HIT Lab NZ

Hangarau Tangata, Tangata Hangarau
Human Interface Technology Lab New Zealand

Annual Report 2024

HITLabNZ
Human Interface Technology Lab New Zealand
Hangarau Tangata, Tangata Hangarau

UC
UNIVERSITY OF CANTERBURY
Te Whare Wānanga o Waitaha
CHRISTCHURCH NEW ZEALAND

Contents

Director's Statement

Tēnā koutou katoa

This document presents a snapshot of the important and varied activities of the HIT Lab NZ for the 2024 calendar year. It has been an exciting year for us, as we continue to prosper in these technologically interesting times.

As you will read in this Annual Report, our stated shared values continue to provide guidance for us in shaping how we embrace emerging trends (e.g., AI), attract outstanding students, connect more broadly with other researchers across UC, secure external funding, produce impactful research outputs, and generally expand our support for an ever-increasing family of local, national and international organisations that reach out to us for assistance in navigating the sea of immersive technologies to improve the world.

The two most important happenings this year were the arrival of Dr Susanne Schmidt and Dr Donald Degraen as new permanent Lecturers (Assistant Professors) at the Lab. Susanne, focusing mainly on Intelligent Virtual Agents, and Donald, focusing mainly on fabrication and haptics, join us from very successful postdoctoral positions in Germany. Their research expertise and experience nicely dovetail with our existing focus areas of Virtual Reality, Augmented Reality and Applied Games, considerably increasing our research and supervision capacity, and enlarging the types of projects we can service.

Professor Rob Lindeman
Kaihautū | Director

Prof Rob Lindeman in Eight360 Nova Ball – 360 degree simulator

About Us

The Human Interface Technology Lab New Zealand (HIT Lab NZ) is a multidisciplinary research centre in the Faculty of Engineering at the University of Canterbury whose work focuses on the intersection between people and technology. Operating since 2002, HIT Lab NZ is recognised internationally as a leader in Human Interface Technology research and education.

As the largest interaction lab in New Zealand, HIT Lab NZ provides researchers and students with access to a wide range of cutting-edge equipment and facilities for experiments that explore, design and develop novel interactions across a range of interactive media and technologies. We take a human-centred research approach with the end goal of improving the user experience.

The multi-disciplinary research team collaborates widely with partners, both nationally and internationally, from industry, academia, and government and has expertise in:

- Virtual, Augmented and Mixed Reality
- Applied Games Design and Development
- Haptics
- (Socially) Intelligent Virtual Agents
- Human Augmentation
- Artificial Intelligence

We offer two postgraduate degrees, a Master of Human Interface Technology (MHIT) and PhD. We also support UC and international research internships.

In 2024 HIT Lab NZ hosted several interns and undergraduate students from various programs. These students contributed to the advancement of research at the lab while gaining valuable project experience in the human interface technology field:

- 2 UC Faculty of Engineering work experience students
- 4 UC PACE interns
- 2 School of Product Design interns working on the “Beneath the Waves” project
- 3 SENG402 Software Engineering Research course students
- 2 Visiting Interns from other domestic academic institutions
- 3 course-only students enrolled in HITD602 and HITD603

Values

The people at the HIT Lab NZ strive to cultivate an open, safe and supportive environment that values creativity, diversity, enthusiasm, tenacity, integrity, honesty, empathy and collaboration in the pursuit of bettering the world through knowledge creation and dissemination.

Mission

Our mission is to support and empower people through the study, invention, development and dissemination of knowledge, technologies and processes that solve human interface technology problems and have positive social impact in a globally aware context. We aspire to this by:

- Providing multidisciplinary, project-based experiences for students
- Maintaining a world-class centre of excellence for human interface technology research
- Developing and transitioning to industry leading-edge human-computer interfaces to accelerate economic development in Aotearoa New Zealand.

HIT Lab NZ Staff

Academic staff

Prof Rob Lindeman
Director

Prof Stephan Lukosch
Professor
Graduate Research Coordinator

Assoc Prof Heide Lukosch
Associate Professor
AIGI Lead

Dr Susanne Schmidt
Lecturer

Dr Donald Degraen
Lecturer

Dr -Ing. Maria Freese
Erskine Fellow

Prof Mark Billinghurst
Adjunct Professor

Professional staff

Chris Buyarski, MS, MBA
Centre Manager

Ryan McKee
Game Developer
IT Manager

Shunsuke Fukuden
Game and Digital Artist

Rodrigo Dias Takase
Beneath the Waves
Developer

Karen Anderson
Administrator

Postdoctoral staff

Dr Kris Tong
Postdoctoral Fellow

Dr Rory Clifford
Postdoctoral Fellow

Dr Tim McKenzie
Postdoctoral Fellow

Dr Sam Morrison
Postdoctoral Fellow – AIGI

Our Research

As an applied research centre HIT Lab NZ contributes significantly to the University of Canterbury's strategic research themes through innovative work in human-computer interaction, applied games, virtual, augmented and mixed reality, haptics, and user-centred design.

Our research aligns with *Technology for Humanity* by advancing technologies that enhance human experience, communication, and learning. It supports *Living Well* by developing tools and processes that improve mental health, accessibility, and quality of life. Additionally, projects use immersive technologies to address disaster response, education, and urban planning, contributing to *Resilient Cities and Communities* and *Sustainable Futures*, demonstrating HIT Lab NZ's integral role in shaping a more connected, inclusive, and resilient society.

For a comprehensive mapping of our 2024 research projects to UC's Research Themes, please see Appendix I.

PhD Researchers

The doctorate in Human Interface Technology is a multi-disciplinary degree designed to allow students from a variety of backgrounds to undertake research within the technology field. The HIT Lab NZ has a strong track record of working across a broad range of disciplines.

In 2024, our Academic staff supervised 20 doctoral candidates undertaking research in human interface technology, alongside candidates from other departments within the Faculty of Engineering.

Our PhD cohort was internationally diverse, with students from nine countries across Asia, Europe, the Pacific, and New Zealand, enriching our research environment with global perspectives.

Key milestones achieved in 2024 include:

- 3 students successfully defended their theses
- 1 student completed and submitted their thesis
- 5 students passed their confirmation milestone
- 5 new students enrolled as doctoral candidates

Research topics commonly focused on interactive technologies such as Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), Applied Games, Artificial Intelligence (AI), and Haptics. These technologies were applied to real-world research challenges across a broad range fields including, education and training, environmental management, disaster preparedness, sports science, health and wellbeing.

Timothy McKenzie

Addressing Video Game Development Challenges Using Industry Best Practices

Supervisory Team: Dr Miguel Morales-Trujillo, Prof Stephan Lukosch, Assoc Prof Simon Hoermann

- This research received funding from the University of Canterbury Department of Computer Science and Software Engineering, and the School of Product Design.
- This research received funding from a University of Canterbury grant from the Early Career Researcher Development Fund.
- This research received support from the University of Canterbury as part of the Applied Immersive Gaming Initiative (AIGI).

This project examines the challenges faced by the video game development (VGD) industry by analyzing the relationship between contexts, success factors, and the methods used in game projects. The research focuses on the effectiveness of Agile/Lean practices in VGD, aiming to address issues such as poor team collaboration and leadership. A key outcome was the development of a comprehensive VGD dictionary, designed to create a shared terminology between developers, academics, and players. The dictionary, built using a hybrid theory and data-driven approach, includes over 12,000 entries on VGD concepts, offering valuable insights for improving team decision-making and project management. Findings highlight Agile/Lean principles, though not widely adopted or fully understood, show significant benefits when implemented. The project includes case studies and workshops with game studios, refining the dictionary to inform industry best practices. This research was also supported by game development partners, NZGDA and Christchurch Game Developers Association, Black Salt Games along with other NZ game studios and developers.

Dilshani Kumarapeli

How Do We Balance User Privacy and User Experience in VR Mediated Experiences?

Supervisory Team: Prof Rob Lindeman, Dr Sungchul Jung

This project is funded by a grant from the Science for Technological Innovation National Science Challenge (SfTI).

This research focuses on the balance between user privacy and expressiveness in virtual reality (VR) environments, as the advancement of VR sensors has raised significant concerns regarding the collection of users' behavioural data. The study investigates privacy risks associated with VR, such as identity detection through behavioural patterns like facial expressions and movements, and the effectiveness of behaviour filters to conceal such information. The team developed real-time filters that modify users' expressions, eye movements, and hand gestures to enhance privacy without sacrificing the quality of interactions. Preliminary studies have shown these filters can prevent identification by machine learning algorithms while maintaining the user's engagement and trust within the virtual space. Funded by the Science for Technological Innovation National Science Challenge, this project emphasizes the need for users to be educated on the privacy implications of their VR data, advocating for greater awareness and control over personal information in immersive environments.

Steve Wheeler

Using Virtual Reality Technology to Train New Zealand Firefighters for High-Risk and High-Cost Scenarios

Supervisory Team: Assoc Prof Simon Hoermann, Prof Stephan Lukosch, Prof Rob Lindeman

This research received funding from Fire and Emergency New Zealand (FENZ).

This project explores the potential of virtual reality (VR) as an alternative to traditional, high-risk, and expensive live fire training for firefighters. By simulating fire behaviour in realistic forest environments, VR provides a safe, cost-effective way for trainees to learn about fire propagation, vegetation behaviour, and fire safety protocols. The VR system enables interactive learning, where users explore fire dynamics influenced by terrain, wind, and vegetation moisture. It also allows them to practice decision-making in controlled scenarios. The research focuses on two key questions: the effectiveness of VR for learning outcomes and the factors influencing its adoption in firefighting training. Preliminary findings indicate that VR is engaging, motivating, and promising for enhancing training. The project has shown significant potential in transforming firefighter education and training by improving access and safety while maintaining effectiveness.

Misha Mirza

Exploring the Efficacy of Augmented Reality Games for Flood Preparedness and Response

Supervisory Team: Assoc Prof Heide Lukosch, Prof Stephan Lukosch, Assoc Prof Adrian Clark

This research received scholarship funding from the University of Canterbury as part of the Applied Immersive Gaming Initiative (AIGI).

This project investigates the use of Augmented Reality (AR) games to enhance flood preparedness and response. The research identifies a gap in AR applications for disaster management, especially in fostering community resilience to floods. Building on the promising results from an initial user study, this project focuses on developing AR tools that raise awareness of natural disaster risks and empower individuals to take proactive measures. By exploring how AR can improve situational awareness, preparedness, and response efficacy, the project aims to create engaging applications that effectively train individuals for flood scenarios. With funding from the University of Canterbury, the project integrates cross-cultural perspectives, specifically focusing on New Zealand and Pakistan, to ensure broader applicability. The goal is to provide valuable insights into the potential of AR games in promoting risk awareness and effective action during climate-related emergencies.

Mac Greenslade

Realising Imagined Play: Transforming Everyday Objects into Virtual Tools for Augmented Reality Games, Using Participatory Design Methods

Supervisory Team: Prof Stephan Lukosch, Assoc Prof Adrian Clark

This PhD is funded by the University of Canterbury Aho Hīnātore | Accelerator Scholarship.

This research received support from the University of Canterbury as part of the Applied Immersive Gaming Initiative (AIGI).

This project explores how everyday objects can be transformed into interactive tools for augmented reality (AR) games, drawing inspiration from the experience of playing make-believe. By leveraging participatory design methods, the project aims to design intuitive and immersive AR interactions using common objects. Unlike previous research that either focuses on matching interactions to object affordances or assigning arbitrary virtual functions, this work emphasizes user-generated interactions that align with objects' natural properties. The research uses design workshops and elicitation studies to create an AR game prototype, which will be tested to evaluate interaction modalities. The goal is to compare object-based interactions with traditional AR input methods such as dedicated controllers or hand gestures, ensuring an engaging and natural play experience. This study contributes to improving the use of everyday objects in AR, promoting creativity and enhancing user engagement in immersive environments.

Yasas Sri Wickramasinghe

Connecting Remote Places and Players with a Location-Based Augmented Reality Game Design

Supervisory Team: Prof Stephan Lukosch, Assoc Prof Heide Lukosch

This research received scholarship funding from the University of Canterbury as part of the Applied Immersive Gaming Initiative (AIGI).

This project explores the integration of real-world environments with gameplay in a location-based augmented reality game (LBARG), aimed at connecting players across distances. Using LiDAR-enabled devices like the iPhone 12 Pro and 2022 iPad Pro, players scan and interact with their surroundings, creating virtual objects and sharing them with remote participants in real time. The game, "ARrive," enables spatial immersion by using various visualization modes like AR window, AR overlay, and AR tabletop. A notable game feature includes collaboratively solving challenges, such as sharing a fire extinguisher to help a remote player in need. The proof-of-concept trial with 32 participants showed positive engagement, with players feeling more immersed in the experience compared to traditional screen-based gaming. This project paves the way for future developments in location-based gaming, promoting collaboration and enhancing well-being by blending virtual and physical environments.

Zoë Platt-Young

How Might We Co-Design and Evaluate a Game-Based Approach for Youth Social Anxiety?

Supervisory Team: Assoc Prof Heide Lukosch, Assoc Prof Cara Swit

This research received scholarship funding from the University of Canterbury as part of the Applied Immersive Gaming Initiative (AIGI).

This research explores the potential of game-based virtual reality (VR) tools as an innovative approach to support young people with social anxiety disorder (SAD). SAD is common among adolescents and can severely impact social functioning and well-being. The project investigates how VR, combined with game elements, can provide exposure therapy in a controlled, engaging environment, offering an alternative to traditional methods such as talk therapies or medications. It also emphasizes the importance of involving youth with lived experiences in the design and evaluation of these VR tools. By co-designing the game with input from young people, clinicians, and other stakeholders, the project ensures the solution is both effective and relevant. The aim is to create an accessible, scalable solution to help adolescents confront social fears, enhancing their confidence in real-world social settings.

Kieron Wall

Designing Learning Games about Volcanic Hazards for Primary Aged Children in a Bi-Cultural Environment

Supervisory Team: Assoc Prof Heide Lukosch, Prof Ben Kennedy, Assoc Prof Simon Hoermann, Dr Kathryn MacCallum

This project is funded by a Ministry of Business, Innovation and Employment (MBIE) Endeavour Grant, under the lead of GNS Science, as part of the Beneath the Waves | Raranga Whāriki Papa Moana research programme.

This project focuses on designing educational games to teach primary-aged children in Aotearoa New Zealand about volcanic hazards. Working alongside a Māori language Kura (school), researchers co-designed a game that incorporates volcanic risk communication and integrates Māori cultural elements. The game, "5 Minute Volcano," features hazard identification based on New Zealand volcanoes, using cultural imagery such as Taniwha and animals to represent hazards.

The project aims to improve children's understanding of volcanic risks, which are particularly important in a region prone to natural hazards. By engaging children with culturally relevant content, the project seeks to enhance resilience and preparedness for volcanic events. The research will continue to explore the effectiveness of these game principles in promoting risk communication across New Zealand. Key findings include the importance of merging Western scientific knowledge with Māori cultural elements to create effective learning tools.

Helen Treffer

Facilitating Earthquake Preparedness at an Individual Level Through Immersive Virtual Reality Gaming

Supervisory Team: Assoc Prof Heide Lukosch, Prof Elena Moltchanova, Prof Daniel Nilsson

This research received support from the University of Canterbury as part of the Applied Immersive Gaming Initiative (AIGI).

This project focuses on using immersive virtual reality (VR) gaming to enhance earthquake preparedness at the individual level. It challenges the assumption that personal experience of an earthquake automatically leads to effective preparedness. Instead, it investigates whether VR simulations can replicate the intensity needed to motivate individuals to take protective actions. The research aims to develop a VR game that simulates a damaging earthquake, promoting constructive cognitions related to earthquake preparedness. It will assess the effectiveness of different theoretical models in predicting protective behaviour, using tools such as Structural Equation Modelling (SEM). The project will also evaluate the impact of the game through longitudinal studies, considering user feedback and behavioural observations. The goal is to provide an innovative, scalable tool for disaster risk reduction (DRR) that can be integrated into public education campaigns, motivating individuals to act in the face of natural hazards.

James Nikitine

Exploring Multiple World Views for Marine Conservation Decision-Making

Supervisory Team: Prof Rob Lindeman, Assoc Prof Heide Lukosch

This study received scholarship funding from the Ministry of Business, Innovation and Employment (MBIE) Endeavour Fund through the Te Mana o Rangitāhua project (2020-2025) led by Ngāti Kuri and Auckland War Memorial Museum.

The Rangitāhua project leverages immersive technology, particularly virtual reality (VR), to improve ocean literacy and environmental awareness. By placing participants in simulated oceanic environments, the project aims to educate individuals on the significance of marine ecosystems and the pressing need for conservation efforts. Through VR, participants can virtually explore diverse underwater landscapes, encounter marine life, and understand the impact of human activity on oceans. The research targets various audiences, from school children to adults, aiming to increase ocean literacy across different demographics. By making ocean conservation more relatable and engaging, the project hopes to inspire a deeper sense of responsibility and action toward preserving our oceans for future generations.

Zoë Hector

Games Based Interventions to Improve Psycho-Social Wellbeing in Deaf and Hard of Hearing Youth

Supervisory Team: Assoc Prof Heide Lukosch, Assoc Prof Simon Hoermann

This PhD is funded by the University of Canterbury Aho Hīnātore | Accelerator Scholarship.

This research received support to attend conferences from the University of Canterbury as part of the Applied Immersive Gaming Initiative (AIGI).

This project aims to develop interactive games specifically designed to enhance the learning and social development of deaf children. By combining game design principles with accessibility features, the research focuses on creating educational experiences that empower deaf children through fun and engaging gameplay. These games are intended to support language acquisition, communication skills, and cognitive development, while also fostering social connections with peers. The project explores how digital games can bridge gaps in accessibility, promoting inclusivity and giving deaf children the tools to better navigate both educational and social settings. The goal is to provide deaf children with resources that enhance their self-confidence and communication abilities, ultimately contributing to their overall well-being and empowerment.

Upulanka Premasiri

Multimodal User Interaction for Mitigating Fatigue to Sustain Long-Term Virtual Reality Usage

Supervisory Team: Prof Rob Lindeman, Prof Stephan Lukosch

This PhD is funded by a University of Canterbury Human Interface Technology Lab NZ PhD Scholarship.

This research aims to determine how multimodal interactions can reduce fatigue and enhance comfort in long-term Virtual Reality (VR) sessions. Users experience physical strain from prolonged movement, visual fatigue from display factors, and mental fatigue from complex tasks. Interactions in VR, such as object selection, object manipulation, navigation, text input, and system control, require continuous hand movements and continuous attention, increasing fatigue over time. This research proposes a multimodal user interaction approach that integrates voice commands, haptic touch, and gaze inputs alongside default controllers and hand gestures to mitigate fatigue in VR for long-term sessions such as at least 1-hour continuous session per day for a few days. Three research questions will explore its effects on arm fatigue, mental fatigue, and aspects of the task. This research seeks to mitigate fatigue in long-term VR sessions by prioritizing user comfort.

MHIT Students

2024 New PhD Students

Marko Ritter

Attention And Distraction In Pedestrian Augmented Reality.

Supervisory Team: Prof Stephan Lukosch, Prof Mark Billinghurst (UniSA), Arash Mahnan (Meta)

Funded by a Meta Scholarship

Anna Treffer

Teaching And Training Physical Motion With Immersive Technology.

Supervisory Team: Prof Stephan Lukosch, Assoc Prof Adrian Clark

Funded by an UC Aho Hinatore | Accelerator scholarship

Hēmi Ateremu McNeill

Leveraging Kaupapa Māori Principles In Human-Computer Interaction: A Social Justice Pathway.

Supervisory Team: Assoc Prof Heide Lukosch

Funded by an UC Aho Hinatore | Accelerator scholarship

Qinyang Wu

Immersive regenerative tourism experiences in Aotearoa.

Supervisory Team: Prof Stephan Lukosch, Assoc Prof Heide Lukosch

Funded by a MBIE He karapitipitinga mariko | Immersive Tourism project scholarship

Md Tanvir Hossain

Human Augmentation For Rhythm Skill Acquisition In Elite Sport.

Supervisory Team: Prof Stephan Lukosch, Prof Rob Lindeman

Funded by a High Performance Sport New Zealand (HSPNZ) scholarship

2023/2024 Cohort

Eleanor Adams

Assoc Prof Heide Lukosch, Prof Rob Lindeman, Assoc Prof John Chrisstoffels

A Study on Audience Experience of Diegetic Portals as a Scene Transition Device in Cinematic Virtual Reality

Marko Ritter

Prof Stephan Lukosch, Dr Kong Meng Liew, Yasas Sri Wickramasinghe

Trust-building for dyadic exchanges of virtual items in Augmented Reality

Felipe Figueroa Flores

Assoc Prof Heide Lukosch, Prof Rob Lindeman, Dr Jennifer Wong

Measuring co-presence in a job interview environment supported by an augmented reality device

Ren Ren

Prof Stephan Lukosch, Dr Kris Tong

Utilizing Augmented Reality for Attention Guidance in Outdoor Cultural Heritage Storytelling

Anna Treffer

Prof Stephan Lukosch, Assoc Prof Adrian Clark

Teaching Dance with Mixed Reality Mirrors: virtual instructors and other forms of visual feedback

Yue (Alex) Zhao

Prof Rob Lindeman, Assoc Prof Tham Piumsomboon

Daddy Long Legs: A Scale and Speed Up Virtual Reality Locomotion Technique for Medium-Scale Scenarios

Amali Seneviratne

Prof Stephan Lukosch, Dr Bethany Growns

Investigate the impact of a simulated Cognitive Augmentation to detect deceptive behaviour in negotiations

Yuming (Finn) Feng

Prof Rob Lindeman, Dr Kris Tong

Stress Reduction Therapy in Immersive Environments: Does Rotation Mode Have an Effect on Mental Stress?

Hēmi Ateremu McNeill

Assoc Prof Heide Lukosch, Mr Hamuera Kahi

Using indigenous knowledge to increase social presence in VR: Incorporating kaupapa Māori to prime collaboration with an AI powered avatar

Wenliang (Kyle) Yin

Assoc Prof Heide Lukosch, Assoc Prof Tham Piumsomboon

Entering the realm of the Wetlands Invasion: Design and Evaluation of Engagement for a Mobile Augmented Reality Game

2024/2025 Cohort

Jiaxuan Ling

Prof Rob Lindeman, Assoc Prof Heide Lukosch

Enhancing Autonomous Sensory Meridian Response (ASMR) Through Personalised Triggers in Virtual Reality

Jonathon Ross

Assoc Prof Heide Lukosch, Dr Susanne Schmidt

Eliciting Emotional Responses Using a Procedurally Generated Forest Environment Curated by Generative AI

Nicholas (Nick) Harding

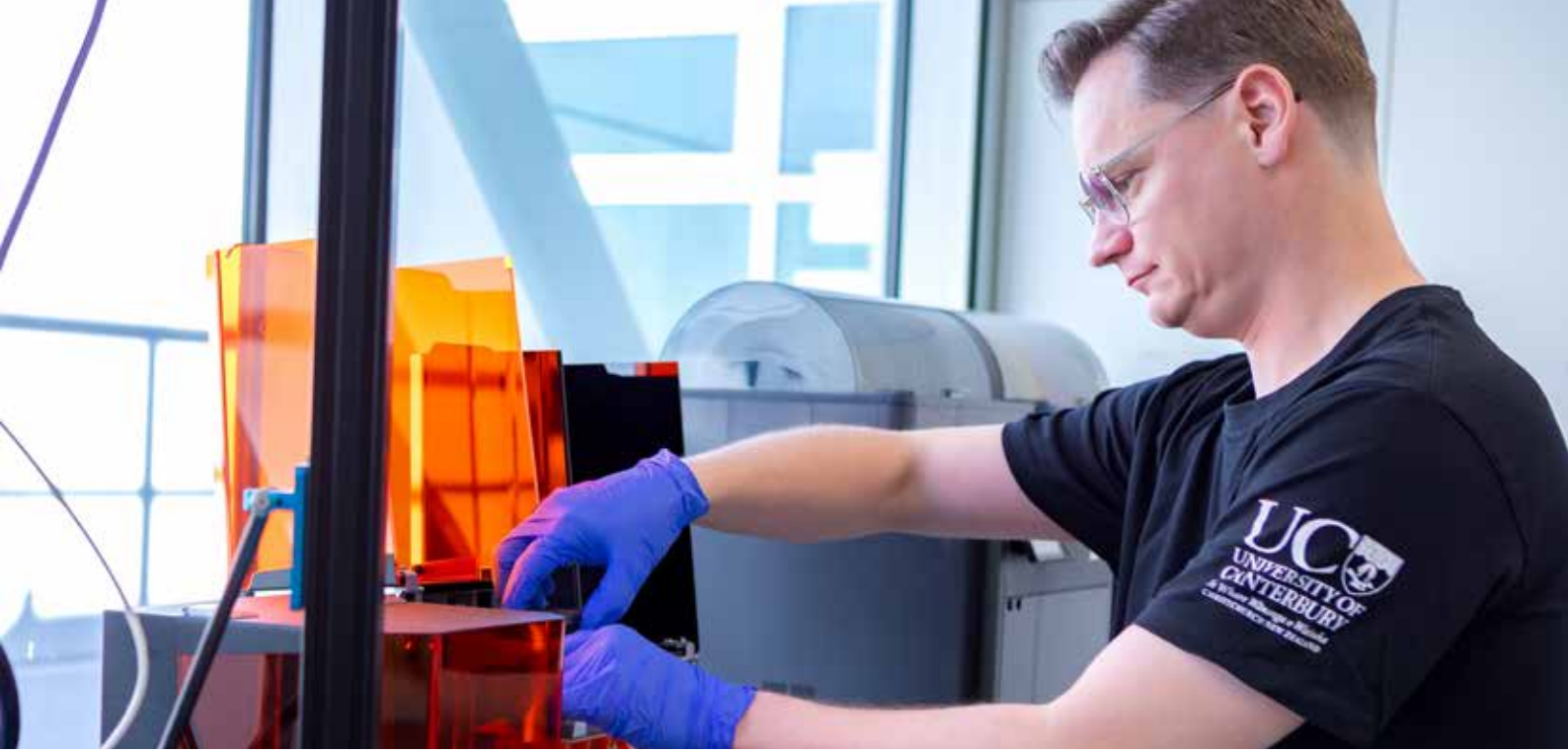
Assoc Prof Heide Lukosch, Dr Peter Thompson

Improving Accessibility of Pedestrian Flow Visualization Techniques for Users with Vision Disabilities

Ziyang Zhang

Prof Rob Lindeman, Prof Stephan Lukosch

A Study on Cybersickness and Immersion in a VR Game with a 360-degree Motion Simulator



Research Projects

New Research Projects

Enhancing whanaungatanga with infants through immersive VR: Case studies in early childhood education and healthcare

2024-2027

Prof Heide Lukosch and Prof Jayne White (Faculty of Education)

This project received Ministry of Business, Innovation and Employment (MBIE) Smart Ideas funding in the 2024 round of the Endeavour Fund.

In response to Aotearoa New Zealand's critical need for well-trained professionals in early childhood education (ECE) and healthcare, and confident parents, this research offers an innovative solution. The interdisciplinary research team will work together with Ngaroma Williams (bicultural early childhood education specialist) and colleagues at the University of Otago to evaluate the impact of VR-enhanced training on relational skills and assessing its applicability across various professions. Early findings indicate significant improvements in professionals' confidence and competence.

Improving Immersive Telecommunication by Increasing Comfort in Virtual Reality

2024-2027

Prof Rob Lindeman

Supported by a three-year travel grant from the Research Institute of Electrical Communication (RIEC), Tohoku University, Japan.

This collaborative research project aims to find solutions to VR discomfort. The grant allows for HIT Lab NZ academics to travel and collaborate with RIEC researchers in Japan. Prof Rob Lindeman, Dr Susanne Schmidt, Dr Donald Degraen and Sam Morrison attended the first workshop from 9-13 December 2024 at the Research Institute of Electrical Communication (RIEC), Tohoku University.

He karapitipitinga mariko: Immersive regenerative tourism experiences in Aotearoa

2024-2029

Prof Stephan Lukosch and Assoc Prof Heide Lukosch

This project is funded from a MBIE Endeavour Fund Research Programme grant. The programme is led by Prof Tobias Langlotz, University of Otago.

This 5-year research program will use VR and AR to create a technology-supported 'new tourism' model and radically transform the sector to address Aotearoa's need for a more sustainable tourism industry. The research will focus on novel interactive and immersive live tourism experiences that can be jointly experienced with

others regardless of their location. Tourism is emerging from a global crisis. While tourism operators still negotiate the immediate effects of the global pandemic, systemic issues that emerged before the current crisis, e.g. related to the impact of tourism on land and people, remain. This situation offers both challenges and opportunities to build a 'new' regenerative tourism model with a unique chance to radically transform the tourism sector. We will explore how far human augmentation can be used to create a collective location-based memory and how this can contribute to regenerative tourism. We will further explore location-based game mechanics in relation to collective memory and how games can foster engagement with and learning about regenerative tourism. Major questions around this relate to the kind of experiences and stories relevant to regenerative tourist experiences, ways to (playfully) capture, share and explore these on location, and socio-technical inquiries into ownership and creation of stories and experiences.

Ongoing Projects

Impact of Augmented Reality on Movement and Spatial Navigation

2023-2026

Prof Stephan Lukosch

This project is funded by Meta Platforms Technologies.

This ongoing research project examines the effects of augmented reality (AR) on human movement and spatial navigation, focusing particularly on how wearing head-mounted displays (HMDs) may alter physical behaviours. The study seeks to identify how AR affects gait and other movement parameters, potentially leading to health and safety concerns such as distraction or increased risk of accidents. By comparing the movement data of participants in real-world environments to their movements while interacting with AR, the project aims to pinpoint any behavioural deviations that might indicate unsafe actions. The findings could inform future AR user interface designs to minimize disruptions to normal movement and reduce the risk of hazards. This research, in collaboration with the University of South Australia and the University of Auckland, is funded by Meta Platforms Technologies.

Human Augmentation for Rhythm Skill Acquisition in Elite Sport

2020-2027

Prof Stephan Lukosch

This project is funded by High Performance Sports NZ.

This project explores human augmentation technologies to improve rhythm acquisition and adherence in elite sports, particularly track and field events such as high jump, long jump, and hurdling. Athletes in these disciplines must select and maintain specific rhythmic patterns to optimize their performance, influenced by variables like biomechanics, weather, and surface conditions. The research aims to enhance athletes' ability to adapt and perfect their rhythms during competition by providing real-time visual, auditory, or haptic feedback. The goal is to develop training methods that improve rhythmic control and adaptability, which are critical for achieving peak performance. The project, funded by High Performance Sports NZ, investigates innovative ways to augment human capabilities, starting with rhythm training and potentially expanding to other performance aspects, like lift-off in high jumps. By refining rhythm skills, athletes can maximize their performance despite fluctuating conditions.

Beneath the Waves | Raranga Whāriki Papa Moana

2021-2026

Prof Ben Kennedy (UC School of Earth and Environment), Assoc Prof Heide Lukosch

This project is funded by a Ministry of Business, Innovation and Employment (MBIE) Endeavour Grant, under the lead of GNS Science, as part of the Beneath the Waves research programme.

The "Beneath the Waves" project aims to improve preparedness and resilience against natural hazards from New Zealand's near-shore volcanoes, Tuhua (Mayor Island) and Whakaari (White Island). In collaboration with Professor Ben Kennedy, the project uses immersive technologies, such as virtual reality (VR), to communicate volcanic eruption and tsunami risks. The initiative includes co-designing an immersive game targeted at school-aged children to raise awareness of these hazards. The project draws from both Mātauranga Māori (Māori knowledge) and scientific methods to bridge cultural and linguistic barriers in disaster risk communication. The name "Raranga Whāriki Papa Moana," meaning the "woven mat of the ocean floor," symbolizes the interconnectedness of the ocean, volcanoes, and life, emphasizing the spirit of reciprocity.

Applied Immersive Gaming Initiative (AIGI)

2019-2025

Lead: Assoc Prof Heide Lukosch

Prof Stephan Lukosch, Prof Rob Lindeman, Assoc Prof Adrian Clark (SoPD), Assoc Prof Simon Hoermann (SoPD), Assoc Prof Tham Piumsomboon (SoPD)

This initiative is jointly funded by the Tertiary Education Commission and the University of Canterbury.

The Applied Immersive Gaming Initiative (AIGI) was established with the goal of advancing research and applications in immersive gaming to tackle real-world challenges. AIGI brings together interdisciplinary experts from computer science, engineering, social sciences, arts, and design to explore the use of games in areas such as health, education, disaster management, and resilience building. By integrating virtual reality (VR) and augmented reality (AR) with game mechanics, AIGI focuses on creating applied games that promote learning, training, and decision-making in engaging ways. The initiative plays a key role in New Zealand's growing gaming industry, addressing skill shortages while fostering collaborations with international game developers and partners. AIGI is dedicated to developing innovative solutions that improve outcomes for individuals, communities, and industries across various sectors.

Successfully Concluded Projects

Virtual Reality Baby Training Tool (VRBTT)

2022 – 2024

Prof Jayne White (Faculty of Education), Assoc Prof Heide Lukosch

This study was funded by the Child Well-being Research Institute at the University of Canterbury.

The VR Baby Training Tool (VRBTT) offers a virtual simulation for students training in early childhood education (ECE) to practice caregiving skills in a safe environment. This innovative tool allows users to interact with a lifelike virtual baby, designed to respond to cues such as being picked up, reacting to objects, or becoming tired. Developed by HIT Lab NZ in collaboration with the University of Canterbury's Child Well-being Research Institute, the VRBTT aims to boost confidence and self-awareness in students by providing a realistic simulation of child interactions. The tool also allows for reflection, as students observe their peers'

approaches in the game. The prototype has already shown promising results, with users demonstrating increased confidence and better relational pedagogical skills. Future projects are planned to enhance simulation with features such as temperature sensing and voice activation which will further enrich the learning experience.

Ātea – Ending With Impact Project: Virtual/Immersive Wānanga

2022-2024

Prof Hēmi Whaanga, Prof Rob Lindeman, Prof Holger Regenbrecht, Assoc Prof Heide Lukosch, Dr Kris Tong

This research was funded by an Ending With Impact Project (EWIP) grant from the Science for Technological Innovation National Science Challenge (SfTI) programme hosted by Callaghan Innovation and the Ministry of Business, Innovation and Employment.

This project builds on the learnings and technology developed during our Spearhead project, Ātea, which successfully created an immersive experience of the wharerau Tahu Pōtiki (Te Rau Aroha Marae in Motupōhue/ Bluff) that enabled whānau to connect remotely back to their own stories and mātauranga. This project continued the work to co-design and deliver the realisation of an immersive, virtual wānanga environment, to evaluate this in the field, and to give this to the community. Researchers also created a tikanga guided framework and prototype virtual space which is fit to hold wānanga that can communicate, share, teach and create new mātauranga.

Ātea – Building an Immersive Tour Creator for Tangata Whenua

2024

Dr Kris Tong, Prof Rob Lindeman

This research was funded by an Ending With Impact (EWIP) grant from the Science for Technological Innovation National Science Challenge (SfTI) programme hosted by Callaghan Innovation and the Ministry of Business, Innovation and Employment.

This project aims to develop an intuitive platform for Māori communities in Aotearoa New Zealand to create and share immersive virtual tours. The platform utilizes virtual reality (VR) and 360-degree video technologies, offering Māori communities a user-friendly solution for content creation and cultural preservation. By providing easy-to-use tools, the project empowers these communities to capture, post-process, and construct their own digital stories, ensuring that the content is shared in a culturally appropriate manner while maintaining ownership. The Immersive Tour Creator will initially benefit Te Rau Aroha Marae, with plans to extend to other Māori communities. Key outcomes include preserving Māori knowledge, fostering cross-cultural exchange, and supporting educational initiatives in Māori schools. This project contributes to cultural empowerment, helping Māori communities celebrate their heritage and share their stories with the world. The tool also aligns with Tikanga Māori, ensuring respect and authenticity.

Ātea – Early Career Researcher Bolt-on Project: Matariki Hunga nui Mixed Reality Experience

2023 – 2024

Dr Kris Tong, Dr Noel Park, Tiriana Anderson, Prof Hemi Whaanga

This research was funded by an Early Career Researcher Bolt-on Project grant from the Science for Technological Innovation National Science Challenge (SfTI) programme hosted by Callaghan Innovation and the Ministry of Business, Innovation and Employment.

The Matariki Mobile Mixed Reality (MR) project focuses on creating an immersive mobile experience centered on Māori astronomy (tātai arorangi), specifically celebrating Matariki, the Māori New Year. By leveraging mobile devices, the project aims to provide accessible, interactive astronomical learning that transcends traditional barriers of time, weather, and location. This MR experience enables users to observe and learn about celestial bodies tied to Māori culture, fostering a deeper connection to both the ceremony and Māori knowledge systems. The project offers a platform for individuals and communities to share mātauranga (knowledge) and engage in educational applications, preserving and enhancing Māori cultural practices. The broader goal is to promote digital storytelling and immersive learning in a way that empowers communities to create content relevant to their iwi or hapū, providing economic and educational opportunities through technology. This project was co-designed and involved collaboration with Te Rau Aroha Marae and tātai arorangi, and Māori astronomy experts on Matariki using immersive technologies.

Scholarships and Awards

Prof Rob Lindeman

Inducted into the IEEE VGTC Virtual Reality Academy for his contribution to research on haptic and multisensory user interfaces for VR. The VRA is a prestigious academy that highlights the accomplishments of leaders in the field. Since awards are limited in number, the field recognizes significant contributions of those who exceed or augment the criteria of existing VGTC awards.

Amali Seneviratne

ACM SUI 2024 (ACM Symposium on Spatial User Interaction) “Best Poster Honorable Mention - Community’s Choice - SUI 2024” for: Amali Seneviratne, Bethany Growns, and Stephan Lukosch. (2024). On the Impact of a Simulated Cognitive Augmentation to Detect Deception on Decision-making Confidence.

Anna Treffer

MHIT graduate and PhD student awarded an Aho Hinatore Scholarship.

Ellie Adams

Thesis project selected and exhibited at the Doc Edge Festival in Christchurch, June 2024.

Hēmi Ateremu McNeill

MHIT graduate and PhD student awarded an Aho Hinatore Scholarship.

Kieron Wall

2024 Geoscience Society of New Zealand conference Runner-up Oral Presentation Award for students.

Marko Ritter

Meta Scholarship.

Md Tanvir Hossain

UC Connect Doctoral Scholarship and High Performance Sport New Zealand (HPSNZ) Scholarship.

Qinyang Wu

MBIE Immersive Tourism ‘He karapitipitinga mariko’ project Scholarship.

Prof Stephan Lukosch

IEEE ISMAR24 Best Poster Honourable Mention Award at the 23rd IEEE International Symposium on Mixed and Augmented Reality (ISMAR), Seattle Area USA, 21-25 October 2024 for a poster on “Navigating Virtual Realms: The Impact of Wearing HMDs on Human Gait” based on a project funded by Meta and in collaboration with the University of Auckland.

Steve Wheeler

UC Faculty of Engineering PhD Publishing Scholarship.

Publications

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Conferences and Workshops

Multicore World XI Conference, 12-16 February 2024

Prof Rob Lindeman attended Multicore World XI Conference at Christchurch Town Hall, on 12-16 February 2024. Multicore World was conceived with an economic development agenda to make New Zealand a global centre for entrepreneurship based in next generation computing technologies.

IEEE VR Conference Florida, 15 March – 7 April 2024

- **Prof Rob Lindeman** IEEE VR Conference Florida, 15 March – 7 April 2024. IEEE Conference on Virtual Reality and 3D User Interfaces (IEEE VR) is the premier international event for the presentation of research results in the broad areas of virtual, augmented, and mixed reality (VR/AR/MR).
- **Prof Rob Lindeman** presented 'Comfortable VR: Supporting Regular and Long-term Immersion' at the 3rd International Workshop on eXtended Reality for Industrial and Occupational Supports (XRIOS). XRIOS is a half-day workshop offered at IEEE VR 2024.

Augmented Humans 2024, 4-6 April 2024

Prof Stephan Lukosch attended Augmented Humans 2024 conference in Melbourne from 4-6 April 2024. The conference focused on physical, cognitive, and perceptual augmentation of humans through digital technologies.

CHI 2024, Hawai'i, 11-16 May 2024

Assoc Prof Heide Lukosch attended CHI 2024 in Hawai'i (11-16 May 2024). She is one of the co-organizers of a one-day workshop, *"Shaping The Future: Developing Principles for Policy Recommendations for Responsible Innovation in Virtual Worlds"*. This workshop is dedicated to developing forward-thinking policy recommendations that address potential future vulnerabilities posed by the widespread adoption of XR technologies, whilst simultaneously encouraging the responsible innovation of new advancements within XR.

Comms Connect New Zealand, Christchurch, 27 June 2024

Misha Mirza (PhD student) and **Assoc Prof Heide Lukosch** were invited to talk at Comms Connect New Zealand on 27 June 2024. They presented their work on how *"AR technology assists with natural disaster preparedness"* at Te Pae in Christchurch. They discussed how Augmented Reality Games can be used to prepare New Zealand for natural disasters and communicate effective disaster mitigation strategies.

55th International Simulation and Gaming Association Conference, University of Canterbury, Christchurch, 8-12 July 2024

Assoc Prof Heide Lukosch along with **Erskine Fellow Dr.-Ing. Maria Freese** organised the **55th International Simulation and Gaming Association Conference**. Hosted at the University of Canterbury from 8-12 July 2024 and supported by the HIT Lab NZ team, the conference welcomed participants from around the world including members from the US, Europe, Asia and Oceania for a week of

interactive learning and play around the theme of 'Simulation Gaming across Borders'. Heide Lukosch is General Chair of the International Simulation and Gaming Association (ISAGA).

Accessible XR, 8-13 September 2024, Dagstuhl, Germany

Prof Rob Lindeman invited to week-long seminar at Dagstuhl on the topic of "Accessible XR", 8-13 September 2024. Members discussed how to increase accessibility (in all its forms) of immersive technologies.

ACM SUI 2024, 7-8 October 2024, Trier, Germany

- **Mac Greenslade** (PhD student) presented paper: Mac Greenslade, Adrian Clark, and Stephan Lukosch. 2024. *Becoming Q: Using Design Workshops to Explore Everyday Objects as Interaction Devices for an Augmented Reality Spy Game.*
- **Marko Ritter** (PhD student) presented paper: Marko Ritter, Kongmeng Liew, Yasas Sri Wickramasinghe, and Stephan Lukosch. 2024. *Trustful Trading in Shared Augmented Reality.*
- **Amali Seneviratne** (MHIT student) poster presented by Prof Stephan Lukosch: Amali Seneviratne, Bethany Growns, and Stephan Lukosch. 2024. On the Impact of a Simulated Cognitive Augmentation to Detect Deception on Decision-making Confidence. Awarded *"Best Poster Honorable Mention - Community's Choice - SUI 2024"*.
- **Prof Stephan Lukosch** panel member for *"The Future of Spatial Computing: Opportunities and Challenges"*.

2024 NZ Game Development Conference (NZGDC), 17-19 October, Wellington

Dr Tim McKenzie (Postdoctoral Fellow) delivered two well-received workshops based on his PhD research - *"Misperceptions to Solving Collaboration Challenges: Agile Game Development Workshop"*.

23rd IEEE International Symposium on Mixed and Augmented Reality (ISMAR), Seattle, 21-25 October 2024

- **Anna Treffer (MHIT student) paper** presented by Prof Stephan Lukosch: *"Teaching Dance with Mixed Reality Mirrors"* based on her MHIT thesis.
- **Prof Stephan Lukosch** presented poster *"Navigating Virtual Realms: The Impact of Wearing HMDs on Human Gait"* for Meta funded project and collaboration with the University of Auckland. Poster received the IEEE ISMAR24 Best Poster Honourable Mention Award.

International Indigenous Research Conference (IIRC2024) Auckland, 11-15 November

Hēmi Ateremu McNeill (PhD student) attended the International Indigenous Research Conference (IIRC2024) in Tāmaki Makaurau Auckland, 11-15 November.

Tūrangawaewae Kairangahau Wānanga 2024 outreach conference, Tūrangawaewae Marae, Kirikiriroa Hamilton, 22-23 November 2024

Zoe Hector attended this Marae-based community forum which offered researchers a unique insight into Te Ao Māori, focusing on interaction rather than traditional conference formats. This event brought together researchers from across Aotearoa to engage with Māori communities in an environment guided by tikanga.

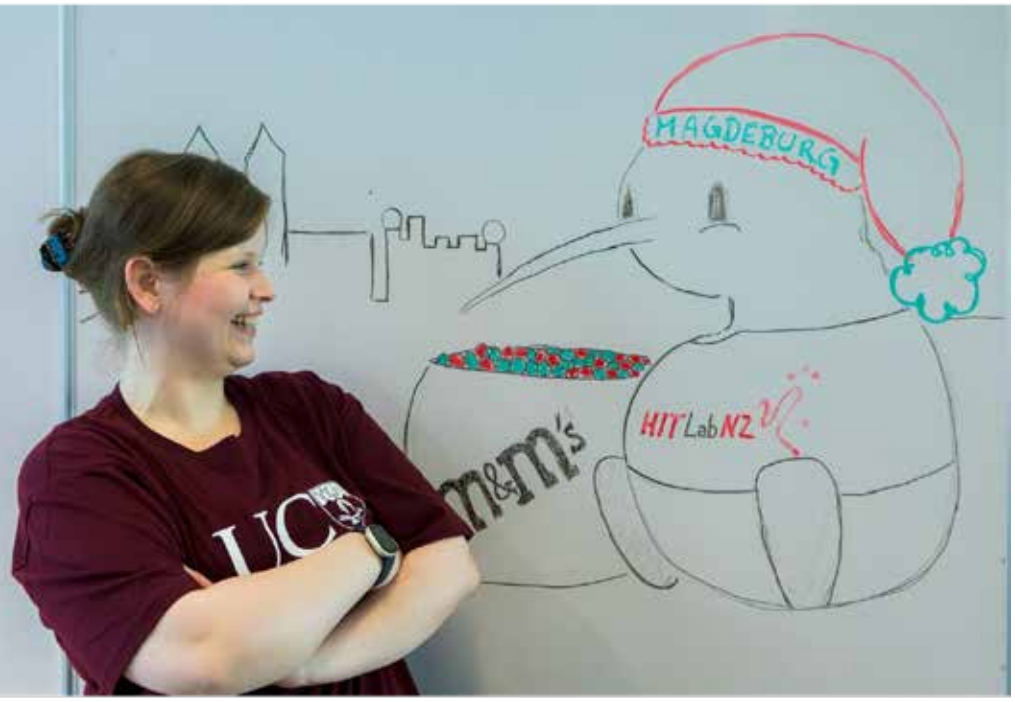
SIGGRAPH Asia in Tokyo, Japan 3-6 Dec 2024

Prof Rob Lindeman attended SIGGRAPH Asia in Tokyo, Japan from 3-6 Dec 2024. SIGGRAPH Asia is an annual international conference focused on computer graphics and interactive techniques.

Improving Immersive Telecommunication by Increasing Comfort in Virtual Reality, 9-13 December 2024, Tohoku University, Japan

Prof Rob Lindeman, Dr Susanne Schmidt, Dr Donald Degraen and **Sam Morrison** attended a workshop as part of the collaborative research project, *'Improving Immersive Telecommunication by Increasing Comfort in Virtual Reality'* at the Research Institute of Electrical Communication (RIEC), Tohoku University.

Engagement and Outreach



Erskine Fellow Dr. Ing Maria Freese from Otto-van-Guericke University in Magdeburg, Germany spent 3-months at the HIT Lab NZ.

HIT Lab NZ regularly welcomes local and international visitors to the lab demonstrating the potential of its research expertise and specialist equipment.

Visiting Academics

Dr.-Ing. Maria Freese, 2024 Erskine Fellow joined us from the Otto-van-Guericke University in Magdeburg, Germany. She is a group leader at the Chair of Production Systems and Automation, working on Simulation Gaming and other novel approaches in teaching and research. Maria has developed games for research and learning, and is an expert in developing, facilitating, and debriefing simulation games. Maria supported the MHIT program and is co-chair of the 2024 ISAGA conference.

Dr Eri Koh, Postdoctoral Researcher in the fields of positive psychology and wellbeing, focusing on emotional experience and regulation in different contexts, such as at work and home, online/virtual and offline environments.

Dr Matteo Filippini, Assistant Professor at the Laboratory of Neurophysiology of Visuo-Motor Systems at the Department of Biomedical and Neuromotor Sciences, University of Bologna, Italy. (PLACES program)

Prof Ben Lok, Director, Virtual Experiences Research Group (VERG), Computer & Information Science & Engineering, University of Florida

Dr.-Ing. Andre Zenner, Postdoctoral Researcher, Deutsches Forschungszentrum für Künstliche Intelligenz (DFKI) GmbH, Ubiquitous Media Technology Lab at Saarland University.

Prof Florian Buchner, Professor for Health Economics at the University of Applied Sciences Carinthia, Austria, currently on sabbatical was interested in our work in applied games and education, especially with immersive technologies. He is using simulation and gaming in his work and is very interested in innovations in higher education.

Dr Jeanine Stefanucci, Professor of Psychology, University of Utah. Research interests: Emotion and Perception, Virtual Environments, Space Perception, Spatial Cognition

Outreach Activities

HIT Lab NZ Open House, 11 July 2024

Staff and students pulled together over 20 demos and exhibits showcasing our research projects and technology. Some favourites with visitors were the NOVA Ball, VR Skiing, and a VR Flying Broomstick. We welcomed up to a few hundred guests to the lab.

Antarctic Research Season Opening

Participation in activities led by ChristchurchNZ and Antarctic treaty partners:

- Chris Buyarski attended a Korean Embassy invited presentation on energy and aerospace (26 September).
- Rob Lindeman with PhD students unveiled a new 360-degree video of Antarctica that he created with award winning NZ film maker, Anthony Powell. The general public engaged with the video using HIT Lab NZ headsets and assistance at Tūranga for the Days of Ice event (9-10 October).
- Prof Rob Lindeman hosted a visit from the US Embassy Leadership providing a tour of the Lab's research facilities (24 October)

Raranga Whāriki Papa Moana | Beneath the Waves Outreach Activities

The Beneath the Waves | Raranga Whāriki Papa Moana research programme is funded by a Ministry of Business, Innovation and Employment (MBIE) Endeavour Grant, under the lead of GNS Science.

- Kieron Wall (PhD student) and Prof. Ben Kennedy (SEE) **were interviewed on RNZ Afternoons program** about their research using board games to communicate with children about volcanic hazards and the research being undertaken by the Beneath the Waves project team.
- Kieron Wall's PhD research he is exploring game-based learning and the effects on school-aged children. In September HIT Lab NZ took delivery of a shipment of **500 5-Minute Volcano board games** designed by Kieron and begun their **distribution to schools around the country**.

- Assoc. Prof. Heide Lukosch, Kieron Wall and Prof. Ben Kennedy participated with the Raranga Whāriki Papa Moana | Beneath the Waves team to contribute to the design and delivery of a **three-day GeoCamp** with students from Te Kura o Te Pāroa in Whakatane. Fun and informative activities combined geological science with tikanga, and mātauranga korero. The first copy of the Kieron Wall's educational 5 Minute Volcano game was presented to and tested by the Acting Principal of Te Kura O Te Pāroa, Ramia Honatana.

Ko Taku Reo – Deaf Education, Christchurch

Co-design partners, Ko Taku Reo, who are collaborating with PhD researcher Zoë Hector, requested a visit to UC and the HIT Lab NZ for 12 of their Deaf and hard of hearing students. Visiting a university and learning about what happens there is an important stage in experiential learning for these students. It also contributes to developing an authentic and ethical research relationship between co-design partners. Zoë Hector gave the students a presentation and tour of lab encouraging lots of discussion and questions.

Christchurch Game Developers Association

Under the auspices of the TEC AIGI grant, HIT Lab NZ provided support for the following:

- **Monthly Meetups** - GameDev Christchurch organises monthly meetups to share knowledge and expertise, build connections, create conversations, share stories, and encourage community growth. Attended by HIT Lab NZ staff and students, these meetups provide an opportunity to network locally with the NZ Game Industry.
- **Canterbury Game Dev and Creative Tech Day** – HIT Lab NZ sponsored and co-organised this inaugural day-long event celebrating game development and creative tech in Canterbury. The event was hosted at the Enterprise Precinct and Innovation Campus (EPIC) with over 250 attendees on December 7, 2024.

Industry Engagement

HIT Lab NZ continues to foster strong relationships with industry. Throughout the year, we engaged with partners through guided tours of our facilities, exploratory meetings to identify areas of mutual interest, and invited guest speakers to our Weekly Lab Meetings. This year we connected with:

- Black Salt Games
- Dr Chandra Harrison, HIT Lab NZ Alum and Managing Director, Access Advisors
- Christchurch Game Developers Association
- Hamish Campbell, MP for Ilam
- Indian Institute of Technology Delhi (IITD)
- JIX Technology Studios
- Lincoln University Library
- Meta
- Nexefy
- Niantic Aotearoa NZ
- New Zealand Centre of Digital Excellence (CODE)
- New Zealand Game Developers Association (NZGDA)
- oVRcome
- PikPok
- Times Higher Education (THE)
- Umajin
- US Embassy
- US Naval Academy

These interactions play a vital role in maintaining an open and innovative research culture. They enhance our research impact and contribute to the advancement of cutting-edge human interface technologies.

We welcome enquiries from organisations interested in collaborating with us. Collaborations should align with the objectives and values of HIT Lab NZ and contribute positively to our research and educational mission.

Our preferred modes of engagement include:

1. Funding for collaborative research projects.
2. Consultancy agreements.
3. Direct scholarship support of PG students.
4. Charitable donations through the UC Foundation supporting HIT Lab NZ scholarships.

All engagements must be carefully scheduled to avoid disruption to our research and teaching activities.

For further information on how to collaborate with us, please contact our Centre Manager at info@hitlabnz.org.

Appendix I – UC Research Themes

As part of its strategic vision, the University of Canterbury has defined four broad areas of research focus.

1. Resilient Cities and Communities

UC researchers contribute to promoting resilience for communities, institutions, ecosystems, and governments by building capacity to reduce the short- and long-term consequences of disruptions in a manner that is just and sustainable.

2. Sustainable Futures

UC research addresses the science and policies of climate change mitigation and adaptation, environmental sustainability, and the involvement of stakeholders in developing long-term sustainable futures.

3. Living Well

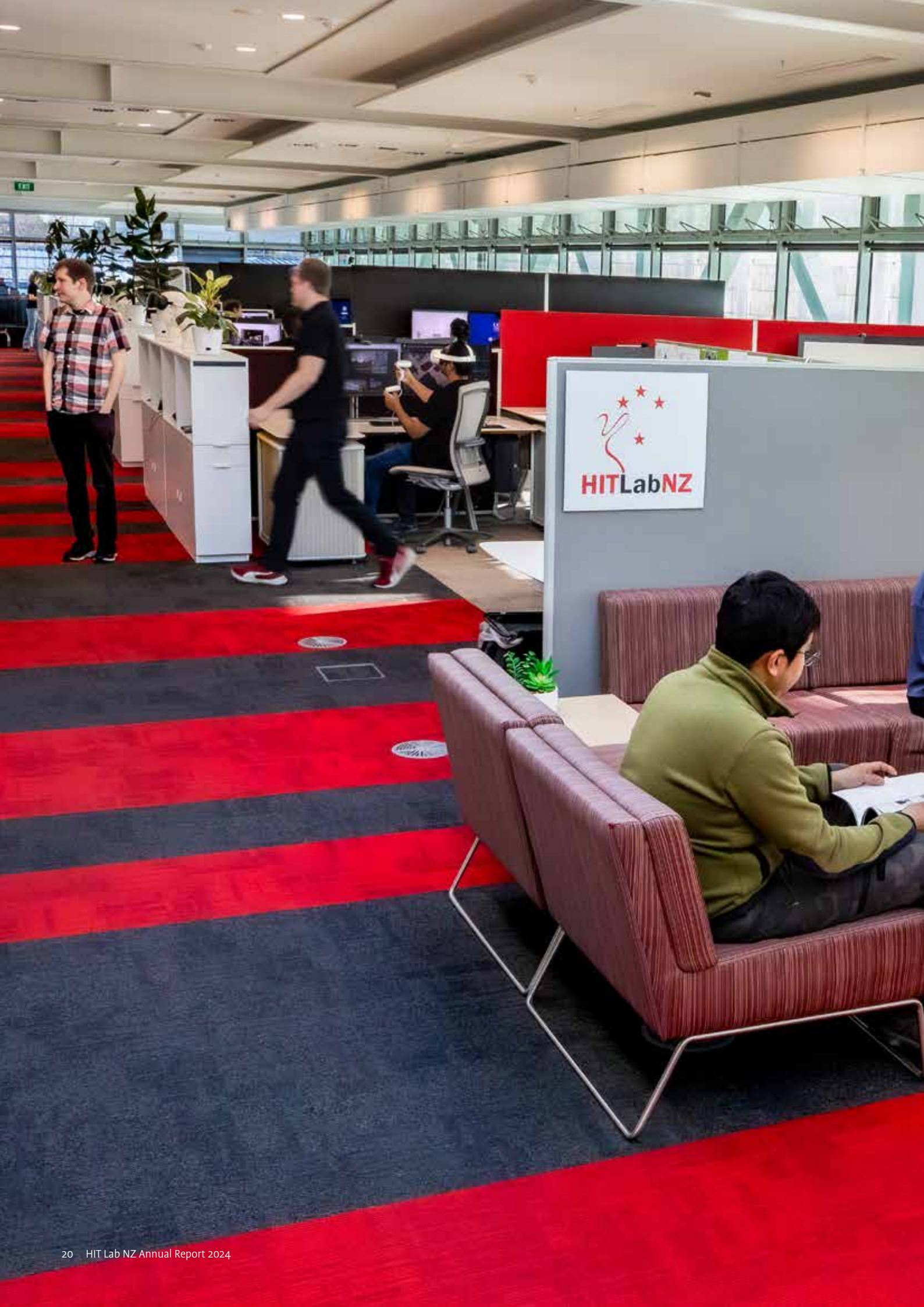
UC research includes a whole-of-life focus on the holistic state of physical, mental, and social well-being including strategies and interventions required to promote, protect, and restore public health and well-being.

4. Technology for Humanity

UC research includes the development of ethically aligned technology for economic, environmental, or societal innovation to transform and support human advancement.

The following table shows how HIT Lab NZ research conducted this year aligns with the UC Research Strategy themes.

Project Name	Resilient Cities and Communities	Sustainable Futures	Living Well	Technology for Humanity
Addressing Video Game Development Challenges Using Industry Best Practices	✓			
How Do We Balance User Privacy and User Experience in VR Mediated Experiences?	✓	✓	✓	
Using Virtual Reality Technology to Train New Zealand Firefighters for High-Risk and High-Cost Scenarios	✓	✓		✓
Exploring the Efficacy of Augmented Reality Games for Flood Preparedness and Response	✓	✓		
Realising Imagined Play: Transforming Everyday Objects into Virtual Tools for Augmented Reality Games, Using Participatory Design Methods				✓
Connecting Remote Places and Players with a Location-Based Augmented Reality Game Design			✓	✓
How Might We Co-Design and Evaluate a Game-Based Approach for Youth Social Anxiety?			✓	✓
Designing Learning Games about Volcanic Hazards for Primary Aged Children in a Bi-Cultural Environment	✓	✓		
Facilitating Earthquake Preparedness at an Individual Level Through Immersive Virtual Reality Gaming	✓	✓		
Exploring Multiple World Views for Marine Conservation Decision-Making	✓	✓		✓
Games Based Interventions to Improve Psycho-Social Wellbeing in Deaf and Hard of Hearing Youth			✓	✓
Multimodal User Interaction for Mitigating Fatigue to Sustain Long-Term Virtual Reality Usage			✓	✓
Attention And Distraction In Pedestrian Augmented Reality			✓	✓
Teaching And Training Physical Motion With Immersive Technology				✓
Leveraging Kaupapa Māori Principles In Human-Computer Interaction: A Social Justice Pathway			✓	✓
Immersive regenerative tourism experiences in Aotearoa	✓	✓	✓	✓
Human Augmentation For Rhythm Skill Acquisition In Elite Sport				✓
Enhancing whanaungatanga with infants through immersive VR: Case studies in early childhood education and healthcare			✓	✓
Improving Immersive Telecommunication by Increasing Comfort in Virtual Reality		✓	✓	✓
He karapitipitinga mariko: Immersive regenerative tourism experiences in Aotearoa	✓	✓	✓	✓
Impact of Augmented Reality on Movement and Spatial Navigation			✓	✓
Human Augmentation for Rhythm Skill Acquisition in Elite Sport				✓
Beneath the Waves – Raranga Whāriki Papa Moana	✓	✓		
Applied Immersive Gaming Initiative (AIGI)	✓	✓	✓	✓
VR Baby Training Tool (VRBTT)			✓	✓
Ātea – Ending With Impact Project: Virtual / Immersive Wānanga	✓	✓	✓	
Ātea – Building an Immersive Tour Creator for Tangata Whenua		✓		
Ātea – Early Career Researcher Bolt-on Project: Matariki Hunga nui Mixed Reality Experience			✓	✓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HITLabNZ
Human Interface Technology Lab New Zealand
Hangarau Tangata, Tangata Hangarau

Contact Us

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info@hitlabnz.org

https://www.canterbury.ac.nz/research/about-uc-research/research-groups-and-centres/human-interface-technology-lab-nz

https://www.hitlabnz.org/

Support Our Researchers

UC research has a positive impact on society in Aotearoa New Zealand. Your gift to this Fund will support scholarships and research.

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