

2026 JASPER

LNBTI Japan–Sri Lanka Research Symposium



LNBTI Japanese
IT University

*"Advancing Knowledge Through Japan-Sri Lanka
Academic Collaboration"*



JASPER 2026 Research Symposium

“Advancing Knowledge Through Japan–Sri Lanka Academic Collaboration”

BOOK OF ABSTRACTS

11th September 2026

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Sri Lanka

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MESSAGE FROM THE CHAIRMAN



It is my great pleasure to extend my warm greetings to all participants of the JASPER Research Symposium 2026.

When LNBTI first envisioned JASPER, our goal was simple yet ambitious: to create a platform where Japanese and Sri Lankan researchers could meet, share ideas, and build lasting academic partnerships. Today, JASPER has grown into a respected symposium that reflects the power of collaboration, curiosity, and shared purpose.

In a world where technology and society evolve rapidly, research plays a vital role in turning possibility into reality. Those who engage in discovery and critical thinking are the individuals who shape the future. In this sense, JASPER is more than an academic event—it is a space where new ideas take root, where young scholars gain confidence, and where future innovations begin.

What makes JASPER truly meaningful is the spirit of partnership it represents. The active participation of universities, researchers, and students from both Japan and Sri Lanka shows that the challenges of the future are best addressed together. The discussions held today may become tomorrow's breakthroughs, technologies, and solutions that benefit communities far beyond our borders.

I am especially encouraged by the contributions of emerging researchers. Their dedication and curiosity are essential for advancing fields such as Artificial Intelligence, Software Engineering, Cybersecurity, IoT, Smart Technologies, and Japanese Studies. I hope they will use JASPER as a stepping stone—refining their ideas, engaging with experts, and developing their work toward future publications and collaborations.

I wish to express my sincere appreciation to the keynote speakers, reviewers, session chairs, authors, organizing committee, academic staff, sponsors, and volunteers. Your commitment and support have made JASPER 2026 possible, and your efforts are deeply valued.

As we look ahead, I believe JASPER will continue to grow as a symbol of academic cooperation between Japan and Sri Lanka. May this symposium inspire bold ideas, strengthen partnerships, and contribute to meaningful progress for many years to come.

I wish JASPER Research Symposium 2026 every success.

Kazuyuki Ikura

Chairman

Lanka Nippon BizTech Institute (LNBTI)

MESSAGE FROM THE VICE CHANCELLOR & SYMPOSIUM CHAIR



It is my great pleasure to welcome all participants to the JASPER Research Symposium 2026.

This year's theme, "Advancing Knowledge Through Japan–Sri Lanka Academic Collaboration," reflects our commitment to strengthening research, academic partnerships, and knowledge exchange between institutions and researchers.

JASPER provides an important platform for academics, researchers, students, and industry professionals to share their work, exchange ideas, and develop new opportunities for collaboration. I am especially pleased to see the active participation of both experienced researchers and emerging scholars across a wide range of research areas.

I sincerely appreciate the contributions of our keynote speakers, session chairs, reviewers, authors, sponsors, organizing committee, volunteers, and everyone who has supported the successful organization of this symposium. In addition to the keynote speakers who joined us from Japan, pre-conference workshops on Information Technology and Japanese culture were also conducted.

I hope JASPER 2026 will lead to meaningful discussions, new research connections, and continued academic collaboration in the years ahead.

I warmly welcome you all and wish JASPER Research Symposium 2026 every success.

Prof. Ananda Kumara

Chair

JASPER Research Symposium 2026

MESSAGE FROM THE KEYNOTE SPEAKER

Prof. Keitaro Naruse

Professor, the University of Aizu, Japan



Title: Robot Software Testing in Virtual and Real World

Abstract:

When developing software, we frequently design and apply a series of tests to our developing software and prove it is safe and secure. In robot software, software testing becomes more difficult, because it should work with noisy sensory inputs and unpredictable motion by disturbances. In addition, robot software has a larger risk of damage physical properties, while it costs larger at time, set up, and human resources.

In this talk, I will present our work on software testing framework including both virtual and real world. First, we test our software by a huge number of tests with a variety of artificial noises in a simulator. Then, we test it with a relatively small number of trials in the real world. However, motion in the virtual and real world is different, we update a world model in the simulator so that it acts as the real world. Iterating the process, we can have an accurate and precise world model in the simulator, which allows us to make only a small number of tests in the real world. In addition, we can use the world model for training AI-based robot controllers.

MESSAGE FROM THE KEYNOTE SPEAKER

Prof. Kazuaki Tanaka

Kyushu Institute of Technology, Japan



Title: Edge AI on Resource-Constrained Devices: Practical AI with ESP Microcontrollers

Abstract:

Artificial intelligence is expanding rapidly beyond cloud environments and into embedded devices at the edge. However, it remains challenging to deploy AI on small-scale hardware due to limitations in CPU performance, memory capacity, power consumption and storage resources. These constraints make it difficult to run conventional AI models directly on microcontroller-based systems.

This keynote explores how these challenges can be overcome by separating AI model training and inference. Conducting computationally intensive training on high-performance computing platforms and deploying optimized models for inference on target devices enables AI capabilities to be brought to even the most resource-constrained hardware.

This session will introduce a practical approach to edge AI on microcontrollers, demonstrating how intelligent applications can be implemented without the need for powerful processors or cloud connectivity. Lightweight AI models and deployment strategies suitable for embedded systems will be the focus.

To illustrate this, the presentation shows a character recognition system implemented on an ESP microcontroller. Attendees will learn how the AI model was developed, optimized and deployed, and the techniques used to achieve reliable recognition within the strict resource limitations of a small microcontroller platform.

This example highlights the growing potential of Edge AI and provides engineers, researchers and developers seeking to integrate AI into IoT and embedded devices with practical insights.

MESSAGE FROM THE PATRON



It gives me great pleasure to extend my warmest wishes to all participants of the JASPER Research Symposium 2026, organized by LNBTI Japanese IT University.

JASPER continues to provide an important academic platform for researchers, academics, students, and industry professionals to exchange knowledge, present emerging ideas, and engage in meaningful scholarly discussion. This year's theme, "Advancing Knowledge Through Japan–Sri Lanka Academic Collaboration," reflects our continuing commitment to strengthening academic and research relationships while creating opportunities for new knowledge

and innovation. Research has an important role in addressing the rapidly changing needs of society, industry, and education. It is therefore encouraging to see contributions across areas such as Artificial Intelligence and Data Science, Software Engineering and Cybersecurity, IoT and Smart Technologies, and Japanese Studies and Education. The diversity of these research areas demonstrates the value of interdisciplinary thinking and collaboration in finding practical solutions to contemporary challenges. JASPER is also an opportunity for young researchers and students to develop their confidence in presenting their work, receive constructive feedback from experienced academics, and build connections that may lead to future research collaborations. I particularly encourage our emerging researchers to view this symposium not simply as an opportunity to present their work, but as an important step in their continuing academic and professional development.

Beyond the symposium, JASPER also provides an opportunity for authors to further develop their research into full papers for consideration through the JASPER journal publication process, subject to a separate review process and the required academic standards. This creates an important pathway for researchers to strengthen their work, extend its academic contribution, and share their findings with a wider scholarly community.

I wish to express my sincere appreciation to the keynote speakers, session chairs, reviewers, authors, organizing committee, academic staff, sponsors, partners, volunteers, and everyone who has contributed towards making JASPER 2026 possible. Their commitment and support are greatly valued. I hope that the discussions, publications, and collaborations initiated through JASPER 2026 will continue beyond the symposium and contribute meaningfully to future research, innovation, and academic cooperation between Sri Lanka, Japan, and the wider international community.

I wish JASPER Research Symposium 2026 every success.

Prof. K. P. Hewagamage

Patron

JASPER Research Symposium 2026

MESSAGE FROM THE SYMPOSIUM CO-CHAIR



It is a great privilege to contribute to the JASPER Research Symposium 2026 as Co-Chair and to welcome all researchers, academics, students, industry professionals, and invited guests to this important academic event.

This year's theme, "Advancing Knowledge Through Japan–Sri Lanka Academic Collaboration," reflects our commitment to strengthening research, innovation, knowledge sharing, and academic collaboration. JASPER has been designed not only as a platform for presenting research, but also as an opportunity to encourage emerging researchers and create meaningful connections among academia, industry, and the

wider research community.

Considerable effort has been made to maintain the academic quality of the symposium. The submitted work went through a blind review process involving two reviews. Based on the nature and maturity of the submissions, concept papers and project-based work have been arranged as poster presentations, while abstract-based research papers will be presented through oral PowerPoint presentations.

This year, JASPER brings together 29 research papers and 20 poster presentations across four thematic tracks. In addition to the research and poster sessions, the symposium activities include keynote speeches, technical sessions, pre-conference workshops, academic discussions, and engagement with visiting academics. These activities are intended to provide participants with opportunities to receive constructive feedback, exchange knowledge, develop their presentation skills, and explore possibilities for future research and collaboration.

Special recognition will also be given through awards such as Best Paper and Best Presenter within the respective tracks, further encouraging quality research and effective academic communication.

I sincerely appreciate the guidance and support of our Patron and Chair, together with the contributions of the keynote speakers, session chairs, reviewers, authors, sponsors, organizing committee, staff members, volunteers, and everyone who has worked behind the scenes to make JASPER 2026 possible.

I hope that the research presented, the discussions generated, and the connections established through this symposium will contribute to strengthening the research culture within our academic community and lead to further collaboration in the future.

I wish all participants a productive and successful JASPER Research Symposium 2026.

Ms. Bhashini Wijewickrama

Co-Chair

JASPER Research Symposium 2026

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PRE-CONFERENCE WORKSHOPS

09th and 10th September 2026



Prof. Keiko Hattori
Kindai University,
Japan

Prof. Yamashita
Kindai University,
Japan

Prof. Naruse Keitaro
University of Aizu,
Japan

Prof. Tanaka Kazuaki,
Kyushu Institute of
Technology,
Japan

Prof. Krishnamoorthy,
Chennai Institute of
Technology,
India

Prior to the JASPER 2026 Research Symposium, a series of pre-conference activities was successfully conducted on 9 and 10 September 2026, with the participation of visiting professors from Japan and India. These activities provided valuable opportunities for academic engagement, knowledge sharing, cultural exchange, and interaction with LNBTI academics, students, and school students.

On 9 September, Prof. Keiko Hattori and Dr. Yamashita conducted a workshop for the Japanese lecturers of LNBTI, providing an opportunity for academic and professional exchange in the areas of Japanese language, culture, and teaching practices.

On 10 September, several parallel pre-conference activities were conducted. Prof. Keiko Hattori and Dr. Yamashita conducted sessions on Japanese Culture and the Japanese Tea Ceremony for LNBTI students and school students, offering participants an engaging opportunity to experience and appreciate Japanese traditions and cultural practices.

Prof. Tanaka Kazuaki and Prof. Krishnamoorthy conducted workshops for both school students and LNBTI students, including a hands-on session on IoT Systems, providing participants with practical exposure to emerging technologies and their applications.

Prof. Naruse Keitaro conducted the workshop “Robot Software Development with Python” for LNBTI students and also participated in an academic discussion with LNBTI staff, encouraging knowledge exchange and further academic collaboration.

Collectively, these pre-conference activities enriched the academic programme of JASPER Research Symposium 2026 by creating meaningful opportunities for practical learning, international academic interaction, cultural understanding, and knowledge exchange.

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**Track 1 - ARTIFICIAL INTELLIGENCE &
DATA SCIENCE**

Abstract Papers

AI-POWERED CHATBOT FOR EARLY CHILDHOOD HEALTH SUPPORT IN RURAL VILLAGES OF SRI LANKA

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Access to early childhood healthcare in rural areas of Sri Lanka remains limited due to shortages of healthcare professionals and low maternal awareness, resulting in delayed guidance and suboptimal child health outcomes. This study proposes a mobile health application integrating an AI-powered chatbot to provide mothers with reliable, accessible, and timely child health guidance. The system employs a Retrieval-Augmented Generation (RAG) architecture powered by OpenAI APIs, supported by a verified knowledge base developed using WHO child health guidelines and locally validated healthcare resources. Supabase PostgreSQL with pgvector is utilized for semantic retrieval and secure backend management. The application enables mothers to submit child health-related questions in natural language and receive context-based responses generated from verified medical resources, while complex cases can be escalated to certified midwives through a Human-AI Hybrid support model. The proposed system was evaluated based on retrieval effectiveness, response accuracy, safety, security, performance, and user experience. The evaluation utilized 6 verified documents, 20 test queries across 6 child healthcare categories, and clinical assessment by 3 certified healthcare professionals. The system was further evaluated with 10 mothers to assess usability and accessibility. Results showed real-time message delivery through Supabase with an average AI response generation time of 2-3 seconds. The RAG-based retrieval system achieved a precision of 95%, while clinical evaluation confirmed the effectiveness and safety of generated responses. Security testing verified authentication mechanisms, role-based access control, and user data protection. User evaluation using the System Usability Scale (SUS) demonstrated positive acceptance and usability among participants. Ethical considerations, including informed consent, confidentiality, data protection, and clinical safety procedures, were incorporated throughout the study. Despite limitations related to internet dependency and evaluation scale, the proposed system demonstrates the potential of RAG-based AI healthcare solutions to enhance early childhood healthcare accessibility in rural communities.

Keywords: Early Childhood Healthcare; AI-Powered Chatbot; Rural Villages; Retrieval-Augmented Generation (RAG); Mobile Health Application; Human-AI Hybrid Support

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STAGE-BASED MACHINE LEARNING FOR TICKET-LEVEL DELAY PREDICTION IN HYBRID SOFTWARE PROJECTS

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Software development projects in hybrid Agile-Waterfall environments frequently experience schedule delays, while existing issue-tracking systems primarily support monitoring rather than proactive delay prediction. Existing studies predominantly focus on Agile-only or general software environments and commonly employ a single prediction model despite the evolving availability of project information across a ticket's lifecycle. To address these limitations, this study proposes a lifecycle-aware, stage-based machine learning framework for ticket-level delay prediction using anonymized Redmine data from a Japanese industry-oriented software development environment. An anonymized dataset of 3000 historical Redmine tickets was analysed using data preprocessing, feature engineering, a chronological train-test split for validation, threshold optimisation, and comparative evaluation of Random Forest, HistGradientBoosting, XGBoost, CatBoost, and LightGBM models. Since delay prediction is meaningful only before completion, tickets were mapped to two lifecycle stages by operational status: Yet-to-Start tickets, containing only planning-related attributes, and In-Progress tickets, which accumulate execution-related information such as logged effort and work progress; closed and other inactive statuses were excluded from both. A HistGradientBoosting classifier was selected for early delay-risk prediction at the Yet-to-Start stage, while a LightGBM classifier-regressor pipeline handled delay classification and delay-day estimation at the In-Progress stage. On held-out chronological test data, the In-Progress stage achieved a ROC-AUC of 0.721 and an F1-score of 0.643 for delay classification, while delay-day estimation achieved an MAE of 1.356 days and an RMSE of 2.441 days, consistently outperforming the Yet-to-Start stage due to the richer execution-stage features available. As the dataset was drawn from a single industry-oriented organisation, generalisability to other organisations or issue-tracking environments remains to be established. The framework's main contribution is a validated, lifecycle-aware, stage-specific prediction architecture that improves early delay visibility and supports proactive decision-making in hybrid software development environments, offering a practical alternative to single-model approaches used in prior work.

Keywords: Machine learning; ticket-level delay prediction; hybrid software project management; lifecycle-aware prediction; Redmine; LightGBM

DOI: <https://doi.org/10.5281/zenodo.22077583>

CNN-BASED DOG EMOTIONS DETECTION THROUGH VOCAL SIGNAL ANALYSIS

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Interpreting a dog's emotional state through vocal signals such as barking, whining, and growling remains a critical challenge for pet owners, veterinarians, and animal caregivers, who otherwise rely on subjective human judgement. Existing research on automated dog emotion recognition has primarily focused on small, single-breed datasets gathered under controlled conditions, with the best comparable classifier achieving only around 43% accuracy, and no prior study delivering a deployable, audio-only pipeline for this task. This gap leaves existing systems vulnerable to misclassifying background noise as dog vocalizations. This study presents PawSense, the first known deployable, real-time system for dog emotion detection from audio, built on a two-stage deep learning pipeline that first checks whether the audio is from a dog, and then classifies its emotion. Stage 1 uses a MobileNetV2-based classifier to verify whether a recording contains a dog vocalization. Stage 2 applies a custom CNN that analyzes Mel-Frequency Cepstral Coefficients (MFCCs), delta, and delta-delta features to classify the sound as angry, happy, neutral, and sad. Unlike single-stage classifiers or loudness-based filtering, PawSense separates detection from classification, eliminating false-positive emotion predictions at the cost of added pipeline complexity. The emotion classifier was trained on 160 labelled Husky audio clips from a publicly available dataset, considerably fewer samples than comparable benchmarks and limited to a single breed, so results should be read as preliminary. As no animal recordings were collected directly by the author for training data, no additional ethical approval was required. The emotion classifier achieved 87.50% test accuracy and a macro F1-score of 0.8748, roughly double the 43% benchmark, though direct comparison is limited by differing datasets. Larger, multi-breed datasets, benchmarking against standard classifiers, and real-time mobile deployment in veterinary and animal-care settings remain key directions for future work. The system runs as a web application supporting both file upload and live recording, validated on both pathways using real-world audio samples the author independently found and collected.

Keywords: audio classification; animal welfare technology; deep learning; real-time emotion detection; canine vocal signal analysis

DOI: <https://doi.org/10.5281/zenodo.22077923>

HANDWRITTEN SINHALA TEXT RECOGNITION USING DEEP LEARNING

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Handwritten text digitization remains a critical challenge for Sinhala, the native language of over 17 million people in Sri Lanka and one of its two official languages. Despite its widespread use in education, administration, and daily life, existing research on handwritten Sinhala OCR has primarily focused on isolated character classification and small-scale benchmark datasets, with the best available system achieving only approximately 48% character-level accuracy (Character Error Rate: 0.5253) and no prior work delivering a deployable application. This gap directly affects students, academics, and office workers who must manually retype handwritten Sinhala content with no accessible digital alternative. This study presents Akshara Scan, the first known deployable web-based OCR system for handwritten Sinhala, converting characters into editable Unicode text through a two-stage deep learning pipeline: YOLOv8s for spatial character detection and a four-block convolutional neural network (CNN) for per-character classification. Unlike existing decoder-based Transformer architectures, which introduce vocabulary-driven prediction bias, Akshara Scan employs direct character-level CNN classification, eliminating language model dependence at the cost of lacking contextual correction. The CNN was trained on 78,730 real handwritten character images across 410 Sinhala character classes from a publicly available dataset – 69 times more data than the benchmark – though the dataset reflects a limited range of writers and handwriting styles. The YOLOv8s model was trained on synthetically generated sentence images, achieving mAP50 of 0.9950. The CNN classifier achieved 94.64% isolated character accuracy on 11,806 held-out test images, compared to the benchmark's ~48% accuracy. Formal end-to-end CER evaluation on diverse real-world handwriting remains a key direction for future work, as current detection validation relies on synthetically generated images. Multi-line and full-page recognition is outside the current prototype scope and a direction for future work. The system runs locally as a web application with per-character confidence indicators supporting both image upload and camera capture.

Keywords: Sinhala handwriting recognition; optical character recognition; deep learning; YOLOv8; convolutional neural network; Unicode

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SMART INGREDIENT AWARE CONVERSATIONAL RECIPE RECOMMENDATION SYSTEM FOR HOUSEHOLD FOOD WASTE REDUCTION USING NLP AND TF - IDF SIMILARITY MODELING

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Food waste is a significant global challenge contributing to environmental degradation and economic loss. A considerable proportion of household food waste stems from ineffective meal planning and limited awareness of available ingredient utilization. Existing recipe recommendation systems primarily rely on keyword - based searches or static collections, offering limited contextual understanding of user ingredients. This study proposes an ingredient - aware conversational recommendation framework that combines NLP - based ingredient extraction, TF - IDF similarity modelling, and ingredient coverage scoring to reduce household food waste. User inputs are preprocessed through text cleaning, lowercase conversion, tokenization, and ingredient extraction to normalize expressions. Recipe ingredient profiles are represented using TF - IDF vectorization, while cosine similarity identifies relevant recipes from a curated dataset of 5,000 recipes and 1,200 unique ingredients. An ingredient coverage scoring mechanism ranks candidate recipes by available ingredient utilization, maximizing existing ingredients while minimizing additional requirements. Experimental evaluation demonstrated strong contextual retrieval performance (Precision@5 = 0.84, Recall@5 = 0.79), with the scoring mechanism consistently prioritizing recipes requiring minimal additional ingredients. The system was developed using Flutter, FastAPI, MySQL, Firebase Authentication, and Python - based NLP components. The NLP intent classification model was iteratively enhanced through dataset expansion, feature engineering, and Logistic Regression parameter tuning, achieving an intent classification accuracy improvement from 41.0% to 67.2%. Comprehensive system validation through unit, integration, and system testing confirmed functional reliability and architectural robustness. A requirement analysis survey of approximately 40 participants validated strong practical demand for ingredient - aware conversational systems and indicated favorable user acceptance of the chatbot interface. The proposed system demonstrates the feasibility of integrating conversational AI, NLP, and similarity - based recommendation techniques to deliver contextually relevant recipe suggestions. The findings indicate substantial potential to support sustainable household cooking practices and contribute to reducing avoidable household food waste.

Keywords: Food waste reduction; Conversational AI; Recipe Recommendation; Natural Language Processing; TF – IDF; Cosine Similarity; Smart Chatbot.

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MELANOMA SKIN CANCER DETECTION MOBILE APPLICATION USING DEEP LEARNING

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Melanoma is one of the most aggressive forms of skin cancer, and delayed diagnosis significantly reduces the chances of successful treatment. Early identification of suspicious skin lesions is essential for improving patient outcomes. Although several deep learning-based melanoma detection systems have been developed, many existing solutions require clinical equipment, are not easily accessible to the general public, or provide limited support through mobile platforms. This creates a need for an accurate, accessible, and user-friendly mobile application for preliminary melanoma screening. This study presents the design and development of a mobile application for melanoma skin cancer detection using a Convolutional Neural Network (CNN). The CNN model was trained using a labelled dermoscopic image dataset containing melanoma and non-melanoma skin lesion images. The model automatically extracts image features and classifies skin lesions through a deep learning-based image classification process. The trained model is integrated into a mobile application that enables users to capture or upload skin lesion images and receive prediction results through a simple and intuitive interface. The application also provides general health guidance and recommends professional medical consultation when a potentially high-risk lesion is detected. The experimental evaluation demonstrated promising classification performance, achieving an accuracy of 92% in melanoma detection. The model was further evaluated using Precision, Recall, and F1-score to measure its classification effectiveness and reliability. Compared with existing mobile screening solutions, the proposed application combines accurate CNN-based image classification with an easy-to-use mobile platform, improving accessibility to early melanoma screening while reducing dependence on specialized medical equipment. The proposed system is not intended to replace clinical diagnosis; instead, it serves as a decision-support tool that encourages early medical consultation and improves access to preliminary melanoma screening, particularly in regions where dermatological services are limited.

Keywords: Melanoma; Skin Cancer Detection; Convolutional Neural Network; Deep Learning; Mobile Health; Image Classification

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FAKE NEWS DETECTION ON SOCIAL MEDIA USING ARTIFICIAL INTELLIGENCE AND DEEP LEARNING TECHNIQUES

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The proliferation of social media platforms has transformed global information dissemination, yet it has simultaneously amplified the spread of fake news and misinformation, posing significant threats to public trust, democratic discourse, and societal stability. While numerous machine learning approaches have been proposed for automated misinformation detection, existing studies often lack comprehensive comparative analyses between traditional classification models and deep learning architectures, particularly regarding their performance on social media textual content. This study presents a comparative framework for fake news detection that systematically evaluates traditional machine learning models against deep learning architectures on a large-scale benchmark dataset. A total of 44,898 news articles were collected and curated from multiple online sources, comprising 21,417 authentic news articles (47.7%) and 23,481 fabricated news articles (52.3%). The textual content underwent systematic preprocessing, including data cleaning, tokenization, and TF-IDF vectorization, followed by a comparative evaluation using Logistic Regression, Random Forest, and Long Short-Term Memory (LSTM) neural networks under an 80/20 train-test split protocol. The experimental results demonstrate that the LSTM model achieved superior performance with an accuracy of 98.6%, precision of 98.5%, recall of 98.7%, and F1-score of 98.6%, significantly outperforming the Random Forest (97.4% accuracy, 97.3% precision, 97.5% recall, 97.4% F1-score) and Logistic Regression (96.2% accuracy, 96.1% precision, 96.3% recall, 96.2% F1-score) baseline models. The comparative analysis reveals that deep learning methods effectively capture sequential contextual dependencies and semantic relationships within news text, thereby enhancing the reliability and robustness of automated misinformation detection. These findings contribute to the field of intelligent information security by providing a reproducible, scalable methodology and empirical evidence for the efficacy of deep learning in social media fake news detection. Future research directions include the integration of transformer-based architectures such as BERT and RoBERTa, real-time deployment on live social media streams, and multilingual misinformation detection.

Keywords: Fake News Detection; Misinformation Detection; Social Media; Long Short-Term Memory; Text Classification; Deep Learning; Natural Language Processing; Machine Learning, Artificial Intelligence

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OBEDIENCE IS NOT SAFETY: EVALUATING AUTHORITY CONFUSION AND PROMPT INJECTION IN AI DATA AGENTS

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Natural-language AI data agents translate business questions into SQL and conversational findings, but fluent structured output does not prove authorised instruction-following. Existing text-to-SQL benchmarks, including Spider and BIRD, offer limited evidence on role-boundary preservation under false authority claims, prompt injection, or data-embedded malicious instructions. This study introduces DataAgent-SafeBench, a controlled framework measuring functional correctness and safe instruction handling. The benchmark contains 120 cases across five synthetic domains: 30 benign, 15 underspecified, 15 privilege-escalation, 15 direct-injection, 15 indirect-injection, 10 prompt-disclosure, 10 hallucination-trap, and 10 jailbreak/task-escape. Three model families were evaluated through NVIDIA NIM with a fixed prompt, temperature 0, read-only SQLite execution, deterministic result-equivalence scoring, and two repetitions per case, yielding 720 evaluations; attack success used 75 adversarial cases per model (150 observations). Metrics, reported with Wilson 95% confidence intervals, cover task, benign, and attack success, JSON conformance, refusal correctness, authority handling, and sensitive-data disclosure. Llama 3.1 8B achieved 68.3% task success (CI 62.2–73.9%), 91.7% benign success, 9.3% attack success, 87.5% JSON conformance, 56.7% refusal correctness, and 69.2% authority handling. GPT-OSS 20B achieved 61.2%, 25.0%, 16.0%, 67.1%, 83.3%, and 81.5% on the same metrics. Nemotron Mini 4B achieved 55.8%, 80.0%, 37.3%, 99.2%, 37.3%, and 66.2%. Holm-adjusted paired exact McNemar tests showed Nemotron exceeded Llama in attack success by 28.0 percentage points (adjusted $p < 0.001$) and GPT-OSS by 21.3 points (adjusted $p < 0.001$), while Llama and GPT-OSS differed by 6.7 points (adjusted $p = 0.087$). No model disclosed a planted canary. A separate Kimi K3 exploratory arm (20 templates, 60 executions, two reviewers) identified jailbreak compliance in the task-escape family, reported separately from the 720 evaluations. Databricks AI/BI Genie remains a historical observation, as updates prevent exact reproduction. DataAgent-SafeBench shows that fluent, structured outputs are not evidence of authorised behaviour.

Keywords: AI data agents; authority confusion; prompt injection; jailbreak evaluation; text-to-SQL; behavioural alignment

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AI-BASED DEEPFAKE DETECTION SYSTEM FOR PREVENTING IDENTITY FRAUD AND SOCIAL ENGINEERING ATTACKS

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The proliferation of generative artificial intelligence (AI) technologies, particularly Generative Adversarial Networks (GANs) and diffusion-based models, has catalyzed the synthesis of hyper-realistic deepfake media, introducing severe cybersecurity vulnerabilities spanning identity fraud, chief executive officer (CEO) impersonation, and advanced social engineering attacks. Existing deep learning-based detection approaches predominantly rely on standard transfer learning without attention-driven artifact localization, and evaluations report only aggregate metrics that obscure per-manipulation performance, constraining their operational utility in cybersecurity workflows. This study proposes an attention-enhanced deepfake detection framework built on EfficientNetB0 augmented with a Squeeze-and-Excitation (SE) attention module to adaptively recalibrate channel-wise feature responses, directing the model to prioritize discriminative manipulation artifacts including blending boundary inconsistencies and colour distribution anomalies. The system was trained and evaluated on the FaceForensics++ benchmark, comprising 1,000 authentic and 4,000 manipulated video sequences produced via four methods: Deepfakes, Face2Face, FaceSwap, and NeuralTextures. A total of 140,000 face-cropped frames were extracted via MTCNN-based face detection, preprocessed with data augmentation, and partitioned into training (70%), validation (15%), and testing (15%) subsets. Training employed the Adam optimizer with a learning rate of 0.0001 and binary cross-entropy loss over 25 epochs with early stopping. On compressed (c23) data, the proposed model achieved an accuracy of 96.4%, precision of 95.8%, recall of 96.1%, F1-score of 95.9%, and an area under the receiver operating characteristic curve of 97.2%. Per-manipulation analysis revealed F1-scores of 97.5% for Deepfakes, 96.2% for Face2Face, 95.1% for FaceSwap, and 94.8% for NeuralTextures, with the highest detection performance on Deepfakes and the most challenging detection on NeuralTextures. Ablation studies confirmed that the SE attention module yielded a consistent 2.8 percentage point improvement over the baseline EfficientNetB0, underscoring the critical role of attention-enhanced architectures in strengthening cybersecurity defences against deepfake-driven social engineering threats.

Keywords: Deepfake detection; artificial intelligence; cybersecurity; EfficientNet; attention mechanism; social engineering.

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STATISTICAL LEARNING – DRIVEN AI FRAMEWORK FOR INTELLIGENT AND SCALABLE DATA RECORD MATCHING

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The proliferation of digital information across heterogeneous enterprise systems and distributed repositories has created significant challenges in accurately identifying relationships among records originating from disparate datasets. Real-world data are often incomplete, inconsistent, and syntactically diverse, limiting the effectiveness of conventional rule-based matching approaches that depend primarily on exact comparisons and manually defined heuristics. To address these limitations, an artificial intelligence–driven data matching framework based on statistical learning principles was developed to improve the accuracy, adaptability, and scalability of large-scale record linkage. The framework evaluated three supervised learning algorithms—Logistic Regression as a probabilistic baseline, Random Forest, and XGBoost—using a set of engineered similarity features. These features were generated from Jaro-Winkler string similarity, Levenshtein edit distance, and TF-IDF-based cosine similarity to capture lexical, structural, and contextual relationships between records. A comprehensive preprocessing pipeline incorporating data cleaning, normalization, transformation, and discriminative feature extraction was applied to improve data consistency and reduce the impact of noise and variability. The resulting feature representations were subsequently used to train and evaluate the classification models for identifying matching and non-matching record pairs. Performance was evaluated using accuracy, precision, recall, and F1-score. Experimental results obtained from benchmark record linkage datasets demonstrated that XGBoost achieved the best overall performance, attaining an F1-score of 76.2%. The findings demonstrated that combining statistical similarity measures with supervised ensemble learning provided a more flexible approach to handling ambiguous matches, partial matches, and typographical variations than conventional deterministic techniques. The developed framework demonstrated potential for application in diverse domains, including customer relationship management, recruitment platforms, recommendation systems, and other data integration and record linkage environments. Overall, the study established a practical, scalable, and robust AI-driven approach for intelligent data matching, supporting more reliable and efficient automated data integration and decision-making.

Keywords: Data matching; statistical learning; machine learning; record linkage; similarity measures; artificial intelligence; ensemble learning; Random Forest; XGBoost; Logistic Regression

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AN EMPIRICALLY REFINED HUMAN-CENTERED EXPLAINABLE AI DECISION-SUPPORT FRAMEWORK FOR EMPLOYEE PERFORMANCE APPRAISAL: EVIDENCE FROM SRI LANKAN EMPLOYEES

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Performance appraisal supports employee development and organizational decisions, yet conventional approaches remain vulnerable to subjectivity, evaluator bias, inconsistent judgement, and limited transparency. Although Artificial Intelligence (AI) may enable more structured appraisal, evidence on perceptions of fairness, transparency, explainability, usefulness, trust, privacy, human oversight, and acceptance remains limited in Sri Lanka. This study developed and empirically refined a conceptual human-centered Explainable AI (XAI) decision-support framework. The framework comprises job-relevant data inputs, advisory AI analysis, understandable explanations, fairness and privacy safeguards, managerial authority to question, modify, or reject recommendations, and employee clarification and correction mechanisms, while managers retain responsibility for final decisions. Grounded in the Technology Acceptance Model, Organizational Justice Theory, and principles of trustworthy, human-centered AI, the study employed a quantitative, cross-sectional survey via Google Form. Participants were selected through non-probability purposive sampling with predefined eligibility criteria, using convenience and professional networks. Following informed consent, anonymous data collection, eligibility screening, and duplicate removal, 127 responses were analyzed. The 32-item questionnaire operationalized eight constructs using four five-point Likert-scale items per construct, adapted from established technology-acceptance, organizational-justice, trust-in-automation, privacy-concern, and XAI-acceptance measures. Descriptive statistics, Cronbach's alpha, Pearson correlations, and simultaneous multiple regression were applied. All constructs demonstrated acceptable reliability ($\alpha = .761-.858$). The model was significant, $F(7, 119) = 15.273$, $p < .001$, explaining 47.3% of the variance in employee acceptance ($R^2 = .473$, adjusted $R^2 = .442$). Perceived fairness positively predicted acceptance ($\beta = .244$, $p = .004$), whereas privacy concern negatively predicted acceptance ($\beta = -.221$, $p = .002$). The remaining constructs correlated significantly with acceptance but showed no significant unique effects. The findings support fairness-centered, privacy-conscious, and human-accountable XAI adoption while reflecting anticipated acceptance rather than implementation outcomes. The study contributes Sri Lankan employee evidence and a refined framework for responsible AI adoption in Human Resource Management.

Keywords: Explainable Artificial Intelligence (XAI); Employee Performance Appraisal; Perceived Fairness; Privacy Concern; Human-Centered AI.

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Track 1 - ARTIFICIAL INTELLIGENCE & DATA SCIENCE

Posters

**PSYCHOLOGICALLY-INFORMED AI FOR URBAN MOVEMENT PREDICTION
USING CCTV AND FACIAL RE-IDENTIFICATION**

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**BRIDGING CULTURES THROUGH AI: INTELLIGENT RESUME OPTIMIZATION
AND GENERATION ACROSS DIFFERENT PROFESSIONAL STANDARDS**

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**AN AI AND NLP - DRIVEN CAREER PATH AND INTELLIGENT RECRUITMENT
SYSTEM FOR PERSONALIZED JOB MATCHING AND PROFESSIONAL
DEVELOPMENT**

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Track 2 - SOFTWARE ENGINEERING & CYBERSECURITY

Abstract Papers

DESIGN AND EVALUATION OF A SEQUENTIAL DUAL-BUCKET TRAFFIC POLICING MECHANISM FOR MITIGATING LOGIN STORMS

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Modern web applications are increasingly exposed to sudden, massive surges in concurrent authentication requests, commonly referred to as login storms. Existing single-stage traffic policing mechanisms, namely the standalone leaky bucket and token bucket algorithms, force an architectural trade-off during these transient events: standalone token buckets allow burst traffic but expose computationally intensive backend authentication systems to destructive concurrency spikes, whereas standalone leaky buckets enforce steady-state limits but immediately discard excess traffic. This research addresses this gap by proposing a Sequential Dual-Bucket (SDB) traffic policing mechanism implemented as an API gateway middleware utilizing a Node.js engine and a Redis-backed First-In, First-Out (FIFO) leaky queue buffer. The architecture pipelines both algorithms: when the token bucket capacity is exhausted during a login storm, excess concurrent requests are dynamically redirected to the leaky queue to be processed progressively at the steady-state refill rate rather than being immediately rejected. To rigorously validate the architecture, a Python-based discrete simulation engine modeled background traffic (5 requests/sec via a Poisson process) combined with severe transient spikes (15 simultaneous requests every 3.0 seconds) across $N = 30$ independent trials using Common Random Numbers (CRN). Empirical results demonstrated that the proposed SDB architecture ($Q = 10$) achieved a mean request drop rate of 46.71% compared to 48.41% in the baseline token-only configuration. While the relative drop rate reduction under this highly saturated stress load is 3.51%, the architecture demonstrates a Cohen's d effect size of 1.28, denoting a highly practical and large statistical effect. Parametric and non-parametric statistical inferences including Welch's t-test ($t = 4.94$), Mann-Whitney U ($U = 173.0$), and a One-Way ANOVA ($F = 180.63$) consistently confirmed that the drop rate reductions were highly statistically significant ($p < 0.001$), successfully rejecting the null hypothesis. The proposed architecture provides a verified, statistically sound, and production-ready traffic policing mechanism that stabilizes high-traffic authentication gateways during acute concurrency spikes without incurring systemic backend failure.

Keywords: API Gateway; Authentication Middleware; Login Storm; Redis Queue; Statistical Validation; Traffic Policing Mechanism

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A SEMANTIC SELF-HEALING FRAMEWORK FOR DATA PIPELINES USING LIGHTWEIGHT LARGE LANGUAGE MODELS

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Contemporary data integration frameworks often encounter errors because of unforeseen alterations in incoming data streams. Although conventional schema validation methods effectively address structural inconsistencies, they are inherently unable to detect minor changes in semantic meaning, permitting inconsistent data to flow into subsequent Machine Learning (ML) models. This research presents an independent, semantic self-repair system integrated directly into data pipelines utilizing a localized, lightweight Large Language Model (LLM)—namely Llama-3-8B—operating as an automated semantic safeguard. Functioning through tailored few-shot prompt engineering techniques in local Python scripts, the framework persistently observes ingestion streams relative to predetermined contextual baselines, adaptively recognizing discrepancies. Upon detecting anomalies, a fixed decision-making process determines if payloads should be denied or automatically modified to fit the anticipated domain context. The framework underwent thorough validation by employing a generated text-stream derivative of the UCI Heart Disease dataset, which included deliberate semantic contextual anomalies (such as corrupted clinical logs and inverted symptom sentiments), and was assessed against conventional rule-based and sentence-embedding similarity standards. Experimental findings indicate that the suggested framework attains a semantic correction accuracy of 94.2%, a precision of 91.8%, and an F1-score of 92.9%. Moreover, assessments of system performance show a consistent processing throughput with an average latency of 142 ms per payload, successfully reducing the risks of LLM hallucination and pipeline stagnation through stringent Pydantic schema protections. This research establishes an adaptive, production-ready data engineering model that ensures data reliability for contemporary AI systems by transitioning from strict structural validation to independent semantic self-repair.

Keywords: Semantic Anomaly Identification; Extensive Language Models; Data Workflows; Semantic Safeguards; Smart Automation; Data Integrity.

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REAL-TIME PHISHING DETECTION USING AN AI-DRIVEN BROWSER EXTENSION

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Phishing attacks remain a critical threat across digital banking, online payments, academic portals, and personal communications. The rise of AI - generated phishing content, including convincing emails, fake login pages, and malicious URLs, has outpaced traditional security mechanisms. Existing blacklist - based systems are inherently reactive, failing to intercept zero-day phishing links that have not yet been reported. Many machine - learning approaches, while effective, demand substantial computational resources that render them impractical for real - time browser level deployment. This paper proposes an AI-driven browser extension that performs real - time phishing detection at the point of user interaction. The extension captures URLs during hover or click events, extracts structural URL features such as length, subdomain count, suspicious symbols, and obfuscation patterns, and transmits them to a lightweight AI backend. Concurrently, a natural language processing model specifically TinyBERT analyzes surrounding page text for urgency, deception, and brand-impersonation cues. The backend fuses structural URL indicators with contextual NLP signals to classify links as safe or phishing in real time, triggering an immediate pop-up warning when a threat is detected. Unlike prior blacklist and offline - learning approaches, the proposed system introduces a browser - triggered, dual-signal pipeline optimized for low - latency detection of previously unseen phishing pages without relying on historical reports. Performance will be evaluated on a hybrid dataset combining phishing URLs from PhishTank with legitimate URLs from the ISCX URL Dataset and Alexa Top Domains, with comparative benchmarks against representative blacklist and machine-learning baselines under controlled browser conditions. The system is expected to achieve greater than 95% classification accuracy with processing latency under 0.8 seconds. Limitations include dependence on surrounding text availability, reduced effectiveness on heavily obfuscated or image - only phishing pages, and the need for continuous model updates as attack patterns evolve. This research contributes a practical, low - latency browser security solution capable of detecting zero - day phishing attempts before users expose sensitive credentials or financial information.

Keywords: Phishing detection; AI-driven browser extension; cybersecurity; zero-day attacks; TinyBERT; natural language processing; URL feature engineering; real-time protection; machine learning

DOI: <https://doi.org/10.5281/zenodo.22118731>

Track 2 - SOFTWARE ENGINEERING & CYBERSECURITY

Posters

SECURITY ASSESSMENT OF STUDENT RUN CAPTURE THE FLAG PLATFORMS USING CTFD

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AI-ASSISTED CLOUD COST AND INCIDENT ADVISOR FOR SMALL-SCALE ACADEMIC WEB SERVICES

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CRWLEAVE – A SMART SHORE LEAVE TRAVEL GUIDE PLATFORM FOR SEAFARERS

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HYBRID POST - QUANTUM CRYPTOGRAPHIC TRANSITION FRAMEWORK FOR CRITICAL INFRASTRUCTURE SECURITY

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Track 3 - IoT, EMBEDDED SYSTEMS & SMART TECHNOLOGIES

Abstract papers

IMAGE BASED IDENTIFICATION SYSTEM FOR COMMON EDIBLE FISH SPECIES WITH CONSUMER GUIDANCE

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Seafood serves as a vital protein source worldwide, yet supply chains face challenges with species mislabeling and rapid spoilage. Traditional freshness assessment relies on subjective evaluation, while methods like DNA barcoding remain unfeasible for everyday vendors and consumers. A major gap in existing research is that current models either restrict analysis to a single species or require users to manually separate body, eye, and gill images. To address this, this study developed FishGuard AI, a mobile-first, cloud-based tool designed to provide accessible species verification for the public. Built using a Flask framework, the system is engineered around a dual-pipeline deep learning architecture leveraging optimized VGG-16 and VGG-19 Convolutional Neural Networks (CNNs). The first pipeline utilizes a 9,000-image dataset from open repositories and web-scraping to execute classification across 9 fish species. Upon identification, the system automatically activates a second pipeline trained on high-resolution localized crops of eyes and gills. This cropping method explicitly handles real-world deployment challenges, allowing the system to function accurately despite complex backgrounds and variable lighting. Both models used a strict 60:20:20 split to evaluate performance and monitor for potential overfitting. To adhere to ethical "explainable AI" standards, Grad-CAM heatmaps are generated alongside text-based confidence scores to visually justify focus areas, using a 70% threshold to output an "Unknown Species" classification for out-of-distribution inputs. Empirical results demonstrate excellent convergence, with the species identification pipeline achieved 94.5% test accuracy, while the multi-step freshness detection pipeline achieved a 92.8% test accuracy. While functioning as a prototype rather than a regulatory authority, this project demonstrates how a dual-pipeline mobile computer vision system can actively mitigate food fraud and improve community food safety.

Keywords: Convolutional Neural Networks (VGG-16,VGG19); Image classification; Dual-Pipeline Architecture; Food safety

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AI-ENABLED IOT-BASED REAL-TIME PREDICTIVE HAZARD DETECTION SYSTEM FOR HIGH-RISE CONSTRUCTION SAFETY

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High-rise construction sites expose workers to hazards such as falls, abnormal movements, physiological stress, and hazardous environmental conditions. In Sri Lanka, safety monitoring still relies heavily on manual supervision and reactive responses, while existing IoT-based systems primarily use static threshold-based alerts with limited capability to analyze multi-modal temporal sensor data. This research proposes an AI-enabled IoT-based predictive hazard detection framework for proactive construction safety management. The proposed system uses an ESP32-WROOM-based wearable with motion, physiological, and environmental sensors: HC-SR501, MPU6050, MAX30102, SHT75, and MQ-135. Sensor data collected at 10-second intervals are transmitted via MQTT for cloud storage and real-time monitoring. A hybrid RF-LSTM model is developed; RF handles feature classification, while LSTM captures temporal patterns for early detection. The dataset included over 50,000 samples gathered during two weeks in three different locations with respect to normal operation, fall detection, abnormal activity, physiological stress, and hazardous environment. The system reached above 96.78% accuracy with 150–220 ms latency to provide a dynamic risk of hazards and warning rather than threshold. In conclusion, the proposed framework provided a cost-effective, scalable, and smart solution for safety using wearable IoT, MQTT, sensors fusion, and AI-based prediction. The limitations of the research were related to reliance on labelled data, calibration of the sensors, and communication. Future work will be directed towards large-scale experiments and edge AI.

Keywords: Artificial Intelligence; Internet of Things (IoT), Construction Safety; Predictive Analytics; Sensor Fusion, Random Forest; Long Short-Term Memory; MQT; Wearable Monitoring

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IOT-BASED PREDICTIVE SMART PEST MANAGEMENT SYSTEM USING ENVIRONMENTAL RISK ANALYSIS AND ADAPTIVE MICRO-SPRAYING

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Pest infestations and plant diseases challenge greenhouse cultivation and small-scale agriculture by reducing crop yield and increasing pesticide use, operational costs, and environmental pollution. Conventional pest management relies on reactive pesticide application after visible symptoms appear, resulting in delayed responses and unnecessary chemical usage. This research proposes an Internet of Things (IoT)-based predictive smart pest management system that integrates environmental risk analysis, edge intelligence, and adaptive micro-spraying control for sustainable plant protection. The proposed system uses an ESP32-based edge computing platform integrated with temperature, humidity, soil moisture, and leaf wetness sensors for real-time greenhouse monitoring. An Adaptive Pest Risk Prediction and Micro-Spraying Optimization (APR-MSO) algorithm estimates pest infestation probability using a weighted fuzzy inference mechanism. The fuzzy model uses predefined membership functions and expert-defined rules to classify pest risk as low, medium, or high. Fuzzy logic handles uncertain environmental conditions with lower computational requirements than conventional machine learning approaches. The model was validated using greenhouse environmental measurements and observed pest infestation data. Experimental results demonstrated that the system achieved a pest risk prediction accuracy of 77.4%, an average edge-based decision response time of 0.0127 seconds, and a pesticide reduction of 41.43% compared with conventional fixed spraying methods. The system achieved 97.6% operational reliability during continuous monitoring and adaptive spraying experiments. Unlike existing IoT-based pest management systems that focus on environmental monitoring or threshold-based automation, the proposed framework integrates predictive risk assessment, edge intelligence, and adaptive micro-spraying optimization within a low-cost architecture. The approach enables localized pesticide application, reduces unnecessary chemical use, and improves pest management capabilities without relying on cloud processing. Limitations include dependence on sensor calibration, expert-defined fuzzy rules, greenhouse-scale validation, and the requirement for larger multi-crop datasets. The proposed framework contributes toward precision agriculture by providing a scalable, resource-efficient, and environmentally sustainable solution for greenhouse and small-scale farming.

Keywords: Smart Pest Management; Internet of Things (IoT); ESP32; Edge Intelligence; Fuzzy Logic; Predictive Agriculture; Adaptive Micro-Spraying; Precision Farming

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REAL-TIME PERSONALIZED OBJECT RECOGNITION AND AUDIO GUIDANCE SYSTEM FOR VISUALLY IMPAIRED INDIVIDUALS USING EMBEDDED AI

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Visual impairment affects more than 2.2 billion people worldwide, according to the World Health Organization, severely limiting the ability of individuals to locate and identify personal belongings such as bottles, wallets, cups, and mobile phones within indoor environments. Although existing assistive technologies address navigation and obstacle avoidance, no low-cost embedded solution currently supports personalized object recognition capable of distinguishing a specific user's item from visually similar objects belonging to others. This paper addresses that gap by presenting the design and implementation of a Personalized Object Recognition System deployed on a Raspberry Pi 4 Model B, providing real-time spoken audio guidance. The principal novelty lies in a two-gate cosine similarity matching mechanism that fuses MobileNetV3 deep feature embeddings with color histogram signatures and edge descriptors, enabling user-specific object discrimination after a one-time registration procedure involving five reference images per object. This feature fusion strategy is integrated within a dual-model detection pipeline combining a custom YOLOv8 model trained on a domain-specific dataset of 1,200 annotated images across six object categories with the general-purpose YOLOv8n model, allowing simultaneous handling of personalized and common objects. Using a monocular pinhole camera model calibrated under controlled indoor settings using ArUco markers, distance estimation reduces mean distance estimation error from 17.5% to 2.9% over an operating range of 0.3–2.0 m. A mean Average Precision (mAP) of 95.8% at IoU 0.50 on a custom test set of 240 images and a 94% true positive rate with a 3% false positive rate across 30 evaluation sessions were attained by the system under various indoor illumination conditions. On the Raspberry Pi 4, real-time inference runs at about 4, 5 frames per second, demonstrating feasible on-device deployability. The suggested system provides an accessible and efficient assistive solution for enhancing the everyday independence of visually impaired people in resource-constrained situations, with an estimated total hardware cost of USD 75.

Keywords: Personal Object Recognition; Visual Impairment; Assistive Technology; MobileNetV3; Raspberry Pi; Embedded AI.

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EMISSIONWATCH: A HYBRID AI FRAMEWORK FOR PREDICTIVE VEHICLE EMISSION MONITORING IN SRI LANKA

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Currently, Sri Lanka checks vehicle emissions annually and manually at Vehicle Emission Testing (VET) centers, so a vehicle's condition goes unmonitored between tests. Globally, Internet-of-Things (IoT)-based emission monitoring systems exist, but most only alert rather than establish what a specific vehicle should be emitting. EmissionWatch's core AI contribution is a learned, per-vehicle emission baseline that replaces this fixed-threshold approach: a linear regression model, trained and 5-fold cross-validated on 5,592 of 5,815 real-world vehicle specifications from Government of Canada fuel-consumption ratings (engine size, fuel type), predicts a new vehicle's reference CO₂ emissions ($R^2 = 0.71$, MAE = 21.3 g/km), replacing a fixed per-fuel-type constant that had no empirical basis. EmissionWatch reads carbon dioxide (CO₂), carbon monoxide (CO), and nitrogen oxides (NO_x) from the vehicle's On-Board Diagnostics (OBD-II) port alongside mileage. This baseline is adjusted to the vehicle's current condition using rule-based age and mileage degradation penalties, then live readings are compared against the personalized baseline to classify the vehicle as Healthy, Warning, or Critical and detect anomalies. Session outcomes update a bounded 0-1000 EcoScore through weighted deltas from +20 to -30, based on the proportion of Healthy, Warning, and Critical readings in each session, with positive updates locked while a vehicle remains Critical; the score drives automated alert escalation and service-center inspection discounts. Validation used the model's held-out performance alongside structured simulated batch datasets spanning healthy, warning, critical, and sudden-spike scenarios across all user roles. Limitations include reliance on non-local training data, diesel underrepresentation (12.5% vs 9.0% mean error), an unvalidated degradation layer, and simulated rather than live OBD-II data; future work targets Sri Lanka-specific fleet data. While prior IoT systems stop at alerting and eco-driving scores are driver-centric, EmissionWatch ties a data-driven, vehicle-condition score to a real repair incentive, tailored to Sri Lanka's combustion-heavy fleet.

Keywords: vehicle emission monitoring; hybrid AI framework; OBD-II; EcoScore; predictive maintenance

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IOT-BASED WEARABLE ENVIRONMENTAL HEAT STRESS MONITORING SYSTEM WITH PREDICTIVE RISK ASSESSMENT FOR CONSTRUCTION WORKERS

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Heat stress is a major occupational health and safety concern in industrial and high-temperature working environments, where excessive exposure to heat can negatively affect worker health, productivity, and safety. Existing commercial Wet Bulb Globe Temperature (WBGT) monitoring systems are often expensive and mainly provide passive environmental measurements without offering real-time decision support or actionable safety recommendations. This research addresses these limitations by developing a low-cost IoT-based WBGT heat stress monitoring system with real-time dashboard visualization and adaptive workplace safety recommendations. The proposed system utilizes temperature and humidity sensors connected to an ESP32 microcontroller for real-time environmental data acquisition. The system calculates WBGT values using standard heat stress equations and classifies environmental conditions into safe, warning, and dangerous levels. A custom dashboard, along with LED indicators and a sound alert system, was developed to visualize environmental conditions and provide real-time warnings. In addition, the system generates safety recommendations by estimating the required temperature reduction to restore safe working conditions. A predictive heat stress risk algorithm is also introduced to forecast unsafe working conditions before critical exposure occurs. The proposed solution enhances workplace awareness and supports industrial safety decision-making through a clear and user-friendly interface. Compared to conventional monitoring systems, it offers a low-cost, scalable, and practical approach to occupational heat stress management. The research contributes to embedded systems, environmental monitoring, and occupational safety, while supporting modern industrial health management practices aligned with smart monitoring technologies.

Keywords: IoT; WBGT; Heat Stress Monitoring; Occupational Safety; ESP32; Predictive Analytics; Environmental Monitoring; Wearable System

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LANKA FOODTRACE: A BLOCKCHAIN-ENABLED FOOD TRACEABILITY AND MARKETPLACE SYSTEM WITH MACHINE LEARNING-BASED WASTE PREDICTION FOR SMALLHOLDER FARMERS IN SRI LANKA

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Food supply chains in Sri Lanka operate through manual, fragmented workflows, disadvantaging smallholder farmers. Existing blockchain traceability systems such as IBM Food Trust, OriginTrail, and FoodLogiQ target large enterprises, cost \$5,000-50,000 annually, and lack a marketplace; a weighted comparison confirmed none serves smallholder Sri Lanka. This paper presents Lanka FoodTrace, a lightweight blockchain traceability and marketplace platform with machine learning-based waste prediction. Events are recorded in an append-only, cryptographically-hashed ledger with atomic state transitions, migration-ready for an Ethereum smart contract via a pre-built adapter. A two-step verification at submission catches erroneous or fraudulent entries before commitment. A role-based platform serves farmers, distributors, retailers, and administrators; consumers trace via QR code. A Random Forest classifier (100 trees, max depth 8, class-balanced) was trained on eight features (category, days-to-expiry, quantity, transit duration, storage conditions, temperature, quality grade, and district) using an 80/20 split of a 2,000-record synthetic dataset approximating Sri Lankan farm and retail conditions. It achieved 94.5% accuracy and ROC-AUC 0.9906. As the dataset is synthetic rather than field-collected, these figures reflect separability in simulated data rather than real-world performance, and are best read as a proof-of-concept ceiling pending real-data validation. 5-fold cross-validation returned a closely matching 94.0% mean accuracy (SD 0.89%), the strongest evidence against overfitting. The blockchain layer used simulated event logging, with a single-function-call migration path to Solidity. A live Etherscan snapshot (0.15 gwei, ETH approx. \$1,868) puts one on-chain event at \$0.03, but at the moderate congestion Ethereum typically sees (approx. 10 gwei), the same event costs closer to \$2.20 (LKR 740), a material cost for a farmer logging many events per harvest. Hardware cost, connectivity, and digital literacy gaps are deployment barriers. The framework offers a technically feasible, cost-accessible approach to reducing waste in smallholder-dominated supply chains, with mainnet deployment and real-world validation as next steps.

Keywords: Blockchain; food traceability; machine learning; smart contracts; smallholder farmers; waste prediction

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ENHANCING CROP YIELD PREDICTION USING CATBOOST: A MACHINE LEARNING APPROACH FOR PRECISION AGRICULTURE IN SOUTH ASIA

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The Yield Prediction module helps farmers make data-driven crop planning decisions to boost productivity, but accurate predictions remain difficult due to weather variability, differing farming practices, resource constraints, and environmental uncertainty. The proposed module employs the CatBoost algorithm, a gradient-boosting framework capable of effectively handling categorical features and modelling complex nonlinear relationships with minimal preprocessing. The framework was developed and evaluated using the South Indian Crop Yield Dataset obtained from Kaggle, comprising over 50,000 agricultural records with attributes including crop type, cultivation area, agricultural season, rainfall, fertilizer usage, pesticide usage, production, and regional characteristics. Data preprocessing involved handling missing values, encoding categorical variables, and feature engineering to derive interaction-based agricultural features that improve predictive performance. The dataset was divided into training and testing sets using an 80:20 split, and model performance was validated using 5-fold cross-validation. Hyperparameters were optimized through grid search, and model performance was evaluated using R^2 , RMSE, MAE, and MSE. The proposed framework compared the performance of Random Forest, XGBoost, CatBoost, Long Short-Term Memory (LSTM), H2O AutoML, and Auto-sklearn. Among these, CatBoost achieved the highest predictive performance with an R^2 score of 0.8891, outperforming the remaining models while requiring comparatively less preprocessing. Unlike previous crop-yield prediction studies that primarily focus on conventional machine learning models or AutoML frameworks, the proposed approach integrates domain-driven feature engineering with CatBoost to improve predictive accuracy while maintaining computational efficiency and interpretability. The findings demonstrate the effectiveness of advanced gradient-boosting techniques for agricultural decision support, enabling farmers to optimize crop planning, resource allocation, and risk management. However, the study is limited to a South Indian agricultural dataset, and therefore the findings should be interpreted within this geographical context. Future work will investigate cross-regional validation, integration of remote sensing and IoT data, early-season yield forecasting, and cloud-based deployment for real-time agricultural decision support.

Keywords: Crop Yield Prediction; Machine Learning; CatBoost; AutoML; Feature Engineering; Long Short-Term Memory; Gradient-Boosting Frameworks; South Asia

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DESIGN AND IMPLEMENTATION OF A SCALABLE AND SECURE PEER TO PEER DELIVERY PLATFORM FOR SUSTAINABLE COMMUNITY LOGISTICS

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The rapid growth of e-commerce and on-demand delivery has intensified the demand for logistics that are fast, reliable, cost-efficient, and environmentally sustainable. Conventional courier systems, however, rely on centralized fleets and fixed routes, resulting in high operational cost, poor route utilization, and avoidable carbon emissions. This paper presents a scalable and secure peer-to-peer (P2P) delivery platform that connects senders with travelers already moving along compatible routes. The principal scientific contribution is a hybrid matching model that jointly evaluates route similarity, user trust level, and delivery time constraints within a unified decision function. Unlike conventional schemes that consider geographic proximity alone, the proposed model ranks candidate carriers by route compatibility together with trustworthiness and temporal feasibility, yielding more suitable matches under practical community-logistics constraints. Security and accountability are enforced through real-time GPS tracking, QR-code parcel verification, identity verification, encrypted communication, and escrow-based payment, mitigating unauthorized access, fraudulent requests, identity misuse, verification abuse, and payment manipulation. The platform is implemented with Next.js for the web client and React Native for mobile. Evaluation combines 850 recorded travel routes, representing realistic mobility patterns, with over 1,200 simulated delivery requests spanning diverse origins, destinations, and time windows; dataset sources and generation procedures are documented with the results to support reproducibility. Scalability is assessed across increasing load levels rather than a single latency measurement. Results show a 25 to 38% reduction in delivery cost, approximately 31% improvement in route utilization, an average matching response time of 320ms under concurrent access, and an 87.6% successful matching rate. Because experiments use a moderate-scale dataset under controlled conditions, higher concurrency and geographically diverse data are needed for full validation. Future work targets machine-learning-based route prediction and blockchain-based trust verification

Keywords: Peer-to-Peer Delivery; Sustainable Logistics; Route Matching; Secure Transactions; Real-Time Tracking; Logistics Information Systems

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MACHINE LEARNING-BASED ELECTRICITY CONSUMPTION PREDICTION AND BILLING SYSTEM FOR SRI LANKAN HOUSEHOLDS

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Managing household electricity consumption has become a growing challenge in Sri Lanka, where a slab-based tariff structure makes monthly bills difficult to predict. Even minor increases in usage can push households into higher pricing brackets, resulting in disproportionately large bills. While tools such as the Ceylon Electricity Board (CEB) Care App and the Public Utilities Commission of Sri Lanka (PUCSL) Calculator exist, these require users to already know their consumption - they calculate costs rather than forecast them. Unlike existing Sri Lankan electricity billing calculators that estimate costs only after electricity consumption is known, the proposed system predicts future household electricity usage and estimates bills in advance using machine learning. This study presents a machine learning-based electricity consumption prediction and billing estimation system designed for Sri Lankan households. The system accepts inputs including household size, past month usage, daily appliance hours for air conditioners, fans, televisions, and refrigerators, along with climate zone, location type, and income level. Since real household data was unavailable due to privacy constraints, a synthetic dataset of 2,400 monthly records across 20 simulated households (2015-2024) was generated, spanning household sizes of 2-9, three income levels, three location types, and three climate zones, with consumption values calibrated against CEB's tariff bands, appliance power ratings, and realistic household usage patterns. Random Forest Regression and Linear Regression were compared using R^2 , Mean Absolute Error (MAE), and Root Mean Squared Error (RMSE). Under the standard 80:20 train-test split, Linear Regression achieved marginally better predictive performance ($R^2 = 0.9704$, MAE = 3.32, RMSE = 4.13) than Random Forest ($R^2 = 0.9670$, MAE = 3.50, RMSE = 4.36). However, when evaluated on an unseen household profile with atypical, extreme appliance-usage values, Linear Regression's performance collapsed (R^2 of -0.37), while Random Forest remained more stable (R^2 of 0.20) with 23% lower RMSE (60.9 versus 79.5), demonstrating better generalization to irregular, non-linear consumption patterns. Random Forest was therefore selected as the primary model for its robustness under real-world variability. A dynamic billing module applies CEB's slab-based tariff and fixed charges from an external file, with a lightweight web interface for input collection and future retraining. With an RMSE of 4.36 units on the primary test set, the system produced consistent, accurate predictions across diverse household profiles, offering a practical energy management tool tailored to the Sri Lankan context.

Keywords: Electricity consumption prediction; Machine learning; Random Forest; Sri Lankan tariff; Household energy management; Synthetic dataset

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LEXSL: RAG-BASED AI-DRIVEN LEGAL CONSULTANT SYSTEM WITH CASE STRENGTH EVALUATION AND SEMANTIC ROLE-AWARE EVIDENCE GROUNDING FOR SRI LANKA.S PLURALISTIC FAMILY LAW

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Citizens navigating legal disputes face limited access to justice where digital tools can widen legal literacy and reduce procedural barriers. Platforms such as AI-Pazz operates as keyword-search assistants without consultation capability, while international systems such as CoCounsel are jurisdiction-specific and inaccessible to ordinary Sri Lankan citizens. General-purpose LLMs exhibit hallucination ranging from 58%-88% on verifiable legal queries, rendering them unsuitable for legal guidance without retrieval grounding. This paper presents LexSL, a citizen-facing legal consultation system for family law disputes addressing these limitations through retrieval-augmented generation (RAG) architecture. The corpus consists of self-annotated Sri Lankan appellate court judgements, embedded using Qwen3-0.6B, indexed in independently maintained vector collections for caselaw and legislations. A 20-label semantic role taxonomy was developed to categorize the content of case laws by their functional role within the judgment, applied through a hybrid labelling pipeline combining keyword matching, structural rules and Llama 3.3 70B-assisted classification. Role labels direct retrieved evidence into for-side and counter-side argument synthesis. A 13-area sub-area taxonomy with 74 sub grounds filters retrieval across the pluralistic personal-law systems. Case strength is assessed via a transparent four-signal scoring model: historical outcome rate (35%), retrieval similarity (35%), court authority (20%), and statute anchoring (10%), computed directly from retrieved evidence signals rather than trained against labelled outcome data, enabling explainable strength estimates. System testing across representative family-law queries spanning divorce, maintenance, matrimonial property, customary marriage validity etc. demonstrated accurate sub-area classification, calibrated strength scoring ranging from 0.43-0.56 reflecting the depth of available precedent, and retrieval anchored to relevant leading Sri Lankan cases. While the study contributes a semantic-role taxonomy for Sri Lankan judgements, a hybrid labelling pipeline, and role-aware retrieval routing, overall reducing hallucination risk, it is significant as an early citizen-facing legal AI system designed specifically for Sri Lanka.s pluralistic family law context improving access to justice.

Keywords: Retrieval-Augmented-Generation (RAG); Pluralistic Personal Laws; Semantic Role Labelling; Artificial intelligence (AI); Case strength evaluation; Sri Lanka;

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Track 3 - IoT, EMBEDDED SYSTEMS & SMART TECHNOLOGIES

Posters

SMART WASTE MANAGEMENT AND IOT SMART BINS: AUTOMATED GARBAGE CLASSIFICATION AND CITIZEN ENGAGEMENT

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WAVEPAY: A PRIVACY PRESERVING NFC BASED CASHLESS PAYMENT FRAMEWORK USING SMARTPHONE SOFTPOS AND EDGE AI

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SOLARCONNECT: A SEMI-AUTOMATED DIGITAL PLATFORM FOR OPTIMIZING SOLAR INSTALLATION WORKFLOWS IN SRI LANKA

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SIMULATION STUDY OF VISIBLE LIGHT ATTENUATION USING DESTRUCTIVE INTERFERENCE PRINCIPLES

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**Track 4 - JAPANESE STUDIES &
EDUCATION**

Abstract Papers

CONTRIBUTION-EVIDENCE TOOLS FOR FAIR GROUP ASSESSMENT: EXAMINING STUDENT PERCEPTIONS AND ADOPTION INTENTION

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In higher education, Group projects are widely used, but students often perceive that a single group mark does not fairly reflect individual contributions. This study examines perceptions of fairness in group assessments and explores the acceptability of version control systems (VCS), such as Git and GitHub, as tools for improving transparency. A two-part mixed-method survey was conducted with undergraduate computing students in Sri Lanka. Dataset A (n = 59) examined fairness, workload distribution, role clarity, and recognition of individual effort. Dataset B (n = 54) examined the acceptance of version control systems (VCS), using the Technology Acceptance Model (TAM). Although the same student groups participated in both studies, the sample size for Dataset B was reduced because some participants did not complete the second data collection, resulting in missing responses. However, this did not have a significant impact on the overall results. The TAM constructs included perceived ease of use (PEOU), perceived usefulness (PU), attitude toward use (ATU), and behavioral intention to use (BI). Descriptive statistics were used for Dataset A, while correlation and regression analyses were applied to Dataset B. Findings showed that 76.3% of students considered group marks fair, while 59.3% indicated that they would contribute more if individual work was better recognized. TAM results showed positive perceptions of VCS usefulness for collaboration and contribution tracking, with PU recording a mean value of 4.03 and BI recording 4.10. ATU was also high and emerged as a strong predictor of BI ($\beta = 0.75$, $p < 0.001$; $R^2 = 0.81$). However, PEOU was comparatively lower ($M = 3.71$), indicating the need for practical guidance and training. Based on these findings, this study proposes a practical framework that enhances transparency, reduces free-riding, and supports fairer grading in group-based computing assessments by leveraging existing Git/GitHub practices.

Keywords: Version Control Systems (VCS); Technology Acceptance Model (TAM); Git/GitHub; Group Assessments; Fairness; Student Contribution

DOI: <https://doi.org/10.5281/zenodo.22133830>

INTEGRATING MONOZUKURI AND KAIZEN INTO COMPETENCY-BASED IOT EDUCATION: A MIXED-METHODS ACTION RESEARCH STUDY

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The transition toward Industry 4.0 and Society 5.0 has intensified demand for computing graduates with applied competencies in Internet of Things (IoT) and embedded systems. However, many higher education IoT programmes remain predominantly theory-oriented, with limited systematic competency development and industry-aligned assessment. Existing approaches rarely integrate competency-based assessment with Monozukuri and Kaizen within an action research framework. This study proposes the Industry - Aligned IoT Competency Development Framework (IICDF), comprising experiential praxis, Monozukuri thinking, Kaizen reflective improvement, and structured competency assessment. Monozukuri and Kaizen were selected because their emphasis on craftsmanship, iterative improvement, and reflective practice closely aligns with the design build test cycles characteristic of IoT engineering, offering stronger competency support than conventional lecture based instruction alone. Using mixed-methods two cycle action research (Plan-Act-Observe-Reflect) at LNBTI, Sri Lanka, competency scores were assessed via standardized rubrics for technical implementation, design iteration, and system integration, while project performance was evaluated via rubrics for artifact quality, functional completeness, documentation quality, and successful IoT system implementation. Quantitative outcomes, qualitative data from student reflective journals analysed via inductive thematic analysis, and post-intervention self-assessment via a five-point Likert questionnaire on IoT concept confidence were integrated across pre-implementation (n = 92) and post-implementation (n = 108) cohorts. The post-implementation cohort achieved significantly higher competency scores (78.53% vs. 64.27%; t-test, $p < 0.05$) and project performance (68.18% to 84.72%). Self-assessment indicated high confidence ($M = 4.43/5$). Qualitative findings indicated improved engineering problem - solving, iterative design practices, and theory - practice integration. The single-institution, non-randomized design and potential baseline differences limit generalizability. Overall, the findings suggest that IICDF can potentially enhance industry - aligned IoT competency development and provide preliminary evidence for its practical application in higher education.

Keywords: Internet of Things (IoT); Competency-Based Education; Monozukuri; Kaizen; Experiential Learning; Engineering Education

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IMPROVING THE EFFECTIVENESS OF THEORY-BASED IT LECTURES USING DIFFERENTIATED TEACHING: AN ACTION RESEARCH STUDY

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Theory-based Information Technology (IT) courses, such as System Analysis and Design, often present learning challenges for undergraduate students due to differences in learning readiness, preferences, and engagement. Differentiated teaching, which adapts instructional approaches to address diverse learner needs, provides a potential solution for improving learning experiences in theory-based classrooms. However, limited research has examined its application in higher education IT theory modules. This study investigated the effectiveness of differentiated teaching strategies in improving student learning and engagement through a classroom action research approach. The study was conducted with 14 undergraduate students enrolled in a System Analysis and Design module over two action research cycles. In Cycle 1, multimodal teaching strategies incorporating visual representations, textual resources, and interactive activities were introduced. Based on observations and student performance, Cycle 2 implemented tiered learning activities and differentiated questioning strategies to address variations in student readiness and understanding. Student learning was assessed using pre- and post-quizzes, while engagement was measured using a five-point Likert-scale questionnaire evaluating participation, interest, motivation, and perceived learning. Since the data violated the assumption of normality, the Friedman test was applied to compare performance across the baseline, Cycle 1, and Cycle 2. The analysis showed a statistically significant improvement in quiz scores across the three measurement points ($\chi^2(2) = 20.83$, $p < .001$), with a large effect size (Kendall's $W = .87$). Post-hoc comparisons confirmed significant improvements between all measurement points, indicating continuous learning gains throughout the intervention. The findings suggest that differentiated teaching strategies, including multimodal instruction and tiered learning activities, can enhance learning experiences in theory-based IT courses. However, the findings should be interpreted cautiously due to the small single-cohort sample. Further studies with larger and more diverse groups are recommended.

Keywords: differentiated teaching; action research; multimodal instruction; tiered learning activities; theory-based IT education; student engagement

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EVALUATING THE EFFECTIVENESS OF A NEW PEDAGOGICAL STRATEGY IN JAPANESE LANGUAGE EDUCATION: A COMPARATIVE MIXED-METHODS STUDY AT LANKA NIPPON BIZTECH INSTITUTE

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Higher education institutions like the Lanka Nippon BizTech Institute (LNBTI) require students to build both technical IT knowledge and Japanese fluency for Japan's job market. To improve Japanese Language Proficiency Test (JLPT/NAT) results, LNBTI introduced an intensive, first-semester Japanese-only "New Pedagogical Strategy" to replace its standard curriculum, where Japanese and IT are taught side by side. The purpose of this study is to evaluate the effectiveness of the New Pedagogical Strategy compared to the Standard Instructional Approach by analyzing quantitative academic metrics alongside qualitative student learning experiences. Utilizing a mixed-methods research design, the study analyzed secondary institutional data—including attendance rates, end-of-semester letter grades, and JLPT/NAT pass/fail outcomes—using Chi-square and Mann-Whitney U statistical tests. Qualitative insights were gathered through semi-structured interviews with 20 participants and evaluated using thematic analysis to assess classroom engagement, motivation, and speaking confidence. The Standard Instructional Approach (n=44) achieved a significantly higher JLPT/NAT pass rate (27.3%) than the New Pedagogical Strategy (n=20) ($\chi^2(1)=4.14$, $p=0.042$) (Fisher's Exact $p=0.046$). Attendance was significantly higher in the Standard group (77.5% median) (Z-score of -2.27) compared to the New Strategy group (60.0% median, $p=0.023$). Final internal course grades showed no statistically significant difference ($p=0.711$) (Z-score of -0.37). While the New Strategy group achieved a higher median internal grade (B vs. C), 95% failed the external JLPT/NAT exam. As per qualitative insights, participants reported structural strain, anxiety, and burnout associated with the New Pedagogical Strategy. The Standard Instructional Approach proved more effective overall, leading to better attendance and external exam readiness due to superior learning retention—despite interdisciplinary workload friction. Conversely, while the New Pedagogical Strategy yielded higher internal grades, those results failed to translate into success on external proficiency exams. Recommendations include progressive learning, AI tools, and integrated curricula; future research should address demographic limitations through longitudinal tracking.

Keywords: Japanese Language Education; Japanese Language Proficiency; Mixed-Methods Research; Intensified language learning; Academic Overload and Time Scarcity

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Track 4 - JAPANESE STUDIES & EDUCATION

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**AI-DRIVEN WARFARE AND JAPAN'S STRATEGIC
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**EXPLORING AI-BASED LANGUAGE LEARNING TOOLS FOR JAPANESE
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**DIFFICULTIES IN LEARNING JAPANESE COUNTERS (JOSUUSHI) AMONG
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**MACHINE LEARNING FOR CAMERA-ASSISTED INTERACTIVE KANJI
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**PASSING ON THE LANGUAGE TORCH: A SHARED-BACKGROUND MODEL FOR
JAPANESE LANGUAGE AND CULTURAL LEARNING**

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**EXPLORING THE INFLUENCE OF FACEBOOK ALGORITHMS ON NEWS
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