

October
17



2024 JAIST-UPI

COLLABORATIVE RESEARCH WORKSHOP

Program Book



WELCOME TO 2024 JAIST-UPI !



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This workshop is jointly organized by the Japan Advanced Institute of Science and Technology (JAIST) and Universitas Pendidikan Indonesia (UPI). It aims to provide a cross-border academic platform that fosters collaboration among students and encourages interactions between faculty members, enhancing the overall academic experience and strengthening ties between the two institutions.

CONCEPT **Designing the Future Together:
Global Co-Creation
Through the Fusion of Technology and Education.**

Overview The JAIST-UPI Student Academic Exchange Event is a unique platform that brings together students from Japan Advanced Institute of Science and Technology (JAIST) and Universitas Pendidikan Indonesia (UPI) to exchange research ideas and foster academic collaboration. The event will feature presentations, discussions, and networking opportunities.

TIME TABLE

CHAPTER2

Venue: K30b, Knowlodge Science, JAIST

Date: *17th October (Wed.)*

13:30 – 14:50 International Workshop Session

14:50 – 15:20 Round table session

15:20 – 16:45 International Workshop Session

PARTICIPANTS

CHAPTER3

Session1

- 1 Elmo Juanara **Framework to Develop Warning System for Volcanic Tsunamis: Case of Anak Krakatau Volcano, Indonesia**
- 2 Siscka Elvyanti, Erik Haritman, Maman Somantri, Tasma Sucita **Enhancing STEM Education through Effective Course Scheduling: A Case Study on the Development of the Unitime Interface Dashboard**
- 3 DONG Yicheng **Development of an Autonomous Vtuber for Online Lectures by Large Language Model**
- 4 Didin Wahyudin, Lilis Widaningsih, Yatti Sugianti, Muktiarni **Empowering Collaborative Learning: Unveiling Student Perspectives on CPbL Implementation Using Application of Project Management**

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- 5 Iwan Kustiawan, Silmi Ath Thahirah Al Azhima, Salsabilla Azzahra **Design of Computer Vision-Based Facial Recognition Application to Improve Student Pickup Security**
- 6 Zheyu TAN, Weiwei Jiang, Chenkai Zhu, Shinobu Hasegawa **Simple Reflection Support on Web-based Self-regulated Learning in Open Domains**
- 7 Jaja Kustija, Iwan Kustiawan, Maman Somantri, Didin Wahyudin **Saving Natural Resources as an Implementation of SDGs through the Use of Remote Laboratories**
- 8 Adam Mukharil Bachtiar **Elucidating the Online Discourse of the Ukraine War: A Combined Topic Modeling and Social Network Analysis of Twitter Data**

Framework to Develop Warning System for Volcanic Tsunamis: Case of Anak Krakatau Volcano, Indonesia

Elmo Juanara

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Abstract:

On the night of December 22, 2018, Anak Krakatau Volcano (AKV) experienced a major lateral collapse during a period of eruptive activity that began six months ago, in June. Although flank instability and sector collapse are familiar on volcanic islands, the collapse of AKV poses a major threat and triggers a deadly tsunami. A catastrophic deadly tsunami that struck the Sunda Strait region resulted in thousands of people being injured and displaced, in addition to hundreds of fatalities. Currently, research on AKV continues to be carried out, such as numerical simulation and modeling of a tsunami in December 2018. Unfortunately, there is still a lack of studies that focus on solving the basic problem of AKV, namely the early warning system. The holistic research framework for the study of the early warning system for predicting volcanic tsunamis is a crucial part of disaster preparedness and mitigation. The ability to predict the occurrence of a tsunami based on analysis of historical and near real-time data will save more human lives in coastal areas. Historical data will provide information about the past behavior of the volcano and the surrounding environment, which can be used to identify patterns and trends. Near real-time data will provide up-to-date information about the current conditions of the volcano and the surrounding area. This study presents the research framework as a guide for developing a volcanic tsunami early warning system and tests one of the main precursor signs, a short-term seismic event, of one part of the stage of the framework to the real event of the December 2018 AKV tsunamis.

Author Information:

Elmo Juanara earned his B.Eng. in Industrial Engineering from the University of Brawijaya, Indonesia, in 2016, and his M.Eng. from Shizuoka University, Japan, in 2021. He is currently pursuing a Ph.D. in Knowledge Science at the Japan Advanced Institute of Science and Technology (JAIST). His research focuses on disaster management and resilience, with a particular emphasis on high-consequence, low-probability (HCLP) events like volcanic tsunamis. His research topic has led to several academic opportunities, including a research internship at the RIKEN Center for Computational Science (RCSS) in Kobe in 2023 and participation in the AIST (National Institute of Advanced Industrial Science and Technology) Innovation School, under the Integrated Geo-information Research Group, for the 2024-2025 period.



Enhancing STEM Education through Effective Course Scheduling: A Case Study on the Development of the Unitime Interface Dashboard

Siscka Elvyanti, Erik Haritman, Maman Somantri, Tasma Sucita

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Abstract:

When it comes to STEM education, effective course scheduling is essential since it has a significant impact on both learning outcomes and resource utilization. It is necessary to have modern technological solutions, such as the Unitime application, to handle the complexity of course scheduling in an educational environment that is always changing. Within the scope of this intentional study, the application of Unitime in education is investigated, with a particular focus on the potential of Unitime to revolutionize scheduling procedures, enhance student achievement, and propel institutional efficiency. It contributes to the continuing conversation about adopting educational technology and innovation in STEM education through case studies and best practices. The method utilized in designing a website is a system development life cycle (SDLC) development cycle that utilizes the waterfall approach. In the context of website quality, the ISO/IEC 25010 standard is referred to as "web testing." Regarding maintainability testing, compatibility testing, and usability testing, the results produced via web testing have fairly good scores.

Author Information:

Siscka Elvyanti received a B.S. degree in 1999 from Education of Electrical Engineering, Universitas Pendidikan Indonesia, and a M.S. in 2005 from Institut Teknologi Bandung, and in 2012, graduated from Universitas Tun Hussein Onn Malaysia for a Ph.D degree in Vocational Education. She research interests including vocational education, gender, and information technology.



Development of an Autonomous Vtuber for Online Lectures by Large Language Model

DONG Yicheng

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Abstract:

This study explores the development of an autonomous Vtuber driven by large language models (LLMs) to enhance online lectures. Traditional educational Vtubers require real-time control, posing challenges for instructors focused on teaching. By leveraging LLMs, we aim to create an intelligent Vtuber system capable of mimicking various teaching styles autonomously. The research addresses three key questions: identifying teaching styles, assessing learner conditions, and integrating LLMs with Vtuber control systems. Our approach involves fine-tuning LLMs to analyze teaching styles through multimodal inputs, including lecture materials and teacher behaviors. We will also evaluate learner engagement and tailor the system to individual learning styles through interactive prompts. This approach offers potential advantages over traditional models like BERT and GPT-3, particularly in handling multimodal content. We propose a methodology that combines educational content analysis with real-time interaction capabilities. A user-friendly interface and API will facilitate communication between the LLM and Vtuber control systems. To assess effectiveness, we will conduct comparative studies on animation quality and user acceptance, along with controlled experiments measuring student engagement and learning outcomes. This autonomous Vtuber system aims to reduce teacher workload and support personalized learning experiences. By fine-tuning LLMs specifically for online education, the system can more effectively emulate a teacher's role, potentially improving both student and teacher satisfaction in remote learning environments.

Author Information:

DONG Yicheng received the B.S. degree from the Department of Computer Science, Jiangsu University of Science and Technology in 2018, and the M.S. degree from Japan Advanced Institute of Science and Technology (JAIST), Japan, in 2023, where he is currently pursuing the Ph.D. degree in information science. He has been researching as a member of Hasegawa lab since 2023. His research interests include using Vtuber (Virtual YouTuber) to support teaching and learning process, with a particular focus on the automation of Vtuber utilizing large language model.



Empowering Collaborative Learning: Unveiling Student Perspectives on CPbL Implementation Using Application of Project Management

¹Didin Wahyudin, ²Lilis Widaningsih, ³Yatti Sugiarti, ²Muktiarni

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Abstract:

This study investigates the effectiveness of integrating the Collaborative Project-Based Learning (CPbL) model with a project management tool to enhance students' collaborative learning experiences. While CPbL is widely recognized for its ability to boost student engagement and foster essential skills such as teamwork and problem-solving, the role of technology in facilitating this model remains underexplored. This research specifically examines students' perspectives on how the application of project management supports CPbL implementation. Data were collected through surveys involving students enrolled in CPbL-based courses, assessing their perceptions of collaboration, task management, and communication within their project teams. The findings reveal that the application of project management tools significantly empowered students by improving task organization, clarifying role distribution, and enhancing communication, which collectively led to better teamwork and overall project outcomes. However, some students encountered challenges in adapting to the new platform and indicated a need for additional guidance and training. These results underscore the potential of project management applications to enrich collaborative learning experiences, contingent on adequate support during the adoption phase. The study concludes that integrating project management tools can optimize the effectiveness of CPbL, transforming it into a powerful educational approach that equips students for future professional environments. Future research should explore the long-term impacts of such technological integration on student skill development and career readiness.

Author Information:

Dr. Didin Wahyudin is a Doctor in Information Science from the Japan Advanced Institute of Science and Technology (JAIST), with research interests in the utilization of computer technology for education, focusing on web and mobile applications to support remote and collaborative learning. His expertise covers Embedded Systems, the Internet of Things (IoT), and Informatics Education. He holds a Master's degree in Electrical Engineering (Game Technology) from the Bandung Institute of Technology (ITB) and a Bachelor's degree in Electrical Engineering (Telecommunications) from Universitas Pendidikan Indonesia (UPI).

Dr. Wahyudin is a member of the IEEE, IEEE Education Society Chapter Indonesia, the International Association of Engineers (IAENG), and the Computer Science Teachers Association (CSTA). His research emphasizes project-based learning approaches, digital tools, and computational methods to enhance learning outcomes and programming skills. He actively contributes to national and international conferences, advancing technology-enhanced learning strategies for modern educational environments.



Design of Computer Vision-Based Facial Recognition Application to Improve Student Pickup Security

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Abstract:

This study aims to create a facial recognition system to detect human faces. This system is designed to provide a solution to overcome security problems when picking up students. The method used involves a computer vision application using the SSD Mobilenet V1 model to identify and recognize faces. The test results show that the facial recognition model achieves high accuracy in recognizing the tested faces. The percentage of facial similarity that is successfully recognized and matches the database reaches 63% in repeated testing 10 times. The system response time is in the range of 0.41s–0.83s with an average of 0.6s with an fps value of 10. Although there are shortcomings in the facial detection system we proposed, the system is still able to perform its function in supporting the security of picking up students at school.

Author Information:

Iwan Kustiawan received the S.Pd. degree from the Department of Electrical Engineering Education, Universitas Pendidikan Indonesia (UPI) in 2001, the M.T. degree from Institut Teknologi Bandung, Indonesia in 2006, and Ph.D. degree from National Yunlin University of Science & Technology, Taiwan in 2017 in the field of Electrical Engineering. He currently serves as a lecturer at the Dept. of Electrical Engineering Education, UPI since 2003. He is chair of IEEE Education Society Indonesia Chapter and TVET Research Center UPI since 2019. His research interests include wireless networks, signal processing, and TVET.



Silmi Ath Thahirah Al Azhima received a Bachelor and Master Degree of Electrical Engineering majoring in control and intelligent system from Institut Teknologi Bandung (ITB) in 2019. She currently serves as a lecturer at the Industry and Technical Education Faculty, Universitas Pendidikan Indonesia, Bandung, Indonesia. She is involved in robotic field research and interest control, intelligent system, navigation system, and autonomous system.



Salsabilla Azzahra received a Bachelor Degree of Electrical Engineering majoring in telecommunication engineering from Universitas Pendidikan Indonesia in 2024. Her research interests are in intelligent system and computer vision.

Simple Reflection Support on Web-based Self-regulated Learning in Open Domains

Zheyu TAN, Weiwei Jiang, Chenkai Zhu, Shinobu Hasegawa

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Abstract:

This paper investigates the application of reflection to enhance Self-Regulated Learning (SRL) within open, unstructured online web-based learning environments, based on Zimmerman's SRL model. Our study involved a Chrome extension designed to monitor web navigation behaviors, including browsing history and click events, and featured a visualization tool that maps learners' navigation patterns to facilitate self-assessment. Participants used the Sustainable Development Goals (SDGs) as a learning context to create concept maps both before and after the intervention. Employing a before-and-after experimental design with 53 participants, the initial phase involved unguided web navigation to establish a knowledge baseline, followed by a post-intervention phase where tailored SRL instructions and the reflection tool were used. The intervention led to significant enhancements in the complexity and depth of the concept maps, indicative of improved self-regulation and metacognitive skills. Current research efforts are dedicated to analyzing the collected behavioral data to identify patterns in SRL strategies and the efficacy of reflection tools, aiming to develop more effective strategies to enhance learning processes and outcomes in digital learning environments.

Author Information:

Ms. Zheyu Tan obtained her B.S. degree in Computer Science and Engineering from University of Electronic Science and Technology of China (UESTC), China, and her M.S. degree in Information Science from Japan Advanced Institute of Science and Technology (JAIST), Japan, where she is presently a Ph.D. candidate. Since 2023, she has been actively involved as a student researcher at the Hasegawa Lab, where her research interests center on learning support and analytics. Her work primarily aims to enhance Self-regulated Learning through the integration of advanced technologies, with a special emphasis on Knowledge Graphs and Learner Models.



Saving Natural Resources as an Implementation of SDGs through the Use of Remote Laboratories

Jaja Kustija, Iwan Kustiawan, Maman Somantri, Didin Wahyudin




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Abstract:

Global population growth has continued to increase significantly over the past few decades. By 2024, the world's population is estimated to reach 8.11 billion people, reflecting increased pressure on the availability and sustainability of natural resources. Over-exploitation often exceeds the Earth's regenerative capacity, resulting in environmental degradation and limited access to essential resources, including educational facilities and laboratories. This challenge demands innovation in education, one of which is through the development of remote laboratory systems that support Education for Sustainable Development (ESD). This article discusses the implementation of a remote laboratory system for mechatronics, which is specifically designed to address the limitations in the availability of laboratory equipment and the large number of students. The remote laboratory is built on a framework that leverages the Internet of Things (IoT) and remote desktop technologies like ThinVNC and TeamViewer, allowing users to interact with real laboratory equipment through a Graphical User Interface (GUI). This research uses the ADDIE model (Analysis, Design, Development, Implementation, Evaluation) to develop and refine the system, which was then tested by students in a mechatronics course at Universitas Pendidikan Indonesia. The results of the research show that the remote laboratory system significantly improves accessibility, facilitates flexible scheduling, and addresses the imbalance between the number of tools and the number of students. Additionally, this system provides a sustainable alternative by supporting the Sustainable Development Goals (SDGs), particularly in terms of reducing material waste and using resources efficiently. However, remote laboratories still face limitations in hands-on practicum activities, which can be improved through the integration of Virtual Reality (VR) and Artificial Intelligence (AI) technologies in the future.

Author Information:

Jaja Kustija    received a bachelor's degree in Electrical Engineering Education at the Indonesian University of Education in 1984, received a master's degree M.Sc. in the field of Instrumentation Physics at the Bandung Institute of Technology in 1992, and received his doctorate in Technology and Vocational Education at the Indonesian University of Education in 2012. The research and publications carried out are very experienced both on a national scale indexed by SINTA and on an international scale indexed by Scopus, and have research umbrellas with other institutions or with students with major topics design, manufacture, testing monitoring and remote control and learning media based on electronics and the IoT. Books that have been published by one of the national scale publishers include; electromagnetic field theory and applications; mechatronics books for colleges; electromagnetic field with required engineering mathematics enrichment; electrical circuit 1 equipped with MATLAB for calculation operations. Now he is a professor at the Indonesian University of Education in the field of Electrical and Mechatronic Engineering Education. He can be contacted at email: jaja.kustija@upi.edu.



Elucidating the Online Discourse of the Ukraine War: A Combined Topic Modeling and Social Network Analysis of Twitter Data

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Abstract:

This study examines a comprehensive analysis of Twitter data on the Ukraine-Russia war. It uses a combination of topic modeling and social network analysis to identify the main topics and the connections between them. The main result was a thorough overview of the public discourse by extracting insights from Twitter posts. The tweet data collected from February to November 2022 were pre-processed and explored by using Latent Dirichlet Allocation (LDA) for topic modeling and revealing the interconnection among the topics by using Social Network Analysis. Topic modeling plays an essential role in revealing several essential topics that highlight significant concerns related to the Ukrainian War. Meanwhile, graph visualization, as a result of social network analysis, facilitates the process of identifying the influencer and how the topic can be spread on social media. The findings of this study have potential significance for policymakers, world leaders, and the public in understanding the complex dynamics of the conflict as reflected in social media discussions. By providing a data-driven perspective on the central issues of the war and their interrelationships, this research not only contributes valuable information to public understanding but also has the potential to significantly impact strategic decision-making.

Author Information:

Adam Mukharil Bachtiar is a Doctoral student at the Japan Advanced Institute of Science and Technology. He received a B.C.S. in Informatics Engineering from Universitas Komputer Indonesia and M.Eng. degrees in Informatics from Institute Teknologi Bandung, Indonesia, in 2008 and 2013. He is a lecturer in the Department of Informatics Engineering, Faculty of Engineering and Computer Science, Universitas Komputer Indonesia. He also has a role as C.E.O. of CodeLabs, one of the Software and Technology Incubations. His research interests include Software Engineering, Data Science, text mining, and Social Media Analytics. He can be contacted at adam.bachtiar@jaist.ac.jp or adam@email.unikom.ac.id.



ORGANIZATION

CHAPTER5

Honorable Chair **Shinobu Hasegawa, Didin Wahyudin**

Program Chair **Kazuki Sugita**

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