Book of Abstracts

THE 5th INTERNATIONAL CONFERENCE ON GREEN TECHNOLOGY AND DESIGN

GREEN PRODUCTION AND SERVICE TO ACHIEVE SUSTAINABLE DEVELOPMENT GOALS

ICGTD 2023

December 5th - 6th, 2023

Institut Teknologi Nasional Bandung, West Java 40124, Indonesia

LP2Mitenas

ICGTD INTERNATIONAL CONFERENCE ON GREEN TECHNOLOGY AND DESIGN

ICGTD 2023 VENUE

OPENING REMARK

Assalamualaikum wr wb

Ladies and gentlemen, colleagues, and students,

It is an honor to welcome you all to our 5th International Conference on Green Technology and Design (ICGTD2023) hosted by Institut Teknologi Nasional Bandung (ITENAS), Bandung, Indonesia. We would like to thank our 4 keynote speakers and 5 invited speakers coming from 5 different countries and more than 45 presenters who made their efforts to contribute to this conference. This year's conference brings a topic of "Green Production and Services to Achieve Sustainable Development Goals" which reflects our commitment to address the global issues.

We appreciate the hard work of the organizing committee to bring in more than 45 articles to be presented in this conference, submitted by our international and domestic participants. All articles are allocated into several themes: green energy, green building, green automation, green transportation, sustainable infrastructure and environment, green information and communication technology, smart materials and adaptable design, and geo-spatial technology for sustainable development. We expect that this conference will provide a platform for multidisciplinary and interdisciplinary collaborations in the near future.

I sincerely hope you will enjoy all of the conference sessions, and hope that we can continue learning each other. Thank you all for your presence and participation and you are the very important part of the Conference success.

Wassalamualaikum wr wb,

Rector of Itenas

Prof. Meilinda Nurbanasari, PhD.

OPENING REMARK

Assalamualaikum wr wb

Dear participants,

It is an honor and privilege to welcome you to the 5th International Conference on Green Technology and Design (ICGTD2023) hosted by Institut Teknologi Nasional Bandung (ITENAS), Bandung, Indonesia. The conference's theme, "Green Production and Services to Achieve Sustainable Development Goals" motivates us to think about the current global issues but also to do something at the local level. We will surely move forward together to make use of this conference to create new collabrations. We are still facing a global issue on climate change and mitigation efforts are there through green production and services. We need to address this together with the efforts on how to achieve Sustainable Development Goals. Please bring more ideas to this conference on green technologies and designs to protect our earth and to secure better life quality.

We thank you all of the keynote and invited speakers, international and national participants from more than 5 countries, and also more than 45 articles to be presented in this conference. This conference is the result of the hard work, support, and dedication of number of parties who can not be mentioned here. Thank you for being here with us. We value your presence at the 5th International Conference on Green Technlogy and Design 2023. Enjoy our campus, our city and also the conference!

Wassalamualaikum wr wb,

Head of LPPM Itenas

Iwan Juwana, PhD

OPENING REMARK

Dear honorable speakers and participants,

As the Chairperson of the 5th International Conference on Green Technology and Design 2023, it is both an honor and a pleasure to extend a warm welcome to all attendees. I am honorably welcome you all to Institut Teknologi Nasional Bandung, Indonesia.

Our theme for this year conference, "Green Production and Services to Achieve Sustainable Development Goals", encapsulates the essence of our collective mission: the green practices. The green practices include the green production and the green service. The green practices benefit to the sustainability of the planet and conserve the natural resources. However, we gather here not only to discuss the latest breakthroughs in green technology but also to explore how innovative design can be a driving force for sustainable development.

I would like to express my gratitude to the Rector of Institut Teknologi Nasional Bandung and the Head of LPPM Institut Teknologi Nasional Bandung for supporting us. I would also like to thank to the organizing committee and volunteers who have worked tirelessly to make ICGTD 2023 a reality.

May your participation in this conference be both professionally enriching and personally rewarding. Thank you for being part of this journey towards a greener and more sustainable future.

Regards,

Chairperson of ICGTD 2023

Dr. Choerudin, S.T., M.T.

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CONFERENCE PROGRAM

ICGTD 2023

Time	Agenda
5th December 2023, Tuesday	
08:30 – 08:40	**Opening Ceremony** **Place: GSG** Welcoming remark by master of ceremony MC: Regyna & Fairuz
08:40 – 08:45	**Welcoming remark** Organizing committee chair **Dr. Cherudin, S.T., M.T.**
08:45 – 08:55	**Opening remark** Rector of Institut Teknologi Nasional Bandung (Itenas) **Prof. Meilinda Nurbanasari**
08:55 – 09:30	**Keynote speech** **Prof. Tjandra Setiadi** (Institut Teknologi Bandung, Indonesia) Moderator: Dr. Choerudin
	Token of appreciation given by Rector of Itenas
	Photo session
09:30 – 10:10	**Plenary Session 1** **Keynote speaker 1: Rosa Karnita, S.Sn., M.Sn., Ph.D.** (Institut Teknologi Nasional Bandung, Indonesia) Moderator: Dr.sc. Lisa Kristiana
	Token of appreciation given by Dr.sc. Lisa Kristiana
10:10 – 10:30	**Coffee break**
10:30 – 11:10	**Plenary Session 2** **Keynote speaker 2: Edi Nuryatno, Ph.D.** (The University of Western Australia, Australia) Moderator: Iwan Juwana, Ph.D.
	Token of appreciation given by Iwan Juwana, Ph.D.

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11:10 – 11:50	**Plenary Session 3** **Keynote speaker 3: Dr. Prapat Pongkiatkul** (King Mongkuths University of Technology Thonburi KMUTT, Thailand) Moderator: Dr.Eng Didin Agustian Permadi	
11:50 – 13:00	**Lunch break (GSG)**	
	Parallel session (Smart Class Room, ITENAS Library and GSG)	
13:00 – 15:40	**Parallel session 1:** **Sustainable Infrastructure and Environment** ***Room:*** *Smart Class Room 1* **Moderator:** Iwan Juwana, Ph.D. **Presenters:** **(13:00-13:20)** **(Invited Speaker)** **Giulia Frigo** École Polytechnique Fédérale de Lausanne, Lausanne, Switzerland 1. **(13:20-13:40)** *Heri Hermansyah, Aulya Rahman Arevin, Ismail Fatih Al-Faruqi, Ibnu Maulana Hidayatullah, Muhamad Sahlan* | Hydrothermal Pretreatment of Oil Palm Fronds Catalyzed by Acid Buffer Solutions to Increase the Accumulation of Reducing Sugars| 2. **(13:40-14:00)** *Abdussalam Topandi, Khadijah Sayyidatun Nisa, Ibnu Maulana Hidayatullah, Firah Gustianda Ayu, Fatimah Azizah Riyadi, Reynaldi Ivan Prasetya, Pranata, Eka Rahayu, Frederick Soetandar, Dimas Rafi Narawangsa –* | Optimizing Tenebrio Molitor Feeding Strategy to Induce Physical Degradation of Tires: A Novel Approach for Sustainable Waste Management |	**Parallel session 2:** **Green Transportation** **Green Energy** ***Room:*** *Smart Class Room 2* **Moderator:** Dr. Didin Agustian Permadi, M.Eng. **Presenters:** 1. **(13:00-13:20)** *Achmad Aminudin, Deni Nur Fauzi, M. Shafwallah Al. Aziz. R, Muhammad Fathoni Asnan* | An Optimizing of Piping System - Case Study Kereta Cepat Merah Putih (KCMP) | 2. **(13:20-13:40)** *Kusnadi , Deni Nur Fauzi, Alfi Tranggono Agus Salim, Wida Yuliar Rezika, Agus Choirul Arifin, Darma Arif Wicaksono* | Evaluation of Environmental Noise Due to the Operation of LRT JABODEBEK and its Mitigation Efforts with Noise| 3. **(13:40-14:00)** *Agus Budianto, Gatot Setiyonoiven, Sumari, Erlinda Ningsih* | Spark Ignition Engine Performance with B20 fuel | 4. **(14:00-14:20)** *Said Muhammad Baisa, Alif Ulfa Afifah, Arie Desrianty* | System Dynamics Modelling of Greenhouse Gas Emissions from Dairy Farms | *5.* **(14:20-14:40)** *Nuha Desi Anggraeni, Liman Hartawan, Dani Rusirawan, Seres István, Farkas István*

	3. **(14:00-14:20)** *Khadijah Sayyidatun Nisa , Reynaldi Ivan Prasetya, Ibnu Maulana Hidayatullah, Abdussalam Topandi, Fatimah Azizah Riyadi, Firah Gustianda Ayu, Frederick Soetandar, Dimas Rafi Narawangsa* | Tenebrio molitor Larvae Feeding Strategy in Efforts to Degrade Polypropylene Components from Disposable Masks | 4. **(14:20-14:40)** *Ibnu Maulana Hidayatullah, Vidola Rineko Nandya, Jeneta Hans, Heri Hermansyah, Muhamad Sahlan* | Enzymatic Hydrolysis of Oil Palm Fronds Employing Hydrolytic Enzymes to Enhance the Concentration of Reducing Sugars | 5. **(14:40-15:00)** *Muhammad Rayhan Alif, Etih Hartati, Dyah Marganingrum* | Removal of Total Chrome (Cr-T) from Liquid Waste Textile Industry Uses Calcium Bentonite | 6. **(15:00-15:20)** *'Aizatul Ummah , Iwan Juwana, Dyah Marganingrum, Ratih Nurjayanti, Hidawati, Rizka Maria* | Seasonal Variations of Chromium Concentrations in The Ciliwung River | 7. **(15:20-15:40)** *Dhias Ahaddistira, Iwan Juwana, Dyah Marganingrum, Ratih Nurjayanti, Hidawati, Rizka Maria* | Assessment of Lead (Pb) Levels in the Ciliwung River: Implications for Water Quality Management and Compliance with Regulatory Standards |	| Estimating semi-transparent photovoltaic (STPV) energy performance in Indonesia | 6. **(14:40-15:00)** *Alauddin Nabhan, Mila Dirgawati, Nguyen Hong Phuc, Didin Agustian Permadi* | Indoor PM2.5 Concentration from Cooking Activities using Liquefied Petroleum Gas (LPG), Kerosene, and Firewood | 7. **(15:00-15:20)** *Dani Rusirawan* | Renewable energy |

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Parallel session 3: **Green Automation** ***Room:*** *Smart Class Room 3* **Moderator:** Dr. Sc. Lisa Kristiana, S.T., M.T. **Presenters:** **(13:00-13:20)** **(Invited Speaker)** **Thipsukon Khumsaeng** Department of Physics and Materials Science, Faculty of Science, Chiang Mai University, Chiang Mai, Thailand 1. **(13:20-13:40)** *Muh.Ekha Saputra J.M., Leo Rhessa Wijaya, Nico Saputro, and Ali Sadiyoko* | Design of An IOT-Based Monitoring and Controlling for Small-Scale Deep-Flow Hydroponics Syste | 2. **(13:40-14:00)** *Yudhy Kurniawan, Wardika, Ferry Sugara, H. Krismas Ginting, Muhammad Idrus Alhamid, Ardiyansyah Yatim* | Thermal Pasteurization System Performnace Analysis Ohmic Heating Method and Fast Cooling Mango Fruit Puree | 3. **(14:00-14:20)** *Darmawan Hidayat , Bambang Mukti Wibawa, Muhammad Luthfi Tantowi, Nendi Suhendi Syafei, Setianto Setianto* | Internet of Things (IoT)-Based Detection of River Water Pollution using	**Parallel session 4:** **Smart Materials and Adaptable Design** ***Room:*** *Smart Class Room 4* **Moderator:** Maharani Dian Permanasari, M.Phil., Ph.D. **Presenters:** **(13:00-13:20)** **(Invited Speaker)** **Tyar Ratuannisa** Craft and Tradition Research Group Color and Smartex Laboratory Institut Teknologi Bandung 1. **(13:20-13:40)** *Achmad Aminudin,Agus Choirul Arifin, Wida Yuliar Rezika, Elang Raihan Permana, Titania Nur Cahyani.* | Utilization Of Coconut Fiber as Carbody Coating Of Composite Material – Case Study Kereta Cepat Merah Putih (KCMP) | 2. **(13:40-14:00)** *Achmad Aminudin, Darma Arif Wicaksono , Deni Nur Fauzi, Fachrul Hermansyah Nur , Muhamad Imam Bastowi* | Performance Analysis of Coconut Fiber Biocomposit Material on Mechanical Test Hardness – Case Study Kereta Cepat Merah Putih | 3. **(14:00-14:20)** *Amrizal , Ahmad Yonanda, Hadi Prayitno, Rio Ariesta Pradipta, Yulian Nugraha, Muhammad Irsyad* | Thermal performance characterization of PV/T air system using cross-cut fins with and without TEC: A comparative numerical study |

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	Multinode Complex Impedance Analyzer | 4. **(14:20-14:40)** *Arbi Parianta Lukman , Retno Utami, M. Rafli Yudhan* | Integration of Road Roughness Measurement Between Specialized Instrumentation and an Android-Based Application | 5. **(14:40-15:00)** *Indarto Yuwono , Darma Arif Wicaksono, R. Akbar Nur Apriyanto, Hafid Mustofa Yahya, Muhammad Dio Syah Putra* | Door Design and Control System In High Speed Train - Case Study Kereta Cepat Merah Putih (KCMP) |	*4.* **(14:20-14:40)** *Maharani Dian Permanasari* | Banana Bark for Acoustic Absorber Panels: A Sustainable Approach to Interior Partitions | 5. **(14:40-15:00)** *Agustina Kusuma Dewi, Levita Dwinaya* | Analysis Model of Collage as a Communication Act in the Digitalization Era Based on the Dadaism Renewal Movement in Collage Art | 6. **(15:00-15:20)** *Irfan Sabarilah Hasim* | Characteristics and dynamics of Baduy cultural life | 7. **(15:20-15:40)** *Andry Masri* | Gas Oven Performance Testing to Obtain Optimal Dryness Values in Corn Cobs for Utilization of Craft Raw Materials |
	Parallel session 5: **Green Information and Communication Technology** ***Room:*** *Smart Class Room 5* **Moderator:** Dr. Fahmi Arif **Presenters:** **(13:00-13:20)** **(Invited speaker)** **Selvi Lukman** Computer Engineering Maranatha Christian University 1. **(13:20-13:40)** *Hardy Purnama Nurba, Achmad Fauzi, Ivany Sarief, Ketut Abimanyu Munastha, Rudy Gunawan, Nina Lestari*	**Parallel session 6:** **Green Building** **Geo-spatial technology for sustainable development** ***Room:*** *GSG Lantai 2* **Moderator:** Mustika K Wardhani, S.T., M.Ars. **Presenters:** 1. **(13:00-13:20)** *Wahyu Buana Putra* Range Photogrammetry in Resilience Building 2. **(13:20-13:40)** *Eggi Septianto, Firmansyah, Heru W Poerbo dan Widjaja Martokusumo* | Multi-Sensory Dimensional Correlation To Public Appreciation On Urban Historic Area: A Study Of The Gedung Sate Area, Bandung | 3. **(13:40-14:00)** *Nur Laela Latifah, Erwin Yuniar Rahadian, Noveryna Dwika Reztrie*

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	| Performance Evaluation of A Fire Extinguishing Robot For High-Risk Areas Based On The Internet Of Things | 2. **(13:40-14:00)** *Arsyad Ramadhan Darlis, Lita Lidyawati , Faradilla Rizqi Trisani* | Real Time Deep Learning-based Organic and Non-Organic Waste Classification | 3. **(14:00-14:20)** *Isabel Kartika Putri Hanesi, Atika Qotrunnada Andrizal, Vitradisa Pratama, Dewi Tresnawati, Nina Lestari, Ary Setijadi Prihatmanto* | A Deeper Look into Stable Diffusion in Generating Building Images | 4. **(14:20-14:40)** *Riyan Farismana, Dita Rizki Amalia, Darsih* | Implementation of a Monitoring Information System for Student Field Work Practices to Support Green Computing : Case Study of the Kertasemaya Teladan Vocational School | 5. **(14:40-15:00)** *Kurnia Ramadhan Putra , Sofia Umaroh, Nur Fitrianti Fahrudin, Prambudhi Wibowo Pandji* | Resilience System in Microservices Architecture Using Fault Tolerance Factor|	| Assessment of Thermal and Visual Comfort Parameters in Architectural Studio Environment | 4. **(14:00-14:20)** *Shirley Wahadamaputera, Nurtati Soewarno, Mustika K. Wardahnia* | The Authenticity of Colonial Building Style as a Tourist Attraction in Bandung City – Indonesia | 5. **(14:20-14:40)** *Tia Adelia Suryani, Nabilla Dina Adharin* | Suitability of Land Capability in Settlement Area BWK II Semaran | 6. **(14:40-15:00)** *Dian N Handiani , Aida Heriati, Hafidz M. Ashari Herlambang, Eka Wardhani.* | Coastal Vulnerability Study and Their Physical Parameter Effect in North Coast of Bekasi Regency | 7. **(15:00-15:20)** *Desti Santi Pratiwi, Muhammad Raihan Aulia Setiawan* Modelling Shallow Foundations | Affected Various Ground Motions due to Earthquake Loads Using Numerical Methods |
	Parallel session 7: **Sustainable Infrastructure and Environment** ***Room:*** GSG Lantai 1 **Moderator:** Dr. Choerudin **Presenters:** 1. **(13:00-13:20)** *Iwan Juwana et al.* | Enhancing Waste Management Practices in Academic Institutions: A Case	

	Study of the Waste Sorting Initiative at Institut Teknologi Nasional (Itenas) Bandung | 2. **(13:20-13:40)** *Rangga Sururi, Mila Dirgawati* | Identification of Dissolved Organic Compounds as Indicators of Domestic Waste Pollution in Ground Water | 3. **(13:40-14:00)** *Mila Dirgawati* | Development of air pollutant concentrations and environmental data for land use regression models in Bandung City | 4. **(14:00-14:20)** *Etih Hartati, Lina Hasyyati, Djaenudin, Didin Agustin Permadi* | An Electrocoagulation Method for Removal Of Chromium From Wastewater Produced By The Leather Tanning Proccess | 5. **(14:20-14:40)** *Kancitra Pharmawati, Gena Gisela Kurnia, Fitriana Khodijah, Dyah Marganingrum, Taufiq Bachtiar, Danang Nor Arifin, Siti Wahyuningsih, Mariana Marselina* | Analysis Of Water Quality Parameters From Dyeing And Printing Unit And Washing Processes In The Textile Industry | 6. **(14:40-15:00)** *Akhmad Setiobudi, Elvina Deninda Putri, Nusaiba Adzilla* | Analyzing the Relationship between Tourism Development and Societal Growth: A Case Study of Alamendah Village, Rancabali District |	
16:00 – 16:30	**Main session led by MC** **Closing remark** Dr. Choerudin, S.T., M.T (Announcement of Best Paper, Best Presenter, Best Participant, Certificate Distribution)	

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6th December 2023, Wednesday	
08.00 - end	**Discssion and networking session (informal)**

TABLE OF CONTENT

Invited Speaker

Parallel Session Paper

Sustainable Infrastructure and Environment

Smart Materials and Adaptable Design

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Green building

Green Automation

Geo-spatial technology for sustainable development

1. **Enhancing Waste Management Practices in Academic Institutions: A Case Study of the Waste Sorting Initiative at Institut Teknologi Nasional (Itenas) Bandung**
   Iwan Juwana et al.

   The escalating incidence of fires in Final Disposal Sites (TPA), particularly in West Java, has prompted accelerated efforts by various stakeholders to manage waste at its source. In 2022, Institut Teknologi Nasional (Itenas), through its Institute for Research and Community Service (LP2M), conducted a study aimed at formulating waste management protocols within the campus environment. The research culminated in the development of an Academic Manuscript, as well as drafts for regulations and Standard Operational Procedures (SOP) for waste management. The primary objective of this research is to instil a waste sorting habit within the campus community, fostering a shift in focus from solely academic performance to an emphasis on improving environmental quality through behavioral changes, notably in waste management. Furthermore, this study serves as a platform for students in the Environmental Engineering program to practice developing waste management system plans. The research methodology employed a combination of qualitative and quantitative approaches. Regular observations were conducted to identify whether the types of waste disposed of adhered to the designated waste receptacles. Additionally, weighing and recording of waste were performed to ascertain the quantity and composition of generated waste. The findings indicated that the waste sorting practices in the selected pilot locations, namely the Environmental Engineering department building and the administrative building, revealed ongoing errors in the use of designated waste containers, resulting in some intermingling of waste. Addressing this issue necessitates widespread socialization efforts to enhance the knowledge, willingness, and understanding of the entire academic community regarding the urgency and benefits of waste sorting. This research underscores the importance of proactive waste management measures within academic institutions, contributing to broader sustainability initiatives and promoting a culture of environmental responsibility among the academic community.

2. **Identification of Dissolved Organic Compounds as Indicators of Domestic Waste Pollution in Ground Water**
   Rangga Sururi, Mila Dirgawati

   The use of drinking water still relies on groundwater, due to limited pipe system services. However, especially in large cities such as Cimahi City with a density of 144 people/ha, groundwater is very vulnerable to contamination from domestic waste. This research aims to determine organic parameters that are indicators of domestic waste pollution in groundwater in Cimahi City. In year 1, the performance of the domestic waste processing system on a communal scale will be studied, starting from distribution and waste water treatment installations (IPAL). The results of the 1st year research have been published in the journal Case Studies in Chemical and Environmental Engineering, with the paper title "Performance evaluation of domestic waste water treatment system in urban Indonesia". The sewage collection system serving 210 house connections and a WWTP operating biological treatment method (anaerobic biofilter) was operated to treat 1.17 L/sec wastewater. Key hydraulic parameters (flow velocity, flowrate, and flow depth), and wastewater quality parameters (chemical oxygen demand (COD), and ammonia) was assessed for evaluation purposes. Wastewater samples were collected during peak and non-peak hours periods from three-subsequent segments of the sewer pipeline (253.28m total length, 150mm diameter), and the inlet and outlet of anaerobic biofilter. Actual peak factors and perubahan karakteristik air limbah sepanjang sewage and WWTP were calculated. The sewerage system did not meet the

hydraulic design criteria, with a maximum peak factor of 4.81. The anaerobic biofilter unit did not reduce COD and ammonia concentration adequately. In the second year, the influence of the distance of the well to the communal IPAL on the water quality of shallow wells will be identified so that organic parameters will be obtained which indicate groundwater pollution.

3. **Hydrothermal Pretreatment of Oil Palm Fronds Catalyzed by Acid Buffer Solutions to Increase the Accumulation of Reducing Sugars**

Heri Hermansyah, Aulya Rahman Arevin, Ismail Fatih Al-Faruqi , Ibnu Maulana Hidayatullah, Muhamad Sahlan

In the palm oil industry, palm fronds are a part that has not been utilized optimally. Oil palm fronds are lignocellulosic biomass which has the potential to produce platform chemical compounds, such as glucose and xylose. Glucose and xylose are obtained through a pretreatment (delignification) stage, hydrothermal pretreatment, then followed by enzymatic hydrolysis. Hydrothermal pretreatment method utilizes steam or water at high temperature and pressure, can be highly effective in reducing lignin, but highly risk degrading simultaneously. The operating condition for hydrothermal pretreatment oil palm fronds needs to be optimized to increase the accumulation of reducing sugars. Optimization of hydrothermal pretreatment of oil palm fronds was carried out by adding an acid buffer solution as a catalyst effectively reduce lignin and convert holocellulose into glucose and xylose. In conclusion, the addition of acid buffer solution, in the form of citric acid buffer, increase 145% accumulated glucose and xylose concentration.

4. **An Electrocoagulation Method for Removal Of Chromium From Wastewater Produced By The Leather Tanning Proccess**

Etih Hartati, Lina Hasyyati, Djaenudin, Didin Agustin Permadi

Tanning is a process to produce leather from raw animal hides and skins that uses chromium sulfate. However, chromium (Cr) is a toxic heavy metal and considered an environmental pollutant. In this study, electrocoagulation was used to treat wastewater produced by the tanning process. The parameters of pH (4, 7, and 10), electric current (0.5, 1.0. and 1.5 A), and duration (1, 2, and 3 h) were varied to optimize the electrocoagulation process to reduce the Cr content of wastewater. The efficiency of the electrocoagulation process was determined by comparisons of the initial and final Cr contents of the wastewater. Response surface methodology was employed to optimize the parameters. The highest efficiency of the electrocoagulation process for Cr removal was 99.94%, which was achieved at pH 4, electric current of 1.5 A, and duration of 3 h. The Cr concentration threshold ntent target of 0.6 mg/L was reached at pH 4, electric current of 0.91 A, and duration of 3 h.

5. **Optimizing Tenebrio Molitor Feeding Strategy to Induce Physical Degradation of Tires: A Novel Approach for Sustainable Waste Management**

Abdussalam Topandi , Khadijah Sayyidatun Nisa, Ibnu Maulana Hidayatullah, Firah Gustianda Ayu, Fatimah Azizah Riyadi, Reynaldi Ivan Prasetya, Pranata, Eka Rahayu, Frederick Soetandar, Dimas Rafi Narawangsa

Due to increased tire usage, a large number of worn tires can become a significant issue. Used tires are usually discarded or burned, which can have a negative impact on the environment. As a result, an environmentally friendly method of disposing of waste tires is desperately needed. It is well known that organisms known as Tenebrio molitor larvae are able to degrade a wide variety of

polymers. The tires are first cut into small pieces so that the larvae of Tenebrio molitor can decompose them more easily. Tenebrio molitor larvae were fed the chopped tires to observe their capability to degrade tires' rubber. This study indicates that Tenebrio molitor larvae survive to eat solely on tires for at least 24 days. The maximum tire consumption that was achieved was 0.2519 grams. There is also an increase of 58.27% in the mass of Tenebrio molitor larvae that are fed by 25% tires and 75% oat brans. The FTIR test revealed that the degraded tires had a missing chemical bond, indicating that the larvae consumed the tires. The TGA and SEM analysis also revealed that Tenebrio molitor larvae consumed the tire.

6. Tenebrio molitor Larvae Feeding Strategy in Efforts to Degrade Polypropylene Components from Disposable Masks

Khadijah Sayyidatun Nisa , Reynaldi Ivan Prasetya, Ibnu Maulana Hidayatullah, Abdussalam Topandi, Fatimah Azizah Riyadi, Firah Gustianda Ayu, Frederick Soetandar, Dimas Rafi Narawangsa

Mask consumption experienced a sharp increase in 2020-2022 due to the COVID-19 pandemic, which forced people to use masks to protect themselves from the COVID-19 attack. The mask that is generally used is a disposable mask made from polypropylene. The massive use of masks made from polypropylene has resulted in the accumulation of used masks, and masks made from polypropylene take a very long time to degrade completely. Tenebrio molitor larvae can be used to break down polypropylene masks. Tenebrio molitor larvae are known to have microflora that contain enzymes that break down synthetic polymers. The mask degradation study used feed engineering to provide feed composition at a specific ratio and evaluate the feed consumption behaviour of Tenebrio molitor larvae. During 21 days of observation, data showed that 0.4% of masks were consumed, and the death rate for Tenebrio molitor larvae was 7.5%, with an average daily consumption rate of 0.201 grams. The total increase in larval weight during cultivation time was 2.3% and produced 0.4635 grams of faeces. This research shows that Tenebrio molitor larvae can be used as a mask degrater. Handling cultivation conditions and optimal feeding strategies can increase the potential for the formation of mutants in the microflora of Tenebrio molitor larvae so that the microflora can be reproduced and degradation will occur more quickly.

7. Analysis Of Water Quality Parameters From Dyeing And Printing Unit And Washing Processes In The Textile Industry

Kancitra Pharmawati, Gena Gisela Kurnia, Fitriana Khodijah, Dyah Marganingrum , Taufiq Bachtiar, Danang Nor Arifin, Siti Wahyuningsih, Mariana Marselina

Using various chemicals and dyes in the textile industry can reduce environmental quality because it produces a high pollutant load of wastewater. This research aims to provide an overview of the characteristics of wastewater generated in the textile production unit of PT X. The research was conducted by analyzing the characteristics of wastewater generated in the dyeing, printing, and washing production units. The results showed that the printing and washing process produced characteristics of pH, temperature, color, COD, sulfide, and phenol parameters that exceeded the applicable quality standards. Waste from the creamy white dyeing process only exceeds the temperature parameter. Exceeding wastewater characteristics can cause environmental impacts, including disturbing the balance of aquatic ecosystems with reduced surface water sources, high toxicity for living things, and aesthetic disturbances. Physical and chemical treatment can reduce parameters that exceed quality standards, such as equalization, aeration, sedimentation, and filtration.

8. **Enzymatic Hydrolysis of Oil Palm Fronds Employing Hydrolytic Enzymes to Enhance the Concentration of Reducing Sugars**

Ibnu Maulana Hidayatullah, Vidola Rineko Nandya, Jeneta Hans, Heri Hermansyah, Muhamad Sahlan

The demand for edible oil has grown globally, increasing the solid waste generated from oil palm plantations. This study uses palm fronds, a solid waste generated from oil palm plantations, as a source for the study. Palm fronds are considered the most abundant lignocellulosic biomass in the palm oil industry. They can be used as platform chemicals to synthesize biobased polymers like gluconic acid and xylonic acid, which are new materials. Due to its high holocellulose content, Lignocellulosic biomass can produce reducing sugars such as glucose and xylose. The production process involves pre-treatment (delignification) and enzymatic hydrolysis. In this study, 8 variations of xylanase and cellulase combinations were used. The following enzyme combinations were duplicated: 1:3, 1:2, 2:1, 3:1, xylanase, cellulase, 0:1, 1:10, and 10:1. The highest glucose concentration of 2.57 g/L, and the highest xylose concentration of 0.24 g/L were obtained through enzymatic hydrolysis using the xylanase enzyme. The highest glucose concentration of 1.41 g/L and the highest xylose concentration of 0.27 g/L were obtained through enzymatic hydrolysis using the cellulase enzyme. The xylanase: cellulase enzyme variation (3:1) produced the best result under variable enzyme conditions. The highest glucose concentration (2.74 g/L) and xylose (0.28 g/L) were obtained during enzymatic hydrolysis under this condition.

9. **Removal of Total Chrome (Cr-T) from Liquid Waste Textile Industry Uses Calcium Bentonite**

Muhammad Rayhan Alif , Etih Hartati, Dyah Marganingrum

Industrial activities can be one of the causes of environmental pollution, one of which is the textile industry. Waste generated from the textile industry comes from the production process, one of which is in the form of liquid waste. The resulting liquid waste is toxic to humans and animals because the waste contains various heavy metals and organic compounds which are toxic and carcinogenic and difficult to process, one of the heavy metals being total chromium, so processing is necessary. One treatment to remove total chrome metal from textile industry wastewater is by adsorption. The aim of this research is to determine the efficiency of total chrome metal removal in industrial wastewater using calcium bentonite as an adsorbent. The method used is the standard addition method which is then measured using an Atomic Absorption Spectrophotometer (AAS). This research has several research variables, including the effect of pH, the effect of bentonite size, the effect of wastewater volume and the effect of bentonite activation. The results of this research produced the greatest removal efficiency, namely 87.37% at pH 6 using chemically activated 40 mesh bentonite with a wastewater volume of 25%.

10. **Development of air pollutant concentrations and environmental data for land use regression models in Bandung City**

Mila Dirgawati

Characterizing spatial variation and exposure to air pollution are important for appropriate ambient air quality information and public health assessments. Land Use Regression (LUR) models have been used increasingly for estimating near-source spatial variation in air pollution concentrations

in rban areas. The LUR models were developed by utilizing air pollutant concentrations as a dependent variable, and potential sources of air pollution or environmental variables, as independent variables., These LUR models, nonetheless, have limited application in Indonesia because of lacking spatial data of air pollutant concentrations and environmental variables. Hence, this study was conducted to collect and establish data on air pollutant concentrations and environmental variables for multiple LUR models of different air pollutants in Bandung City, Indonesia. A 1-year average concentrations of particulate matter (PM10 and PM2.5), and nitrogen dioxide (NO2) at 30 selected sites in 2022 were predicted by atmospheric dispersion modelling such as AERMOD. Moreover, potential air pollution sources in Bandung City were selected and developed as environmental variables. There are resulted seven environmental variables which grouped into three categories: traffic related, land use, and population data are potential to be important contributors to within-city variation in exposure to airborne PM10, PM2.5, and NO2 concentrations in Bandung City.

11. Seasonal Variations of Chromium Concentrations in The Ciliwung River

'Aizatul Ummah , Iwan Juwana, Dyah Marganingrum, Ratih Nurjayanti, Hidawati, Rizka Maria

The occurrence of the heavy metal chromium in water is indicative of pollution, as it is not naturally present. This pollution can occur due to the disposal of industrial waste. The Ciliwung River, a crucial source of drinking water for the community, contains chromium, prompting this study to investigate seasonal variations in chromium concentrations. Sampling was conducted at 12 points along the river using the grab sampling method with bottle containers, followed by preservation. Chromium concentrations were determined using an Automatic Absorption Spectrophotometric (AAS) tool. Analysis revealed that during the rainy season, chromium concentrations in the Ciliwung River ranged from 0.0004 mg/L to 0.0199 mg/L, while in the dry season, concentrations varied from 0.0388 mg/L to 0.0502 mg/L. Notably, the data suggests a higher potential for chromium pollution during the dry season. The proposed method for removing chromium parameters is through an adsorption unit. This research can be further developed, particularly in terms of evaluating the environmental economic impact of heavy metal pollution.

12. Assessment of Lead (Pb) Levels in the Ciliwung River: Implications for Water Quality Management and Compliance with Regulatory Standards

Dhias Ahaddistira, Iwan Juwana, Dyah Marganingrum, Ratih Nurjayanti, Hidawati, Rizka Maria

The Ciliwung River stands as a critical raw water source for PDAMs, necessitating vigilant monitoring to mitigate the risk of contaminant intrusion. Of particular concern are heavy metals, with lead (Pb) being a notable offender due to its strong affinity for soil, posing potential hazards to both human health and riverine ecosystems. This study seeks to assess lead (Pb) concentrations in the Ciliwung River throughout distinct seasonal variations, specifically during the rainy and dry seasons. Field investigations were conducted in March and September 2023, employing a comprehensive sampling strategy encompassing 12 sites along the river's course from its upstream to downstream stretches. The quantification of Pb levels utilized precise Atomic Absorption Spectrometry (AAS) techniques. The results reveal a consistent presence of Pb in the Ciliwung River during both the rainy and dry seasons, surpassing the stringent quality standards set forth in the Republic of Indonesia Government Regulation Number 22 of 2021, Appendix VI - National Water Quality Standards. Notably, the highest recorded Pb content occurred at the 12th sampling site in March, reaching 0.11 mg/l, while the lowest concentration was observed at the 11th site

during the same period, measuring 0.0447 mg/l. These findings underscore the pressing need for remedial actions to address the elevated lead levels and uphold water quality standards in the Ciliwung River.

13. Analyzing the Relationship between Tourism Development and Societal Growth: A Case Study of Alamendah Village, Rancabali District

Akhmad Setiobudi, Elvina Deninda Putri , Nusaiba Adzilla

Tourism innovation plays an important role in advancing regional progress, since the tourism sector impact economic growth and income enhancement. Nevertheless, many villages often face challenges, including insufficient community empowerment and knowledge. Therefore, innovation in tourism development is required. This study investigates the correlation between tourism development innovation and the economic growth of the community in Alamendah Village which is measured by community incomes. This study used a mixed method with population research of approximately 23,870 people and a total sample of 100. Data collection involves the distribution of questionnaires and interviews.

Smart Materials and Adaptable Design

14. Analysis Model of Collage as a Communication Act in the Digitalization Era Based on the Dadaism Renewal Movement in Collage Art

Agustina Kusuma Dewi, Levita Dwinaya

Abstract. The "obscurity" of the various signs that appear through the collage technique as a Dadaist way of "encoding" their signs gives rise to double codes, trans-aesthetic codes. The art of collage in the realm of art and design communication becomes a process that can be "read" through the integration of at least 3 traditions in communication, namely: Roland Barthes' Semiotic Tradition, Edmund Husserl's Phenomonological Tradition, Jurgen Habermas and Karl Marx's Critical Tradition. This research which was developed from previous research entitled "Development of Design Multiliteracy Competencies Based on the Application of Communication Traditions in the Era of Indonesia 4.0" (2019); aims to analyze the communication process of collage art in the digital era. In the digital era, collage art can be processed with digital photography technology which uses computer software so that collage art can be created more quickly and easily. The collage technique applied will return to the basic word, namely "paste". This "pasting-sticking" process is a concept that is assumed to also occur in the communication process of art and design in the digital era. This occurs as a result of the communication process of art and collage design which is cyclical and capable of transcending space and time. As a conclusion, the research findings also provide development in the science of Visual Communication Design, especially for visual communication strategies to strengthen the efficiency of collage visual language in creating creative uniqueness through “Analysis Model of Collage as a Communication Act in the Digitalization Era Based on the Dadaism Renewal Movement in Collage Art”.

15. **Banana Bark for Acoustic Absorber Panels: A Sustainable Approach to Interior Partitions**

Maharani Dian Permanasari

This research continues the previous activity focusing in the post-harvest utilization of banana bark through a sustainable design and zero-waste approach. Adding values through functional products, the output of this research is partition panel product designs for art exhibitions and interior accessories. The design solution is a continuation of the previous research in the acoustic sound absorber made from banana bark based on the A1405 Japanese Industrial Standard. The previous study encompasses an examination of the acoustic properties of banana bark and the process of converting these barks into functional absorber panels. Tests were conducted to determine the sound absorption coefficient of banana bark panels, revealing a remarkable capacity for sound attenuation, comparable with conventional synthetic materials. The findings of this study hold significant implications for the future of sustainable architecture and design, offering an innovative solution that contributes to reducing the industry's environmental impact while providing efficient noise control. This research underscores the potential of agricultural byproducts such as banana bark in creating sustainable alternatives for traditionally used construction materials, thus paving the way for more eco-friendly design approaches in the future. Keywords: banana bark, acoustic absorber, partitions, sustainable, product design

16. **Utilization Of Coconut Fiber As Carbody Coating Of Composite Material – Case Study Kereta Cepat Merah Putih (KCMP)**

Achmad Aminudin,Agus Choirul Arifin, Wida Yuliar Rezika, Elang Raihan Permana, Titania Nur Cahyani

A joint research development study with a consortium of universities, INKA and KAI that plans to realize a high speed train called Kereta Cepat Merah Putih (KCMP). The Carbody is a geometry that contains passengers or goods, and the equipment that supports the train operation, which is built with frame construction. To find the best results on Coconut Fiber as a composite material, tests were carried out in the form of Fourier Transform Infra-Red (FTIR) and mechanical tensile tests.

17. **Performance Analysis of Coconut Fiber Biocomposit Material on Mechanical Test Hardness – Case Study Kereta Cepat Merah Putih**

Achmad Aminudin, Darma Arif Wicaksono , Deni Nur Fauzi, Fachrul Hermansyah Nur , Muhamad Imam Bastowi

Railway is a transportation that uses a variety of developed materials, for example composites. Composites are materials formed from a mixture of two or more materials with the aim of obtaining better mechanical properties. The material used in composites is usually coconut. Coconut is a plant that is easily found throughout the archipelago, so the presence of coconut in Indonesia is very abundant. Coconut coir waste has the potential to be utilized as reinforcement for composite materials. Coconut coir contains fibers which are alternative natural fibers in the manufacture of composites. The purpose of this study was to determine the effect of coconut fiber powder size and soaking time on mechanical properties (tensile test, compressive test, impact test). With variations in soaking time of 1 hour, 2 hours, 3 hours, 4 hours and coconut particles with variations in mesh 50, 100, 150, and 200. after that FTIR testing was carried out on coconut

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fiber fibers to determine the best value. With a volume fraction of 40% and following the composite material standards used, namely ASTM D638 type 1.

18. Thermal performance characterization of PV/T air system using cross-cut fins with and without TEC: A comparative numerical study

Amrizal , Ahmad Yonanda, Hadi Prayitno, Rio Ariesta Pradipta, Yulian Nugraha, Muhammad Irsyad

During the summer, Photovoltaic (PV) cells are bathed in direct sunlight to produce electrical energy. However, due to sunlight exposure, this may increase the operating temperature and consequently reduce the electrical efficiency. To deal with the issue this leads to the implementing fins as a heat absorber. Alternatively, the waste heat from the photovoltaic cells also could potentially generate extra electricity by using TEC. This study aims to look into the thermal impact of application for combining both cross-cut-fins with and without TEC. The working fluid used in this work is air that varies from 0 to 90 degrees and 1.5 to 6 m/s for the fluid flow direction and fluid velocity, respectively. While the irradiation is implemented from 500 to 1250 W/m2. The simulation process using the CFD approach illustrates the contours of working fluid velocity and PV temperature. In general, the operating temperature without TEC is found to be lower than that of with TEC. The maximum difference temperature between with and without TEC reach by about 5.35oC and 4.50oC for irradiation of 1250 W/m2 and fluid velocity of 6 m/s, respectively. Furthermore, the directions of working fluid flow have an insignificant impact on thermal performance compared to the fluid velocity as well as irradiation level effects.

19. Characteristics and dynamics of Baduy cultural life

Irfan Sabarilah Hasim

The Baduy people, also known as Urang Kanekes, live in Kanekes Village. They are known as people who still adhere to their ancestral traditions, including walking barefoot, not being allowed to use vehicles, and prohibiting household or other modern equipment and items. Kanekes Village is divided into two large zones: Inner Baduy and Outer Baduy. The rules that apply in Inner Baduy are stringent, while in Outer Baduy, they experience dynamics and change, although they still adhere to the laws passed down from generation to generation. This research aims to reveal the original character of the Baduy community and the changes that have occurred currently through its constituent elements. This research used an ethnographic approach to describe and interpret the patterns of values, behavior, and beliefs of a group of people who share the same culture. Data and information were collected through field observations, interviews, and photo and video documentation. Data collection in the Baduy Dalam area only uses freehand sketches and notes and does not use modern tools because using cameras, videos, recording equipment, or other digital devices is prohibited. The Baduy Dalam community still upholds ancestral customary rules: 1) Maintaining and guarding its natural environment, 2) Building a built environment that complies with the traditional rules, and 3) Carrying out daily activities by custom. People living in Outer Baduy still carry out activities according to traditional

rules, although dynamics and changes are taking place significantly, mainly due to the increasing number of tourists visiting Baduy currently

20. Gas Oven Performance Testing to Obtain Optimal Dryness Values in Corn Cobs for Utilization of Craft Raw Materials

Andry Masri

Previous research on products made from corn cobs using lamination technology has produced a variety of disposable products that can become commercial commodities. Focusing on the relationship between creation and production aspects requires follow-up so that the product can be quickly absorbed by consumers. The exact problem of predicting the first prototype produced requires resolution through iterative prototyping in order to obtain a compromise value between creation value, production efficiency and market absorption. This research aims to obtain the results of consumer absorption testing of the second prototype of the creation of a women's bag product design using corn cobs as raw material based on the evaluation of the first prototype results. The research begins with an evaluation of the bag products that have been produced, in parallel with determining market segmentation and direct observation of consumers of corncob bag products, until design criteria are produced which will become the basis for the second prototype product design concept. In this research, 4 alternative designs were produced which were tested first to obtain production efficiency, and then tested for market absorption through the sales process to the target community. During the research, several findings were obtained regarding the market characteristics of products made from corn kernels as a truly new product, and the test results showed that products made from corn kernels still require time and strategies to be adopted as a commodity that is acceptable to the public.

Green Transportation

21. An Optimizing of Piping System - Case Study Kereta Cepat Merah Putih (KCMP)

Achmad Aminudin, Deni Nur Fauzi, M. Shafwallah Al. Aziz. R, Muhammad Fathoni Asnan

The high speed train is one of the most influential modern means of transportation in the world due to their advantages such as high speed running, ride comfort, large transport capacity, and low energy consumption. One of the main tasks in railway system is to convey fluid that is interconnected to each other based on the design that has been designed. The objective of this paper is to develop a design of the piping and routing system at Kereta Cepat Merah Putih (KCMP). In addition, this research also discusses about selection of materials to be used in piping systems that are lightweight and also environmentally friendly.

22. Evaluation of Environmental Noise Due to the Operation of LRT JABODEBEK and its Mitigation Efforts with Noise

Kusnadi , Deni Nur Fauzi, Alfi Tranggono Agus Salim, Wida Yuliar Rezika, Agus Choirul Arifin, Darma Arif Wicaksono

Operation of the LRT will result in noise emissions, both indoor noise and noise radiated to the surrounding environment from steel wheels rolling on steel rails (wheel/rail noise), from drive motors, air conditioning units, and other ancillary equipment. Noise from train wheels generally increases as

train speed increases. LRT operations may generate high noise emissions to neighborhoods (environmental noise) that are relatively close to the railroad. The Jabodebek LRT line should not cause environmental noise impacts, as stated in KEPMEN LH NUMBER: KEP-48/MENLH/11/1996 on "Noise Level Standard". Therefore, it is necessary to measure the exposure of noise emitted by trains to the surrounding environment based on the ISO 3095:2005 standard ("Measurement of Noise Emitted by Railbound Vehicles"). The results of environmental noise measurements around the Jabodebek LRT service line show that the average equivalent noise level before the LRT operates (LAeq exist) is > 70 (dBA). Measurements of noise emissions from LRT trains conducted in Palembang showed that at a train speed of 60 (km/h), it produced an SEL of 98 (dBA) at a distance of 7.5 (m) from the track. The data was then used to simulate noise predictions at several operational speeds of the Jabodebek LRT (80 (km/h) and 100 (km/h)) and the distribution of noise caused to the surrounding environment, which is considered to represent land use categories, such as residential areas, hotels/apartments, hospitals, schools, offices. When the LAeq project value from the prediction results at the point in the area above passes the LAeq exist, it is necessary to make noise mitigation efforts by installing noise barriers.

Green Information and Communication Technology

23. Performance Evaluation of A Fire Extinguishing Robot For High-Risk Areas Based On The Internet Of Things

Hardy Purnama Nurba , Achmad Fauzi, Ivany Sarief, Ketut Abimanyu Munastha, Rudy Gunawan, Nina Lestari

This paper presents the implementation of the internet of things system on a fire extinguishing robot. This system integrates a flame detector sensor to detect fire in its coverage area. Currently, the process of extinguishing fires in high-risk areas is very dangerous for humans, especially firefighters. Robots can replace the role of humans with their ability to detect fire with high accuracy. The internet of things is a system that integrates the internet with hardware so that it becomes a system that works effectively and in real time. This robot is integrated directly with a WiFi camera, buzzer, and water pump, which are programmed in a microcontroller. The sensing process by the robot and the actions carried out by the robot can be monitored directly via a connection to a smartphone or web browser. This robot is designed to detect fire using computer vision detection and extinguish freely moving fires with monitoring. Overall, the robot can explore the area, monitor the surroundings, detect fire, and extinguish it properly. The robot can detect fire from a distance of 10 cm to 60 cm and will automatically activate the water pump to extinguish it. The ESP32Cam can predict the fire detection with precission 0.71 and as a controller connection functions well at a maximum distance of 50 meters, and the camera connection will be lost when it enters a distance of 40 meters. There will be a delay depending on the speed or strength of the connected WiFi network.

24. Real Time Deep Learning-based Organic and Non-Organic Waste Classification

Arsyad Ramadhan Darlis , Lita Lidyawati , Faradilla Rizqi Trisani

Recently, everyone has created and produced waste in human life, which become an issue. The waste in Indonesia is divided into two types, i.e., organic and non-organic. The study develops a system that can classify organic and non-organic waste in real-time. The deep learning methods, Jetson Nano, and cameras are utilized to build a system for classifying organic and non-organic waste types in real-time, using the Convolutional Neural Network (CNN) method with the

ResNet-18 architecture and Python programming language. In this study, the training process used 30 epochs, and the testing process considered the waste object's condition in the morning, day, afternoon, and night conditions. The result showed the excellence performance where the classification accuracy in the morning was 95.24%, 95.24 during the day, 90.45% in the afternoon, and 86.90% at night. Then, the average accuracy in real-time organic and non-organic waste classification is 91.96%.

25. A Deeper Look into Stable Diffusion in Generating Building Images

Isabel Kartika Putri Hanesi , Atika Qotrunnada Andrizal , Vitradisa Pratama, Dewi Tresnawati, Nina Lestari, Ary Setijadi Prihatmanto

The field of Artificial Intelligence has grown since the 1950s, with the development of Generative AI going in full blast in recent years. Art generation based on text-to-image prompts has been researched since 2015 with the development of Align Draw and has only grown since, with one of the most commonly known models being Stable Diffusion, a generative AI model based on Latent Diffusion Model. Stable Diffusion is trained by feeding images as training data into the model, where they are gradually reduced to pure noise, and then go through a reverse diffusion process where the noises are converted back into their initial states. In this paper, the process of diffusion model training in Stable Diffusion will be explained more thoroughly and applied to the training of a model to generate a specific building type. The model training itself took 7 minutes to complete all 10 epochs and a total of 240 steps. The loss during each epoch was shown. The loss peaked at epoch 8 at 18.3% but went down significantly at epoch 9 to only be at 13.8%. With the loss during training to be less than 20% at most, it is feasible to assume that the image generated by the model will hopefully be similar to the real thing.

26. Implementation of a Monitoring Information System for Student Field Work Practices to Support Green Computing : Case Study of the Kertasemaya Teladan Vocational School

Riyan Farismana, Dita Rizki Amalia, Darsih

Increasing computing processes directly affects high levels of carbon dioxide (CO2) emissions. To minimize this situation, there is a green computing campaign that focuses on the use of energy-saving and environmentally friendly computing. The first step in implementing green computing needs to start in the education sector, in this case vocational schools, as strategic institutions to not just theory but practice green computing. Kertasemaya Teladan Vocational School, as a school that has a commitment to being environmentally friendly, wants to implement this concept in field work practice activities where the two main focuses are reducing paper by implementing a field work practice monitoring information system where the attendance process, making daily journals, reports, complaints, and assessments can be used. web and mobile devices so that they are more efficient, the development process is carried out using the RAD method, which can save time and guarantee the quality of the system being developed, as well as the use of virtualization technology for servers using VPS, which is more energy and cost-efficient, which is the goal of green computing.

27. Resilience System in Microservices Architecture Using Fault Tolerance Factor

Kurnia Ramadhan Putra , Sofia Umaroh, Nur Fitrianti Fahrudin, Prambudhi Wibowo Pandji

In designing a system there are important stages such as the design stage because it is a benchmark in creating a system or application. At the Bandung National Institute of Technology (Itenas) there is a attendance system that helps students to record their attendance which relies on the Itenas SIKAD system. The attendance system that relies on SIKAD has several problems, including the system failing to handle the user load which is replaced by filling in attendance via paper so it has low resilience. System resilience refers to the ability to maintain the performance of a service at an acceptable level which is related to reliability. High reliability capabilities can be obtained by building large systems from small and simple components with clean interfaces (microservices) designed to handle failures (fault tolerance) which can be achieved using circuit breakers. The microservice system is designed using the Microservice Migration Pattern to achieve resilience and support Circuit Breakers which results in being able to overcome cascading failures because it fails fast through the fallback method when the Circuit Breaker is Open and restores system availability when it is Half-open so as to support system resilience. because it can restore service availability when a failure occurs so it has the ability to maintain acceptable system performance.

Green energy

28. Renewable energy

Dani Rusirawan

29. System Dynamics Modelling of Greenhouse Gas Emissions from Dairy Farms

Said Muhammad Baisa, Alif Ulfa Afifah, Arie Desrianty

The greenhouse gas emissions are on the rise with the agricultural sector is one of the major contributing factors in this increase. In 2022, West Java ranked as Indonesia’s second-largest milk-producing province, yielding over 300,000 tons of milk . The research focuses on modelling the increase in greenhouse gas emissions, highlighting the significant role of the agricultural sector. West Java, as Indonesia's second-largest milk producer, generating over 300,000 tons annually, serves as a crucial study area. The objective is to deepen our understanding of dairy farming operations and pinpoint the sources of emissions. The study employs a system dynamics model to quantify greenhouse gas emissions from dairy farms in West Java. It considers various influential factors, including enteric fermentation (methane from digestion), manure management (methane from cattle waste), and agricultural soil emissions (methane from fertilizer and cattle urine use). The study aims to create a comprehensive model of greenhouse gas emissions in West Java, Indonesia, using a system dynamics approach. This involves analysing the complex interactions between different sources of emissions and their environmental impacts. The findings reveal high greenhouse gas emissions from dairy farms, negatively affecting the environment. It highlights the urgent need for farmers to implement emission mitigation strategies to safeguard the environment.

30. Estimating semi-transparent photovoltaic (STPV) energy performance in Indonesia

Nuha Desi Anggraeni1, Liman Hartawan, Dani Rusirawan, Seres István, Farkas István

STPV is not widely used in Indonesia due to its low PCE value. However, with relatively high irradiation values in Indonesia, the use of STPV in Indonesia is worth considering. Given its ability to transmit some sunlight. In estimating performance, the STPV used as a reference is 2x10 pieces 165 Wp Solarwatt Vision with 3.3 kWp. The goal of this research is to use mathematical models to estimate energy performance in Indonesian regions based on global irradiation. The methodology used is to create a mathematical model based on irradiation data for the performance of the Solarwatt Vision STPV and then apply it to irradiation conditions in Indonesia. The solution to the mathematical equation y=35499x, shows an energy performance range between 124 to 146 kWh for the Java-Bali-Nusa region.

31. Spark Ignition Engine Performance with B20 fuel

Agus Budianto, Gatot Setiyonoiven, Sumari, Erlinda Ningsih

Biofuel is an alternative fuel to replace fossil fuels. The main ingredient of biofuel is vegetable oil, the availability of which is very abundant. The addition of vegetable oil is one way to reduce CO2 emissions produced by fossil fuels during the combustion process. The aim of the research is to obtain fuel specifications on the performance of spark ignition engines. Mixed fuel with BE20 ratio and engine performance testing. The dyna test is used to assess engine performance with variable speed (variable speed test) 4500, 4000, 3500, 3000, 2500, 2000, 1500 rpm with the throttle fully open. The research results show that the torque, power and MeP of the engine 216,1 N.m .maximum torque is achieved at 3500 rpm.

32. Indoor PM2.5 Concentration from Cooking Activities using Liquefied Petroleum Gas (LPG), Kerosene, and Firewood

Alauddin Nabhan, Mila Dirgawati, Nguyen Hong Phuc, Didin Agustian Permadi

Indoor air pollution resulting from household cooking activities is a significant public health concern, particularly in developing regions where traditional solid fuels like firewood and kerosene are commonly used. This paper presents a comprehensive study on the measurement of $\boldsymbol{PM_{2,5}}$ (particulate matter with a diameter of 2.5 micrometers or smaller) concentrations generated during cooking with three distinct fuels: Liquefied Petroleum Gas (LPG), Kerosene, and Firewood. The investigation involves real-world cooking scenarios and employs state-of-the-art air quality monitoring equipment. Through a series of controlled experiments and field measurements, this study quantifies the $\boldsymbol{PM_{2,5}}$ emissions associated with each cooking fuel, providing valuable insights into the comparative health and environmental impacts. Furthermore, the research examines the factors contributing to $\boldsymbol{PM_{2,5}}$ emissions, such as cooking methods, stove types, ventilation conditions, and fuel properties. The findings reveal significant variations in $\boldsymbol{PM_{2,5}}$ concentration levels between the different cooking activities and underline the importance of adopting cleaner cooking technologies. The results of this research contribute to our understanding of indoor air quality in households using diverse cooking fuels, aiding policymakers, public health officials, and environmental advocates in formulating strategies to mitigate the health risks associated with household air pollution. Additionally, the study

emphasizes the urgency of transitioning to cleaner cooking fuels and technologies to reduce the burden of indoor air pollution, particularly in resource-constrained settings.

Green building

33. Range Photogrammetry in Resilience Building

Wahyu Buana Putra

34. Multi-Sensory Dimensional Correlation To Public Appreciation On Urban Historic Area: A Study Of The Gedung Sate Area, Bandung

Eggi Septianto, Firmansyah, Heru W Poerbo dan Widjaja Martokusumo

Experiencing a place requires an empirical assessment of the relationship between humans and the environment. The association is based on holistic multi-sensory experience influencing the image and meaning of the environment. Sensory experience shapes a place's image, legibility, appreciation, and social construction by interpreting and understanding individual senses. The multi-sensory dimension can increase visits and ensure sustainable development of cultural heritage sites by creating unique and enjoyable experiences. In experiencing a place, it is not just the elements that make it up (activity, form, and image/meaning) but the bonds and interactions between people and places. This is in line with the development of the paradigm of management and conservation of cultural heritage determined by physical quality and the experience of non-physical aspects based on human sensory perception. The result of the discussion on cultural heritage environmental management models is still limited to maintaining the authenticity of artifacts and paying attention to physical quality based on visual senses. Therefore, this study aims to explain the effect of multi-sensory perception on community appreciation in urban historic areas. The research approach uses a mixed exploratory research method, namely collecting online questionnaire data and experiencing and measuring the sensory environment at several locations simultaneously to be analyzed qualitatively and quantitatively separately. This research is expected to enrich new discourses to integrate non-physical aspects based on subject perceptions in discussions on urban cultural heritage areas.

35. Assessment of Thermal and Visual Comfort Parameters in Architectural Studio Environment

Nur Laela Latifah, Erwin Yuniar Rahadian, Noveryna Dwika Reztrie

Thermal comfort becomes an important issue that goes hand in hand with the efficiency of building energy consumption. The importance of paying attention to thermal comfort is that it has the most significant impact on the operational energy consumption of buildings, particularly in relation to energy for artificial ventilation. The largest proportion of the building's operational energy consumption comes from the air conditioning, followed by energy for artificial lighting. This study was conducted in Architectural Studio 17302, Department of Architecture, Institut Teknologi Nasional Bandung, to determine thermal and visual comfort. The aim of this research is to produce a pilot project in the form of a design that embraces the concept of green building in terms of building operational energy savings, thermal comfort and visual comfort. Measurements and simulations were carried out twice, before and after physical changes to the building (addition of sun shading, painting of external walls and ceiling). Measurements for thermal comfort included temperature, humidity, air velocity and solar heat gain, while visual comfort was related to illuminance. Weather instruments and lux meters were used to collect field

data. Based on the field data, simulations were carried out using Dialux Evo 11.0 and Velux Daylight Visualizer 3.0 software (to measure the quality of natural and artificial lighting), Archicad Thermal Bridge Simulation 26 software (to measure thermal transmittance in the building envelope), and 3D modelling using Rhino and Grasshopper to design sun shading for the openings in the façade. To prove the performance of this pilot project, a kWh meter is used to determine the decrease in electrical energy consumption that occurs.

36. The Authenticity of Colonial Building Style as a Tourist Attraction in Bandung City - Indonesia

Shirley Wahadamaputera, Nurtati Soewarno, Mustika K. Wardahnia

Indonesia has a tropical climate with high rainfall and humidity. This made the soil fertile, allowing various plants to thrive, which was seen as a potential that attracted other nations to come, especially from Europe, including the Dutch. Climatic conditions different from the Netherlands are fundamental considerations for creating thermal comfort when constructing buildings. In addition, high-quality materials are used so that the building can survive. This is reflected in the architectural style of Colonial buildings, which is different from traditional Indonesian buildings. The former Colonial building has been designated as a cultural heritage building that should be preserved. The commonly used preservation methods are adaptive reuse and revitalization. In Bandung, colonial buildings can still be found in several areas. These buildings can be identified by their unique and distinct architectural styles. The building is located in a strategic area of the city, so it is easy to reach. The originality of the architectural style and shape of the building has a specific appeal that can attract visitors. Therefore, these cultural heritage buildings tend to change their function to become commercial buildings. By observation of the objects and the surrounding area, this study will describe the form of adaptation of heritage buildings to their new functions. Three objects were selected: Gas Block Building on Braga Street, Dakken Café on Riau Street, and Mont Clair Living on Dago Street. The three cases are in three areas that are currently tourist destinations in the city of Bandung. A successful process of adaptation and revitalization is the key to creating a form of preservation of cultural heritage buildings that is in harmony with sustainable development. This effort is hoped to be applied to other cultural heritage buildings in Bandung and other cities to preserve cultural heritage.

Green Automation

37. Design of An IOT-Based Monitoring and Controlling for Small-Scale Deep-Flow Hydroponics System

Muh.Ekha Saputra J.M., Leo Rhessa Wijaya, Nico Saputro, and Ali Sadiyoko

This research addresses the diminishing agricultural land issue for food production in urban areas by developing an IoT-based deep-flow small-scale hydroponics system for cultivating water spinach (ipomoea aquatica). Leveraging Smart Farming and IoT, a monitoring and control system for pH and TDS levels in water spinach plants has been created and connected to the BLYNK cloud server using NodeMCU ESP8266. This study focuses on the automation of the growth process and its impact on plant development and power consumption. The proposed automated system enables the system to maintain the pH at 5-6.5 and TDS at 1050-1400 ppm. The experiment results indicate that the automated hydroponic system significantly enhances water

spinach average stem height by 19% and reduces power consumption by 25% compared to the traditional system.

38. **Thermal Pasteurization System Performnace Analysis Ohmic Heating Method and Fast Cooling Mango Fruit Puree**

Yudhy Kurniawan, Wardika, Ferry Sugara, H. Krismas Ginting, Muhammad Idrus Alhamid, Ardiyansyah Yatim

Mango is one of the main commodities in West Java, especially in the Indramayu Regency. Unfortunately, mangoes are a type of seasonal fruit, so when the harvest arrives, the availability of mangoes is abundant, but when outside the season mangoes become scarce. This situation will cause problems with the availability of raw materials in the finished product processing industry. Meanwhile, harvest time also poses problems for farmers, where prices are low and fruit is damaged because it is not consumed. To answer these problems, efforts were made to handle crop preservation, namely thermal pasteurization technology for intermediate products in the form of mango puree. In this study, the purpose focused on analyzing the performance of pasteurization and rapid cooling used for secondary cooling after the pasteurization of mango puree. The method used for the thermal pasteurization process is Ohmic heating, while for fast cooling it uses a steam compression system. In the pasteurization process, the product is heated not exceeding 70 oC in the ohmic heating tube by an electric current on the electrode attached to the end of the ohmic tube. Then after heating, the product is stored in bottles and then cooled quickly to reach a temperature of 25 oC to avoid damage to nutrients and vitamins due to heating too long. The analysis carried out was to calculate the performance of thermal pasteurization and rapid cooling devices with variations in electrode thickness (stainless steel) 1 mm, 2mm, and 4mm. The analysis results were obtained, the 1 mm thickness electrode efficiency is 93% with a heating time of 720 seconds, the 2 mm thickness electrode has 76% efficiency with a heating time of 660 seconds, and the 4 mm thickness electrode is 64% with a heating time of 540 seconds. As for the performance of fast coolers, an efficiency of 58% was obtained by achieving a cooling time of 31 minutes.

39. **Internet of Things (IoT)-Based Detection of River Water Pollution using Multinode Complex Impedance Analyzer**

Darmawan Hidayat, Bambang Mukti Wibawa, Muhammad Luthfi Tantowi, Nendi Suhendi Syafei, Setianto Setianto

Nowadays, river water pollution become a major environmental problem. Textile dyes are the most frequently found as a river water pollutant, especially in developing countries. This work presents a centralized, in-situ, and real-time system for monitoring and detecting the contamination of river water based on Internet of Things (IoT) technology. The pollutant contamination detection was detected using a Complex Impedance Analyzer (AD5933 module) based on the change in the electrical impedance of water due to pollutant contamination. The measured impedance was sent to a Gateway, in which the measured data was processed, computed, and sent to the IoT Server (Thingspeak and Firebase servers). The storage data was displayed, stored, and recorded in the IoT server. An Android application was developed as the user interface for remote monitoring purposes. The testing results showed that the water impedance value changed as the pollutant contaminated the water and presented a specific value compared to that of unpolluted water. The testing results of device-to-server data transmission

showed that the data was successfully sent, displayed, and stored in the server and Android devices. In conclusion, the system has been successfully realized and adequately functioned.

40. Integration of Road Roughness Measurement Between Specialized Instrumentation and an Android-Based Application

Arbi Parianta Lukman , Retno Utami, M. Rafli Yudhan

The state of the road pavement surface is critical to guaranteeing the safety and comfort of road users. Maintaining a safe and comfortable road condition is critical to the road's function as a vital infrastructure for the transportation of people and products. The evaluation of road conditions is critical for the upkeep of transportation infrastructure. Road roughness measures are unquestionably the most extensively used approach by road management to determine the state of road pavement surfaces. The goal of this study is to compare the IRI values obtained with the Roughometer III device to those obtained during rigid motion on toll roads using the smartphone-based Roadroid application. The testing was done on a toll road's rigid pavement across a 10-kilometer stretch. The IRI values obtained represent the International Roughness Index across a 10 meter span. The following are the test findings for the IRI values obtained from the two instruments used. The Roughometer III and Roadroid devices were fitted and tested on the same car. The relationship between IRI value from Roughometer III and IRI value from Roadroid was analyzed using a polynomial analysis. It resulted in the equation IRI (Roadroid) = -0,0022(IRIrgh)2+0,8464(IRIrgh)+1,8894 with a coefficient of determination (R2) of 0,4701.

41. Door Design and Control System In High Speed Train - Case Study Kereta Cepat Merah Putih (KCMP)

Indarto Yuwono , Darma Arif Wicaksono, R. Akbar Nur Apriyanto, Hafid Mustofa Yahya, Muhammad Dio Syah Putra

The development of research in the field of high speed train is an independence of transportation technology and a link and match between industry and academia, especially trains in Indonesia. Joint research from college consortium INKA and KAI plans to realize a high speed train called Kereta Cepat Merah Putih (KCMP). The passenger door design and control technology are supporting device in the train carbody. Making sliding plug doors has advantages in terms of reliability and noise reduction. The scheme used in door control consists of opening, closing and action when there is fault or trap condition in operation.

Geo-spatial technology for sustainable development

42. Suitability of Land Capability in Settlement Area BWK II Semaran

Tia Adelia Suryani, Nabilla Dina Adharin

Tantangan terbesar bagi banyak negara berkembang adalah permasalsahan lahan. Keterbatasan lahan yang ada diikuti dengan tingginya pertumbuhan penduduk serta perkembangan kota akan menjadi masalah bagi banyak sektor, salah satunya aspek lingkungan. Daya dukung lingkungan suatu kota memiliki keterbatasan masing-masing. Dengan demikian pengembangan kota harus diarahkan. Perkembangan Kawasan permukiman yang baik adalah yang sesuai dengan Kawasan pengembangan. BWK II Kota Semarang diprediksi mengalami pertumbukan pada tahun 2031

sampai 24,41%, padahal guna lahan mayoritas adalah sebagai kawasan permukiman. Perkembangan BWK II yang cenderung pesat dan diikuti pertumbuhan jumlah penduduk dikhawatirkan dapat meningkatkan kebutuhan akan perumahan. Kemampuan lahan dianggap dapat menjadi salah satu metode untuk menganalisis daerah mana yang masih boleh dikembangkan. Tujuan dari penelitian ini adalah untuk mengetahui kesesuaian kemampuan lahan di kawasan permukiman BWK II Kota Semarang. Sasarsan yang ingin dicapai antara lain: identifikasi kawasan permukiman BWK II Kota Semarang, analisis kemampuan lahan BWK II Kota Semarang, dan analisis kesesuaian kemampuan lahan di kawasan permukiman BWK II Kota Semarang. Penelitian ini menggunakan metode penelitian kuantitatif dengan pendekatan spasial. Kawasan permukiman dianalisis menggunakan 9 Satuan Kemampuan Lahan (SKL) yang meliputi: SKL Morfologi, SKL Kemudahan Dikerjakan, SKL Kestabilan Lereng, SKL Kestabilan Pondasi, SKL Ketersediaan Air, SKL Terhadap Erosi, SKL untuk Drainase, SKL Pembuangan Limbah, dan SKL Bencana Alam. SKL tersebut dioverlay dan diberi bobot. Selanjutnya hasil dari kemampuan lahan dioverlay dengan kawasan permukiman sehingga dapat diketahui kawasan permukiman yang sesuai dan tidak sesuai dengan kawasan pengembangan. Hasil penelitian menunjukkan 97% kawasan permukiman masih sesuai dengan kawasan pengembangan dan 3% Kawasan permukiman di BWK II tidak sesuai dengan kawasan pengembangan.

43. Coastal Vulnerability Study and Their Physical Parameter Effect in North Coast of Bekasi Regency

Dian N Handiani , Aida Heriati, Hafidz M. Ashari Herlambang, Eka Wardhani

Northern part of Bekasi Regency (Pantura Bekasi) has diverse land: a port area, fisheries, marine tourism, agriculture, residential, industrial and government. Various types of development are occured to support the community welfare. Developments occur without considering sustainability will result in a decline of environmental conditions, and each region will have its own ability to anticipate the impacts of changes that occurs. This research studied coastal vulnerability in the Pantura Bekasi and the relationship between their coastal physical parameters and the vulnerability. Field observations were also conducted as field validation and perceive current conditions. The results show that vulnerability is very high in Fishery port (PPI) Muara Jaya port zone (Mekar Coast), and low vulnerability occurred in Taruma Jaya port zone (Taruma Jaya Coast). Two paramaters are different in these two locations, they are coastline change and geomorphological. The coastline change at Mekar Coast is abrasion, and Taruma Jaya Coast is accretion. The geomorphological at Mekar Coast are a muddy beach and delta, while Taruma Jaya Coast is a swampy beach. Field conditions show that Mekar Coast has low mangrove density, while Taruma Jaya Coast has high mangrove density. These results hopefully can be used as policy consideration for the local government in optimizing coastal management planning, where the spatial plan for Pantai Mekar Beach is designated as a conservation area and demersal fisheries, while on Pantai Taruma Jaya as a public use area such as for Gas and Steam Power Plant (PLTGU) Muara Tawar, PPI Paljaya and port zone.

44. Modelling Shallow Foundations Affected Various Ground Motions due to Earthquake Loads Using Numerical Methods

Desti Santi Pratiwi , Muhammad Raihan Aulia Setiawan

AEarthquakes are natural disasters that are difficult to predict and prevent. Moreover, earthquakes can emerge additional stress and collapse on infrastructure. The ground motions generated by earthquakes must be taken into account when designing buildings, particularly for

geotechnical structures such as foundations. Foundations are crucial in the support of the upper buildings. Therefore, it is necessary to research foundations subjected to earthquake loads. This study aims to determine the influence of dynamic loads sourced by ground motions, in variation, subjected to shallow foundations by a Non-linear Site Response Analysis using the Numerical Method. The ground motions used were based on data recorded in Japan (2007), Taiwan (1999), and Italy (1980). In addition, the soil layer consists of homogeneous clay with three consistencies: soft, medium, and hard, which were modelled with Hardening-Soil Small material. Our research includes observations of deformation and the time that shows the largest ground motions take place. The analysis results show that highest deformation, both vertical and horizontal, occurs in soft soil. The Taiwan earthquake produced the highest horizontal deformation compared to other earthquakes. However, the highest vertical deformation was produced by ground motion in the Italian earthquake. According to arias intensity results, it can be seen that the duration of the earthquake between 10% and 90% was over 9 seconds for all the earthquakes.

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