect of different solvents on protein extraction from *G. salicornia*, *S. henslowianum*, and *C. lentillifera*.



DISCUSSION

(a) GLE 20% w/v; (b) GLE 40% w/v
(c) GLE 60% w/v; (d) GLE 80% w/v;
(e) GLE 100% w/v

Effects of GLE concentration on the growth of *Brassica juncea*

(a) SLE 20% w/v; (b) SLE 40% w/v;
(c) SLE 60% w/v; (d) SLE 80% w/v;
(e) SLE 100% w/v

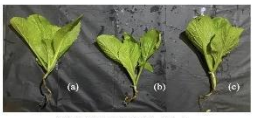
Effects of SLE concentration on the growth of *Brassica juncea*

(a) CLE 20% w/v; (b) CLE 40% w/v;
(c) CLE 60% w/v; (d) CLE 80% w/v;
(e) CLE 100% w/v

Effects of CLE concentration on the growth of *Brassica juncea*

(a) GLE:SLE (1:1) v/v;
(b) GLE:CLE (1:1) v/v;
(c) SLE:CLE (1:1) v/v

Effect of different pairs of seaweed extracts on the growth of *Brassica juncea*.



(a) SLE:ALE (1:1) v/v;
(b) CLE:ALE (1:1) v/v;
(c) GLE:ALE (1:1) v/v

Effect of Seaweed extracts mid with Aloe vera extracts on the growth of *Brassica juncea*

CONCLUSIONS

This study concludes that extracts from three types of seaweed *G. salicornia*, *S. henslowianum J. Agardh*, and *C. lentillifer* effectively stimulate the growth of Brassica juncea. The extraction with 1% HCl proved most efficient across all seaweed types, yielding high levels of beneficial compounds. Particularly noteworthy is *S. henslowianum*, which exhibited significantly higher levels of these compounds than the other seaweeds, especially when extracted with 1% HCl.
When these seaweed extracts were applied to *Brassica juncea*, the 100% concentration of S. henslowianum extract showed the most substantial impact on growth parameters such as plant height, root length, leaf area, and biomass, surpassing the effects seen with the other extracts. The mixed extract of SLE and GLE (G. salicornia extract) at specified concentrations also demonstrated enhanced growth effects, suggesting a synergistic interaction that benefits plant development. Overall, the findings support the potential of these seaweed extracts, particularly from S. henslowianum, as bio-stimulants for agriculture.

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The 2nd Conference on Sustainability and Emerging Technologies CSET 2024

Designs of Graphene Metasurface with Encoding Capabilities (2,3,4 Bits) for Cyanide Detecting Sensor Applications

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[2]King Saud University, Saudi Arabia
[3]University of Nebraska–Lincoln, USA
[4]Van Lang University, Vietnam

ABSTRACT

- A novel graphene metasurface capable of 4-bit encoding.
- The metasurface, situated on a glass substrate, can also be used to detect sodium cyanide (NaCN), potassium cyanide (KCN), and hydrogen cyanide (HCN).
- The detection capabilities of three different graphene metasurface sensor (GMSS) designs are examined.
- This multifunctional device can serve as either a sensor or an encoder.
- It can be used in a variety of applications such as anti-counterfeiting, dynamic information encryption, information authentication, optical data storage
- Others could greatly benefit from the proposed tunable GMSS and its applications in information encryption and anti-counterfeiting.

DESIGN AND MODELLING

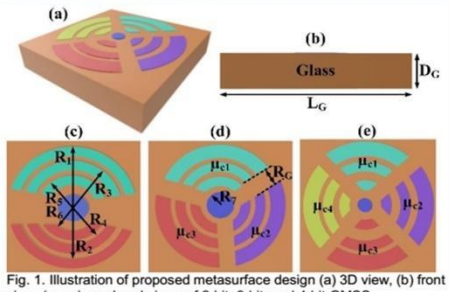

Fig. 1. Illustration of proposed metasurface design (a) 3D view, (b) front view, (c – e) overhead views of 2-bit, 3-bit, and 4-bit GMSS.

LOCATION AND MAGNITUDE OF TRANSMITTANCE DIPS AND NEAR PERFECT TRANSMITTANCE FOR 2-BIT GMSS

Parameter	Value	Parameter	Value
R_1	4500 nm	R_6	2000 nm
R_2	4000 nm	R_7	1500 nm
R_3	3500 nm	R_G	500 nm
R_4	3000 nm	L_G	10000 nm
R_5	2500 nm	D_G	1500 nm

Graphene Conductivity

$$\varepsilon(\omega) = 1 + \frac{\sigma_g}{\varepsilon_0 \omega \nabla}$$

$$\sigma_{intra} = \frac{-je^2 k_B T}{\pi \hbar^2 (\omega - j2\Gamma)} \left(\frac{\mu_c}{k_B T} + 2 \ln\left(e^{\frac{\mu_c}{k_B T}} + 1 \right) \right)$$

$$\sigma_{inetr} = \frac{-je^2}{4\pi\hbar} \ln\left(\frac{2|\mu_c| - (\omega - j2\Gamma)\hbar}{2|\mu_c| + (\omega - j2\Gamma)\hbar} \right)$$

$$\sigma_s = \sigma_{intra} + \sigma_{inter}$$

DISCUSSION

- Our goal is to investigate the proposed GMSS structures as hazardous liquid chemicals detecting surface and 2-bit, 3-bit, and 4-bit encoders

Cyanide Detection with 2-bit, 3-bit, and 4-bit GMSS

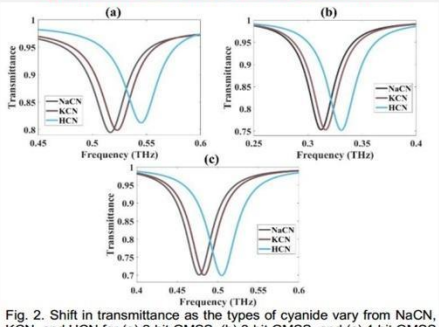

Fig. 2. Shift in transmittance as the types of cyanide vary from NaCN, KCN, and HCN for (a) 2-bit GMSS, (b) 3-bit GMSS, and (c) 4-bit GMSS

RESULTS

2-bit

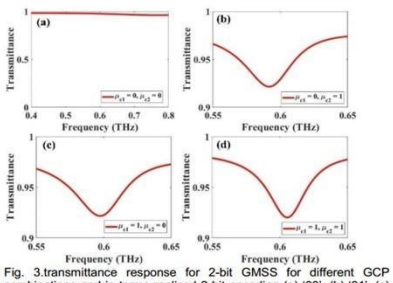

Fig. 3.transmittance response for 2-bit GMSS for different GCP combinations and in terms realized 2-bit encoding (a) '00', (b) '01', (c) '10', (d) '11'

3-bit

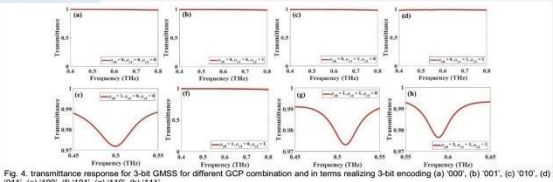

Fig. 4. transmittance response for 3-bit GMSS for different GCP combination and in terms realizing 3-bit encoding (a) '000', (b) '001', (c) '010', (d) '011', (e) '100', (f) '101', (g) '110', (h) '111'

4-bit

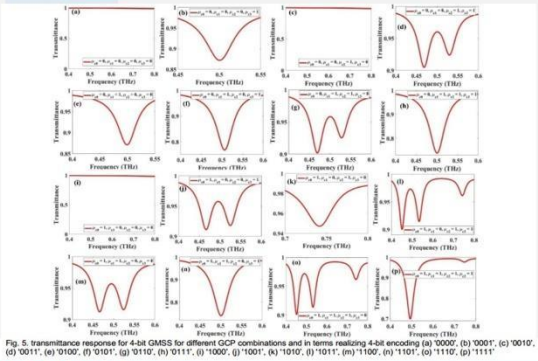

Fig. 5. transmittance response for 4-bit GMSS for different GCP combinations and in terms realizing 4-bit encoding (a) '0000', (b) '0001', (c) '0010', (d) '0011', (e) '0100', (f) '0101', (g) '0110', (h) '0111', (i) '1000', (j) '1001', (k) '1010', (l) '1011', (m) '1100', (n) '1101', (o) '1110', (p) '1111'

CONCLUSIONS

- We have proposed a GMSS for multifunctionalities.
- Three structures have been proposed for the hazardous chemicals NaCN, HCN, and KCN detection
- These structures were also investigated for 2-bit, 3-bit, and 4-bit information encoding, which in turn can be utilized for information encryption.
- We claim that this is the first graphene metasurface inspired 4-bit encoding structure that is safer than the static and single channel radiative metasurfaces.
- The proposed tunable GMSS and its information encryption and anticounterfeiting applications would considerably assist anticounterfeiting, dynamic information encryption, information authentication, optical data storage, and other related industries.

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(CSET-24-056)

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INVESTIGATION OF MODE SHAPES AND RESONANT FREQUENCIES IN OVERHANG-SHAPED MICROCANTILEVER

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ABSTRACT

The torsional mode of Atomic Force Microscope (AFM) cantilevers is extensively used in a variety of high-sensitivity measurements. However, discrepancies often arise between theoretical and experimental approaches due to the approximated frequency and mode shape of varied-shaped cantilevers. In this study, we theoretically computed an intensive analysis of the torsional vibrations of cantilevers with varying widths to accurately ascertain their frequency and mode shape, particularly higher-order modes. Our work revealed alterations in mode shape and frequency, offering multiple maxims as the overhang length changed. In addition, we demonstrated the potential for effective frequency tuning by manipulating the overhang length, providing a practical approach to selecting optimal geometric parameters for cantilevers targeting specific frequencies.

METHODS

THE EULER-BERNOULLI THEORY OF BEAM

$$\frac{\partial}{\partial x}\left[GJ(x)\frac{\partial\phi(x,t)}{\partial x}\right]-\rho I_p(x)\frac{\partial^2\phi(x,t)}{\partial t^2}=0$$

WITH ASSUMING THAT

$$w(x)=\begin{cases} w_0, & 0<x\le l_0 \\ w & l_0<x\le L\end{cases} \longrightarrow \begin{aligned}&\phi_0^{(2)}(x)+\gamma_0^2\phi_0(x)=0 \quad (transition)\\ &\phi_c^{(2)}(x)+\gamma_c^2\phi_c(x)=0 \quad (cantilever)\end{aligned}$$

THE GENERAL SOLUTIONS

$$\begin{aligned}\phi_0(x)&=A\sin(\kappa\gamma x)+B\cos(\kappa\gamma x)\\ \phi_c(x)&=C\sin(\gamma x)+D\cos(\gamma x)\end{aligned}$$

THE USED CONDITIONS

$$\begin{aligned}&\phi_0(0)=\phi_c'(L)=0;\\ &\phi_0(l_0)=\phi_c(l_0)\\ &GJ_0\phi_0'(l_0)=GJ_c\phi_c'(l_0)\end{aligned}$$

NOTE THAT $\frac{\gamma_c}{\gamma_0}=\frac{w_c}{w_0}=\frac{1}{\kappa}$

MATRIX EQUATION

$$K.X=0$$

$$\Leftrightarrow\begin{bmatrix}0 & 1 & 0 & 0\\ 0 & 0 & \cos\gamma & -\sin\gamma\\ \sin\kappa\eta\gamma & \cos\kappa\eta\gamma & -\sin\eta\gamma & -\cos\eta\gamma\\ \kappa^2\cos\kappa\eta\gamma & -\kappa^2\sin\kappa\eta\gamma & -\cos\eta\gamma & \sin\eta\gamma\end{bmatrix}\begin{bmatrix}A\\B\\C\\D\end{bmatrix}=\begin{bmatrix}0\\0\\0\\0\end{bmatrix}$$

RESULTS

THE CHARACTERISTIC EQUATION

$$\det K=0\Rightarrow\kappa^2\cos(\gamma-\gamma\eta)\cos(\gamma\eta\kappa)-\sin(\gamma-\gamma\eta)\sin(\gamma\eta\kappa)=0$$

MODE SHAPES

$$\begin{aligned}\phi_0&=A\sin(\kappa\gamma x)\\ \phi_c&=A\cos[(1-x)\gamma]\sec[(1-\eta)\gamma]\sin(\kappa\eta\gamma)\end{aligned}$$

NOTE THAT: To obtain frequency and mode shape, we need to find out values γ, which are solutions from the above-mentioned frequency equation

FREQUENCIES OF BEAM

$$\omega=\frac{\gamma}{L}\sqrt{\frac{GJ_c}{\rho I_{p,c}}}$$

The geometric functions of the beam cross section $J(x) = w(x)t^3/3$, and the polar moment of inertia $I_p(x) = w^3(x)t/12$

Parameters	Symbol (unit)	Value
Length	L (μm)	350
Width	w (μm)	35
Thickness	t (μm)	1.5
Young's modulus	E (GPa)	169
Density	ρ (kg/m³)	2300

Table: used parameters of cantilever parts

DISCUSSION

In Fig.1, (a) shows the first mode, and (b) displays the second mode. Here $\eta=l_0/L=0.5$ and different values of overhang widths $\kappa=w_0/w$. Generally, deflection at L trends to increase the width of the transition part increased

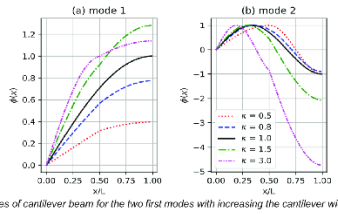

Fig 1: Mode shapes of cantilever beam for the two first modes with increasing the cantilever width via κ and η =0.5.

Considering the change in resonant frequencies of the first four modes, the first mode initially increases [Fig. 2(a)], peaking at $\eta \approx 0.2$, and then decreases significantly as η increases. In the maxima region (orange to red), the frequency increases with κ, indicating that a larger overhang results in a stiffer cantilever. However, the 2nd to 4th modes do not clearly exhibit a maximal region. Instead, all frequencies tend to decrease rapidly as η increases.

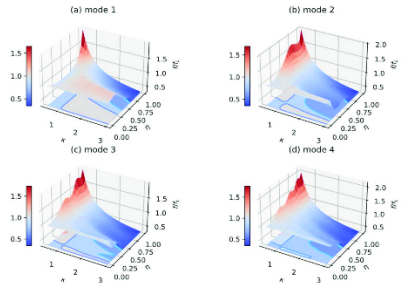

Fig 2: The frequencies of the first four modes of the consider beam.

CONCLUSIONS

We have analytically derived the frequency characteristic equation, mode shapes, and frequencies for the torsional modes of overhang- and T-shaped cantilevers. The results demonstrate that the mode shape and frequency significantly and effectively change with variations in the length and width of the overhang part. This behavior can be useful for controlling and tuning cantilever frequencies by adjusting the overhang length, thereby enhancing high-harmonic frequencies. Moreover, effective modulation of higher-order modes based on the structural geometry can enhance the exploitation of various modes in measurements and improve mode-coupling.

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(CSET-24-066)

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An assessment of sustainable development in the port industry

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INTRODUCTION

- This research explores the multifaceted sustainability challenges and opportunities within the port sector.
- The study employs Multiple-Criteria Decision-Making (MCDM) to evaluate and prioritize sustainability criteria critical to the port industry.
- Recognizing the sector's significant economic contribution, the research emphasizes the need for a balanced approach that integrates economic growth, environmental stewardship, and social responsibility.
- This research provides valuable insights for policymakers, port authorities, and industry stakeholders, offering a framework for implementing sustainable practices that balance economic, environmental, and social objectives.

RESEARCH METHODS

The MCDM can be adopted as follows:

Step 1: Defining reciprocal positive matrix

$$A=[a_{ij}]_{m\times n}=\begin{bmatrix}1 & a_{12}\dots a_{1n}\\ a_{21} & 1\dots a_{2n}\\ \vdots & \vdots \quad \vdots\\ a_{n1} & a_{n2}\dots 1\end{bmatrix}=\begin{bmatrix}1 & a_{12}\dots & a_{1n}\\ 1/a_{12} & 1\dots & a_{2n}\\ \vdots & \vdots & \vdots\\ 1/a_{1n} & 1/a_{2n}\dots & 1\end{bmatrix}$$

Step 2: Integrating expert ratings:

$$a_{ij}=\left[\prod_{k=1}^{h} a_{ij}^{k}\right]^{\frac{1}{h}}$$

Step 3: Figuring out the relative priority weight:

$$W_i=\left(\prod_{j=1}^{m} a_{ij}\right)^{1/m} \Bigg/ \sum_{i}^{m}\left(\prod_{j=1}^{m} a_{ij}\right)^{1/m}$$

Step 4: normalizing the relative priority weight:

$$\omega_i=\frac{W_i}{\sum_{i=1}^{n} W_i}\times 100(\%)$$

Step 5: Finding out the maximum eigen value:

$$\lambda_{\max}=\frac{1}{n}\left(\frac{W_1'}{W_1}+\frac{W_2'}{W_2}+\dots\dots+\frac{W_n'}{W_n}\right)$$

Step 6: Checking consistency of expert ratings:

$$CI=\frac{\lambda max-n}{n-1} \qquad CR=\frac{CI}{RI}\times 100(\%)$$

RESULTS AND DISCUSSION

Hierachy of factors and criteria:

Factors	Assessment criteria	Code
Environmental Sustainability (ES)	Air Quality Management	ES1
	Water Quality Protection	ES2
	Energy Efficiency	ES3
	Biodiversity Conservation	ES4
Economic growth (EG)	Operational Efficiency	EG1
	Infrastructure Investment	EG2
	Economic Diversification	EG3
	Financial Performance	EG4
Social Sustainability (SS)	Community Engagement	SS1
	Health and Safety	SS2
	Employment Opportunities	SS3
	Cultural Heritage Protection	SS4
Governance and Management (GM)	Regulatory Compliance	GM1
	Transparency and Accountability	GM2
	Stakeholder Collaboration	GM3
	Risk Management	GM4

Finding 1:

The relative weight of factors and criteria (%)

Factors	Global weight	Criteria	Local weight	Global weight
Environmental Sustainability (ES)	17.64	ES1	15.63	2.76
		ES2	21.98	3.88
		ES3	23.83	4.20
		ES4	38.56	6.80
Economic growth (EG)	22.07	EG1	29.54	6.52
		EG2	28.11	6.20
		EG3	19.59	4.32
		EG4	22.76	5.02
Social Sustainability (SS)	28.63	SS1	17.14	4.91
		SS2	27.59	7.90
		SS3	29.77	8.52
		SS4	25.49	7.30
Governance and Management (GM)	31.66	GM1	19.83	6.28
		GM2	18.18	5.76
		GM3	29.53	9.35
		GM4	32.46	10.28

Finding 2

Port performance assessment

ACs	Global weight (%)	Alternatives				
		CRN	CTU	BNP	PMP	HGI
ES1	2.76	17.18	12.47	22.64	20.06	27.65
ES2	3.88	11.46	29.63	19.18	11.52	28.20
ES3	4.20	14.25	28.42	20.69	18.80	17.84
ES4	6.80	15.64	20.47	14.87	17.79	31.24
EG1	6.52	18.05	22.69	15.75	20.81	22.69
EG2	6.20	12.49	23.77	11.17	19.82	32.75
EG3	4.32	20.75	17.65	22.68	15.15	23.77
EG4	5.02	19.03	18.50	27.78	11.75	22.95
SS1	4.91	12.74	20.33	17.81	26.56	22.57
SS2	7.90	14.49	15.82	20.93	19.73	29.03
SS3	8.52	16.38	20.21	21.92	10.88	30.61
SS4	7.30	27.67	12.03	18.56	16.03	25.71
GM1	6.28	11.38	28.52	18.19	20.38	21.54
GM2	5.76	17.79	17.78	19.32	19.00	26.10
GM3	9.35	14.03	18.25	24.15	17.11	26.46
GM4	10.28	29.01	12.57	19.97	26.86	11.59
Average		**17.60**	**19.39**	**19.66**	**18.52**	**24.83**

CONCLUSION

- An assessment of sustainable development in the port industry consists of four factors and sixteen assessment criteria.
- Factors of ports are Environmental Sustainability (ES), Economic growth (EG), Social Sustainability (SS), Governance and Management (GM).
- The top five criteria for sustainable development in the port industry include Risk Management (10.28%), Stakeholder Collaboration (9.35%), Employment Opportunities (8.52%), Health and Safety (7.90%), Cultural Heritage Protection (7.30%).
- HGI is ranked as the best performance, followed by BNP, CTU, PMP, and CRN.
- This research provides valuable insights for policymakers, port authorities, and industry stakeholders in implementing sustainable practices.

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(CSET-24-067)

The 2nd Conference on Sustainability and Emerging Technologies CSET 2024

MECHANICAL CHARACTERISTICS OF CARBIDE HVOF SPRAY COATING OF INTERNAL SURFACE PIPES

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ABSTRACT

Electrolytic hard chrome (EHC) methods are still widely utilized in the aerospace, automotive and offshore industries. Alternative solutions to EHC have been widely developed in the past decade by High velocity oxy fuel (HVOF) processes, which are operating at higher kinetic energy and more particularly at lower temperature, significantly increasing wear and corrosion resistance properties. The paper presents the research results on the fabrication of WC-12Co carbide coatings by HVOF, which was used to improve the quality of the internal surface pipes operating in aggressive environments. The pipe material used is CT3 steel pipe, The investigated coating properties include porosity, microhardness, adhesion to steel substrates, phase composition. There are three coating technology parameters that have been surveyed, including relative spray gun speed, spray distance and powder flow. A dedicated internal diameter HVOF system is presented here and specially designed fixtures with a maximum inside diameter of 400 mm have been manufactured for this purpose, with a possibility to spray samples at increasing lengths up to 600 mm. Coating properties are discussed for further optimization of coating performance.

METHODS

WC-12Co powder with characteristics in table 2 used in the study to create coatings by thermal spraying HVOF is usually a commercially available powder material with a composition of 88% WC, 12%Co produced by agglomeration and sintered with an average size of 15-45µm. Table 1 presents the values of key manufacturing parameters for coating production, including three parameters studied experimentally over a wide range to determine the suitable technological regime, serving as a basis for practical application of coating on inner surfaces of pipes.

The HP-2700M (Figure 1) equipment system includes the following components.
- Powder feeder system PF-3350.
- Gas system (oxygen, propane, compressed air).
- Flow control system MP-2100.
- HVOF spray gun HP-2700-M.
- Support system.

Figure 1. HVOF HP-2700M thermal spray equipment system.

the special jig is designed and manufactured with a suitable for the spraying sample in the study.

Figure 2. The equipment is designed for the spraying process

Table 1. Spray parameters

No	Parameters	Value
1	Spray distance	0,2-0,3 m
2	Powder flow	20-32 g/min
3	Relative velocity of the spray gun	0,1-0,2 m/s
4	Movement step	3-5 mm
5	Spray angle	90 ± 10°

Table 2. Properties of the WC carbide and Co

No	Properties	WC	Co
1	Melting Temperature (°C)	2785+2830	1495
2	Compressive strength (MPa)	6833	2927
3	Density (g/cm3)	15,88	8,9

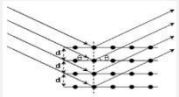


Figure 3. Principle of X-ray scattering

X-ray diffraction method is widely used to determine crystal structures using a narrow, monochromatic, parallel X-ray beam directed at the sample

DISCUSSION

Principle of determining adhesion strength according to the method of determining the sliding adhesion stress of the coating with the substrate material (Figure 4)

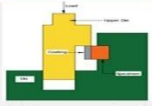


Figure 4. Principle of testing the adhesion strength of coating

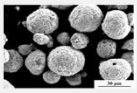


Figure 5. SEM image showing the morphology of WC-12Co powder

The morphology of these powders is described as nearly spherical with some internal porosity

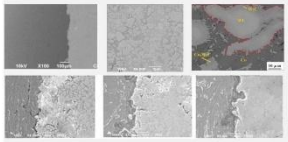


Figure 6. Microstructure of coatings

SEM images of the coating have shown that WC-12Co coating by HVOF spraying has tightness and high adhesion strength compared to some other common spraying methods.

RESULTS

Porosity measurement results show that the coatings have different porosities depending on the HVOF spraying parameters, ranging from 1.48-3.06%.

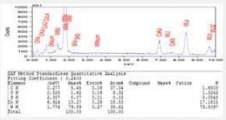


Figure 7. EXD scanning results of the WC-12Co powder

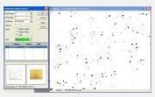
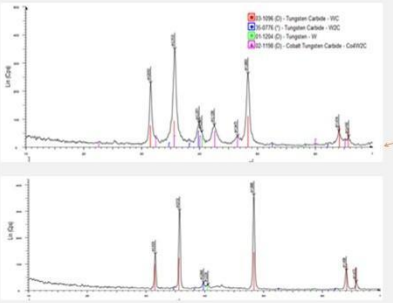


Figure 8. Porosity test

Porosity measurement results show that the coatings have different porosities depending on the HVOF spraying parameters, ranging from 1.48-3.06%.

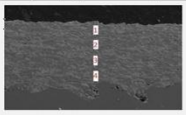


show that WC remains the main component, with the main transformation of WC forming W_2C and Co_4W_2C, while the amount of decomposition forming W is minimal

Figure 9. Analytical image (XRD) of coating phase composition of two sample

Table 3. EDX analysis results on samples

No	Composition (%)	1	2	3	4	5	6	7	8	9
1	WC	64	72,5	60,6	71,9	58,2	71,5	53,1	61,6	53,7
2	W_2C	10,9	7,9	16,9	10,4	18,3	10,9	17,7	6,1	27
3	W	6,8	10,7	8,8	4,4	8,1	3,4	13,2	12,5	9,1
4	Co_4W_2C	18,3	8,8	13,7	13,2	15,4	14,2	16	19,8	10,1



The coating hardness remains above 1000 HV, and the varying hardness indicates phase changes in WC affecting the coating hardness. Consequently, the wear resistance properties of WC-Co coatings will also change

Figure 10. Hardness measurement locations

Table 4. Hardness measurement results on samples

Specimen	1	2	3	4	5	6	7	8	9
Hardness (HV)	1176.3	1029.7	1150.2	1247.2	1185.5	1200.4	1233.1	1093.6	1083.1

CONCLUSIONS

The WC-12Co carbide coating manufactured by the HVOF spraying method has been studied, evaluated, and practically tested. Three manufacturing technology parameters of the coating class have been surveyed, including spraying distance, powder flow, and relative spraying gun velocity.
- The porosity of the coating reaches a minimum value of 1.48% when the coating is sprayed with a powder feed rate of 20 g/min, a relative spraying gun velocity of 0.2 m/s, and a spraying distance of 0.3m.
- The microhardness and adhesion strength of the coating reach their highest values at 1247.2 HV and 65.6 MPa, respectively.
- XRD analysis shows the formation of new carbide phases such as WC (main component), W_2C, and Co_4W_2C.

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RESEARCH ON SOME PARAMETERS FOR THE PROCESS OF CUTTING CASSAVA SHAFT TYPE TO ACHIEVE OPTIMAL RESULTS

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ABSTRACT

A special feature for machines planted with hard cuttings such as sugarcane and cassava is the cutting mechanism. The task of the cutting mechanism is not only to ensure the length of cuttings planted, cuttings are not crushed, but also to ensure the distance between the cuttings planted on the row as prescribed. During the working process, cuttings are automatically cut and spread into the planting trench. Structure cutting cuttings for sugarcane and cassava according to the principle of cutting shaft type. This cutting principle is only applied in some narrow industries of food production to cut confectionery and plants. Therefore, there are still many shortcomings. Therefore, Therefore, in the design and manufacturing plan, a cassava growing machine from cuttings, engineers and technical experts still need to learn and when determining the working parameters for the cutting mechanism to ensure full meet the agronomic requirements for cuttings. If the arameters are not calculated and tested correctly, it can lead to the phenomenon of cuttings not breaking, cutting length is not guaranteed, cuttings are crushed not only the cutting cross section but sometimes on the whole stem. The drive for the cutting mechanism is not reasonable. Therefore, this paper will study some parameters of the cassava cutting structure of the cassava planter with urgency, scientific significance and practical significance. This is the scientific basis for designing cutting cutting mechanism in particular and cassava drum machine in general

METHODS

In agricultural production in our country, cassava is an important food crop. Currently, cassava is tending to increase both area and output, competing with other other crops such as rice, sugarcane. The cassava harvest has not been highly effective, Because of the same system of cassava cutting machines, the cassava cutting machine has not achieved the expected results and the kinematic parameters for the cassava cutting mechanism not optimized yet, this paper will research and give the results. the results and building a model to calculate the kinematic parameters for the shaft-type cassava cutting mechanism.

Figure 1 Semi-automatic cassava growing machine MTM -2

The experimental machine is a mechanism to cut cassava cuttings according to the principle of the rolling shaft on the semi-automatic cassava growing machine MTM – 2

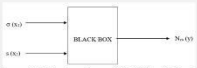


Figure 3 Math of model "Black box".
+ Input parameters: sharpening angle σ degrees]; cutter convolution s [mm].
+ Output parameters: Cost capacity for cassava stem cutting process Ncs [w]

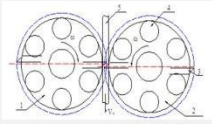


Figure 2. The mechanism of cutting cassava cuttings on a semi-automatic cassava growing machine from cuttings. 1. The left cutter drum, 2. The right cutter drum, 3. Cutting knife,4. Rubber hose, 5. Cassava seedlings

Table 1. Experimental domain.

Parameter Level	σ [0]	S[mm]
Upper level + 1	22,6	2,5
Upper level - 1	16,0	1,5
Base level 0	18,0	4,5
Lower star level: - α = -2	12,3	2,1
Over star ering: + α = +2	23,7	4,9

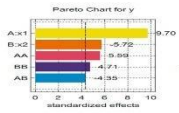
Table 2 Experimental results.

Experiment order	Input parameters	Output parameters Ncs [W]
σ [0]	s [mm]	
1	18,0	3,5	518
2	18,0	2,1	707
3	23,7	3,5	795
4	22,0	4,5	617

Table 3 Experimental matrix and results in coded form

Rm	Input parameters	Output parameters y [W]
X1	x2	
1	0,0000	0,0000	538
2	0,0000	-1,4142	707
3	1,4142	0,0000	795
4	1,0000	1,0000	617
5	0,0000	0,0000	512
6	-1,4142	0,0000	518
7	1,0000	-1,0000	836
8	-1,0000	1,0000	574
9	0,0000	0,0000	563
10	0,0000	1,4142	568
11	-1,0000	-1,0000	571

DISCUSSION



Using the program Statgraphic vers 7.0 to assess the influence of regression coefficients (specific for input parameters) to the model or cost-power function for cassava stem cutting in cassava cutting cutting mechanism y axis (Ncs).

Figure 4. Influence chart of the regression coefficients to the public function shaft cutting capacity of cassava cuttings rolling coded form y[W]

first-order effect of both the tool sharpening angle σ [degrees] (x1) and the cutter convolution s[mm] (x2); the second-order effect of both the tool sharpening angle σ [degrees] (x1) and the cutter convolution s [mm] (x2); Interaction between the tool sharpening angle factor σ [degrees] (x1) with the cutter's convolution factor s [mm] (x1).

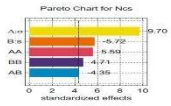


Figure 5. The graph of the influence of the coefficients of regression to the rate at the shear mechanism cassava cuttings of real shaft type Ncs[W]

RESULTS

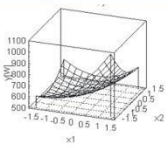


Figure 8. Graph of the relationship y – x1 – x2 in the form of 3D space
Graph y – x1 – x2

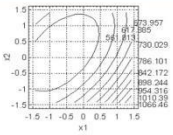


Figure 9. Graph of relationship y – x1 – x2 in flat form

Table 4. Experimental results at the optimal working mode.

Order	Measurement parameters, units of measure	Measurement results on the sample					
1	2	3	4	5	Medium		
1	Cost capacity for cassava cutting mechanism Ncs [W]	522	491	480	495	507	499

$$S = \sqrt{\frac{\sum_{i=1}^{5}(N_{csi} - \overline{N}_{cs})^2}{n-1}} = 16{,}0779\ [W]$$

The experimental standard deviation of capacity and cost for the cassava stem cutting process of the rolling mill type cassava cutting mechanism in the MTM-2 machine at the optimal working mode is calculated by the formula:

The confidence interval (area) for the cost capacity for cassava stem cutting of the manifold cutting mechanism of the MTM-2 at the optimal operating mode is:

$$\overline{N}_{cs} - t_{p/2}.\frac{S}{\sqrt{n}} \le N_{cs}[W] \le \overline{N}_{cs} + t_{p/2}.\frac{S}{\sqrt{n}}$$

$$499 - 2{,}776.\frac{16{,}0779}{\sqrt{5}}[W] \le N_{cs} \le 499 + 2{,}776.\frac{16{,}0779}{\sqrt{5}}[W]$$

$$479\ [W] \le N_{cs} \le 519\ [W] \qquad (1.18)$$

Evaluation of the error between experimental results and the (optimal) model on the cost
capacity for cassava stem cutting process of the roll-type cassava cutting mechanism in the MTM-2 machine at the optimal working mode to be:

CONCLUSIONS

- Cassava cuttings grown according to the principle of the shaft need to have a convolution between two cutters located on two drums when facing each other to ensure conditions for cutting the stem. This relationship satisfies the condition: 2e.cosσ > δ, where e [mm] – eccentricity of the tool, σ[độ] – sharpening angle, δ[mm] – clearance between tools.
- The power required to cut cassava stalks for cuttings Ncs[W] on the MTM-2 cassava planter has a second-order polynomial mathematical model for two structural parameters of the cutter, the sharpening angle σ[0] and the convolution of the cutter s[mm] are built by the experimental planning method with high accuracy, which is suitable in theory and experiment.
- The optimization parameters for the cassava cutting mechanism according to the rolling principle are determined from the results of calculation and optimization of the mathematical model. Calculation results are optimized for N cs optimal = 505 [W], the optimal sharpening angle σ optimal = 15,4[0], the convolution of the cutter has the optimal s optimal = 3.6 [mm].
- Experimental testing of the optimal working mode shows that there is a good agreement between theory (optimum calculation) and experiment. The error between theory (optimum calculation) and experiment on the power required to cut cassava stems for cuttings is 1.19 [%].

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LIST OF ORGANIZERS

Dong Nai University of Technology is a leading private university located in Dong Nai Province, Vietnam. Established in 2005, the university offers a wide range of undergraduate and postgraduate programs in engineering, technology, and applied sciences. With state-of-the-art facilities and a focus on research, DNTU produces highly skilled graduates sought after by industries across the region.

Established in 1974, Deakin University is a globally recognized institution renowned for its excellence in teaching and research. As Victoria's #1 university for student satisfaction, Deakin delivers world-class education across its five modern campuses, empowering students to reach new heights through innovative, career-oriented programs and strong industry connections.

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THANK YOU TO ALL PARTICIPANTS

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