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New Zealand North Section

IEEE Region 10

TALE 2023

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Te Whare Wānanga o Tāmaki Makaurau
NEW ZEALAND

ENGINEERING
DEPARTMENT OF ELECTRICAL, COMPUTER, AND SOFTWARE ENGINEERING

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TALE 2023 General Chair Welcome Speech

Nirmal Nair
General Co-Chair
IEEE TALE 2023
University of Auckland

Kia ora All:

On behalf of the IEEE Education Society (EdSoc) 12th edition **of International Conference on. Teaching, Assessment and Learning for Engineering-** TALE 2023 Organizing Committee, it is our privilege and great pleasure to extend a warm Kiwi welcome to all delegates, invited keynotes/guests, sponsors and exhibitors. Attendees from 48 countries around the globe hail from different life-long learning stages like Student, Young Professional, Women in Engineering, Researchers, Professors, Innovators and Professionals. A special welcome to all the invited panel speakers who are engineering education thought leaders, experts, practitioners and innovators.

It has been around 2 years since this journey began with the invitation by IEEE Education Society for IEEE New Zealand North Section to host TALE 2023. TALE is held in Nov- December each year in the Asia-Pacific region (IEEE Region 10), complementing the other events in the IEEE Education Society's suite of conference offerings, including Frontiers in Education in North America (IEEE Regions 1–7), EDUCON in Europe/Middle East/Africa (IEEE Region 8), and EDUNINE in Latin America (IEEE Region 9). The last 3 years between 2020-22 TALE held in Takamatsu-Japan, Wuhan-China and Hung Hom-Hong Kong were primarily online versions. IEEE NZ North Section had also delivered in 2021 a fully online version of IEEE Region 10 flagship TENCON international technical conference and thereafter hosted a blended 7th IEEE Workshop on the Electronic Grid (eGRID 2022) end of the 2022, as the world was just opening up since the closing down due to pandemic. Hosting rights coming back to New Zealand for the second time (TALE 2014 was in Wellington) it is a great opportunity for Auckland New Zealand 2023 to deliver a big refresh to bring this conference back to its pre-pandemic level and greater. In December 2022, we were still uncertain what the mode will be since TALE 2022 was also online. We regrouped and refreshed around February 2023 involving fresh and experienced set of volunteers to deliver a majority face-to-face event. We had great support from the TALE Steering Committee and the local organizing team were also organizing another flagship event IEEE PES ISGT Asia 2023. We had gone through the bidding process in 2022 and, we would like to take this opportunity to express our sincerest gratitude to the Auckland Convention Bureau, who helped prepare marketing documents professionally which we strongly believe played a key part for getting more participation despite several of the conferences happening during this time of the year as the world have started reopening back for conferences. IEEE NZ North

volunteers along with Engineering and Computer Science Staff from University of Auckland and Auckland University of Technology have also been very supportive of these efforts and are delighted for the opportunity to engage strongly with this IEEE EdSoc brand of conferencing for this global membership driven power engineering fraternity together here 'down-under'.

As part of the local hosting process, we would particularly like to take this opportunity to express our sincerest gratitude to the Department of Electrical, Computer and Software Engineering at University of Auckland, who agreed to support with several in-kind and delegate material. The University fraternity from across the world, and particularly from Asia-Pacific, including several non-IEEE members participation is appreciated. Great to have these supportive efforts to help us host collectively, this **IEEE EdSoc and IEEE Region 10 (Asia-Pacific)** flagship event, in Auckland New Zealand.

For a global engineering education teaching and learning event of this kind, we have embedded workshops and poster sessions to blend and engage alongside the paper-sessions delivered by educators, trainers, accrediting bodies, innovators across the board. Technical presentations and poster sessions typical of TALE are scheduled to go along with Keynotes and workshop by national and international thought leaders and educators. This naturally meant that the traditional culture and practices of the TALE paper conference attendees need to be met along with a blended program that appears seamless and representative to the attendees who might be representing countries, institutions/ companies and as individuals. At the outset, we would like to acknowledge the patience and accommodation that each one of you extended before arriving here, as the organizing committee worked through the details and help establish a cohesive and integrated program that hopefully satisfies each one of your expectations and positive experiences during this conference.

At the time of sending this handbook to the e-printer we have about 175+ attendees and organizers from 48 countries that are participating across various events during this conference. During the actual conference, we expect some more local participants to engage.

In particular, we would like to thank **IEEE Education Society** reposing their faith to host TALE 2023 in Auckland and for their support and advice during the program preparation and sharing expectation of the practitioner-academia-research balance expected of this international conference brand.

At this stage, we would also like to say a big **'Nga mihi' (Thanks)** to our supporters, members and local volunteers of all categories – Engineering Educators, Universities, Training organisations and students for their participation to showcase the engineering education challenges, opportunities, experiences and engagements from Aotearoa, New Zealand and across the globe. There is active participation across the various events from Kiwi engineers,

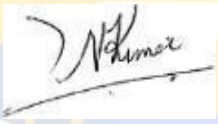
leadership, researchers, affinity groups- 'Students, Women, Young professionals' education and training stakeholders across the board and engineering societies which represents the breadth of New Zealand education and training institutions graduating engineering professionals across graduate and undergraduate programs.

The call for papers and contributions for TALE 2023 (Auckland) were around core and special topics. Core Tracks include *Computing & IT Education; Engineering Education; STEM Education; Technology-Enhanced Learning; Open, Flexible & Distance Learning; and, Work-Integrated Learnings* while special tracks invitations were for *Artificial Intelligence in Education; Online Learning and Academic Integrity; and, Problem-based Learning*. The resulting four days of programs include Teaching and AI workshop followed by optional Engineering Building visit, opening keynote, followed by two themed keynotes around ***"Engineering Excellence in a Changing World of Work"*** and ***"Impact of Generative AI on the future of Engineering Education"***, followed by poster session for Work-in-Progress submissions on Wednesday. 23 Technical Sessions (8 of them online), workshop on IEEE Publication, 2 social networking functions, 1 Dinner Banquet and several opportunities to professionally interact with global innovators, experts, technical professionals, researchers gaining opportunities for recognition and peer-esteem. Details of the above are provided by our Technical Chairs later in this handbook.

We hope that the **4-days of TALE 2023 program** and various social networking activities will provide a roadmap for all attendees, to inspire new ideas for a collaborative leadership of sustainable and exciting engineering education and training in coming decades. A special thanks to all the volunteers, sponsors and exhibitors for the preparation and help towards actual conduct of this event.

On behalf of the organizing committee, we thank you for your participation and supporting TALE 2023. We wish you all a great event full of new ideas, networking opportunities and showcasing the new technologies and strategies that will shape our sector in coming decades. For those of you who are here for the very first time, please take time to explore locally and nearby across our beautiful landscape and experience the friendly hospitality.

Nga Mihi,



On behalf of Nirmal Nair and Mano Manoharan

General Co-Chairs TALE 2023

TALE 2023 Conference Mihi Whakatau

Prof Gerard Rowe
Dean of Engineering
The University of Auckland

Hello everybody, warm greetings to everyone. I'm Gerard Rowe, and as Dean of Engineering it is my pleasure and privilege to welcome you to the University of Auckland for the IEEE TALE 2023 Conference.

We have begun the Conference with what is known as a Mihi whakatau. The Mihi whakatau is a traditional Māori welcome ceremony. The purpose of the Mihi whakatau is to remove the tapu (restrictions) of the Manuhiri (visitors) to make them one with the Tangata Whenua (Home people or hosts). It is a gradual process of the Manuhiri and the Tangata Whenua coming together.

In my brief Mihi, I greeted you, I welcomed you to the University of Auckland and to this Conference and I welcomed you to the discussions that will take place over the next few days. A key part of a mihi is to acknowledge those present at a gathering. In that context, I also acknowledged the expertise and diversity of the conference attendees, and the esteemed leaders present.

I followed my Mihi with a Pepeha. While a mihi is a greeting, a pepeha is a form of introduction that establishes identity and heritage. In my Pepeha, I outlined where I was from (Thames), where I now identify with (Tamaki Makaurau (which is Te Reo for Auckland)), the geographical features that I am most affiliated with (Rangitoto and the Waitemata Harbour) and where I work.

The main values underpinning a mihi whakatau are:

manaakitanga – the process of showing respect, generosity and care for others and

whakawhanaungatanga – the process of establishing relationships.

With that brief explanation (enabling the beginnings of the establishment of a relationship between the visitors (manuhiri) and the hosts (tangata whenua), I note that the IEEE TALE conference has a broad remit and caters for researchers and practitioners with an interest in engineering, technology, and integrated STEM education as well as those interested in the innovative use of digital technologies for learning, teaching, and assessment in any discipline.

I look forward to the discussions and will be particularly interested in those that touch on education for a post-pandemic world and initiatives to improve student engagement. One of

the major challenges we face at the moment in New Zealand is dropping levels of learner preparedness of high school leavers. In turn this is leading to

- a dropping domestic school leaver first year enrolment
- higher than normal attrition rates in Part 1 and
- an increase in academically at-risk students in Part 2, 3 and 4.

The issues aren't confined to academic preparedness but also include metacognition, self-regulation and basic preparedness for tertiary study.

Across the world, when tertiary institutions have analysed what are the key features that lead to student academic success, one that is consistently identified is engagement. Anything that can be done to increase student engagement via academic support and co-curricula activities is likely to contribute to that all-important sense of belonging leading to better academic outcomes. The pandemic has made that so much more important and also so much more difficult to achieve.

I hope a number of you were able to take advantage of the building and campus tour arranged immediately prior to this Mihi whakatau. In particular I hope you were able to see through our new Engineering building.

Engineering is spread over two campuses the City Campus and the Newmarket Campus. In the City we have recently opened a wonderful new building which has been designed to transform our teaching to a much more engaging active style, one which encourages innovation and leadership. A particular design feature is that we have introduced 26 flexible learning spaces (known as MDLS – multi-disciplinary learning spaces) that can be rapidly reconfigured to suit different learning activities. The new building also includes in excess of 50 specialist research laboratories.

The Newmarket Innovation Campus houses our physically large laboratories, our industry facing activities and industrial co-locators.

We are a large a diverse Faculty – the fifth largest in the University, and one of the few that operates across two campuses. The Faculty has emerged from the pandemic in good shape.

We have around 4000 students in the BE(Hons). We also have around 1000 postgraduate students. Our cohort is 65% undergraduate, 11% research postgraduate and 24% taught postgraduate (and that 24% includes the final year of the BE(Hons)). Our cohort is around 26% women and 4% Māori and 4% Pasifika

We now have 10 specialisations in the BE(Hons) with students in the most recently introduced specialisation (Structural Engineering) now in Part 4.

At the Faculty of Engineering, we aim to equip our students with the core skills to take on the profession's biggest challenges. This is why our teaching focuses not only on each specialisation's theoretical, practical, and technical knowledge, but also the core professional competencies:

the capacity to problem-solve, to understand social and economic nuances, to work well in teams and to bring passion and empathy to workplaces and communities.

We are currently working on a major University-wide curriculum transformation which emphasises:

- sustainability,
- trans-disciplinarity,
- work integrated learning and
- innovation and entrepreneurship.

With those few brief words of introduction, I'll close with offering a warm welcome to all our presenters and attendees. My thanks go also to the Organising Committee for arranging the event and putting the programme together. That organising Committee contains representatives from the Faculties of Engineering and Science at the University of Auckland and from the School of Engineering, Computer and Mathematical Sciences at AUT. I hope you will all have an enjoyable conference.

No Reira

Tēnā koutou, tēnā koutou, tēnā koutou katoa

Professor Gerard Rowe

Dean of Engineering
The University of Auckland

TALE 2023 Technical Report

Welcome to IEEE TALE 2023, celebrating the 11th anniversary of the TALE conference.

Thank you for your support and paper submission. We received 193 submissions from more than 30 countries/regions from 600+ authors and co-authors. After a rigorous review process, the conference accepted 85 full papers, 14 short papers and 39 work-in-progress (poster) papers. Except for special cases (e.g., out of scope), each paper received at least three reviews. Top papers accepted by IEEE TALE 2023 will be invited for submission to the IEEE Transactions on Learning Technologies (IEEE-TLT) (SSCI, SCI, EI indexed) with extension and enhancement conforming to the IEEE-TLT's publishing policies.

We have organized the following sessions this year:

1. Laboratory Experiences
2. AI and Engineering Education
3. Virtual, Augmented and Mixed Reality Learning Environments
4. Mixed Reality and Engineering Education
5. Computer-Based Learning and Courseware Technologies
6. Industry Linkages and Partnerships
7. Educational Games and Simulations
8. Educational Data Mining
9. Online/E-Learning and Blended
10. Gender and Diversity
11. Capstone Projects and Project-Based Learning

We would like to sincerely thank the many technical program committee members for their hard work and contributions in reviewing the papers and providing timely comments. We hope that you will enjoy the conference. We look forward to seeing you in IEEE TALE 2023, either in person or online.

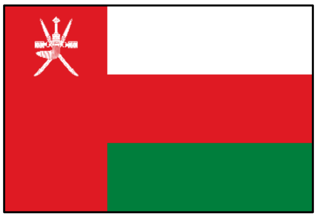
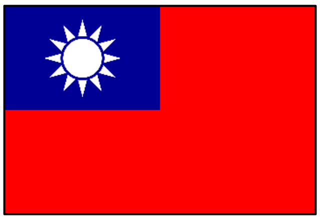
November 23, 2023 Auckland

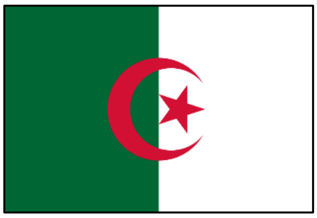
Matthew Kuo
Technical Chair
Auckland University of Technology

Roopak Sinha
Publication Chair
Auckland University of Technology

Countries Represented

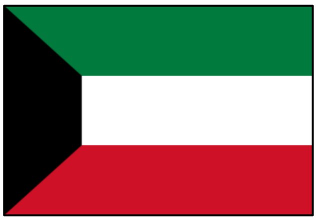


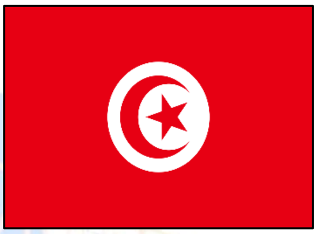
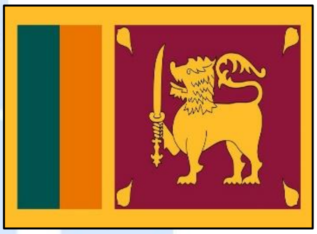
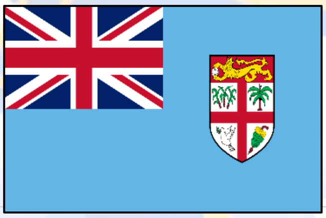








TALE 2023 Committee

Organizing Committee

- **Manuel Castro,** Universidad Nacional de Educación a Distancia
- **Abhinav Rakesh Chopra,** The University of Auckland
- **Lamees Elhiny**, The University of Auckland
- **Matthew Kuo,** Auckland University of Technology
- **Tek Tjing Lie,** Auckland University of Technology
- **Mano Manoharan,** The University of Auckland
- **Nirmal Nair,** The University of Auckland
- **Gerard Rowe,** The University of Auckland
- **Roopak Sinha,** Auckland University of Technology

Steering Committee

- **Preeti Bajaj,** Lovely Professional University, Phagwara, Punjab, India
- **S H Bharati,** REVA University, Bangalore, India
- **Henry Chan,** Hong Kong Polytechnic University, Hong Kong, China
- **Dale Carnegie,** Victoria University of Wellington, Wellington, New Zealand
- **Manuel Castro** (Chair), Universidad Nacional de Educación a Distancia
- **Ford Lumban Gaol,** Bina Nusantara University, Jakarta, Indonesia
- **Kai Pan Mark,** Hong Kong Polytechnic University, Hong Kong, China
- **Mano Manoharan,** University of Auckland, Auckland, New Zealand
- **Gerard Rowe,** University of Auckland, Auckland, New Zealand
- **Gary Wong,** The University of Hong Kong, Hong Kong, China

Local Organizing Committee

- **Michael Gibson,** University of Auckland
- **Leyla Zafari,** University of Auckland
- **Shaila Arif,** University of Auckland
- **Stefan Wang,** University of Auckland
- **Aihui Zou,** University of Auckland
- **Linge Wang,** University of Auckland

TALE 2023 General Information

The following information is provided as a guide the Conference.

If you have any queries, please visit the registration desk.

Registration desk

For any questions, please visit the registration desk during the conference.

Registration desk is located on Science Building foyer.

Available from Tuesday, 28 November 2023 From 8:00 am onward

Conference catering

Lunches morning and afternoon tea will be served in the ground level Foyer of the Science Building, University of Auckland.

Dietary requirement

Vegetarian options are provided with each meal break. Care has been taken to ensure all of advised dietary requirements are catered to.

If you specified your dietary requirements when registering, please make yourself known to the catering staff.

Presenting authors

Presentation slots are 15 minutes long, with 3 minutes scheduled for questions. Each session chair will be keeping strictly to time.

Please ensure your PowerPoint is uploaded before your session starting.

Mobile phones

During all presentation please turn your mobile phones to silent.

Presentation

As a courtesy to our presenters, please ensure you arrive at each session venue prior the start of presentation.

Wi-Fi Access

Select the wireless network : UoA-Guest-WiFi

Enter the username : ieeetale2023@auckland.ac.nz

Enter the password : 3O8adIbM

TALE 2023 Conference Venue

Science Building, University of Auckland.

23 Symonds Street, Auckland CBD, Auckland 1010

TALE Asia 2023 Programme

Day 1 Tuesday, 28th November 2023	
13:00 – 14:30	Registration **Location: 302-G80**
14:30 – 15:30	Pre-conference workshop by Nael Barakat ((Adopting Emerging Technologies when Teaching Engineering Ethics and Social Responsibility – AI as an example) **Location: 302-G60**
16:00 – 18:00	Campus Tour **Location: UoA Engineering Building (401 and 405), 20 Symonds Street**
18:00 – onward	Mihi Whakatu & Welcome Reception **Location: 302-G60**

Day 2 Wednesday, 29th November 2023			
	Registration space: 8:00AM – 5:00PM **Location: 302-G80**		
09:00 – 09:30	Official Opening **Location: 303-G23**		
09:30 – 10:30	Keynote: **Walking Backwards into the Future** Andrew Luxton-Reilly Location: 303-G23		
10:30 – 11:00	Morning Tea **Location: 302-G20**		
11:00 – 12:30	**Session 1** Laboratory Experiences **Chair**: Jolly Atit Shah **Room** :303-G14	**Session 2** AI and Engineering Education - 1 **Chair**: Henry Chan **Room** :303-G15	**Session 3** Virtual, Augmented and Mixed Reality Learning Environments **Chair**: Lamees Elhiny **Room** :303-G16
12:30 – 14:00	Lunch **Location: 302-G80**		
14:00 – 15:30	**Session 4** Mixed Reality and Engineering Education **Chair**: Chien Ching Lee **Room** :303-G14	**Session 5** AI and Engineering Education – 2 **Chair**: Caesar Ortega-Sanchez **Room** :303-G15	**Session 6** Industry Linkages and Partnerships **Chair**: Jitty Varghese **Room** :303-G16
16:00 - 17:00	Keynote: Engineering Excellence in a Changing World of Work Saurabh Sinha **Location**: 303-G23		
17:00 - 18:00	Keynote: Impact of Generative AI on the future of Engineering Education Arnold Pears **Location**: 302-G23		
18:00 - 19:00	Poster session & networking **Location**: 302-G80		

Day 3 Thursday, 30th November 2023				
	Registration space: 8:00AM – 5:00PM **Location: 302-G80**			
09:00 – 10:30	**Session 7** Educational Data Mining-1 **Chair:** Gary Wong **Room:**303-G14	**Session 8** Curriculum Design **Chair:** Minjie Hu **Room** :303-G15	**Session 9** Educational Games andSimulations - 1 **Chair:** Satoshi Takahashi **Room** :303-G16	
10:30 – 11:00	Morning Tea **Location: 302-G80**			
11:00 – 12:30	**Session 10** Computer-Based Learning and Courseware Technologies Chair: Jeffrey S.Cross **Room:** 303-G14	**Session 11** Online/E-Learning andBlended -1 **Chair:** Jianrong Zhou **Room:** 303-G15 (Online Session)	**Session 12** Gender and Diversity**Chair:** Da Yang Tan **Room:** 303-G16	
12:30 – 13:30	Lunch **Location: 302-G80**			
13:30 - 14:30	Workshop by Gary Wong - IEEE Publications “My paper has been accepted to an IEEE conference!”: What is the next step to advance your current research through publishing in IEEE journals? **Location: 303-G23**			
14:30 – 15:30	**Session 13** Educational Data Mining - 2 **Chair:** Preut Thanarat **Room:** 303-G14 (Online Session)	**Session 14** Online/E-Learning and Blended-2 **Chair:** Hasan Jamil **Room:** 303-G15 (Online Session)	**Session 15** AI and Engineering Education -3 **Chair:** Chamith Wijenayake **Room:**303-G16 (Online Session)	**TALE Steering Committee Meeting Room:** 302-G23
15:30 - 15:45	Bus to Dinner Location **Pickup at 16:00. Pickup Location: Contact Conference reception**			
18:00	Gala dinner **Location:** Soljans Estate Winery**Website:** https://soljans.co.nz/			

Day 4 Friday, 1st December 2023			
	Registration space: 8:00AM – 5:00PM **Location: 302-G80**		
09:00 – 10:30	**Session 16** STE(A)M education in K-12 or higher education **Chair:** Mengmeng Zhang **Room:** 303-G14	**Session 17** Assessment and Evaluation - 1 **Chair:** Aryobarzan Atashpendar **Room:** 303-G15 (Online Session)	**Session 18** Online/E-Learning and Blended – 3 **Chair:** Chamith Wijenayake **Room:** 303-G16 (Online Session)
10:30 – 11:00	Morning Tea **Location: 302-G80**		
11:00 – 13:00	**Session 19** Assessment and Evaluation- 2 **Chair:** Kuntinee Maneeratana **Room:** 303-G14	**Session 20** Wearable, Mobileand Ubiquitous Learning **Chair:** Jayanthi Sivaswamy **Room:** 303-G15	**Session 21** Educational Data Mining - 3 **Chair:** Rachel Philip **Room:** 303-G16 (Online Session)
13:00 – 14:30	Lunch **Location: 302-G80**		
14:30-16:30	**Session 22** Human-MachineCollaborative Learning **Chair:** Denis Gillet **Room:** 303-G14	**Session 23** Robotics in Education **Chair:** Jie Zhang **Room:** 303-G15 (Online Session)	
16:30	Awards, Closing ceremony and Post-conference drinks **Location: 302-G80**		

TALE 2023 Technical Session Programme

Technical Session 1 : Laboratory Experiences **Chair**: Jolly Atit Shah Wednesday, 29th November 2023 Time: 11:00 - 12:30 NZST Room: 303-G14	
Slot 1	Paper ID 41
	A Novel Remote FPGA Lab Platform Using MCU-based Controller Board
Slot 2	Paper ID 138
	Consideration of On-Demand Online Exam-Taking Methods that Promote Continuous Learning
Slot 3	Paper ID 109
	Using a Virtual Reality Tool for Experimental Learning in Engineering. A Survey of Learner Preferences
Slot 4	Paper ID 31
	An Exploration of Self-Regulation Learning Practices and Its Effectiveness with Kahoot! Incorporated into Electronics Teaching

Technical Session 2 : AI and Engineering Education - 1 **Chair**: Henry Chan Wednesday, 29th November 2023 Time: 11:00 - 12:30 NZST Room: 303-G14	
Slot 1	Paper ID 128
	A New Frontier in AI-Assisted English Oral Presentation Assessment
Slot 2	Paper ID 84
	A Design of Artificial Intelligence Education
Slot 3	Paper ID 160
	Explicitly Introducing ChatGPT into First-year Programming Practice: Challenges and Impact
Slot 4	Paper ID 193
	Grading Generative AI-based Assignments Using a 3R Framework

Technical Session 3 : Virtual, Augmented and Mixed Reality Learning Environments **Chair**: Lamees Elhiny Wednesday, 29th November 2023 Time: 11:00 - 12:30 NZST Room: 303-G16	
Slot 1	Paper ID 45
	FLOD: Full-Lifecycle Online Judge For Accompanying Programming Teaching
Slot 2	Paper ID 86
	Effects of Augmented Reality Gamification on Students' Intrinsic Motivation and Performance
Slot 3	Paper ID 35
	Exploring Team-based Classroom Experiences in Virtual Reality
Slot 4	Paper ID 20
	Enhancing Critical Thinking and Engagement through Puzzle Box Integration in Virtual Reality-based Digital Game-Based Learning

Technical Session 4 : Mixed Reality and Engineering Education **Chair**: Chien Ching Lee Wednesday, 29th November 2023 Time: 14:00 - 15:30 NZST Room: 303-G14	
Slot 1	Paper ID 13
	Exploring the Fusion of Mixed Reality and Digital Game-Based Learning: The Case of Puzzle Box Games for Education
Slot 2	Paper ID 115
	Educative impact of a remote laboratory to experience industrial robotics
Slot 3	Paper ID 90
	A Real-time Distance Learning System for Alpine Skiing Using Virtual Reality
Slot 4	Paper ID 53
	User experience on a virtual patient chatbot for physiotherapy student training

Technical Session 5 : AI and EngineeringEducation – 2 **Chair**: Caesar Ortega-Sanchez Wednesday, 29th November 2023 Time: 11:00 - 12:30 NZST Room: 303-G15	
Slot 1	Paper ID 50
	How Helpful do Novice Programmers Find the Feedback of an Automated Repair Tool?
Slot 2	Paper ID 112
	Artificial Intelligence Education – Self guided learning
Slot 3	Paper ID 92
	ChatGPT and Moodle Walk into a Bar: Capabilities, Integration, Use Cases, and Challenges
Slot 4	Paper ID 130
	The Impact of Generative Artificial Intelligence-based Formative Feedback on the Mathematical Motivation of Chinese Grade 4 Students: a Case Study

Technical Session 6 : Industry Linkages and Partnerships **Chair**: Jitty Varghese Wednesday, 29th November 2023 Time: 14:00 - 15:30 NZST Room: 303-G16	
Slot 1	Paper ID 47
	Entrepreneurship Programs to Connect University Classrooms to Industry
Slot 2	Paper ID 11
	Designing An Overseas Experiential Course in Data Science
Slot 3	Paper ID 25
	Sustainability Projects with a Community Partner, a social norm nudging effort
Slot 4	Paper ID 60
	Evaluating the Professional Development Landscape for Digital Technology Teachers in New Zealand

Technical Session 7 : Educational Data Mining - 1 **Chair**: Gary Wong Thursday, 30th November 2023 Time: 09:00 - 10:30 NZST Room: 303-G14	
Slot 1	Paper ID 168
	Assessing the Efficacy of Virtual Teaching versus Face-to-Face Instruction and the Dunning-Kruger Effect: A Ten-semester Comparative Analysis
Slot 2	Paper ID 89
	AI-driven Teacher Analytics: Informative Insights on Classroom Activities
Slot 3	Paper ID 64
	A Data-Driven Analysis of the Correlation between English Language Proficiency and Academic Performance in Transnational Education
Slot 4	Paper ID 82
	Peer Learning in an Undergraduate Linear Algebra Course - A Social Network Analysis

Technical Session 8 : Curriculum Design **Chair**: Minjie Hu Thursday, 30th November 2023 Time: 09:00 - 10:30 NZST Room: 303-G15	
Slot 1	Paper ID 43
	Rethinking the Course Design of Information Theory in Engineering Education
Slot 2	Paper ID 99
	Improving Computing Education through a Holistic Learning Framework: A Focus Group Study
Slot 3	Paper ID 152
	Teaching Reform of Microelectronics Courses by Strengthening STEM Education
Slot 4	Paper ID 122
	Improvement and Evaluation of a Block-based Language Environment for Introductory C# Programming Course

Technical Session 9 : Educational Games and Simulations **Chair**: Sathosi Takashi Thursday, 30th November 2023 Time: 09:00 - 10:30 NZST Room: 303-G16	
Slot 1	Paper ID 72
	Gameful Experience (GAMEX) for Students' Meaningful Learning
Slot 2	Paper ID 44
	Using Learning Objective-based Course Modeling for Complete Exercise Generation: From Course Material to an Aggregated Knowledge Representation
Slot 3	Paper ID 3
	Real-Life Project-Based Learning in Introductory Programming: a Game for Cancer Prevention
Slot 4	Paper ID 9
	Data Science in an Agent-Based Simulation World

Technical Session 10 : Computer-Based Learning and Courseware Technologies **Chair**: Jeffrey S. Cross Thursday, 30th November 2023 Time: 11:00 - 12:30 NZST Room: 303-G14	
Slot 1	Paper ID 57
	E-Quiz: Empowering Educators with a Self-Contained and Programmable Online Exam System
Slot 2	Paper ID 106
	Exploring the Effects of Digital Storytelling-Enhanced Scenario-Based Learning on Students' Learning Outcomes
Slot 3	Paper ID 75
	Implementation of Sostek Application with Curriculum Intervention for the Development of Sustainability Competencies of Graduating Students
Slot 4	Paper ID 71
	Exploring Opportunities and Challenges of using ChatGPT in Professional Writing Instruction

Technical Session 11 : Online/E-Learning and Blended -1 **Chair**: Jianrong Zhou Thursday, 30th November 2023 Time: 11:00 - 12:30 NZST Room: 303-G15 (Online Session)	
Slot 1	Paper ID 36
	Improving Immersive Virtual Reality Training of Bioreactor Operations using Gamification
Slot 2	Paper ID 32
	Effectiveness of Resilience Support in an Online PBL Class for Business Planning based on Circular Economy(CE)
Slot 3	Paper ID 83
	Active Distance Learning: How Student Perceptions Affect Academic Performance
Slot 4	Paper ID 114
	The Effects of Kindergarten Principals' Digital Leadership on Teachers' Technology Integration during the COVID-19 Pandemic in Western China

Technical Session 12 : Gender and Diversity **Chair**: Da Yang Tan Thursday, 30th November 2023 Time: 11:00 - 12:30 NZST Room: 303-G16	
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	Comparing Attitudes Towards Mobile App Development between International Students and Domestic Japanese Students
Slot 2	Paper ID 125
	Transforming Traditional Universities into Entrepreneurial Universities: Four Key Strategies for Meeting the Needs of the Knowledge Economy
Slot 3	Paper ID 15
	Project-Based Learning in the Development of a Job-Matching Website for Women in STEM
Slot 4	Paper ID 93
	Exploring the Role of Reverse Engineering Pedagogy to Integrate Design Thinking and Physics in Interdisciplinary Education

Technical Session 13 : Educational Data Mining - 2 **Chair**: Preut Thanarat Thursday, 30th November 2023 Time: 14:30 - 15:30 NZST Room: 303-G15 (Online Session)	
Slot 1	Paper ID 143
	The Feature selection and Comparison performance of Student's academic between Random Forest, Naïve bayes and XGboost
Slot 2	Paper ID 5
	Applying Structural Equation Modelling in Education Research
Slot 3	Paper ID 127
	Classroom Audio Analysis for Estimating Engagement of the Students

Technical Session 14 : Online/ E-Learning and Blended - 2 **Chair**: Hasan Jamil Thursday, 30th November 2023 Time: 14:30 - 15:30 NZST Room: 303-G15 (Online Session)	
Slot 1	Paper ID 46
	Strategies to Enhance Educators' Soft Skills: The Role of Managers
Slot 2	Paper ID 116
	Predicting the Use Behavior of Higher Education Students on ChatGPT: Evidence from the Philippines
Slot 3	Paper ID 88
	An Experiment on Leveraging ChatGPT for Online Teaching and Assessment of Database Students

Technical Session 15 : AI and Engineering Education - 3 **Chair**: Chamith Wijenayake Thursday, 30th November 2023 Time: 14:30 - 15:30 NZST Room: 303-G16 (Online Session)	
Slot 1	Paper ID 91
	Leveraging ChatGPT to Enhance Computational Thinking Learning Experiences
Slot 2	Paper ID 163
	Exploring the Performance of Generative AI Tools in Electrical Engineering Education
Slot 3	Paper ID 61
	An Experiential Learning Approach to Learn AI in an Online Workshop

Technical Session 16 : STE(A)M Education in K-12 or Higher Education **Chair**: Mengmeng Zhang Friday, 1st December 2023 Time: 09:30 - 11:00 NZST Room: 303-G14	
Slot 1	Paper ID 131
	Computational Thinking Activities in High Schools to Enhance Interest and Skills in Programming
Slot 2	Paper ID 56
	Promoting Girls' Participation in K-12 STEM Education: Current Landscape, Hindering Factors, and Recommendations for Actions
Slot 3	Paper ID 142
	Students' Reflective Learning in the Prototyping Process in STEM Education
Slot 4	Paper ID 16
	Harnessing E-Portfolio Creation for Exam Success, Student Engagement, and Satisfaction

Technical Session 17 : Assessment and Evaluation - 1 **Chair**: Aryobarzan Atashpendar Friday, 1st December 2023 Time: 09:30 - 11:00 NZST Room: 303-G15 (Online Session)	
Slot 1	Paper ID 103
	From Pedagogy to Andragogy to Heutagogy: Students Becoming Engineers
Slot 2	Paper ID 29
	Rule-Based Error Classification for Analyzing Differences in Frequent Errors
Slot 3	Paper ID 98
	Authentic Assessment of Programme Learning Outcomes in Infocomm Technology
Slot 4	Paper ID 38
	Difficulty-Adjusted Quizzes: An Effectiveness Analysis

Technical Session 18 : Online/ E-Learning and Blended - 3 **Chair**: Chamith Wijenayake Friday, 1st December 2023 Time: 09:30 - 11:00 NZST Room: 303-G16 (Online Session)	
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	Proposed System Design for Cross-Cultural Distance Reciprocal Teaching Using "Kusho"
Slot 2	Paper ID 135
	Investigating Different Approaches on Online Laboratory Practices
Slot 3	Paper ID 49
	Instilling Computational Thinking in Undergraduate Students Across Multiple Disciplines through an Adaptive Gamified e-Learning Platform
Slot 4	Paper ID 42
	Online Tutoring and Plagiarism-Aware Authentic Assessment of Database Design Assignments

Technical Session 19 : Assessment and Evaluation - 2 **Chair**: Kuntinee Maneeratana Friday, 1st December 2023 Time: 11:30 - 13:00 NZST Room: 303-G14	
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	Exploring the Factors and Moderators Influencing the Use of Radar Visualisation of Student Performance from Parents' Perspective
Slot 2	Paper ID 8
	Plagiarism and AI Assistance Misuse in Web Programming: Unfair Benefits and Characteristics
Slot 3	Paper ID 134
	Product Competitor Analysis for First Year Engineering Students
Slot 4	Paper ID 70
	A Cognitive and Metacognitive Diagnostic Assessment System: TATSUJIN Test ICT

Technical Session 20 : Wearable, Mobile and Ubiquitous Learning **Chair**: Jayanthi Sivaswamy Friday, 1st December 2023 Time: 11:30 - 13:00 NZST Room: 303-G15	
Slot 1	Paper ID 96
	Ready, Set, Go! Teachers' Perceptions of Technology Integration in University-level Physical Education Through Mobile Apps: A Mixed Methods Study
Slot 2	Paper ID 24
	Class Participation, Using Technology to Enhance Efficiency and Fairness
Slot 3	Paper ID 51
	AnaVu: A Scalable Anatomical 3D Visualization System for Classroom Teaching
Slot 4	Paper ID 97
	Visualization of Potential Differences in Comprehension by Distribution of Notes and Questions in O0nline Programming Courses

Technical Session 21 : Educational Data Mining - 3 **Chair**: Rachel Philip Friday, 1st December 2023 Time: 11:30 - 13:00 NZST Room: 303-G16 (Online Session)	
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Slot 2	Paper ID 145
	Access, Excellence and Scale in India's National Programme for Technology-Enabled Learning (NPTEL): Identifying the Hidden Gaps
Slot 3	Paper ID 95
	The Influence of Digital Game-based Learning with a Mathematical Game on Calculation Abilities of Grade 3-4 Students: a Case Study
Slot 4	Paper ID 111
	An Optimal Grouping and Regrouping Method for Effective Collaborative Learning: Leveraging the Group Dynamics
Slot 5	Paper ID 146
	The impact of gender on female engineering students

Technical Session 22: Human – Machine Collaborative Learning **Chair**: Denis Gillet Friday, 1st December 2023 Time: 14:30 - 16:30 NZST Room: 303-G14	
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	Reimagining Online Coding Assessment Throughout the Pandemic: The Role of Auto-Grading and Enquiry Features
Slot 2	Paper ID 148
	Reform of Undergraduate Education with Chat-Bots for Microelectronics Specialty
Slot 3	Paper ID 137
	A Collaborative English Learning System with Role Reversal Feature
Slot 4	Paper ID 68
	Digital Intervention for Collaborative and Human-Centered Activities in Design-Based Learning Scenarios
Slot 5	Paper ID 102
	Gauging Lecturer LMS Training Video Engagement With YouTube Analytics

Technical Session 23: Robotics in Education **Chair**: Jie Zhang Friday, 1st December 2023 Time: 14:30 - 16:30 NZST Room: 303-G16 (Online Session)	
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	Design and Practice of Experimental Teaching of Avionics Fire Control System Based on OBE
Slot 2	Paper ID 107
	A Pedagogical Approach of "Learning from Failure" for Engineering Students: Observation and Reflection on a Robotics Competition (RoboRoarZ-Edition 2)
Slot 3	Paper ID 62
	Using Educational Robotics to Support Active Learning Experiences and Foster Computational Thinking Skills among Non-STEM University Students
Slot 4	Paper ID 76
	Health Diagnosis of Gear Based on Artificial Intelligence Deep Learning and Rigid-Flexible Coupling Dynamics Model
Slot 5	Paper ID 105
	Visualizing Multimodal Programming Attention in Debugging Test
Slot 6	Paper ID 43
	Rethinking the Course Design of Information Theory in Engineering Education

TALE 2023 Posters Presentation

Poster ID	Title	Presentation Mode
174	Developing Industry-Focused Internet-of-Things Course for Wireless Access Networks	In person
180	Flipping the Script: Reflection on Implementing the Flipped Classroom in Mathematics	In person
184	Reflective Insights: Flipping Learning in Engineering and ICT Courses	In person
194	Designing Worksheet for Using ChatGPT: Towards Enhancing Information Retrieval and Judgment Skills	In person
170	On the possibility of measuring learner's facial expressions in on-demand learning environments in junior high school students	In person
10	Impact of innovative workshops to inspire students to pursue a STEM career	In person
178	Incorporating Intercultural and Interdisciplinary Methods in a Project-based Learning Course to Foster Global Leading Engineers	In person
201	Engaged Student Learning with Gamified Labs: A New Approach to Hardware Security Education	In person
189	DIY Wind Turbines: A Low-Cost Smart ICPS for Educational Research	In person
144	Effectiveness of Hackathons to cultivate Sustainability Mindset among Engineering and Computing Students	In person
19	Scaffolding Critical Reflection using a critical thinking framework and micromodule	In person
202	Virtual Training on Remote Piloting: A Mobile Drone Simulator for Empowering Beginning Learners to Practice Visual Line of Sight Operations	In person
197	Hands-on Activities for Learning Computer Networks and Information Security in CS0 Course	In person
69	Vocational Education and Training (VET) System and Social Justice in Australia	In person

Poster ID	Title	Presentation Mode
187	The student experience of technology-focused micro-credentials as part of a larger learning journey	In person
179	Work-in-Progress: Relating Logical Thinking Skills to Program Complexity in Children's Programming Education	In person
40	Development of Metaverse Inquiry-Based Learning	In person
188	Feature Expansion of the Equation Editor in Mathematics Classroom Collaborator (MC2) for Smartphones	In person
181	Automated Essay Grading of Constructive Response Test Responses for Mechanical Engineering Students	In person
150	Reform of Integrated Circuit Courses Based on the Integration of Industry and Education Systems	In person
198	Examining the Influence of Auditory Stimuli on Memory Retention Using the Method of Loci	In person
6	Differential Analysis of Biological Information during the Learning of a Second Language and a Programming Language	In person
190	Improving Engineering Accreditation in United States Programs – Investigating Why ABET Accreditation is Superficial and Misguided	In person
182	Proposal for a Knowledge Map in Programming Education Curriculum for IT Talent Development in Japan	In person
186	Discovering Teacher Leaders: The Journey to Self-Identification	In person
199	The Eye Gaze Feature During Face-to-Face Discussion Between Two People	In person
203	A multimodal approach to mitigate cheating in online assessments	N/R
54	Problem-based Learning: A Catalyst for Teacher and Student Motivation in K-12 Schools	Virtually
119	Foundations of an AI-based, cross-plattform companion app for lifelong learning optimization	Virtually

Poster ID	Title	Presentation Mode
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139	Teaching Design Thinking to a Large Cohort, A Process Perspective	Virtually
94	A 5G Comprehensive Practical Teaching Laboratory Plan and Implementation	Virtually
200	Cultivating Inclusivity: A Journey Towards Democratizing Cybersecurity Education	Virtually
153	Enhancing Chemistry Laboratory Teaching through Gamification: The IQ-Mobile race	Virtually
39	Work-in-Progress of Exploring High School Students' Science Concept During an Engineering Design Challenge	Virtually
28	A Brief Scoping Review of Musical Performance Support System in IEEE Study Fields	Virtually

Tale 2023 Keynote Speaker

Keynote 1 – Professor Andrew Luxton-Reilly

University of Auckland

Andrew Luxton-Reilly focuses on Computing Education in the tertiary education sector, and how to support students who are learning to program. He is an advocate for scholarship of teaching and learning, and disciplinary-based education research. His research interests include peer learning, automated assessment tools, programming style, introductory programming, and the applications of AI for introductory programmers.

Keynote 2 - Professor Saurabh Sinha

University of Canterbury

The Future of Work is upon us and has rapidly and profoundly influenced many professions and industries. Alongside this, we argue that it is essential for the landscape of post-school education and training (PSET) both in South Africa and globally to adapt to the changing nature of work, and ideally lead this change. Learning is presented as a nexus between teaching, research and innovation — as a service in the context of the fourth industrial revolution (4IR), given the innovative technologies that are increasingly penetrating the mainstream. We discuss the transition toward an augmented approach, University 4.0, and the associated challenges, both technological and societal that accompanies the shift.

Keynote 3- Prof Arnold Pears

KTH Royal Institute of Technology

Engineering education research contributes to a better understanding of how engineering should be taught in the context of the needs of our world's societies and cultures. Engineering education is so much more than technical knowledge, it is an array of professional practices, competences and the ability to apply technical knowledge in the workplace to the benefit of humanity and society at large.

In a world where in many places engineering remains a male dominated area of human endeavour one of the major challenges is to render engineering a more inclusive enterprise, and to better understand the factors which young people associate with engineering. My research focuses on understanding the learning experience from a learner perspective, both in terms of the learning of specific technical concepts, and more broadly in terms of engineering skills and competencies. A major current challenge is to explore mechanisms to connect more young people with technology and engineering and help them to find the study of STEM (Science, Technology, Engineering and Mathematics) more meaningful and relevant.

Tale 2023 Workshop Speaker

Workshop Teaching & AI – Professor Nael Barakat

University of Texas at Tyler (UT-Tyler), TX. USA

Nael Barakat is currently serving as professor and Chair of Mechanical Engineering at University of Texas at Tyler (UT-Tyler), TX. USA. He is a registered professionally engineer and a fellow of the American Society of Mechanical Engineers (ASME). Dr. Barakat has served in many professional roles such as: chair of the Division of Engineering Ethics at the American Society of Engineering Education (ASEE), and Chair of Technology and Society Division at ASME. His expertise and interest are in the areas of Mechatronics, Control, Robotics, and energy harvesting, as well as Engineering Ethics, Professionalism, Leadership, and Education.

He has taught and delivered numerous courses, seminars, and workshops, internationally, and has developed research on different professional and educational engineering topics, including: ethics, professionalism, and leadership.

Workshop Teaching & AI – Professor Gary Wong

University of Hongkong

Professor Gary Wong is an Associate Professor of Computer Science Eductaion in the Faculty of Education, and Director of Centre for Information Technology in Education at the University of Hong Kong. He earned a B.S. in Computer Science and Mathematics (Double) from Brigham Young University Hawaii, an M.Phil. in Electronic and Computer Engineering from the Hong Kong University of Science and Technology, and a Ph.D. in Computer Science from City University of Hong Kong. He also obtained a Ed.M. in Learning Design and Technology from University of Illinois at Urbana Champaign, and LL.M. in Information Technology and Intellectual Property Law from the University of Hong Kong.

His primary research interests are computer science education and educational technologies. His research focuses on the understanding of computational thinking development and learning at young ages. He has published more than 100 research outputs. He received the Faculty Knowledge Exchange Award in 2022 and IEEE EAB Meritorious Achievement Award in Pre-University Education from IEEE Educational Activities Board (EAB) in 2023 to recognize his impactful research in computational thinking education. He is now serving as an associate editor of IEEE Transactions on Education and IEEE Access (Education Section). He is an IEEE Senior Member and Secretary of the IEEE Education Society Executive Committee.

TALE 2023 Proceeding

Kindly note that access to conference proceedings is limited to registered presenters only. The Publication Chair will soon send a dedicated email containing detailed information about the proceedings. A snapshot of the proceedings can be found below for your reference.

TALE 2023

AUCKLAND · NEW ZEALAND

28 November - 1 December 2023

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Auckland Information

The following information is provided as a guide to Auckland. If you have any queries, please visit the registration desk.

Emergencies, Medical Needs and Illnesses

If you have an emergency, you can contact the police, paramedics and fire department by calling 111 from any landline or mobile phone.

The Venue for the event is:

Faculty of Science,

23 Symonds Street,

Waipapa Taumata Rau

University of Auckland,

Auckland

If you require non-emergency medical attention during the workshop, please inform the registration desk.

Getting Around

Taxis and Airport Shuttles

There are many taxi companies to choose from in Auckland. We suggest:

Auckland Co-op Taxis 00 300 3000
www.cooptaxi.co.nz

Blue Bubble Taxis 0800 228 296
www.bluebubbletaxi.co.nz

Super Shuttle 0800 748 885 shared airport transfers direct to/ from your accommodation
www.supershuttle.co.nz

SkyDrive 0800 759 374 direct express service between the terminals of Auckland Airport & Central Auckland City

www.skydrive.co.nz




Piha Beach (top left), Wynard Quarter (bottom left), Waiheke Island (top right), Cornwall Park (bottom right)

Nearby Services

Pharmacy and Post Shop

Level 1 Kate Edgar Information Commons Corner & Symonds Street

Eat & Drink in Auckland

Where to start? Auckland has more great places to eat and drink than we could hope to recommend. For Current reviews visit:

Metro Eats Auckland
www.metroeat.co.nz

Check the Top 50 Restaurants 2023, Cheap Eats and Best Bar lists.
The Urban List
www.theurbanlist.com/auckland

Places to Visit

Visit Waiheke Island for some of the best vineyards in New Zealand, including the University's own award-winning Goldie vineyard.

Take a walk on one of Auckland's 50 volcanoes. For a quick trip, visit Mt Eden or One Tree Hill or for a day trip take the ferry out to Rangitoto Island.

View www.aucklandnz.com for more ideas.

Thank You | Ngā Mihi Maioha!

Thank you for being a part of the TALE 2023 Conference!

As we conclude this enriching event, we extend our heartfelt appreciation to all participants, speakers, sponsors, and organisers. Your contributions have made this conference a resounding success, fostering collaboration and innovation in in teaching, assessment and learning for engineering.

Key Highlights | Hirahira:

- Engaging Sessions: The conference featured insightful presentations and discussions, providing a platform for the exchange of cutting-edge research and ideas.
- Diverse Perspectives: Scholars, researchers, industry experts, and policymakers brought diverse perspectives, contributing to a holistic understanding of the challenges and opportunities in the realm of engineering, technology, and integrated STEM education.
- Networking: The networking sessions facilitated valuable connections, fostering partnerships that will drive future advancements in sustainable energy solutions.

Gratitude | Whakawhetai:

We express our deepest gratitude to our esteemed speakers and presenters who shared their expertise, our sponsors whose support made this event possible, and our organising committee for their dedication and hard work.

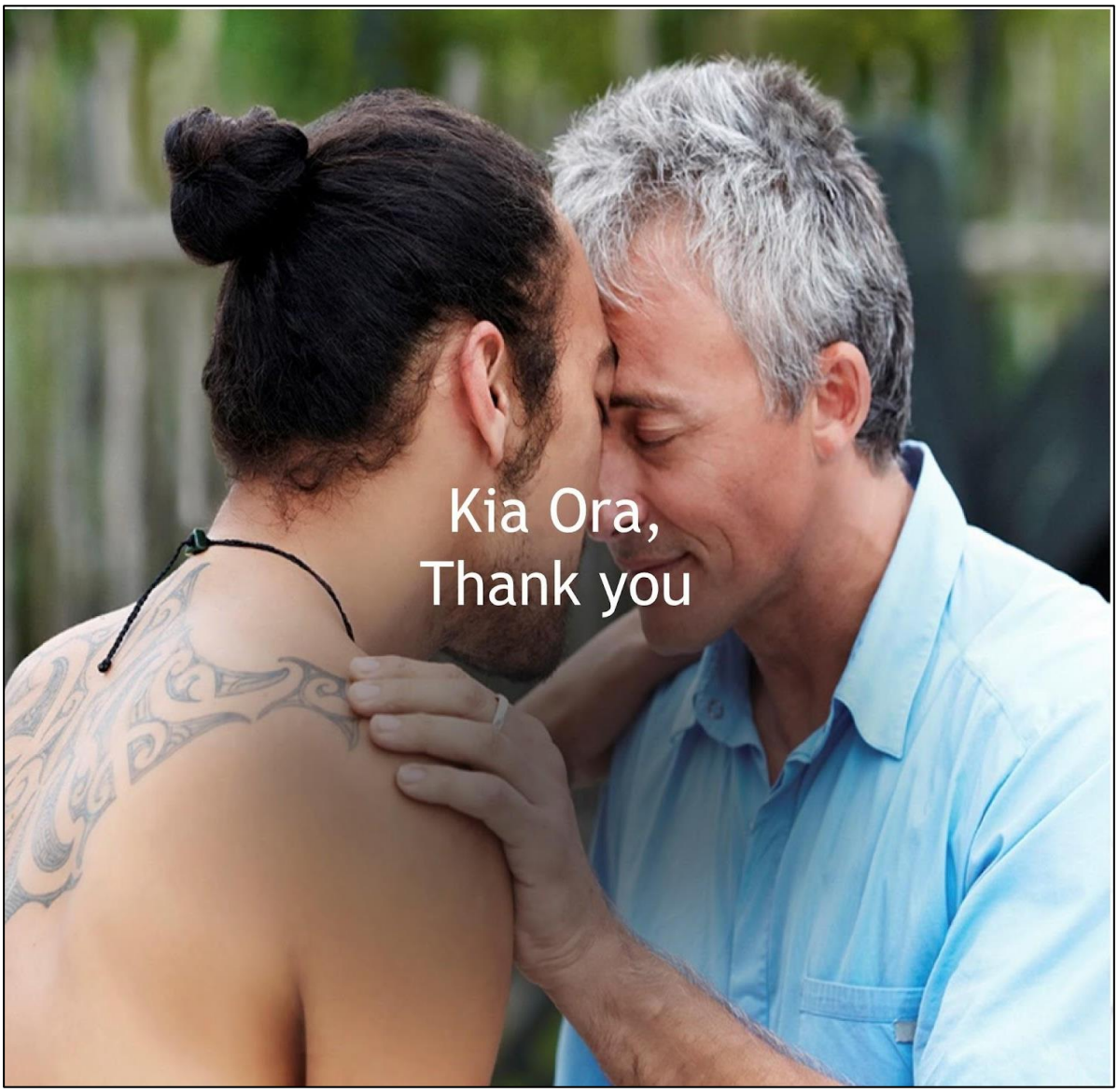
Stay Connected | Whakawhanaungatanga:

Keep the conversation going! Connect with fellow participants through our official social media channels and continue the dialogue on the future of smart grid technologies.

We look forward to welcoming you again at the next TALE conference. Stay tuned for updates on the location, dates, and exciting themes for our upcoming events.

Safe travels, and until we meet again! | Mā te wā!

The TALE 2023 Organising Committee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Thank you